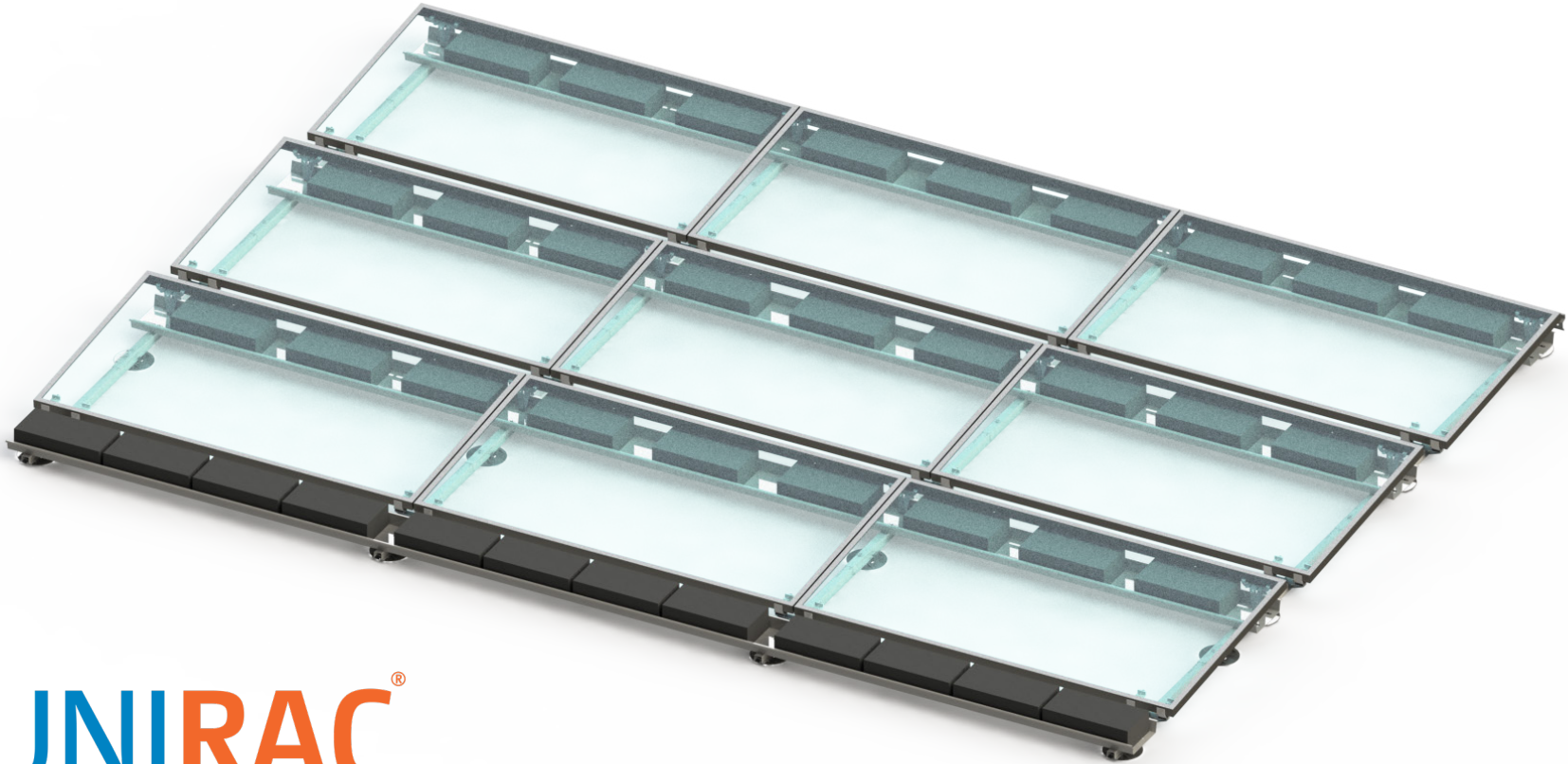




# INSTALLATION GUIDE



## UNIRAC Code-Compliant Installation Manual

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# INSTALLATION GUIDE

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## TECHNICAL SPECIFICATIONS:

Material Types: A380 cast aluminum and mill finish extruded aluminum

(6005A-T61 or 6061-T6), G180 steel, Galvalume, PC/ASA

Maximum System Voltage: 1500V

Maximum Module Width: 44.65"

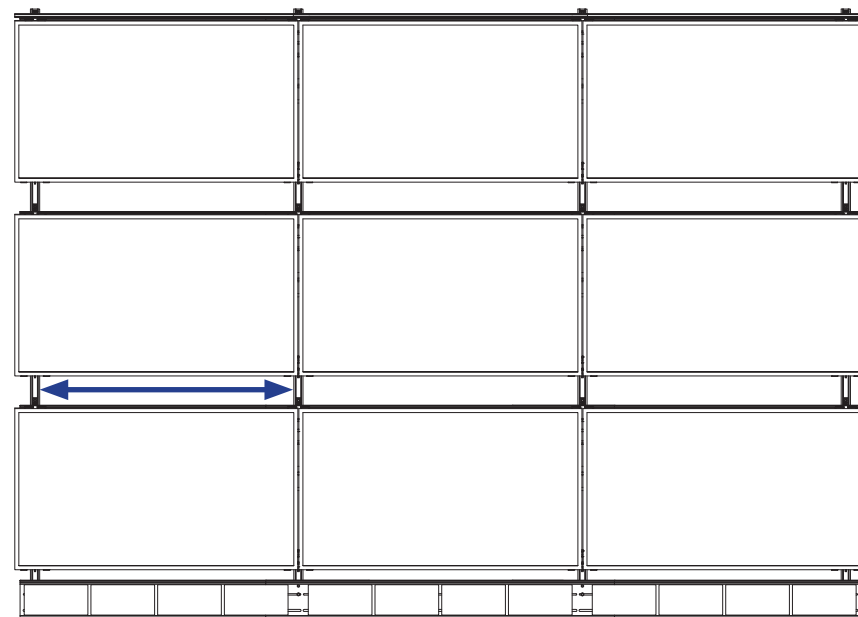
Hardware: Stainless steel

Bonding and Grounding: UL2703 Listed Continuous Bonding Path

## TOOLS REQUIRED OR RECOMMEND FOR LAYOUT, ATTACHMENTS, AND INSTALLATION:

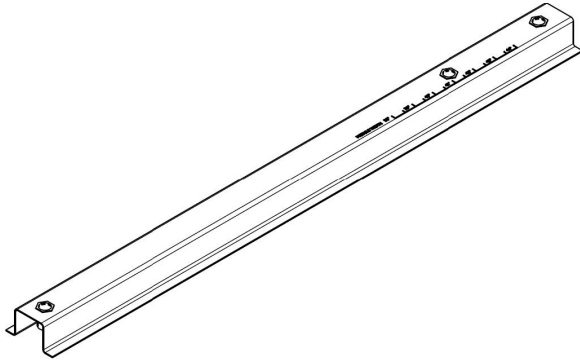
- Drill (Do Not Use an Impact Driver)
- 1/2" Socket
- Torque Wrench
- Tape Measure
- Chalk Reel
- Optional Spacers

All applicable OSHA safety guidelines should be observed when working on a PV installation job site. The installation and handling of PV solar modules, electrical installation and PV racking systems involves handling components with potentially sharp metal edges. Rules regarding the use of gloves and other personal protective equipment should be observed.



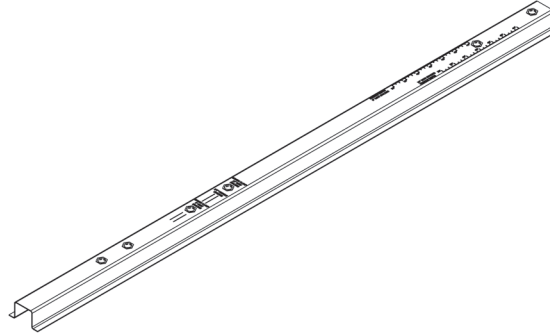
OPTIONAL COLUMN SPACER: 

Rail center to center = Module Length + 1/4"

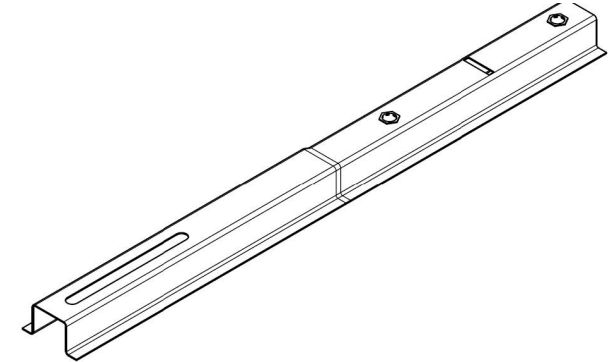


## **SOUTH RAIL (P/N:360030)**

The rail is made of Galvalume steel, pre-assembled with 5/16" SS Riv-Hex nuts. Module width scale is marked on rail, for overlap alignment.

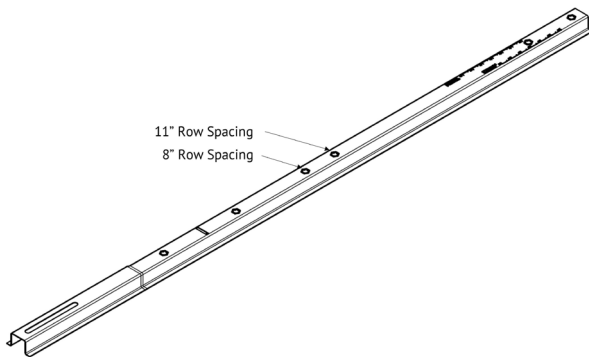


**SOUTH RAIL EXTENDED (360032):** The rail is made of Galvalume steel, pre-assembled with 5/16" SS Riv-Hex nuts. Module width scale is marked on rail, for overlap alignment.



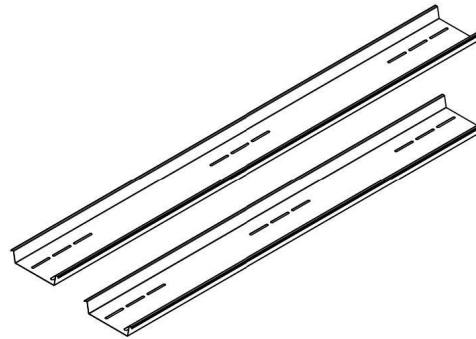
## **NORTH RAIL (P/N: 360010)**

The rail is made of Galvalume, pre-assembled with 5/16" Riv-Hex nut, SS. This rail is bulged at one end for overlapping rail connection.



## **MID RAIL (P/N: 360020)**

The rail is made of Galvalume, pre-assembled with 5/16" Riv-Hex nuts, SS. This rail is bulged at one end for overlapping rail connection.

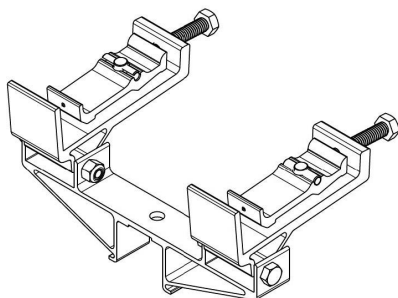


## **BALLAST TRAY (P/N: 360071/360081/360101/360120)**

Ballast Trays made of G180 galvanized steel hold standard ballast blocks. Multiple lengths are available to accommodate different module lengths.

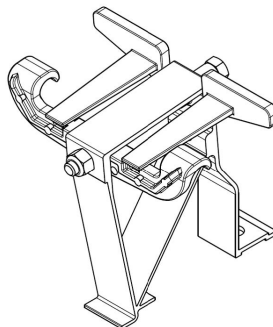
**MID RAIL & SOUTH RAIL EXTENDED NOTE:**  
Rails have a provision to adjust the row to row spacing (8" or 11"). Two module width scales each corresponding 8" and 11" row spacing are printed on rail, so that rails are overlapped to achieve accurate module width connection.

**BALLAST TRAY NOTE:**  
Ballast tray can fit up to 4 standard 4"x8"x16" solid concrete cap blocks.  
Block weight can range from 26lbs – 38lbs. The weight of the block will have a major impact on how many will be required for the project so be sure to verify your block weights before using the U-builder online tool.



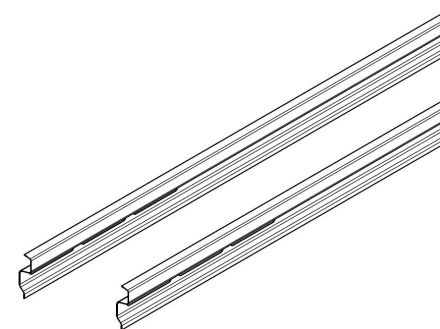
## **SOUTH CLAMP (P/N: 360050)**

The south stanchion assembly is made of a mill finish Aluminum and engages the return flange underneath the panel to secure and electrically bond the module. This unique design attaches to the return flange and outside of the module frame creating a universal connection.



## **NORTH CLAMP (P/N: 360042/360043)**

The north stanchion assembly is made of a mill finish Aluminum and engages the return flange underneath the panel to secure the module. This unique design takes advantage of the design of the module frame, attaching to the return flange of the frame creating a universal connection.

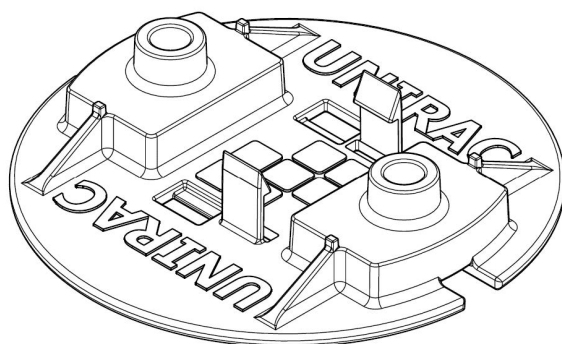


## **WIND DEFLECTORS**

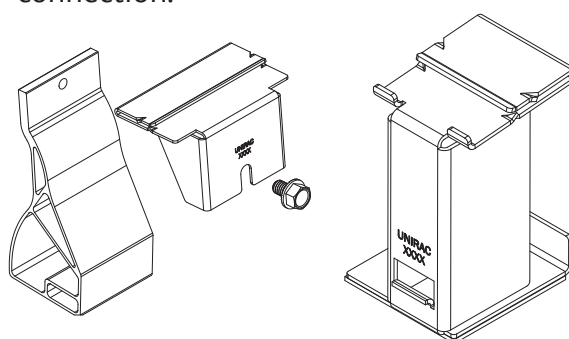
**(P/N: 360100/360090/360102/ 360110)**

Wind deflectors are made of G180. Multiple lengths are available to accommodate different module lengths

**IMPORTANT: WIND DEFLECTORS ARE REQUIRED ON NORTH EDGES OF ARRAYS TO MAINTAIN CLASS A FIRE RATING.**



**ROOF PAD (P/N: 360060 )** The Roof Pad provides a protective interface between the Rails and roofing material to protect the roof membrane.



## **MID-SUPPORTS (P/N: 360200)**

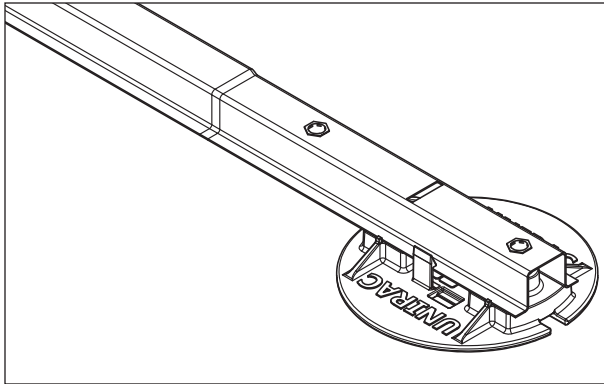
Mid-Supports are made of Galvalume steel, electrically bond to the module frame, and provide additional downforce support for large modules as well as heavy wind and snow loads.

## **HARDWARE:**

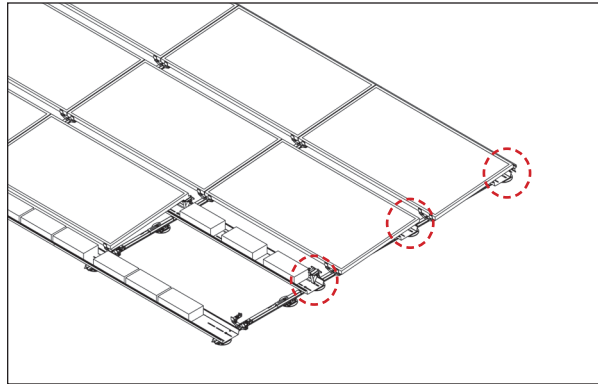
- 1.** 5/16-18" X 1.25" Hex Head Bolt
- 2a.** 5/16" Flat Washer 0.75" O.D.
- 2b.** 5/16" Flat Washer, 1" OD, .125 thk.

**P/N means Part Number**

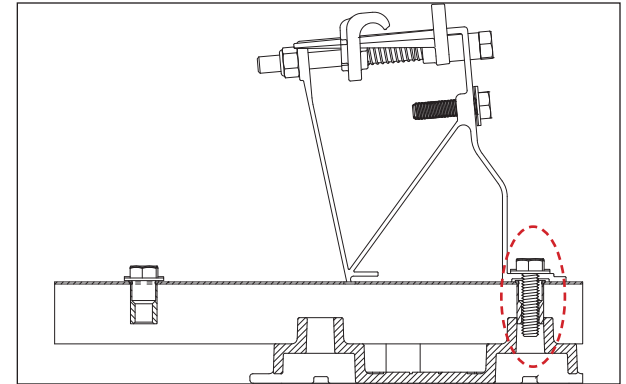
## INSTALL ROOF PADS ON RAILS AT NORTH STANCHION



Snap Roof Pad onto rails



Install a Roof Pad under every North Stanchion.

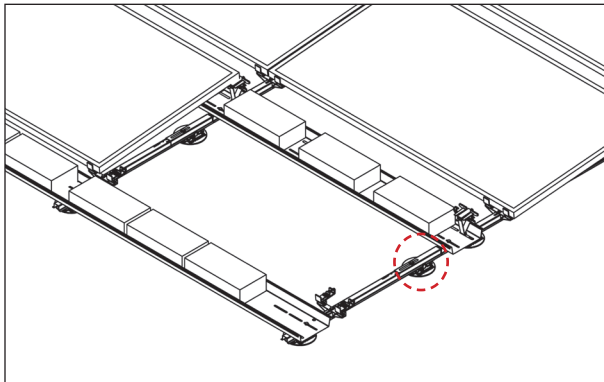


Ensure the stanchion bolt above each roof pad goes into the protruding boss in the roof pad.

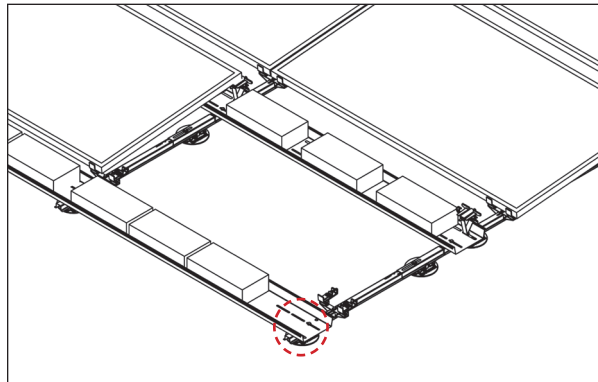
## AT SOUTH EDGE OF AN ARRAY

Install a Roof Pad at each of these two locations:

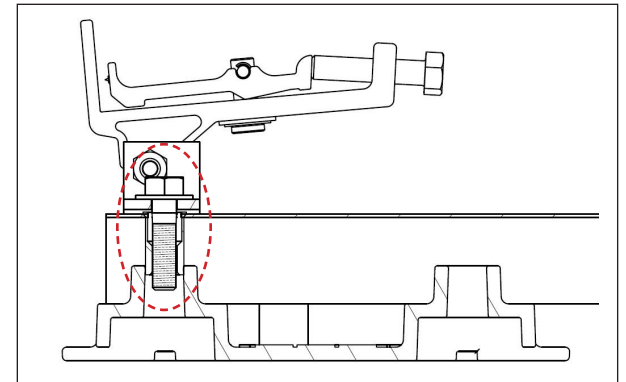
1. Under the South Rail to Mid Rail Joint
2. Under the Ballast Tray or Attachment Strut.



*Under the South Rail to Mid Rail Joint*



*Under the Ballast Tray*

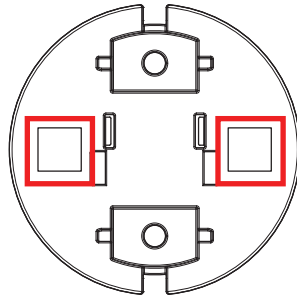


Ensure each bolt passing through the South Rail at both locations mentioned above goes into the protruding boss in the roof pad.

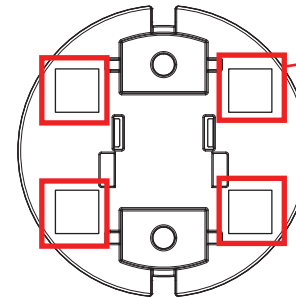


## ROOF PAD PROVISION FOR GRAVEL AND MINERAL CAP SHEET ROOFS

Systems installed on gravel or MCS roofs require Santoprene stickers be added to the Roof Pads. two for gravel and four for MCS as shown below.

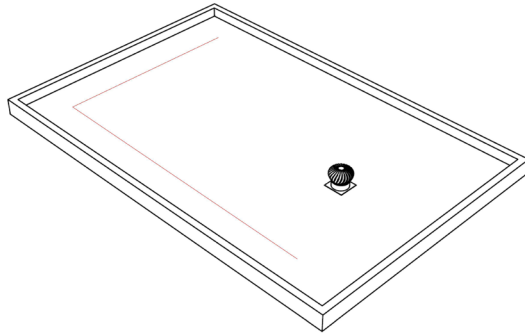


2 Stickers for Gravel

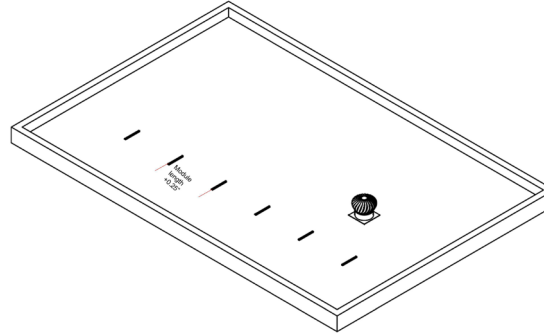


Santoprene stickers

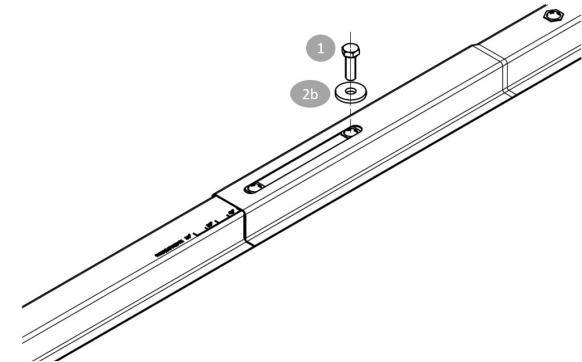
4 Stickers for Mineral Cap Sheet



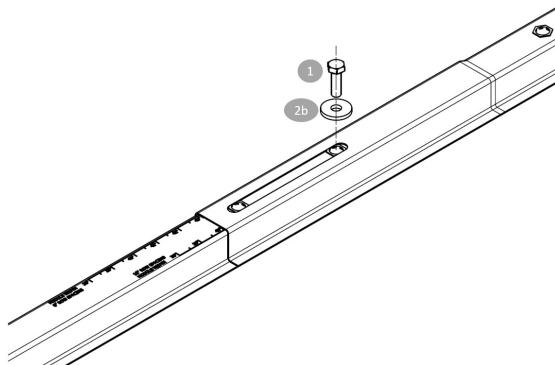
**MARK ROOF WHERE ARRAY WILL START:** Use chalk line to mark distances from roof edge as called out in construction documents.



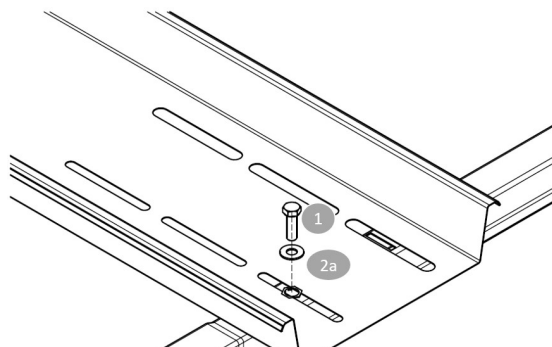
**LOCATE ARRAY ON ROOF:** Align South Rails with previous chalk lines. Rail Spacing center to center = Module Length + .25". East and west side rails may be tucked in, under the module.



**ATTACH SOUTH RAIL TO MID RAIL:** Overlap Mid-Rails on top of South Rails, use the measurement scale printed (8" or 11" row spacing) on the rail (Extended South Rail) to determine the overlap length. Match the value on scale to the module width. Insert hex bolt with 1" OD washer into riv-nut.



**ATTACH MID-RAIL TO MID-RAIL/ MID-RAIL TO NORTH-RAIL :** Overlap next Rail bulge on top of Rail laid on roof, use the measurement scale (8" or 11" row spacing) printed on the rail to determine the overlap length. Match the value on scale to the module width. Insert hex bolt into riv-nut through a 1" OD washer  
**TORQUE VALUE – 10 FT-LBS**



**LAY BALLAST TRAY AT NORTH STANCHION:** With rails spaced apart the module length + .25", align the slots in the Ballast Tray with the holes on the Base Rail. Secure the Ballast Tray south direction with a hex head bolt with 0.75" OD washer and screw in the riv-nut

**TORQUE VALUE – 10 FT-LBS**

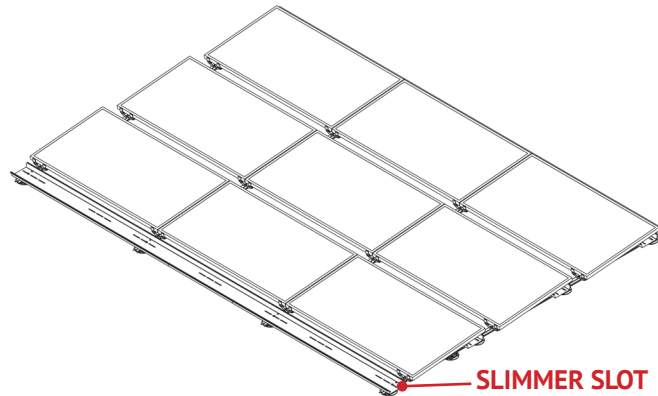
Refer to **page 11** for strut installation at North Stanchion

**FOR HARDWARE CALL OUTS REFER TO PAGE 3**  
**TORQUE VALUE – 10 FT-LBS**

**IMPORTANT:**  
**TO MEET THE SYSTEM'S MECHANICAL DESIGN LOAD RATINGS, THE MAXIMUM CANTILEVER FROM THE EDGE OF A MODULE TO THE CENTER OF A TUCKED STANCHION CLAMP IS 8"**



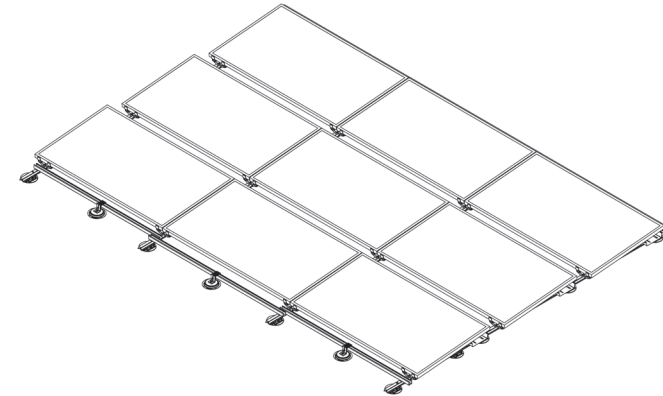
LAY BALLAST TRAY OR ATTACHMENT STRUT ON THE SOUTH RAIL:



#### BALLAST TRAY AT SOUTH RAIL

- Lay the Ballast Tray on South Rails such that the slimmer slots on the Ballast Trays need to be on the North side.
- Secure the Ballast Tray with a hex head bolt and 0.75" OD washer into the south-most riv nut.

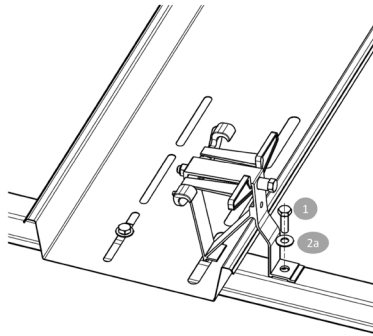
**TORQUE VALUE – 10 FT-LBS**



#### ATTACHMENT STRUT AT SOUTH RAIL

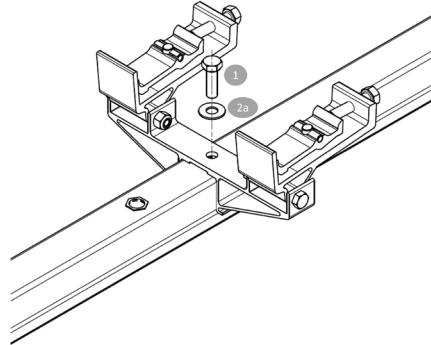
- Lay the attachment strut on any of the two available riv nuts located at the south side of the South Rail.
- Secure the attachment strut into the riv nut with a hex head bolt with 1" OD washer.
- On the next attachment strut, utilize the other available riv nut to stagger the struts and attachments.

**TORQUE VALUE – 10 FT-LBS**



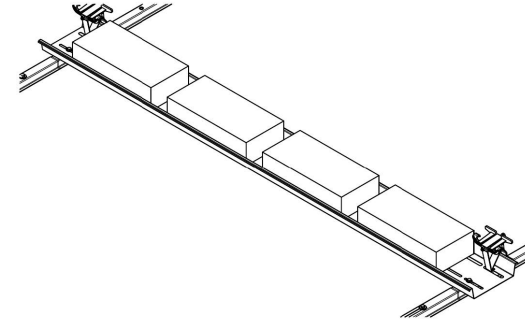
**ATTACH NORTH STANCHION:** Insert the front tab of the North Stanchion into the slot of the base rail and together. Secure with a hex head bolt with .75" OD washer through the rear hole into the riv-nut

For hardware call outs refer to [page 3](#)  
**TORQUE VALUE – 10 FT-LBS**



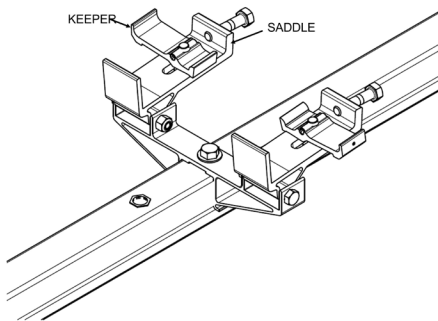
**ATTACH SOUTH STANCHION:** Depending on the row to row spacing (8in or 11in), place the south stanchion over the hole provided on the base rail and secure with a hex head bolt with .75" OD washer in to the riv-nut.

FOR HARDWARE CALL OUTS REFER TO [PAGE 3](#)  
**TORQUE VALUE – 10 FT-LBS**

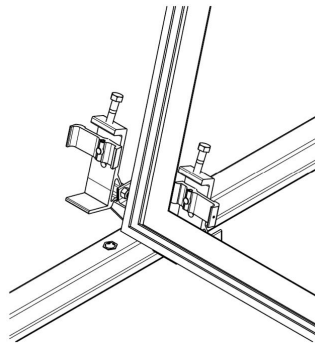


**LAY BALLAST BLOCKS:** Lay ballast blocks into ballast trays. Quantity of blocks to be placed should be as per appropriate engineering and U-Builder.

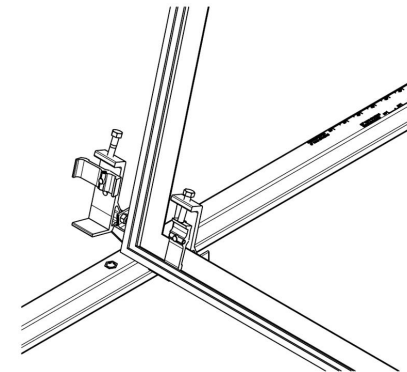
Refer to [page 11](#) for instructions to install the strut attachment.



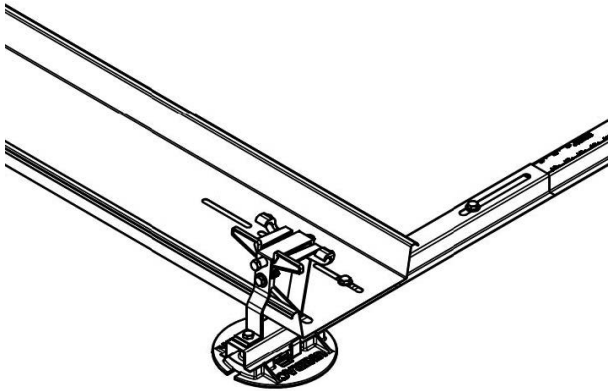
**MODULE CONNECTION, STEP 1:** Rotate the keeper perpendicular to saddle and pull it completely towards the hex bolt.



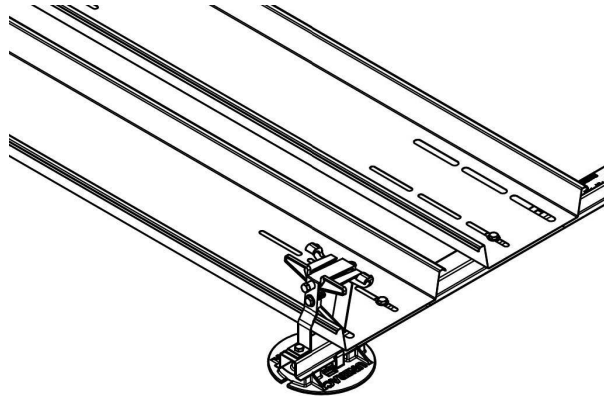
**MODULE CONNECTION, STEP 2:** Now keep the south clamp at 75 deg, and place one end of module into the clamp.



**MODULE CONNECTION, STEP 3:** Now rotate the keeper towards the module and tighten the hexagonal bolt such that the keeper touches the wall of vertical return flange.

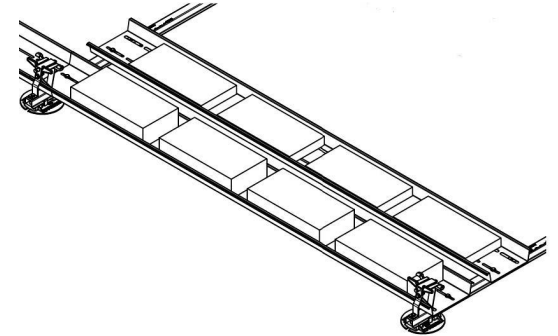


**HIGHER BALLAST REQUIREMENT:** An additional Ballast Tray can be installed in the connection between North rail to Mid rail /Mid rail to Mid rail to support for higher uplift. The Additional Ballast tray can only fit half blocks.

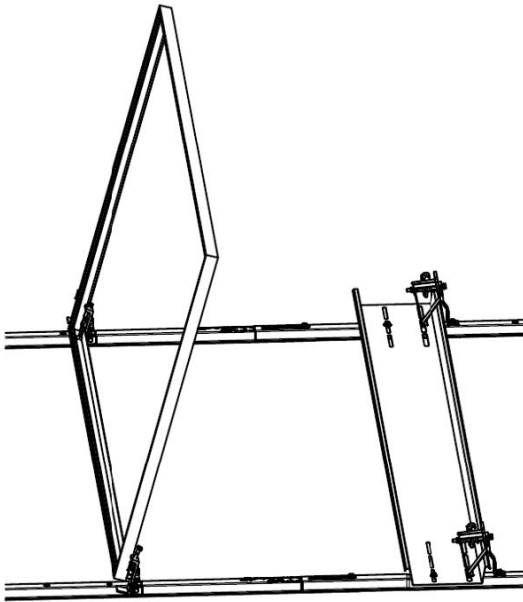


Align the smaller slots in Ballast Tray with the hole used for the rail overlap connection. Secure the ballast tray using the hex bolt and 1" OD washer provided for the rail overlap connection.

**TORQUE VALUE: 10 FT-LBS**



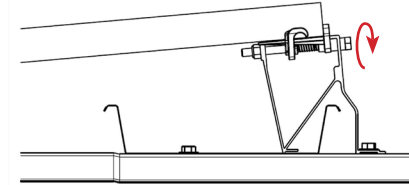
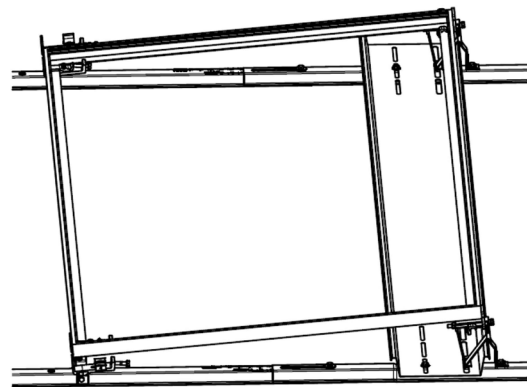
Place up to 4 half ballast blocks as needed.



#### MODULE CONNECTION, STEP 4:

Tightening the South Stanchion bolts and rotate the module down to rest on the North Stanchion as shown.

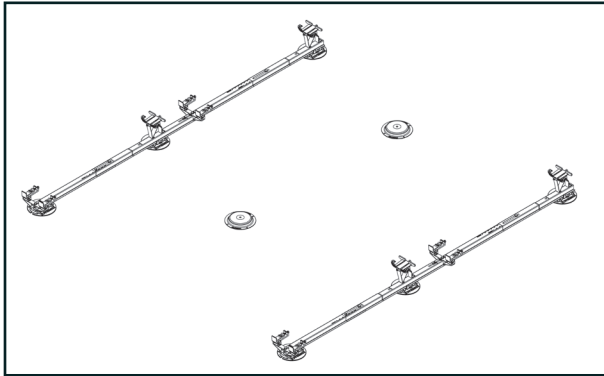
**SOUTH STANCHION CLAMP TORQUE**  
**VALUE – 8 FT-LBS**



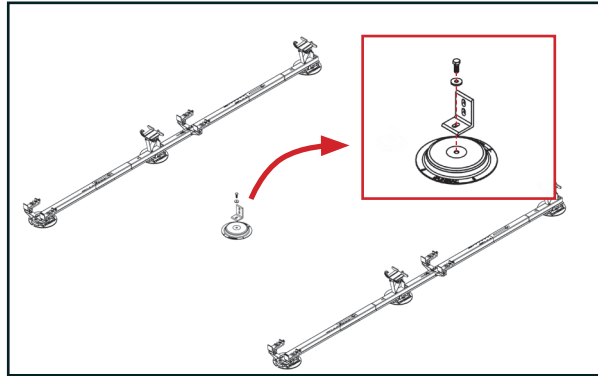
**MODULE CONNECTION, STEP 5:** Rest the north end of the module on the North Stanchion Clamp. Install the adjacent module and tighten the hexagonal bolt so the clamp engages the return flange of both modules firmly.

**NORTH STANCHION CLAMP TORQUE**  
**VALUE – 2 FT-LBS**

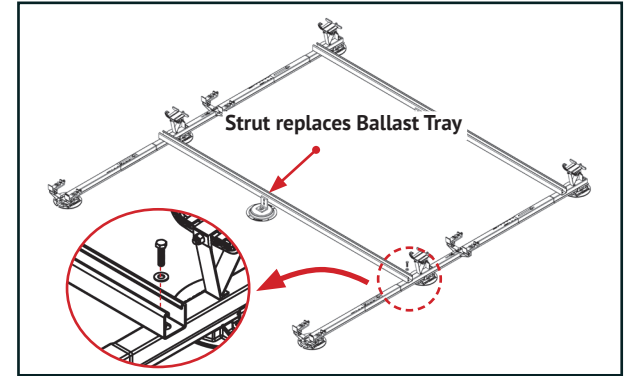
## INSTALLATION OF FLASHLOC RM ATTACHMENT AND UNISTRUT



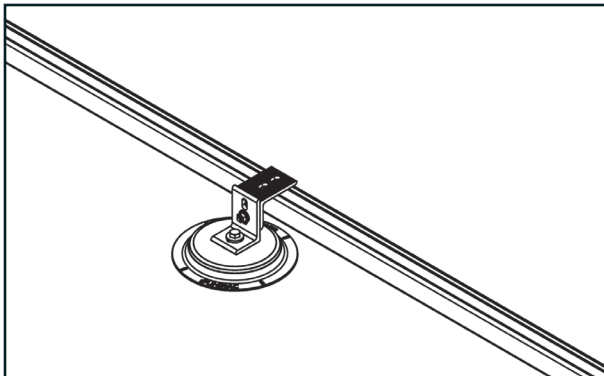
**STEP 1:** Position Flashloc RM attachment as per construction drawings and install according to Flashloc RM installation guide



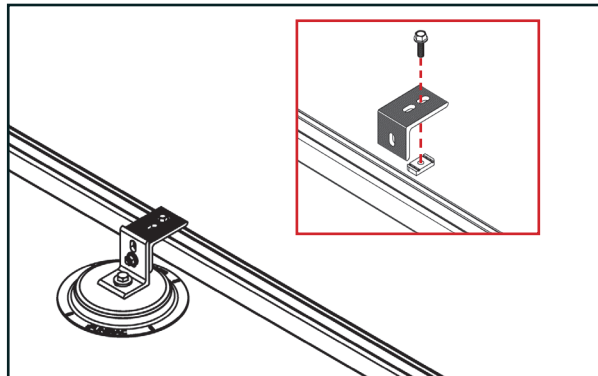
**STEP 2:** Place the L-foot on the Flashloc RM and secure it with a 1" 3/18-16 bolt and 1" OD washer.  
**Torque the bolt to 30 ft-lbs.**



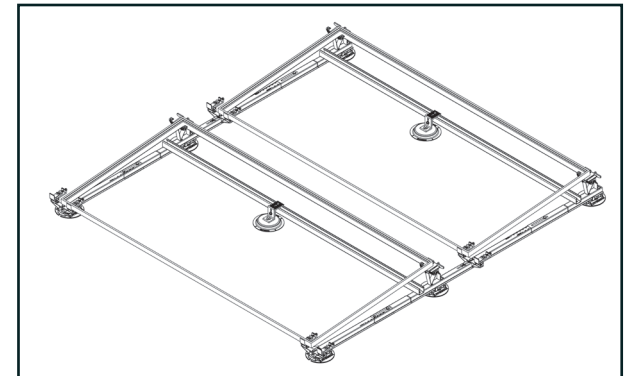
**STEP 3:** Position the unistrut to match the holes on the rail and attach it on both sides using a 1.25" 5-16 bolt and a 5/16" plain washer.  
**Torque the bolt to 30 ft-lbs.**



**STEP 4:** Secure second L-foot to first L-foot as shown in figure using a 1" 5/16-18 Hex flange bolt and 5/16-18 Hex flange nut.  
**Torque the bolt to 30 ft-lbs.**

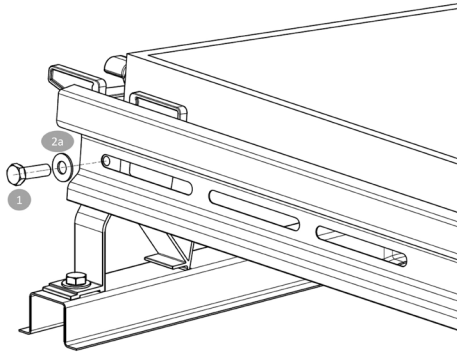


**STEP 5:** Insert strut nut into the strut and secure it to Flashloc RM using a 1" 5/16-18 Hex flange bolt.  
**Torque the bolt to 30 ft-lbs.**

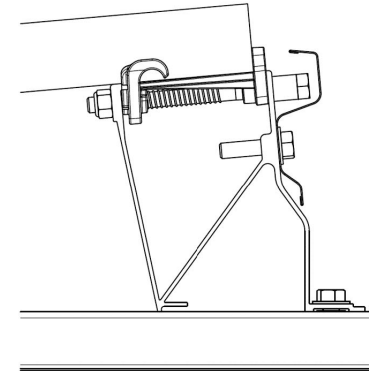


**STEP 6:** Place modules and secure them to the system as described on page 8.

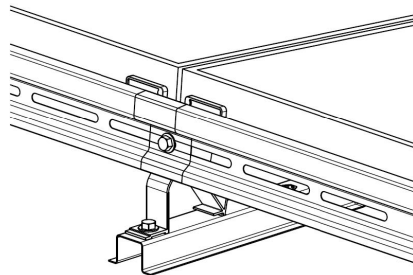
## INSTALLATION OF OPTIONAL WIND DEFLECTOR



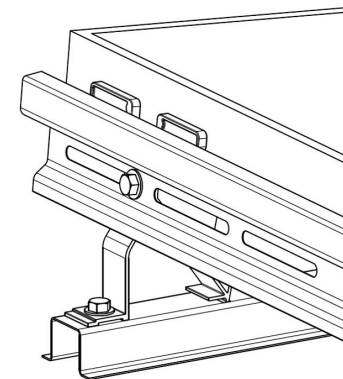
**INSTALL WIND DEFLECTOR:** Thread the bolts through the included 0.75" OD washer, then wind deflector, and into the threaded hole provided in north stanchion.



**TIGHTEN BOLTS TO TORQUE:**  
 Narrow side of the deflector will be on the bottom.  
**TORQUE VALUE: 6-8 FT-LBS**



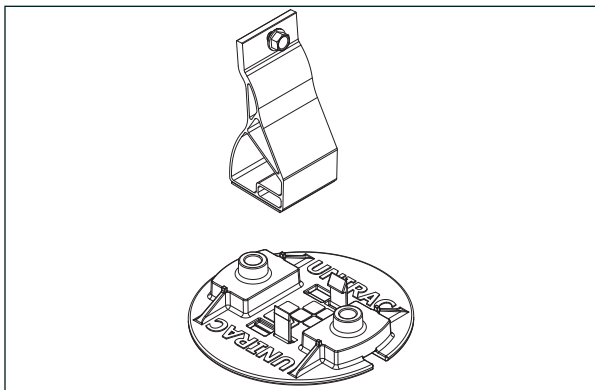
**NOTE:** Wind deflectors will overlap where modules meet.



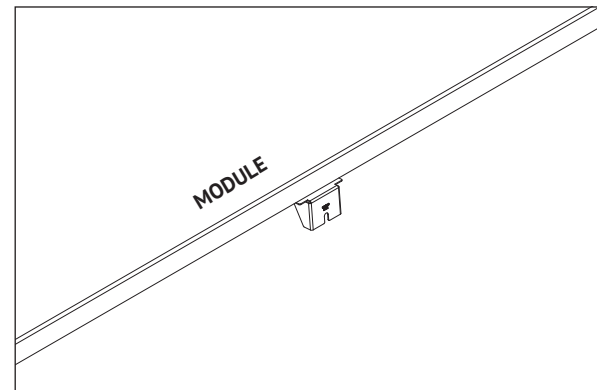
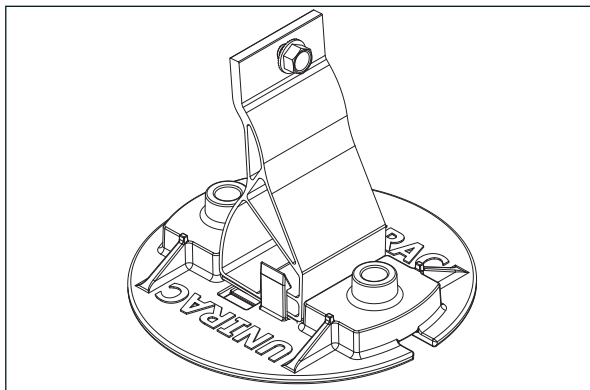
**NOTE:** For perimeter modules, align outside edge of wind deflectors with the exposed edge of module.



## INSTALLATION OF NORTH MID-SUPPORT WITH ROOF PAD

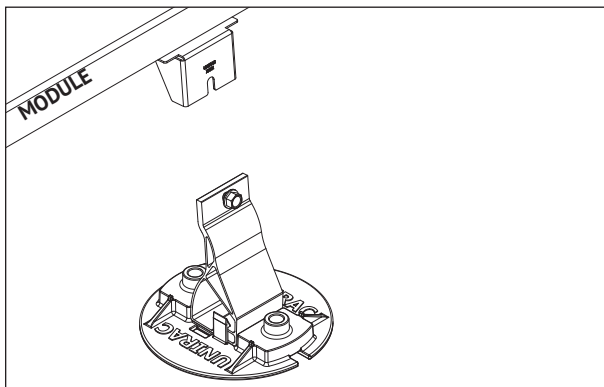


**STEP 1:** To install the north mid-support base into the roof pad, place the north mid-support on the roof pad and press it. Ensure proper orientation such that the box of the mid-support base aligns with and clicks into the roof pad tabs.

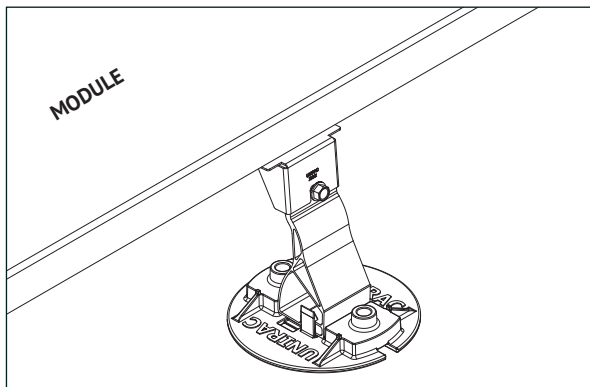


**STEP 2:** Using the PV module cell lines, locate the module center point (+/- 1") and attach north top to module flange and pull until fully engaged.

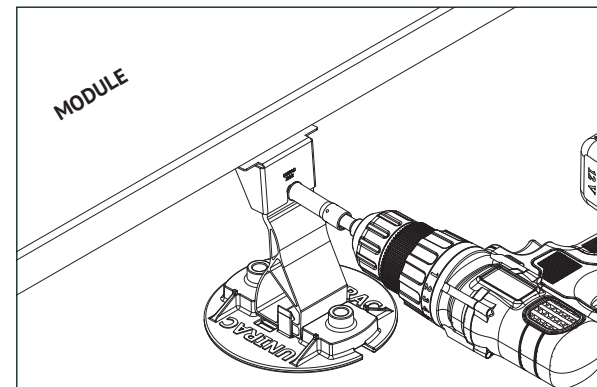
**NOTE:** It is recommended that the part is pulled from the clamping portion rather than the slotted face of the part to prevent bending.



**STEP 3:** Lift the north side of the module and slide the base or roof pad assembly into place



**STEP 4:** Align the bolt with the slot in the mid-support top, then lower the module to rest on the north stanchions.

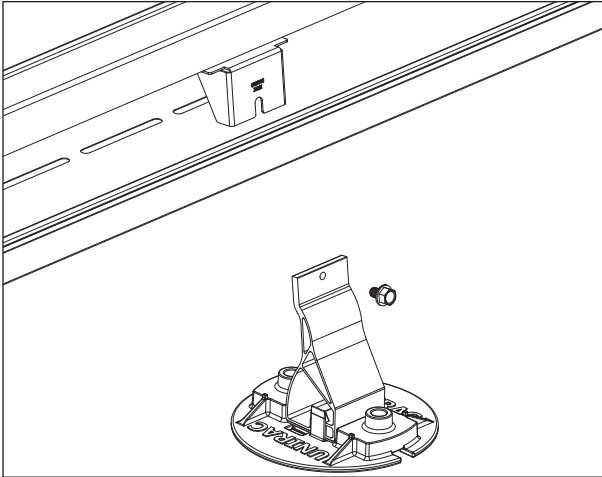


**STEP 5:** Torque the bolt to **10 ft-lbs.**

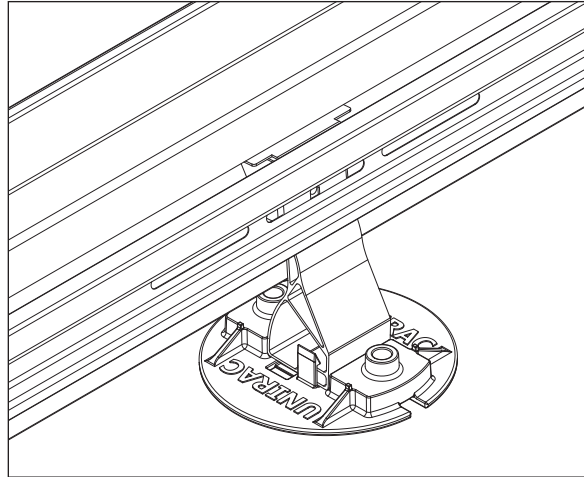
**NOTE:**

Similarly, we can install the North mid-support without the roof pad by following the step 2 to step5.

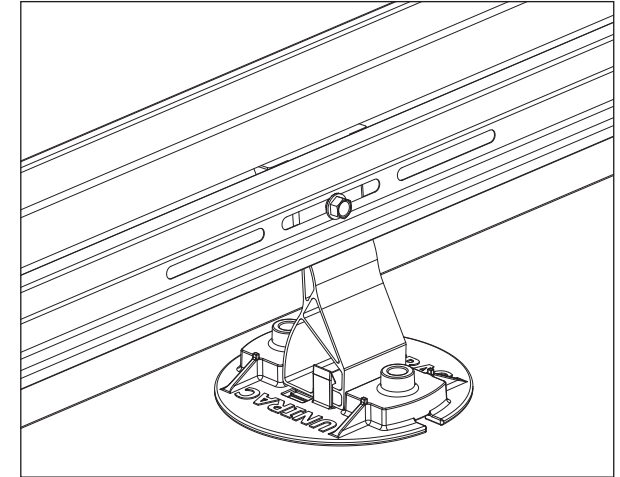
## INSTALLATION OF WIND DEFLECTOR TO NORTH MID-SUPPORT



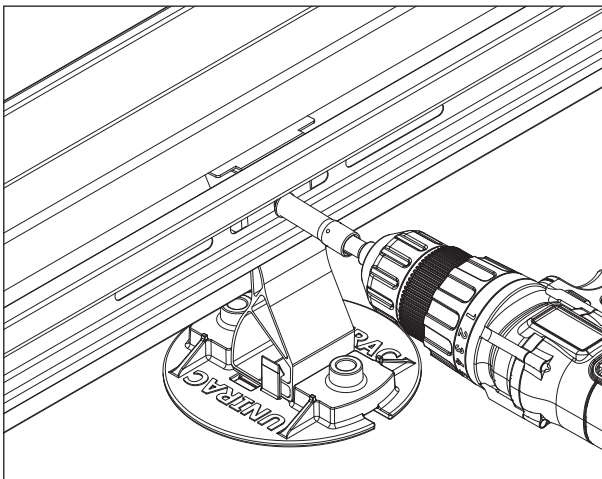
**STEP 1:**  
Remove the bolt from the mid-support base. Attach the wind deflector as per the instructions shown on page 5.



**STEP 2:**  
Align the hole in the mid-support base with the wind deflector slot and the mid-support top slot.



**STEP 3:**  
Thread the bolt through the wind deflector and mid-support top, into the mid-support base.

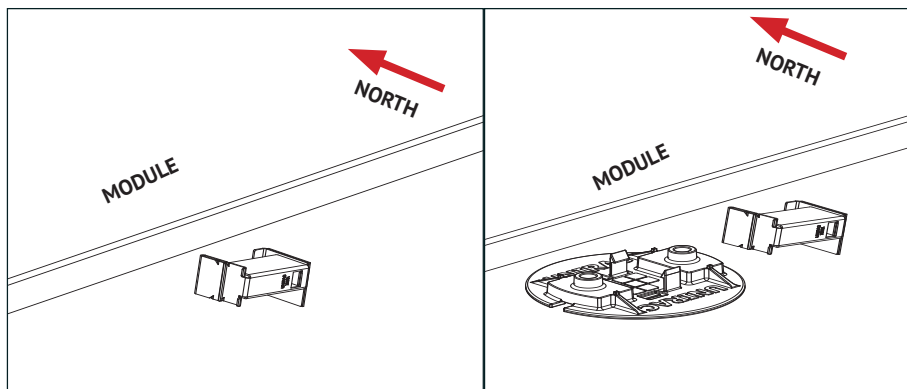


**STEP 4:**  
Torque the bolt to **10 ft-lbs.**

**NOTE:**

A roof pad is required when attaching the wind deflector to the mid-support on the north row. It is also acceptable to opt not to attach a deflector to the mid-support. In this case, a roof pad is not required.

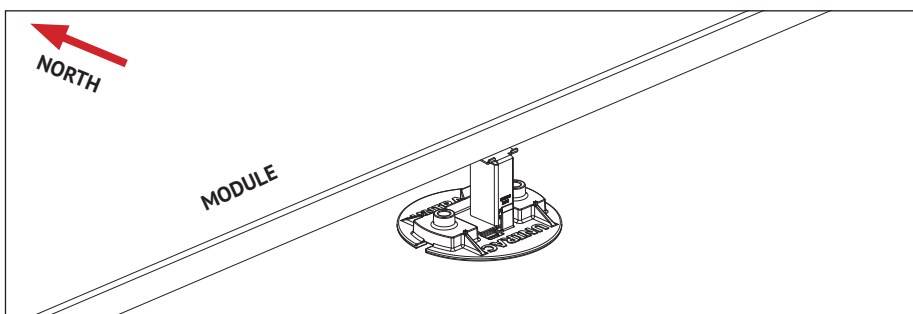
## INSTALLATION OF SOUTH MID-SUPPORT WITH ROOF PAD



**STEP 1:** To install the south mid-support, rotate it horizontally as shown in the figure and insert it under the module's south side. Now insert the roof pad under the module separately.

### CAUTION

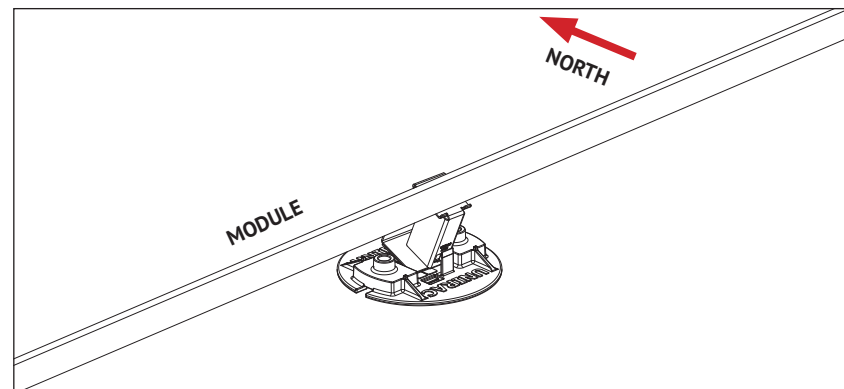
While inserting the south mid-support, make sure not to scrape the roof surface with the metal edge.



**STEP 3:** Pull the mid-support onto the module flange. Ensure the mid-support is fully engaged. The mid-support will sit 0.25" off of the roof surface.

### NOTE:

Similarly, we can install the south mid-support without the roof pad by following the above steps.

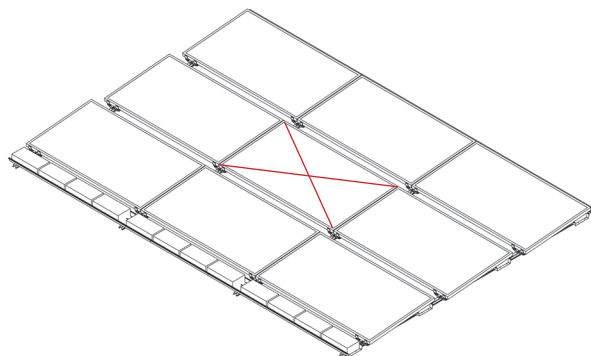


**STEP 2:** Using the PV module cell lines, locate the module centre point (+/- 1"). Rotate back mid-support to vertical position. Install the mid-support on the roof pad under the module.

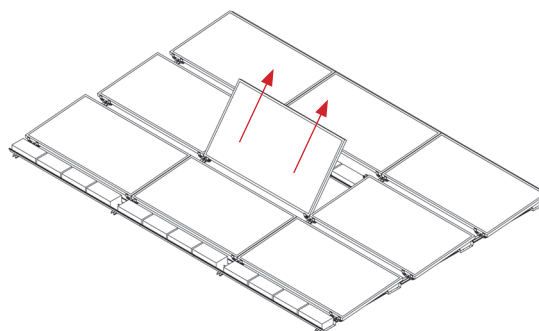
**NOTE:** Installing the mid-support on the roof pad is a blind operation, but the click of the roof pad tabs is a positive indicator that the mid-support is installed correctly.

### CAUTION

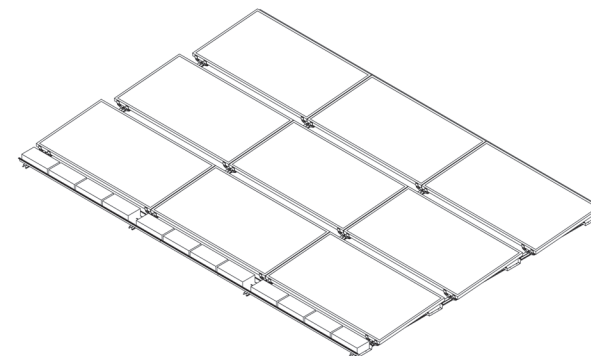
While rotating the south mid-support, make sure not to scrape the roof surface with the metal edge.



**STEP 1:** Locate the module to be replaced. Loosen the hexagonal bolt in both the north stanchions to which the module is connected.



**STEP 2:** Now lift the module from north edge and rotate it 75deg towards south. Loosen the bolt in the south stanchion and rotate the keeper 90deg.



**STEP 3:** Remove the module and place the new module by following module attaching steps from page 5 and 6.

**IMPORTANT:**

Unirac recommends periodic re-inspection of the installation for loose components, loose fasteners, and any corrosion, such that if found, the affected components are to be immediately re-tightened replaced.

**GROUNDING LUG MOUNTING DETAILS AS REQUIRED BY CODE & ENGINEER OF RECORD:** The Ilsco lug has a green colored set screw for grounding indication purposes. One lug is recommended per continuous array, not to exceed 150ft X 150ft. Unirac GridFlex™ is intended to be used with PV modules that have a system voltage less than or equal to that allowable by the National Electric Code (NEC). It is the installer's responsibility to check adherence to local codes.

**NOTE: The installation must be conducted in accordance with the National Electric Code ANSI / NFPA 70.**

GROUND LUG	BOLT SIZE	TORQUE VALUE
Ilsco Lug SGB-4	1/4" - 20	6.5ft-lbs (75 in-lbs)
Ilsco Lug GBL-4	#10 - 32	2.9ft-lbs (35 in-lbs)
Wiley 6.7	1/4" - 20	10ft-lbs (120 in-lbs)

**NOTE: In order to prevent corrosion induced by dissimilar metals, it is important to verify that the bare copper wire does not come into contact with aluminum or galvanized steel. These metals must be kept separate.**

Although conformance with UL2703 was demonstrated without the use of oxide inhibitor material, it is recommended by Ilsco to provide an optimized bonding solution for their lay-in-lug.

Ilsco SGB-4 Solar Grounding & Bonding



#### TERMINAL TORQUE:

Install conductor and torque to the following: **4-14 AWG: 35 in-lbs**

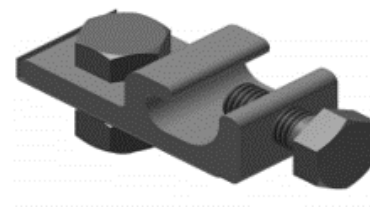
Ilsco GBL-4 Solar Grounding & Bonding



#### TERMINAL TORQUE:

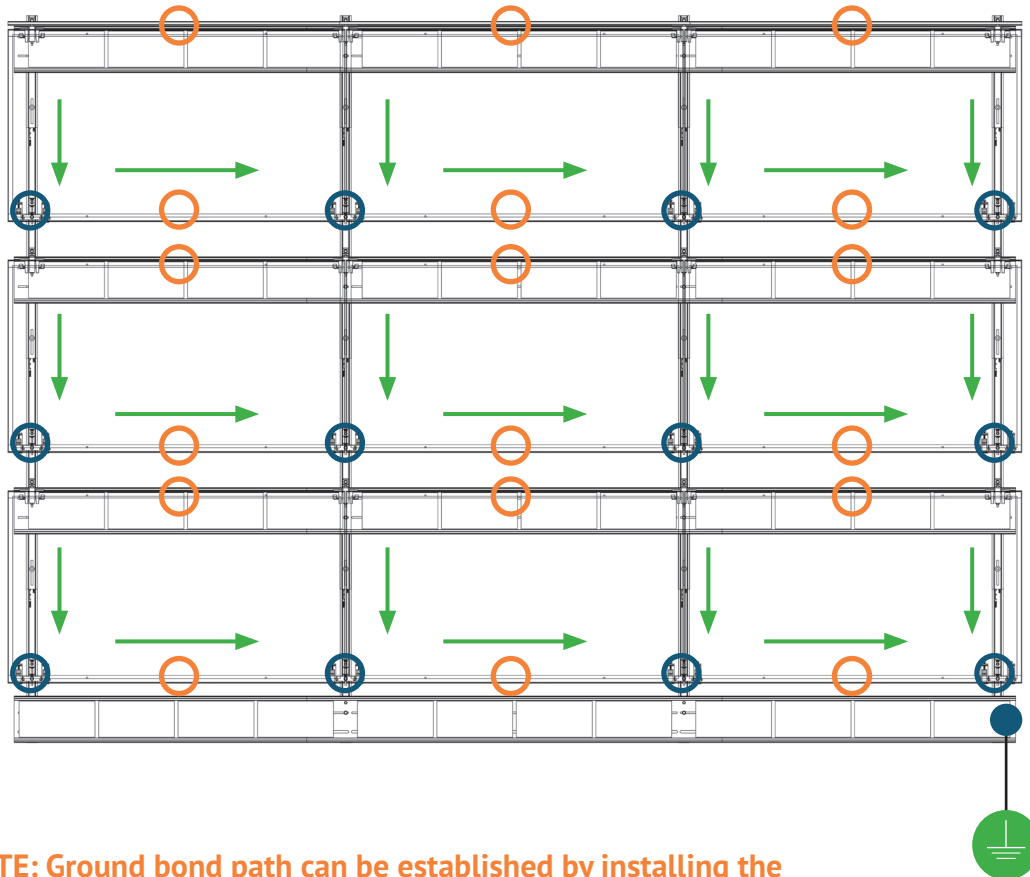
Install conductor and torque to the following: **4-6 AWG: 35 in-lbs, 8 AWG: 25 in-lbs**

Wiley WEWB-Lug 6.7 Solar Grounding & Bonding







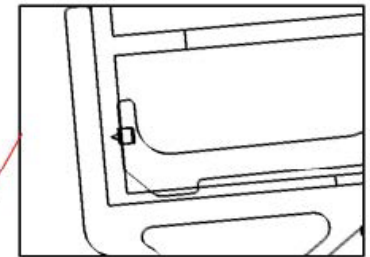
#### TERMINAL TORQUE:

Install conductor and torque to the following: **4-6 AWG: 10 ft-lbs, 6-14 AWG: 7 ft-lbs**

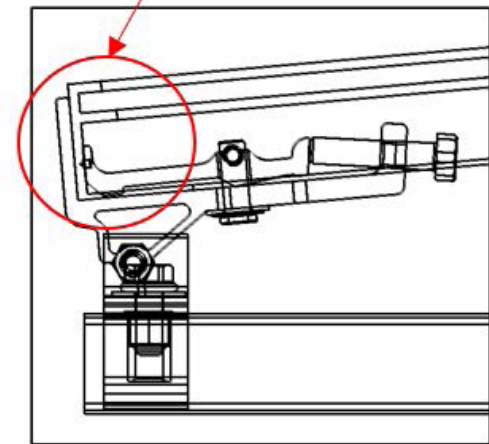


**NOTE:** Ground bond path can be established by installing the ground lug and copper wire connection to either the South Stanchion, North Stanchion, Rail, Wind Deflector, or Ballast Tray

-  Optional Bonded Mid-Supports
-  Grounding Clamp
-  Grounding Lug
-  Min. 10AWG, 105°C Copper Wire



Bonding pin



Module to South Stanchion to Rail Connection



**SYSTEM LEVEL FIRE CLASSIFICATION:** The system fire class rating is only valid when the installation is conducted in accordance with the assembly instructions contained in this manual over a fire resistant roof covering rated for the application. GridFlex™ has been classified to the system level fire portion of UL2703. It has achieved Class A performance for low sloped roofs when used in conjunction with modules whose fire type is 1, 2, 3 with a metal frame, 19, 22, 25, 29, or 30. Please see the specific conditions for mounting details described within this document required to maintain the Class A fire rating. Minimum and maximum roof slopes are restricted through the system design and layout rules. The fire classification rating is only valid on roof pitches less than 2:12 (slopes < 2 inches per foot, or 9.5 degrees).

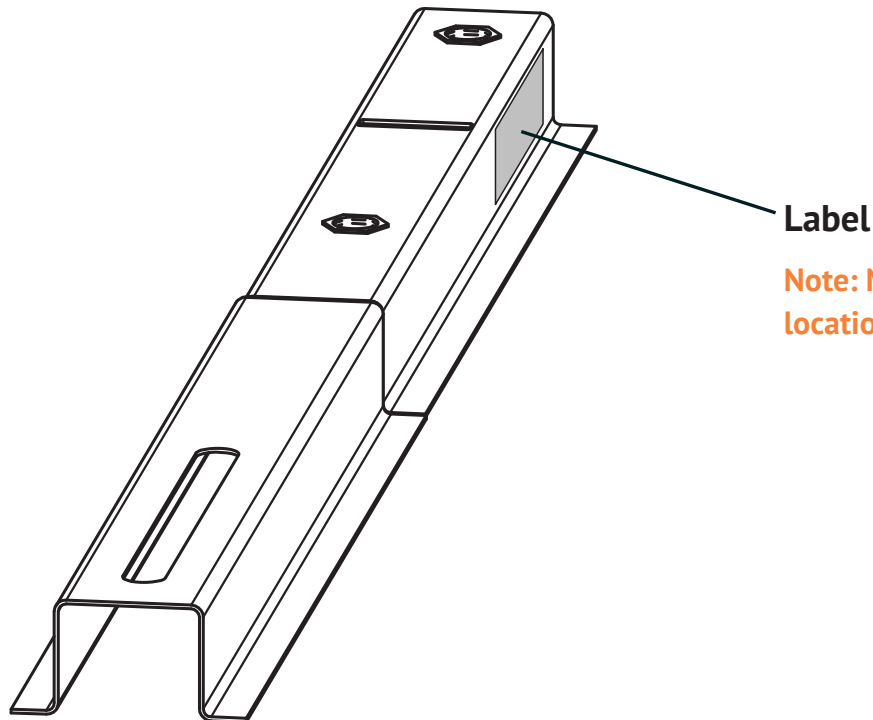
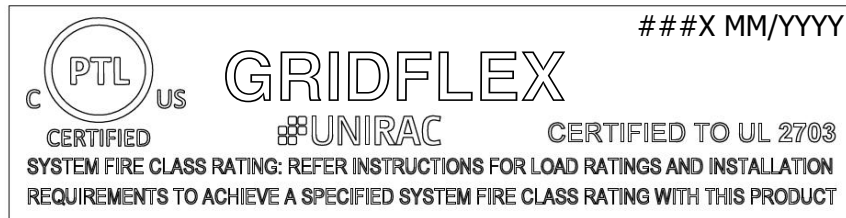
**IMPORTANT:** Wind Deflectors are required on north edges of arrays to maintain Class A fire rating.

**NOTE:** Fire Type information can be found on back of modules or through manufacturers documentation. Some building codes and fire codes require minimum clearances around such installations, and the installer should check local building code requirements for compliance.

## **CLASS A FIRE RATING MOUNTING ORIENTATION**

GridFlex™ has achieved Class A system level fire performance for type 1, 2, 3 with a metal frame, 19, 22, 25, 29 and type 30 module constructions. In order to maintain the fire rating, the module J-Box must be oriented away from the array east-west edges.

**UL2703 System Label:** To comply with UL2703 system rating, North rail has a stamp of system label as shown below



**Note:** North Rail has a stamp of the system label at the location shown in the diagram.

## MECHANICAL LOAD TEST QUALIFICATION

The GridFlex™ system has been tested to the mechanical load provisions of UL2703 and covers the following basic parameters:

- PV module may have reduced load rating, independent of the GridFlex™ rating. Please consult the PV module manufacturer's installation guide for more information.
- Load rating may vary based on PV module area. Please Contact Unirac for more information
- Basic single and double wall frame profiles

See the table below for system design loads in the up, down, and downslope directions for the various system installation configurations

Manufacturer	Module	Area (sq ft)	Standard Installation Configuration - No Mid-Supports		Installed with Third Rail at Module Center		Installed with Mid-Support Component	
			Up Design Load (psf)	Down Design Load (psf)	Up Design Load (psf)	Down Design Load (psf)	Up Design Load (psf)	Down Design Load (psf)
BenQ Solar	PMxxxP01	16.5	20.97	30.67	Not Tested	Not Tested	20.97	Not Tested
Canadian Solar	CS3W-PB-AG	24.0	Not Tested	Not Tested	28.40	40.39	Not Tested	40.39
	CS6W-xxxMB-AG	27.66	17.23	13.60	30.13	33.73	17.23	27.17
Runergy (Hyperion)	HY-DH144P8 (30 mm)	27.81	20.7	13.53	30.83	45.86	20.7	42.93
Hyundai	HiS-M305TI	21.1	16.70	36.00	Not Tested	Not Tested	16.70	Not Tested
Jinko	JKM M-72HL4-V	27.8	16.11	29.21	Not Tested	42.62	16.11	42.62
Longi	LR4-HPH-xxxM	23.4	Not Tested	Not Tested	27.20	47.00	Not Tested	47.00
NE Solar (30 mm)	NESE xxx-72MHB-M10	27.8	14.00	10.63	Not Tested	Not Tested	29.47	35.13
Philadelphia Solar	PS-M144(HCBF)	27.77	13.17	10.35	20.37	30.57	13.17	30.57

**\*All installation configurations have achieved a minimum of 5psf design load in the downslope direction, tested with the Jinko JKM M-72HL4-V module listed in this table**

## Mechanical Load Testing Cont.

Manufacturer	Module	Area (sq ft)	Standard Installation Configuration - No Mid-Supports		Installed with Third Rail at Module Center		Installed with Mid-Support Component	
			Up Design Load (psf)	Down Design Load (psf)	Up Design Load (psf)	Down Design Load (psf)	Up Design Load (psf)	Down Design Load (psf)
Q Cells	Q.PEAK DUO L-G8.3	23.1	17.30	21.05	30.60	50.00	17.30	50.00
	Q.PEAK DUOXL-G11.3/ BFG (570-585W)	29.49	13.61	14.70	24.40	40.67	13.61	40.00
SunPower	P-19-330-COM	22.2	18.45	36.50	Not Tested	Not Tested	18.45	Not Tested
Trina	DE19	28.1	13.33	12.00	21.38	29.39	13.33	29.39
ZN Shine	ZXM6-NHLDD144	23.4	17.17	17.27	27.30	37.25	17.17	37.25
	ZXM7-SHLDD144	27.88	15.1	13.67	Not Tested	Not Tested	15.1	38.55

**\*All installation configurations have achieved a minimum of 5psf design load in the downslope direction, tested with the Jinko JKM M-72HL4-V module listed in this table**

### Electrical Bonding and Grounding Test Modules

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the GridFlex™ system.

Manufacture	Module Model / Series	Manufacture	Module Model / Series	Manufacture	Module Model / Series
Aleo	P-Series & S-Series	CertainTeed	CT2xxMxx-01, CT2xxPxx-01, CTxxxMxx-01, CTxxxPxx-01, CTxxx-Mxx-02, CTxxxMxx-03 CTxxxMxx-04, CTM10xxxHC11-09, CTxxxHC11-04	JA Solar	JAP6 60-xxx, JAM6(K)-60/xxx, JAP6(k)-72-xxx/4BB, JAP72SYY-xxx/ZZ, JAP6(k)-60-xxx/4BB, JAP60SYY-xxx/ZZ, JAM6(k)-72-xxx/ZZ, JAM72SYY-xxx/ZZ, JAM6(k)-60-xxx/ZZ, JAM60SYY-xxx/ZZ. i. YY: 01, 02, 03, 09, 10 ii. ZZ: SC, PR, BP, HiT, IB, MW YY = Backsheet, ZZ Cell technology JAM72D30 xxx/MB, JAM78D10 xxx/MB
Aptos Solar	DNA-120-MF10 DNA-120-(MF/BF)26 DNA-144-(MF/BF)26	Eco Solargy	Orion 1000 & Apollo 1000	Jinko	JKM & JKMS Series JKMxxxM-72HL-V JKMxxxN-72HL4-TV JKMxxxN-72HL4-BDV
Astronergy	CHSM6612 M, M/HV CHSM6612P Series CHSM6612P/HV Series CHSM72M-HC,	ET Solar	ET AC Module, ET Module	Kyocera	KD-F & KU Series
Auxin	AXN6M610T, AXN6P610T, AXN6M612T AXN6P612T	Flextronics	FXS-xxxBB	LG Electronics	LGxxx(E1C/E1K/N1C/N1K/N2T/N2W/ S1C/S2W/Q1C/Q1K)-A5 LGxxx(A1C/M1C/M1K/N1C/N1K/Q1C/ Q1K/ QAC/QAK)-A6 LGxxxN2W-B3 LGxxxN2T-B5 LGxxxN1K-B6 LGxxx(N1C/N1K/N2T/N2W)-E6 LGxxx(N1C/N1K/N2W/S1C/S2W)-G4 LGxxxN2T-J5 LGxxx(N1K/N1W/N2T/N2W)-L5 LGxxx(N1C/Q1C/Q1K)-N5 LGxxx(N1C/N1K/N2W/Q1C/Q1K)-V5
Axitec	AC-xxxMH/120(S/V/SB/VB) AC-xxxMH/144(S/V/SB/VB)	Freevolt	PVGraf		
BenQ Solar	PMxxxP01	GCL	GCL-P6 & GCL-M6 Series		
Boviet	BVM6610, BVM6612	Hansol	TD-AN3, TD-AN4, UB-AN1, UD-AN1		
BYD	P6K & MHK-36 Series	Hanwha SolarOne	HSL 60		
Canadian Solar	CS1(H/K/U/Y)-MS CS3K-(MB/MB-AG/MS/P/P HE/PB-AG) CS3L-(MS/P) CS3N MS CS3U-(MB/MB-AG/MS/P/P HE/PB/ PB-AG) CS3W-(MS/P/P-PB-AG) CS3Y-MB-AG CS5A-M CS6K-(M/MS/MS AllBlack/P/P HE) CS6R-MS-HL CS6W-xxxMB-AG	Heliene	36M, 36P 60M, 60P, 72M & 72P Series		
		HT Solar	HT72-156(M/P), HT72-156P-C, HT72-156P(V)-C HT72-156M(PDV)-BF, HT72-156M(P- D)-BF HT60-156M-C, HT60-156M(V)-C		
		Hyundai	KG, MG, RW, TG, RI, RG, TI, KI, HI Series HiA-SxxxHG, HiD-SxxxRG(BK), HiS- S400PI		
		Imperial Star	ISM7-SHDD120-xxx/M		
		ITEK	iT-SE Series		
Centrosolar America	C-Series & E-Series	Japan Solar	JPS-60 & JPS-72 Series		

- Unless otherwise noted, all modules listed above include all wattages and specific models within that series. Variable wattages are represented as "xxx"
- Items in parenthesis are those that may or may not be present in a compatible module's model ID
- Slashes "/" between one or more items indicates that either of those items may be the one that is present in a module's model ID.
- The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system
- Use with a maximum over current protection device OCPD of 30A
- Please see GridFlex™ information at Unirac.com to ensure the exact solar module selected is approved for use with GridFlex™
- Listed models can be used to achieve a Class A fire system rating, for low slope applications, only when modules fire typed 1, 2, 3 with a metal frame, 19, 22, 25, 29 or 30.

### Electrical Bonding and Grounding Test Modules

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the GridFlex™ system.

Manufacture	Module Model / Series	Manufacture	Module Model / Series	Manufacture	Module Model / Series
LONGi	LR4-60(HPB/HPH)	Phono Solar (Cont.)	PSxxxM1-20/UH	REC	RECxxxAA (BLK/Pure/ Pure 2/ Pure R)
	LR4-72(HBD/HPH)		PSxxxM1H-20/UH		RECxxxNP (N-PEAK)
	LR4-HPH-xxxM	Prism Solar	PSxxxM-24/T		RECxxxNP2 (Black)
	LR6-60		PSxxxMH-24/T		RECxxxPE, RECxxxPE72
Mission Solar Energy	LR6-60(BK/HPB/HPH/HV/PB/PE/PH)	Q.Cells	PSxxxM-24/TH		RECxxxTP, RECxxxTP72
	LR6-72		PSxxxMH-24/TH		RECxxxTP2(M/BLK2)
	LR6-72(BK/HBD/HV/PB/PE/PH)		P72 Series		RECxxxTP2S(M)72
	RealBlack LR4-60HPB		Q.PEAK DUO (BLK) - G5(SC)	Renesola	RECxxxTP3M (Black)
Mitsubishi	RealBlack LR6-60HPB		Q.PEAK DUO (BLK) - G6(+)(AC)(SC)		RECxxxTP4 (Black)
			Q.PEAK DUO (BLK) - G7	Risen	RECxxxNP3 Black
Neo Solar Power Co.			Q.PEAK DUO (BLK) - G8(+)	Runergy Solar (Hyperion)	All 60-cell modules
			Q.PEAK DUO (BLK) ML-G10(+)		RSM Series
NE Solar	NESE xxx 72MHB-M10,		Q.PEAK DUO (BLK) ML-G10(+)	S-Energy	HY-DH144P8 (30mm)
	NESE xxx 72THB-M10,		Q.PEAK DUO BLK-G6+/TS		HY-DH156N8
	NESE xxx 72MHT-M10		Q.PEAK DUO L - G4.2	SEG Solar	HY-DH156P8
Panasonic	VBHNxxxSA06/SA06B/SA11/SA11B		Q.PEAK DUO L - G5(.1)(.2)(.3)		SEG-xxx-BMA-HV
	VBHNxxxSA15/SA15B/SA16/SA16B,		Q.PEAK DUO L - G6(.1)(.2)(.3)	Seraphim	SEG-xxx-BMA-TB
	VBHNxxxKA, VBHNxxxKA03/04,		Q.PEAK DUO L - G7(.1)(.2)(.3)(.4)(.7)		SEG-xxx-BMB-HV
	VBHNxxxSA17/SA17G/SA17E/SA18/		Q.PEAK DUO L - G8(.1)(.2)(.3)(.3/BFF)		SEG-xxx-BMB-TB
Peimar	SA18E,		Q.PEAK DUO XL-(G9/G9.2/G9.3/G10.2/	Sharp	SEG-6 & SRP-6 Series
	VBHNxxxZA01/ZA02/ZA03/VBHNxxx-		G10.3)		SEG-xxx-6MA-HV
Philadelphia Solar	ZA04		Q.PEAK DUO XL-G10.3/BFG		SRP-xxx-6MB-HV
	EVPVxxx (K/H/ PK)		Q.PEAK DUO XL-G11.3/BFG		SRP-xxx-BMA-HV
Phono Solar	SGxxxM (FB/BF)		Q.PEAK DUOXL-G11.3/BFG		SRP-xxx-BMB-HV
	SMxxxM		Q.PEAK DUO XL-G11S.3/BFG		SRP-xxx-BMC-HV
	PS-M144(HCBF)		Q.PEAK L G4(.2)(.5)		SRP-xxx-BMD-HV
	PSxxxM1-20/U		Q.PLUS DUO L - G5(.1)(.2)(.3)		SRP-xxx-BMZ-HV
	PSxxxM1H-20/U		Q.PLUS L G4.2		NU-SA & NU-SC Series
	PSxxxM1-20UH		Q.TRON XL-G2.3/BFG		
	PSxxxM1H-20UH				

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- Items in parenthesis are those that may or may not be present in a compatible module's model ID
- Slashes "/" between one or more items indicates that either of those items may be the one that is present in a module's model ID.
- The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system
- Use with a maximum over current protection device OCPD of 30A
- Please see GridFlex™ information at Unirac.com to ensure the exact solar module selected is approved for use with GridFlex™
- Listed models can be used to achieve a Class A fire system rating, for low slope applications, only when modules fire typed 1, 2, 3 with a metal frame, 19, 22, 25, 29 or 30.



### Electrical Bonding and Grounding Test Modules

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the GridFlex™ system.

Manufacture	Module Model / Series
Silfab	SLA-M, SLA-P, SLG-M, SLG-P & BC Series SIL-xxx(BG/BL/HC/HC+/HM/HN/QD/QM/NL/NT/HL/ML/BK/NX/NU)
Solaria	PowerXT
Solartech	STU HIT, STU PERC & Quantum PERC
SolarWorld	Sunmodule Protect, Sunmodule Plus/Pro
Sonali	SS-M-360 to 390 Series SS-M-440 to 460 Series SS-M-430 to 460 BiFacial Series
Sun Edison	F-Series, R-Series
Suniva	MV Series & Optimus Series (35mm)
SunPower	AC, X-Series, E-Series & P-Series
Suntech	STP
Talesun	TP572, TP596, TP654, TP660, TP672, Hipor M, Smart BIPRO TD6I72M, TD6I72M
Tesla	SC, SC B, SC B1, SC B2 TxxxH, TxxxS
Trina	PA05, PD05, DD05, DD06, DE06 DE15H(II), DE15M(II) PD14, PE14, DD14, DE14 TSMxxx-DE19, TSMXXX-DE15V TSMxxx-DEG19, TSMxxx-DEG15VC TSM-NEG19RC.20, DEG18MC

Manufacture	Module Model / Series
TSMC	TS-150C2 CIGSw
Upsolar	UP-MxxxP, UP-MxxxM(-B)
URECO	D7Kxxx(H7A/H8A), D7Mxxx(H7A/H8A) FAKxxx(C8G/E8G), FAMxxxE7G-BB FAMxxxE8G(-BB)
Vikram	Eldora, Somera, Ultima, PREXOS VSM DHT.72.AAA.05
Vina	VNS-72M1-5-xxxW-1.5, VNS-72M3-5-xxxW-1.5, VNS-144M1-5-xxxW-1.5, VNS-144M3-5-xxxW-1.5, VNS-120M3-5-xxxW-1.0
VSUN	VSUN315-60M-BB, VSUN390-72MH VSUN415-144BMH, VSUN450-144BMH
Waaree	Bi-55-xxx
Winaico	WST & WSP Series
Yingli	YGE & YLM Series
ZNShine Solar	ZXM6-72 Series ZXM6-NHLDD144 ZXM7-SHLDD120 ZXM7-SHLDD144 ZXM7-SHDB144 ZXM7-UHLDD144

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- The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system
- Use with a maximum over current protection device OCPD of 30A
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