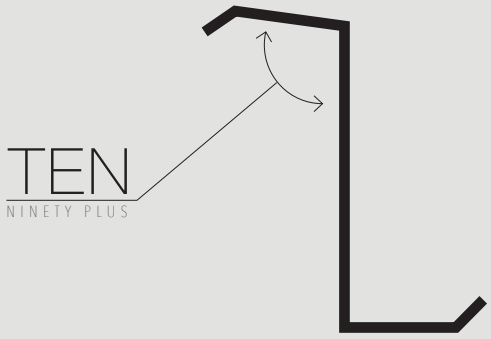
INSTALLATION MANUAL

SWIF ***TEN*** RACKING SYSTEM



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04.29.2024 v.15

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RATINGS / CERTIFICATION DETAILS

SWIF Solar has been evaluated by Intertek Testing Services NA (ETL) and Listed to UL Standard 2703 for Bonding & Grounding, Mechanical Loading, and Fire Classification.

These requirements cover rack mounting systems, mounting grounding/bonding devices, and clamping/retention devices for specific (manufacturer/model designation) flat-plate photovoltaic modules and panels that comply with the Standard for Flat-Plate Photovoltaic Modules and Panels, UL 1703, or the Standard for Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements For Construction, UL 61730-1 and the Standard for Photovoltaic (PV) Module Safety Qualification – Part 2: Requirements For Testing, UL 61730-2, intended for installation on or integral with buildings, or to be freestanding (i.e., not attached to buildings), in accordance with the National Electrical Code, ANSI/NFPA 70 and Model Building Codes.

Systems, components and/or devices evaluated under this standard may be used to ground and/or mount a PV module complying with UL 1703 or UL 61730-1 and UL 61730-2 when the specific module or frame has been evaluated for bonding/grounding or the module has been evaluated for mounting with the evaluated system, component or device.

These requirements cover rack mounting systems and clamping devices intended for use with photovoltaic module systems with a maximum system voltage of 1500 V. This racking system may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting. Refer to the Panel Compatibility chart for a list of compatible modules.

These requirements cover rack mounting systems, clamping, retention devices pertaining to ground/bonding paths, mechanical strength, and suitability of materials only.

2703 for Grounding/Bonding

Conforms to UL 467 for Safety Grounding and Bonding Equipment
Max Over-current Protective Device (OCPD) Rating: 25A
Ground Conductor Rating: 6-10 AWG, bare copper. May require conduit protection for conductors smaller than 6 AWG according to NEC.

2703 for Mechanical Loading

Maximum Panel Size:	27.4 sq. ft		
Downward Design Load:	1600 Pa	Downward Test Load:	2400 Pa
Upward Design Load:	1600 Pa	Upward Test Load:	2400 Pa
Downslope Design Load:	5 psf	Downslope Test Load:	7.5 psf

Actual system structural capacity is defined by PE stamped certification letters.

Class A Fire Rating per UL 1703.

Rated for Low Sloped Roof Application (less than 2 in/ft) when installed with Type 1 or Type 29 UL 1703 Class PV panels. Class A rated PV systems can be installed on Class A, B, and C roofs without affecting the roof fire rating. The end user must check the label for the fire type rating. A minimum of 24” roof gap under the panel is required.

INSTALLER RESPONSIBILITIES

It is recommended to review the complete manual prior to beginning installation.

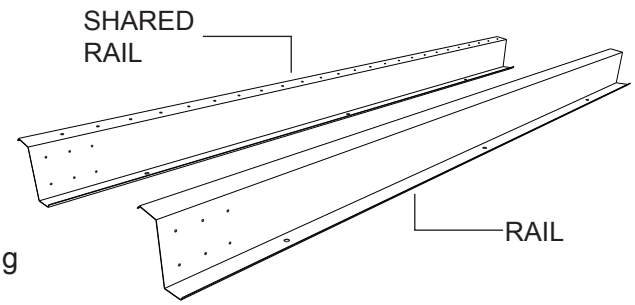
THE FOLLOWING ARE THE SOLE RESPONSIBILITY OF THE INSTALLER:

- Comply with all applicable local, state or national building and fire codes, including any that may supersede the manual.
- Ensure that products used are appropriate for the particular installation, the environment and the PV array.
- Use only SWIF Solar products, products fabricated to SWIF Solar specifications as described in this manual, or products by other manufacturers as specified by SWIF Solar in this manual. Use of alternate products or fabrications may void any applicable warranty.
- Ensure that the roof, its rafters, connections, and other structural support members can support the PV array in its entirety.
- Maintain the waterproof integrity of the roof.
- Ensure correct and appropriate design parameters are used in determining the design loading used for the specific installation. Parameters, such as snow loading, wind speed, exposure and topographic factor should be confirmed with the local building official or a licensed professional engineer.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- Ensure safe installation of all electrical aspects of the PV array. All electrical installation and procedures should be conducted by a licensed and bonded electrician or solar contractor.
- Ensure all warning label requirements are met per the latest National Electrical code (NEC), International Fire Code (IFC), and/or Cal Fire Code.
- Provide an appropriate method of direct-to-earth grounding according to the latest edition of the National Electrical code including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems.
- Do not during routine maintenance, inspection, or cleaning, break or disturb the bonding path of the system.
- If loose components or fasteners are identified during periodic inspection, re-tightened or replace immediately as specified by the component manufacturer. If corrosion is found, replace the affected components immediately.
- This rack system may be used to roof mount and ground PV panels complying with UL 1703 only when the specific panel has been evaluated for grounding and/or mounting with the SWIF Solar rack system as described in this manual. See the PV panel Compatibility section.
- Ensure the provided information is accurate. Issues resulting from inaccurate information are the installer's responsibility.
- Review PV panel manufacturer's documentation for compatibility and compliance with warranty terms and conditions.

COMPONENTS

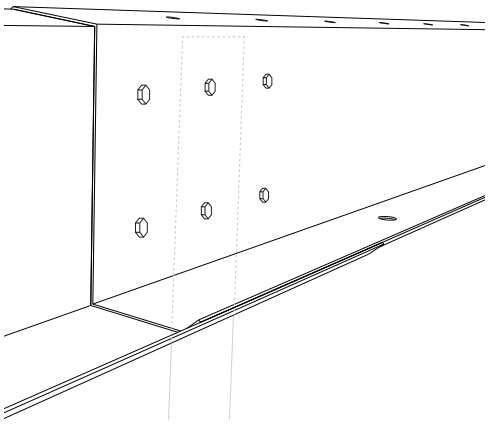
RAILS

1. Spans between SWIFs, supports PV PANELS.
2. 100° bend places top flange flush to PV PANEL frames when sloped at 10°.
3. Pre-punched holes on top flange of SHARED RAIL for quick MID CLAMP installation.
4. Weep holes on bottom flange manage water accumulation.
5. Bottom flange can be used for cable management.
6. G90 galvanized coating resists corrosion conforming with ASTM A653.
7. Secure with SELF DRILLING BOLT - SHORT.



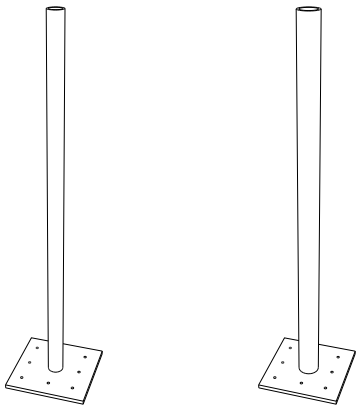
RAIL SPLICE

1. Aligns contiguous RAILS and electrically bonds RAILS together.
2. Secure with SELF DRILLING BOLT - SHORT.



STANDOFF WITH INTEGRATED FLANGE (SWIF)

1. Elevates RAILS.
2. Provides clear area under PV PANELS for maintenance and repair.
3. Steel baseplate FLANGE for positive connection to the building roof structure.
4. G90 galvanized coating on pipe resists corrosion conforming to ASTM A123.
5. FLANGE punch pattern can be modified to meet the fastener requirements specified by the structural engineer.



COMPONENTS

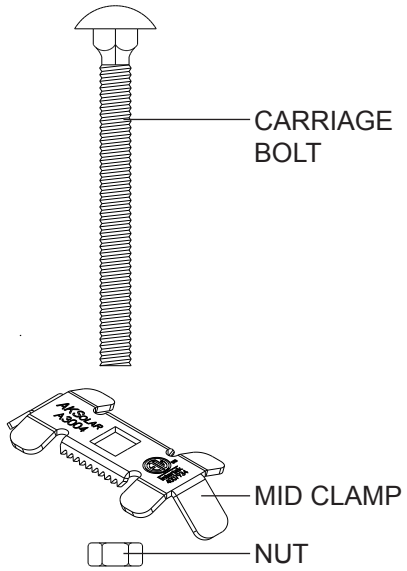
MID CLAMP ASSEMBLY

CONDUCTIVE MID CLAMP* (MID CLAMP)

1. 316 Stainless Steel
2. Penetrates solar frame anodization with sharp teeth for strong electrical conductivity.
3. Mechanically holds solar panels in place, providing structural support.
4. Features panel spacing flaps for panel alignment.

CARRIAGE BOLT & NUT

1. 316 Stainless Steel
2. Provides bonding between CONDUCTIVE MID CLAMPS and the RAILS.
3. CARRIAGE BOLT locks together with MID CLAMP to resist turning, allows for single side tightening.



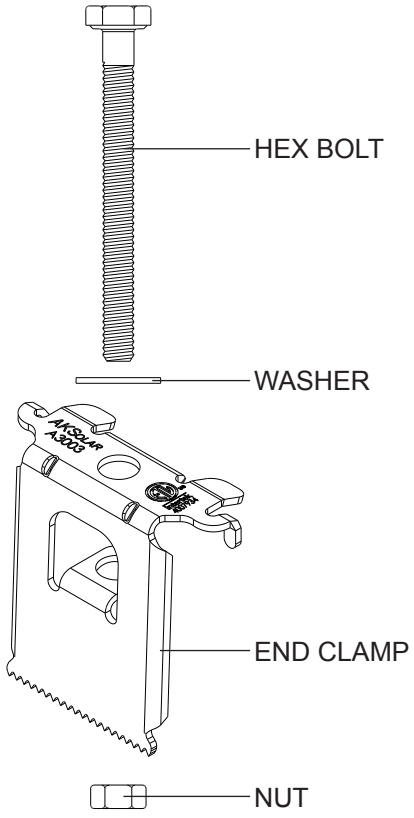
END CLAMP ASSEMBLY

CONDUCTIVE END CLAMP* (END CLAMP)

1. 316 Stainless Steel
2. Penetrates solar frame anodization with sharp teeth for strong electrical conductivity.
3. Mechanically holds solar panels in place, providing structural support.

HEX BOLT WITH WASHER & NUT

1. 316 Stainless Steel
2. Provides bonding between CONDUCTIVE END CLAMPS and the RAILS.

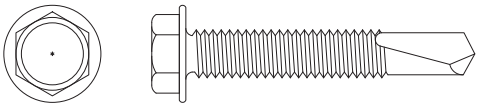


* For single use only.

COMPONENTS

SELF DRILLING BOLT - SHORT*

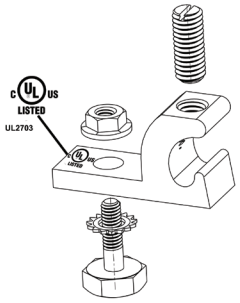
1. Attaches SWIF to RAIL.
2. Bonds and fastens RAIL SPLICE.
3. Bonds SWIFS and RAILS.



GROUNDING CONNECTION WITH MOUNTING HARDWARE

Amphenol HG Helios Grounding Products
HelioLug (wire range 4-12 AWG)

1. UL2703 for use with a ground wire.
2. Meets all NEC 2008/2011 requirements.
3. Capable of accepting 4-12 AWG solid copper conductors.
4. Comes with all certified custom hardware needed for making rapid, secure connections to PV modules and racks.



INSTALLER SUPPLIED MATERIALS

COLD GALVANIZED SPRAY & COLD GALVANIZED PAINT

1. 97% zinc rich, blended with an epoxy resin.
2. Apply over cut surfaces of RAILS and SWIFS when they are trimmed to size in the field.
3. Apply per the manufacturer's instructions.

* For single use only.

PLAN YOUR INSTALLATION

RECOMMENDED TOOLS

1. 5/16” sheet metal hole cutter
2. 1-1/2” & 2” heavy duty pipe cutter
3. Laser level
4. Shims

TORQUE SPECIFICATIONS

MID CLAMP ASSEMBLY	**10 FT-LBS**
END CLAMP ASSEMBLY	**10 FT-LBS**
SELF DRILLING BOLT - SHORT	**10 FT-LBS**
GROUND LUG	To attach to the racking, mount on a flat surface if used in a channel, or into a ¼” hole drilled through the extrusion. Place the star washer between the racking and lug and secure the nut and bolt to **30 IN-LBS**. Insert a 4 to 12 AWG copper wire into the lug and tighten the lug set screw to the copper wire to the torque based on the wire size. 4-6 AWG at **35 IN-LBS** 8-12 AWG at **30 IN-LBS** Do not exceed the maximum rated overcurrent protection, 20 A (12 AWG), 40 A (10 AWG), 90 A (8 AWG), 150 A (6 AWG), and 200 A (4 AWG).

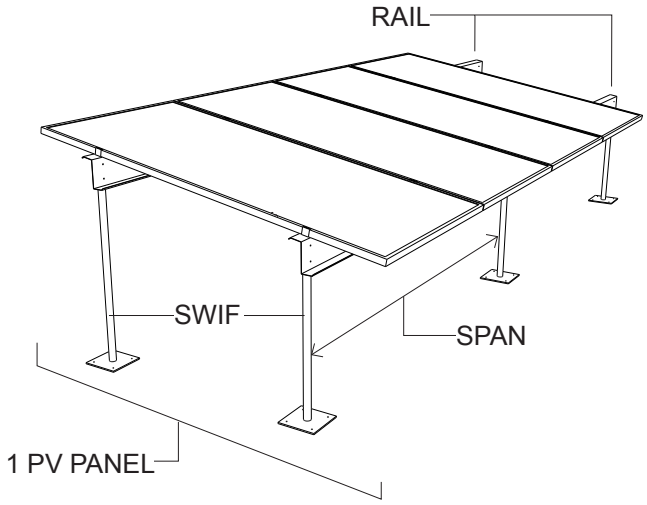
NOTES

1. Review PV module and any third-party manufacturer’s documentation for compatibility and compliance with warranty terms and conditions prior to planning array layout and commencing installation.
2. Add 3/8” to account for the gap between modules in each direction.

PLAN YOUR INSTALLATION

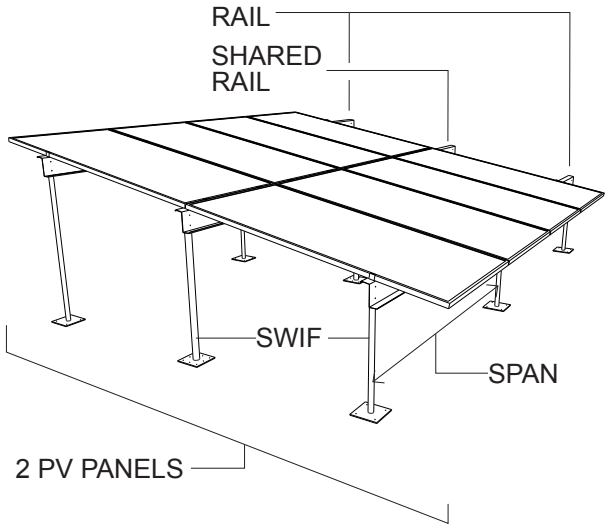
SPP vs. TPP-SR CONFIGURATIONS

SPP: SINGLE PANEL IN PORTRAIT



- (2) RAILS support a single row of panels.
- MAXIMUM RAIL SPANS:
  8’, 16’, 24’ between SWIFS.

TPP-SR: TWO PANELS IN PORTRAIT WITH A SHARED RAIL



- (3) RAILS support a double row of panels. The panels share the middle rail for support.
- MAXIMUM RAIL SPANS:
  8’, 16’ between SWIFS.

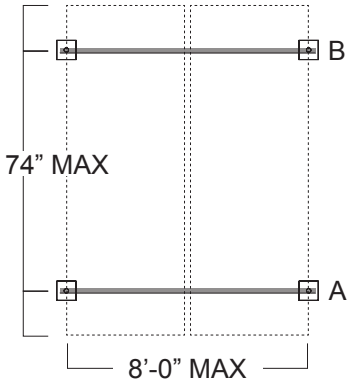
NOTES:

1. Refer to the RACKING LAYOUT and the RACKING COMPONENT SCHEDULES section of the INSTALLATION MANUAL for component sizes and configuration parameters.
2. Layouts must comply with the parameters set forth in the INSTALLATION MANUAL as well as any local, state or national building and fire codes, including any that may supersede this manual.

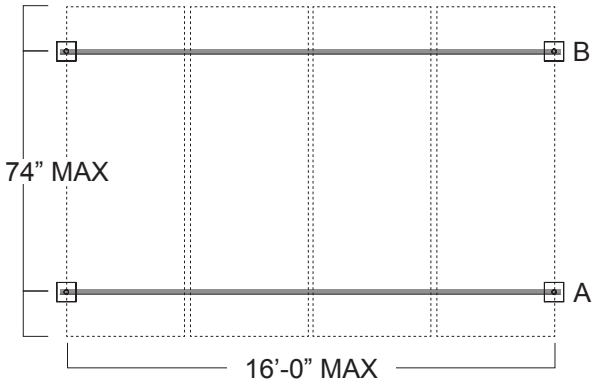
RACKING LAYOUTS

SPP CONFIGURATIONS

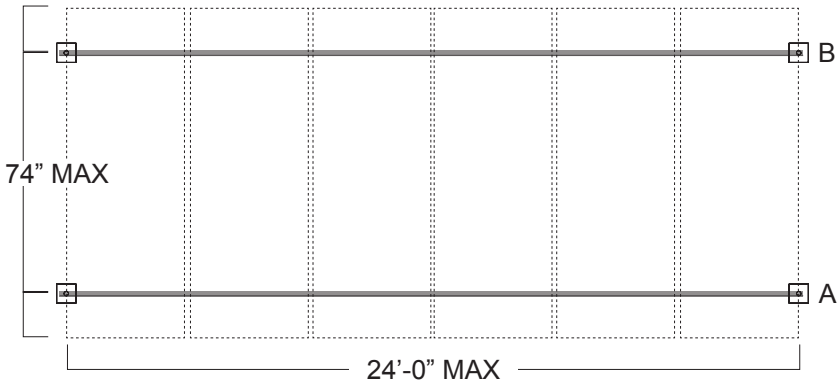
8’ SPP *PLAN VIEW*



16’ SPP *PLAN VIEW*



24’ SPP *PLAN VIEW*



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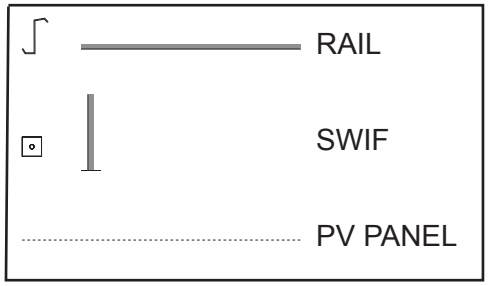
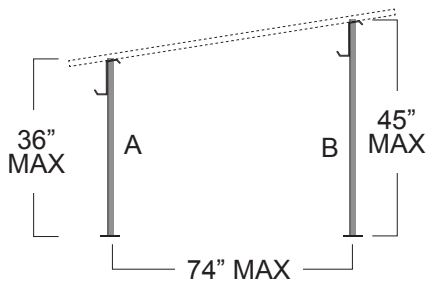


1. Refer to the RACKING COMPONENT SCHEDULE section of the INSTALLATION MANUAL for RAIL and SWIF sizes.
2. Distance between RAILS A and B is determined by the distance between CLAMPS required by the PV PANEL manufacturer.

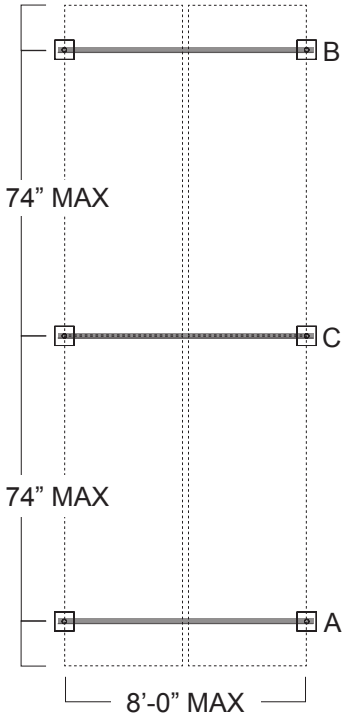
SPP - ALL *SECTION VIEW*



RACKING LAYOUTS

TPP-SR CONFIGURATIONS

8’ TPP-SR *PLAN VIEW*



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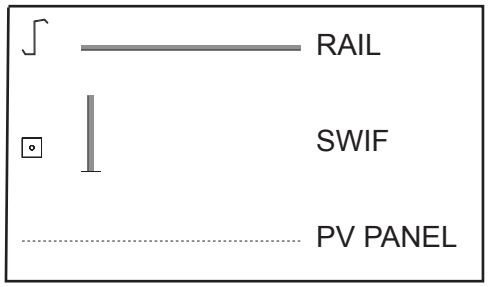
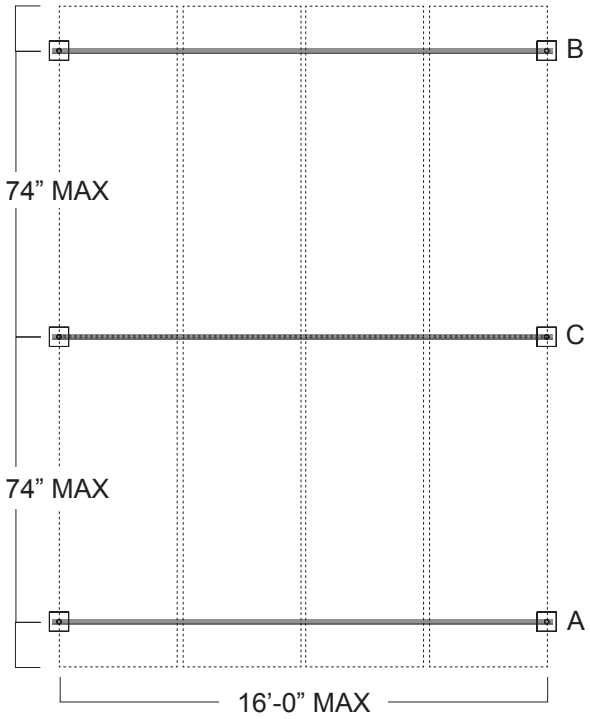
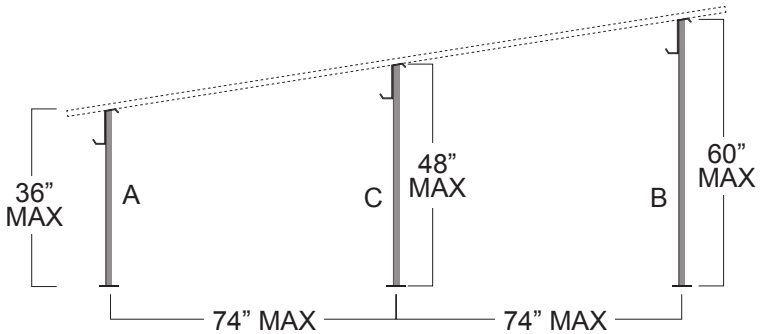


1. Refer to the RACKING COMPONENT SCHEDULE section of the INSTALLATION MANUAL for RAIL and SWIF sizes.
2. Distance between RAILS A, B and C is determined by the distance between CLAMPS required by the PV PANEL manufacturer.

16’ TPP-SR *PLAN VIEW*



TPP-SR - ALL *SECTION VIEW*



RACKING COMPONENTS SCHEDULES

SUMMARY OF MODEL CONFIGURATIONS

	EXAMPLE
TEN 8' SPP - S | SC | M | MC | L | LC	TEN 8' SPP - M
TEN 8' TPP-SR - S | SC | M | MC | L | LC	TEN 8' TPP-SR - LC
TEN 16' SPP - S | SC | M | MC	TEN 16' SPP - SC
TEN 16' TPP-SR - S | SC | M | MC	TEN 16' TPP-SR - MC
TEN 24' SPP - S | SC	TEN 24' SPP - S

RAIL + SWIF SCHEDULE

MODEL NAME	CONFIGURATION NOTE: (MAX SPAN BETWEEN SWIFS)	RAIL POSITION (SEE PG. 9, 10)	# RAILS [3]	RAIL TYPE		RAIL OPTIONS [1] S = 1 SPAN	SC = 1 SPAN, CUSTOM LENGTH	M = 2 SPANS	MC = 2 SPANS, CUSTOM LENGTH	L = 3 SPANS	LC = 3 SPANS, CUSTOM LENGTH	SWIF HEIGHT [4] (IN INCHES)	# SWIFS PER RAIL [2] S	SC	M	MC	L	LC
TEN	8' SPP (8'-0" MAX SPAN BETWEEN SWIFS)	A	1	6	-	8'-8"	VARIES	16'-8"	VARIES	24'-8"	VARIES	36	2	2	3	3	4	4
		B	1	6	-	8'-8"	VARIES	16'-8"	VARIES	24'-8"	VARIES	45	2	2	3	3	4	4
TEN	8' TPP-SR (8'-0" MAX SPAN BETWEEN SWIFS)	A	1	6	-	8'-8"	VARIES	16'-8"	VARIES	24'-8"	VARIES	36	2	2	3	3	4	4
		B	1	6	-	8'-8"	VARIES	16'-8"	VARIES	24'-8"	VARIES	48	2	2	3	3	4	4
		C	1	6-SR	-	8'-8"	VARIES	16'-8"	VARIES	24'-8"	VARIES	60	2	2	3	3	4	4
TEN	16' SPP (16'-0" MAX SPAN BETWEEN SWIFS)	A	1	10	-	16'-8"	VARIES	32'-8"	VARIES	-	-	36	2	2	3	3	-	-
		B	1	10	-	16'-8"	VARIES	32'-8"	VARIES	-	-	45	2	2	3	3	-	-
TEN	16' TPP-SR (16'-0" MAX SPAN BETWEEN SWIFS)	A	1	10	-	16'-8"	VARIES	32'-8"	VARIES	-	-	36	2	2	3	3	-	-
		B	1	10	-	16'-8"	VARIES	32'-8"	VARIES	-	-	48	2	2	3	3	-	-
		C	1	10-SR	-	16'-8"	VARIES	32'-8"	VARIES	-	-	60	2	2	3	3	-	-
TEN	24' SPP (24'-0" MAX SPAN BETWEEN SWIFS)	A	1	12	-	24'-8"	VARIES	-	-	-	-	36	2	2	-	-	-	-
		B	1	12	-	24'-8"	VARIES	-	-	-	-	45	2	2	-	-	-	-

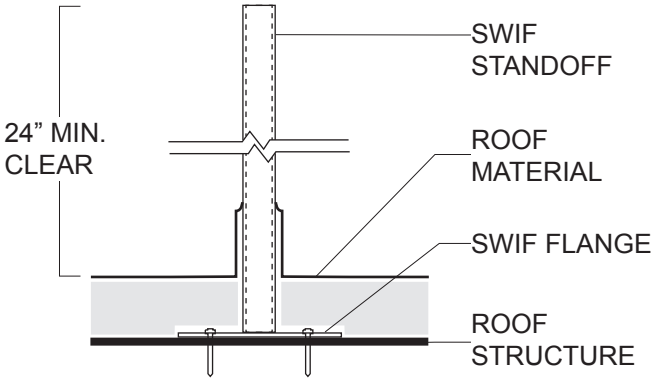
HARDWARE SCHEDULE

HARDWARE	QUANTITY	HARDWARE	QUANTITY	HARDWARE	QUANTITY
END CLAMP ASSEMBLY	(4) *PER ARRAY*	SELF DRILLING BOLT - SHORT	(2) *PER SWIF*	GROUNDING CONNECTION WITH MOUNTING HARDWARE	(1) *PER ARRAY*
MID CLAMP ASSEMBLY	(2) *PER PANEL*		(4) *PER RAIL SPLICE*		(1) *PER ARRAY*

1. A RAIL may span along SWIFS, (3) spans in length, before a splice is needed. For example: An 8' SPP ARRAY with a total length of 24'-8" has (3) 8'-0" spans. Each RAIL of the ARRAY can be composed of either (3) 6-S RAILS *or* (1) 6-S RAIL + (1) 6-M RAIL *or* (1) 6-L RAIL. A SWIF is required at the beginning and end of each span. M and L RAILS require intermediate SWIFS to support multiple spans.
2. Calculate the number of SWIFS required for an ARRAY by adding (1) to the total number of spans in the ARRAY. For example: An 8' SPP ARRAY with a total length of 24'-8" has (3) 8'-0" spans: (3) spans + 1 = 4. RAIL A requires (4) SWIF-36 and RAIL B requires (4) SWIF-45. The SWIFS will be spaced 8'-0" apart on center along the RAILS.
3. See RAIL SPLICE DETAIL on page 13 for how to connect ARRAYS exceeding (1) RAIL in length.
4. SWIF height may be shortened in the field to allow for leveling. A minimum 24" of the SWIF is required to remain above the finished roof surface. See SWIF TO ROOF CONNECTION detail on page 12.

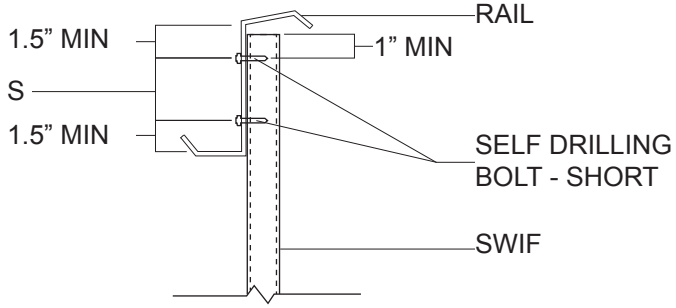
RACKING INSTALLATION DETAILS

SWIF TO ROOF CONNECTION



- SWIF flange to roof structure fastener to be specified by the project engineer. Inquire for select pre-engineered conditions.
- Design new structures or assess existing structures to ensure they can support PV system loads.
- Roof penetration detail per roof manufacturer approved specifications is required.

RAIL TO SWIF CONNECTION

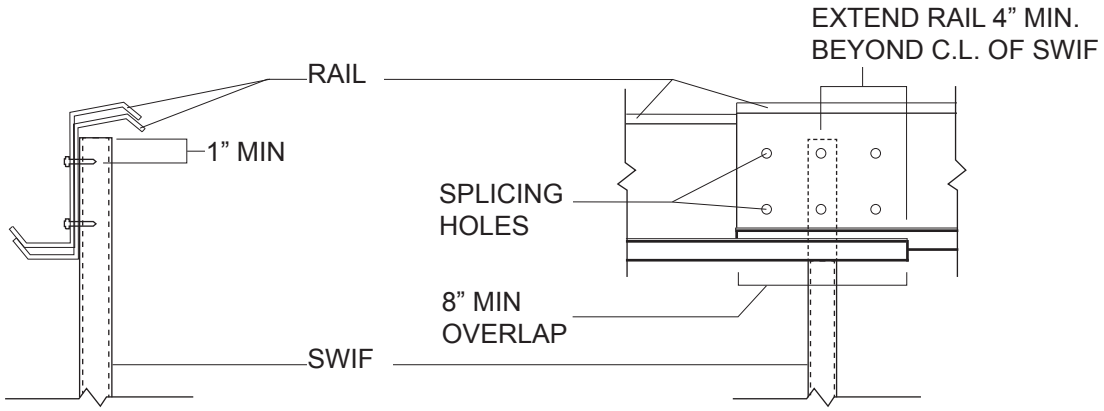


SPACING FOR
SELF DRILLING BOLT - SHORT

RAIL	S
TYPE 6	3"
TYPE 10	6"
TYPE 12	8"

- SWIF heights may be shortened in the field to allow for leveling the RAILS.

RAIL SPLICE



- RAIL SPLICE overlap is exaggerated for graphic clarity. Due to flex in the material, RAILS are effectively flush apart from their material thickness at the RAIL SPLICE.
- A RAIL may span along SWIFS, three spans in length, before a RAIL SPLICE is required.
- A SWIF is required at the beginning and end of each span. See RACKING LAYOUTS on pages 9 & 10 for maximum spans. RAILS in excess of (1) span will require intermediate SWIF supports.
- Rails can be shortened in the field by trimming the end without RAIL SPLICE prepunches.
- RAIL is required to extend a minimum of 4" beyond a SWIF support point.

CLAMP LAYOUT

TWO CONFIGURATIONS

SPP

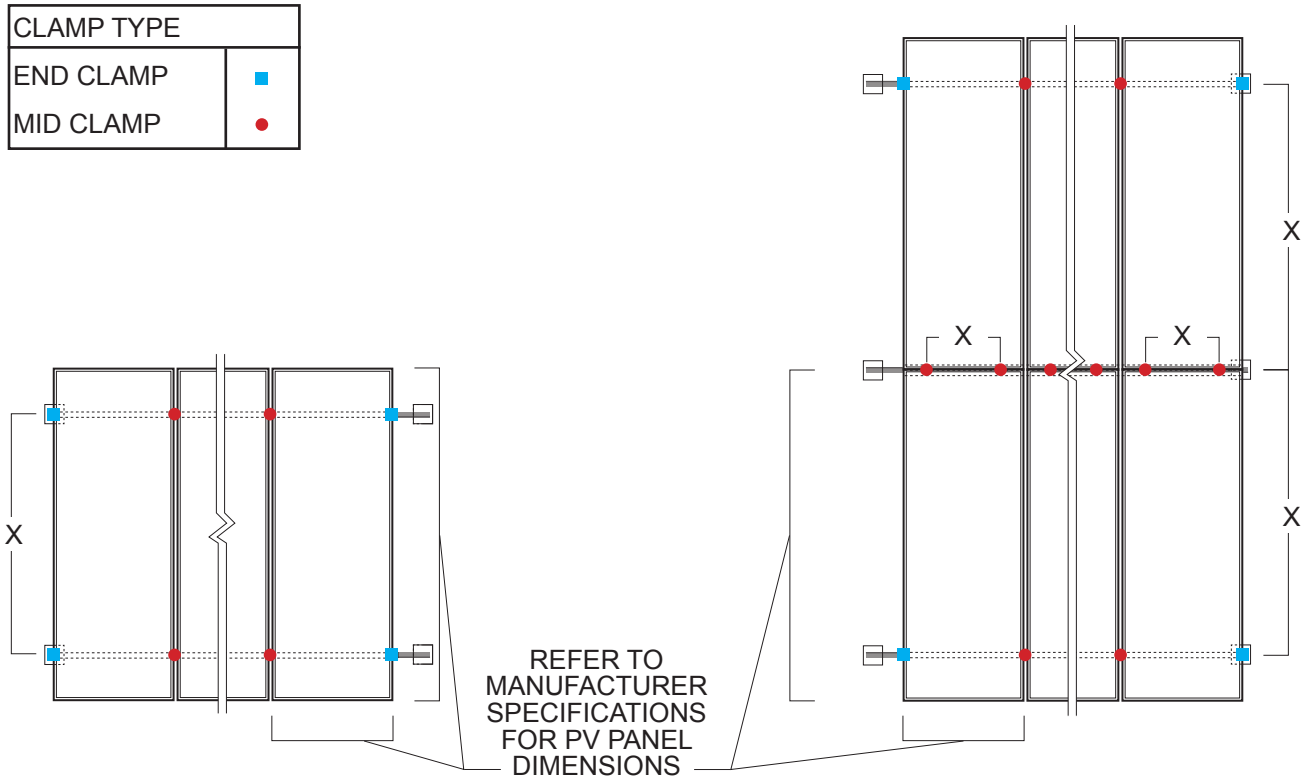
SINGLE PANEL IN PORTRAIT

TPP-SR

TWO PANELS IN PORTRAIT WITH A SHARED RAIL

KEY

CLAMP TYPE	
END CLAMP	■
MID CLAMP	●

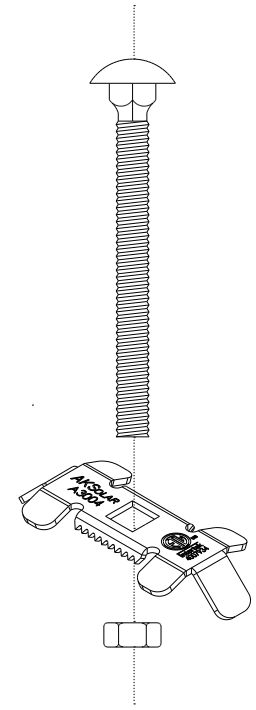


X: MID CLAMP and END CLAMP placement are per the PV PANEL Manufacturer's approved clamp layout. Manufacturer CLAMP placement requirements must be considered to lay out the SWIFS and RAILS for each ARRAY. See RACKING LAYOUTS on pages 10 and 11 for SWIF and RAIL spacing parameters.

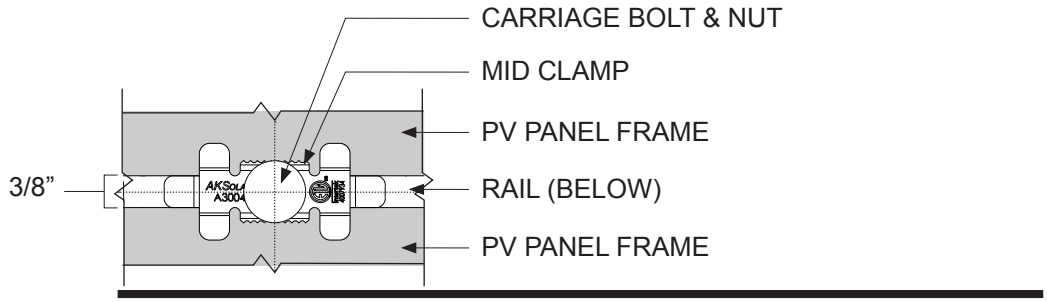
1. ARRAY refers to a sequence of PV PANELS supported on a continuous SPP or TPP-SR configuration with RAIL SPLICES when required.
2. END CLAMPS to be installed at the ends of a PV PANEL ARRAY.
3. MID CLAMPS to be installed between PV PANELS within a PV PANEL ARRAY.
4. Align MID CLAMPS and END CLAMPS with the center of the top flange of the RAIL.
5. Allow 0.37" space between panels. Snug PV PANEL FRAMES to CLAMP spacer tabs.

CLAMP INSTALLATION DETAILS

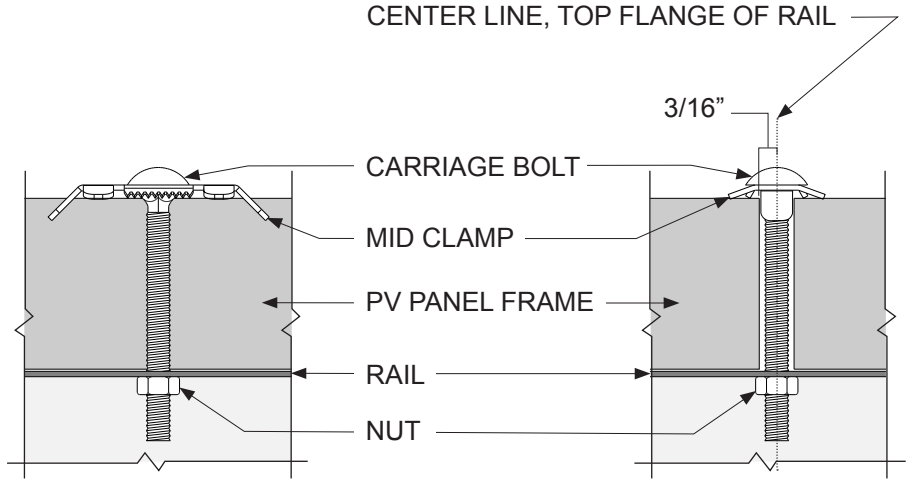
MID CLAMP ASSEMBLY



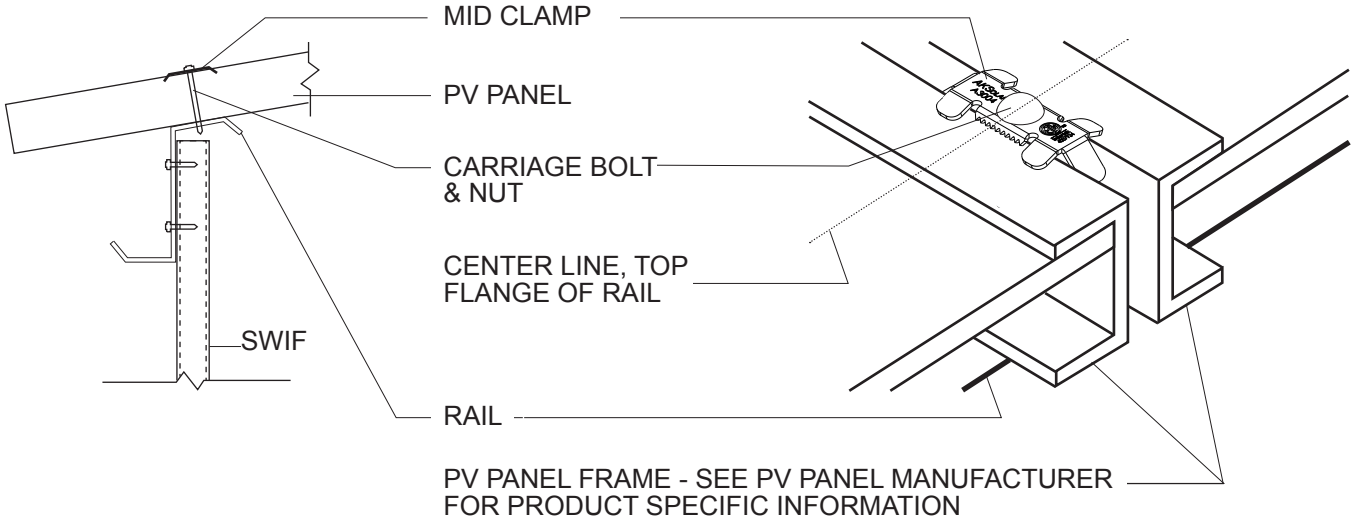
RECOMMENDED TORQUE:
10 FT-LBS



PLAN

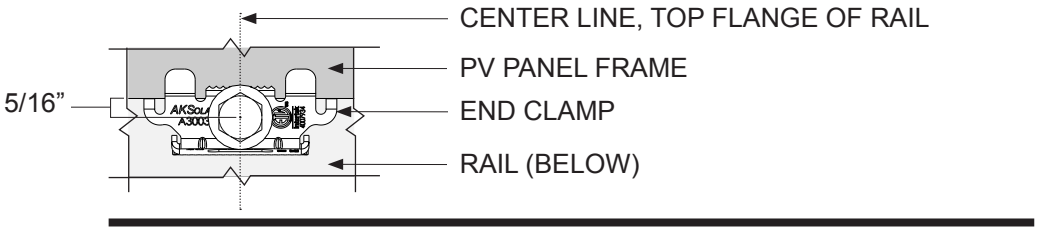


FRONT ELEVATION SIDE ELEVATION

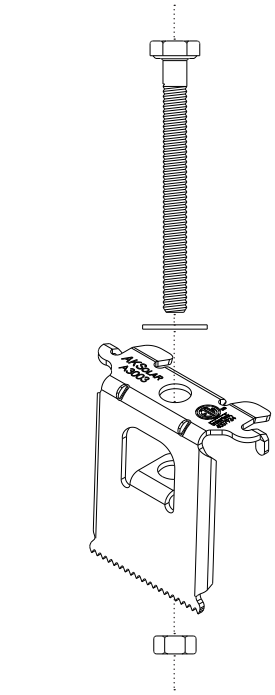


CLAMP INSTALLATION DETAILS

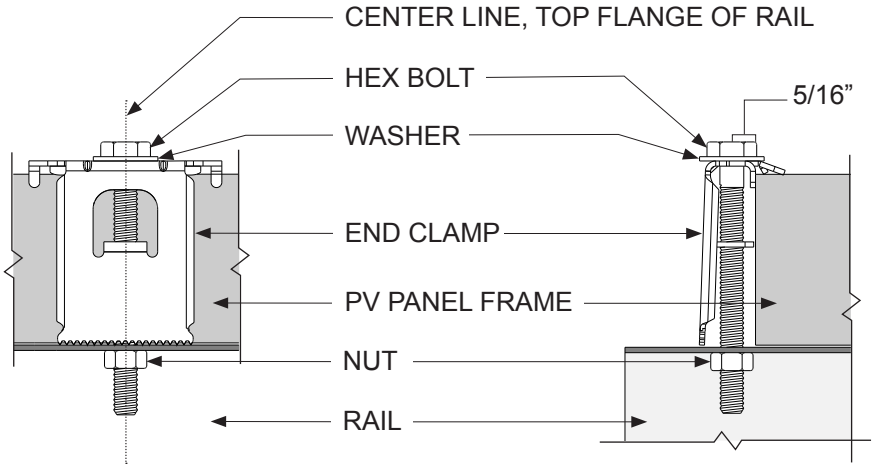
END CLAMP CONNECTION



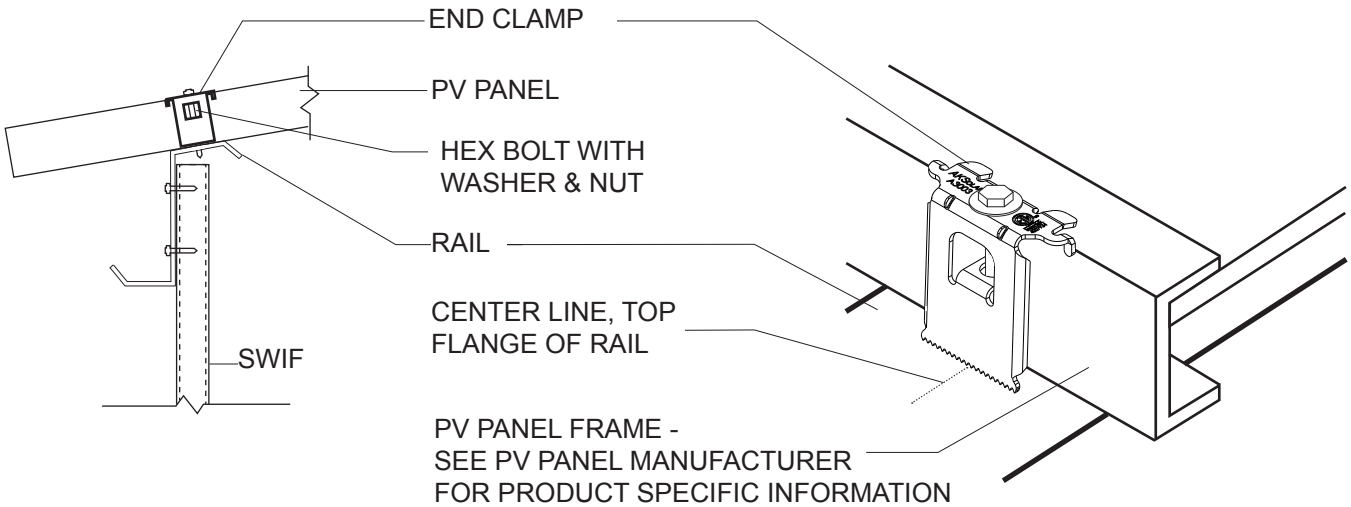
PLAN



RECOMMENDED TORQUE:
10 FT-LBS



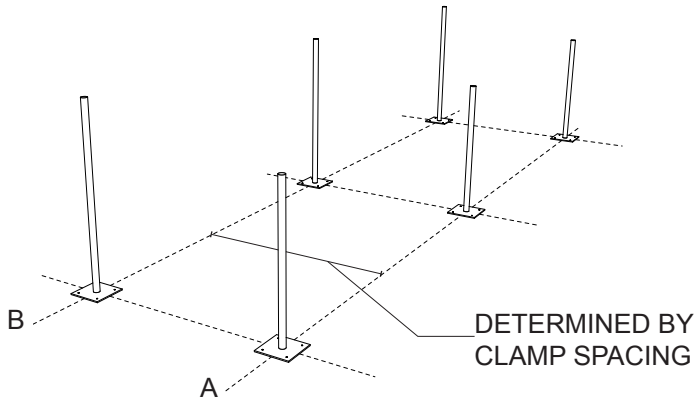
FRONT ELEVATION SIDE ELEVATION



INSTALL SEQUENCE

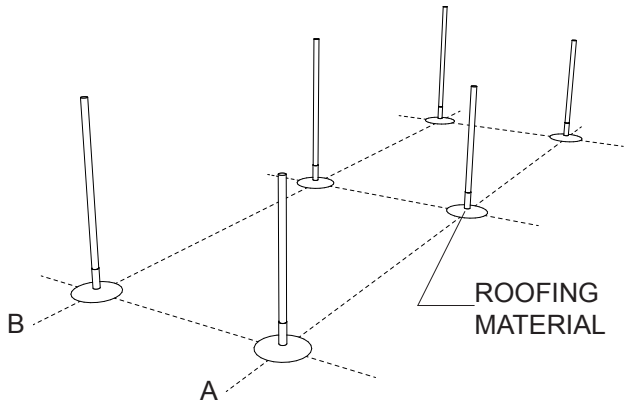
SPP CONFIGURATIONS

1. LAYOUT AND FASTEN SWIFS TO ROOF STRUCTURE



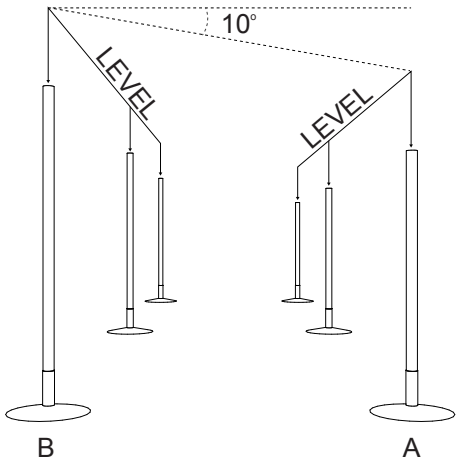
- The distance between RAILS A and B is determined by the distance between the CLAMPS as specified by the PV PANEL Manufacturer's installation manual.
- Locate the SWIFS on the roof.
- Access the Roof Structure and secure the SWIFS with the appropriate fasteners.
- Ensure SWIFS are square and plumb.

2. INSTALL FINISHED ROOF



- Install the finished roof, encapsulating SWIF penetrations per the roof manufacturer's specifications.
- If installing on an existing roof, close the existing roof around SWIFS per the roof manufacturer's specifications for roof penetrations.

3. LEVEL SWIFS

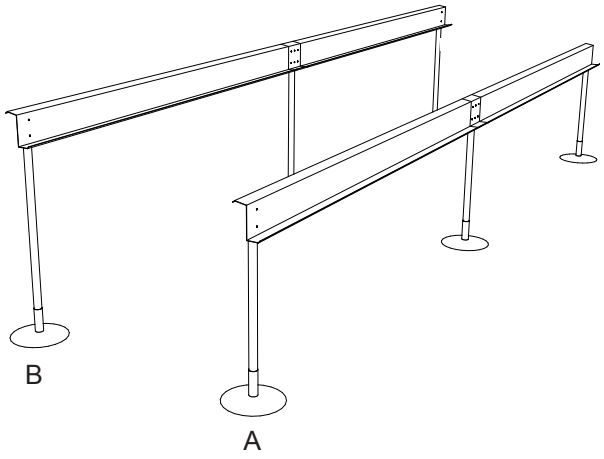


- Where required, trim the top of the SWIFS level across each row of the ARRAY. Apply a single coat of COLD GALVANIZED PAINT uniformly on cut edges.
- Where required, trim top of the SWIFS to achieve a 10 degree slope between RAILS A and B.
- Maintain a minimum height of 24" above the finished roof plane to the top of the SWIF.

INSTALL SEQUENCE

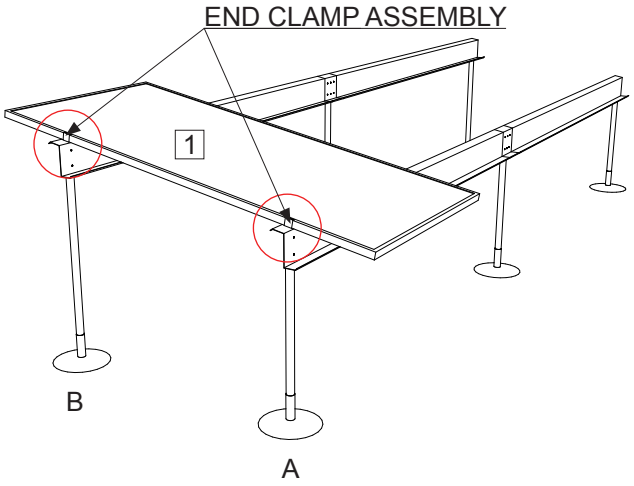
SPP CONFIGURATIONS

4. INSTALL RAILS



- RAILS may be trimmed to length in the field. Apply a single coat of COLD GALVANIZED PAINT uniformly on any cut edge.
- Mount RAILS A and B onto the SWIFS with SELF DRILLING BOLTS - SHORT.
- Connect the RAILS with a RAIL SPLICE where required using the SELF DRILLING BOLTS - SHORT.

5. INSTALL PV PANELS

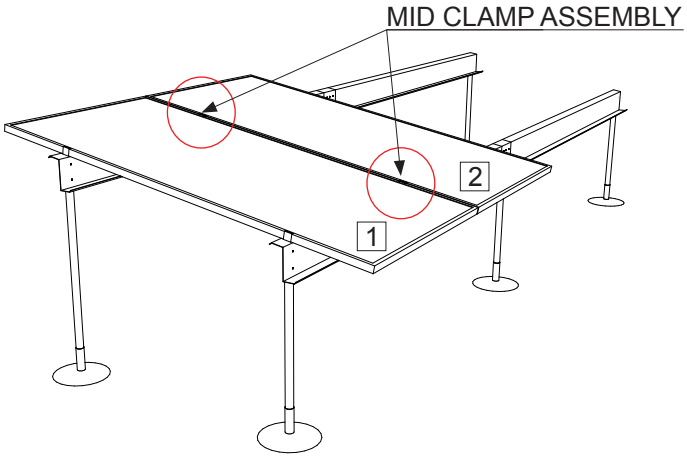


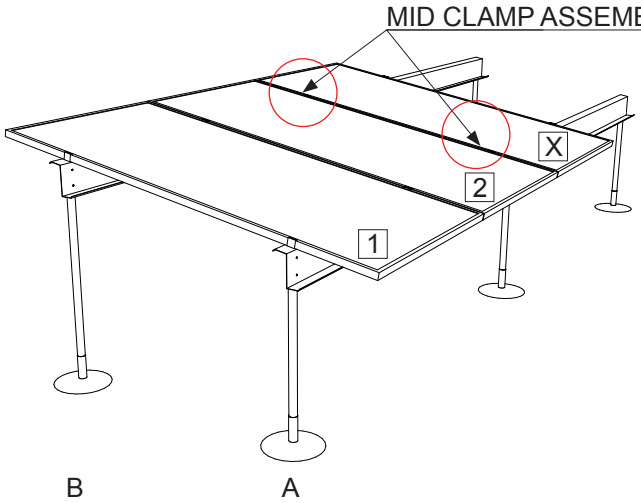
- Lay PV PANEL 1 on the RAILS.
- Drill a 5/16” hole at the center line of the top flange of each rail, centered 5/16” from the edge of the PV PANEL frame.
- Attach PV PANEL 1 to RAILS A and B with an END CLAMP ASSEMBLY.

INSTALL SEQUENCE

SPP CONFIGURATIONS

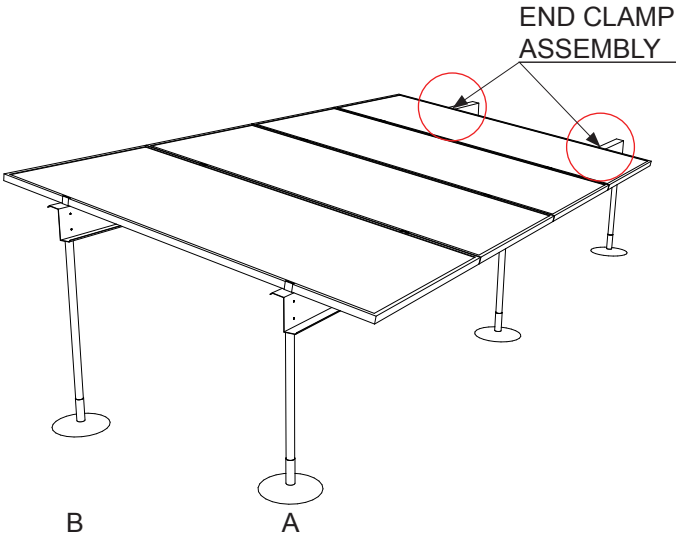
6. INSTALL PV PANEL 2, AND ONWARD





- Drill a 5/16” hole at the center line of the top flange of each rail, centered 3/16” from PV PANEL 1.
- Lay PV PANEL 2 on the RAILS.
- Place MID CLAMPS between PV PANELS 1 and 2.
- Snug PV PANEL 2 to the MID CLAMP panel spacing flaps between the PV PANELS.
- Confirm the PV PANELS are aligned.
- Attach PV PANELS to RAILS A and B with a MID CLAMP ASSEMBLY.
- Repeat with remaining PV PANELS in the ARRAY.

7. INSTALL LAST PV PANEL

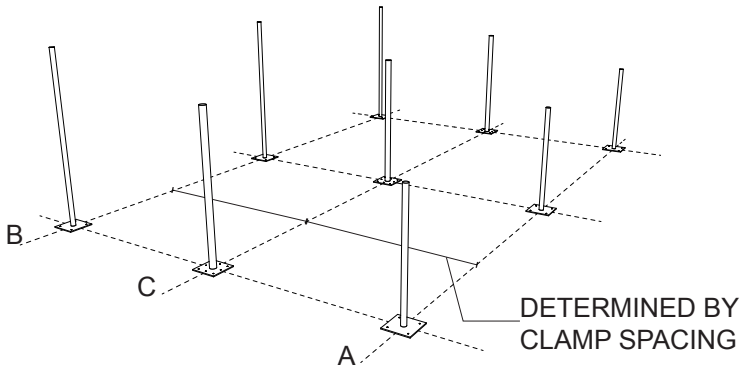


- Secure the terminal side of the last PV PANEL of the ARRAY to RAILS A and B with END CLAMP ASSEMBLYS in the same manner as PV PANEL 1.

INSTALL SEQUENCE

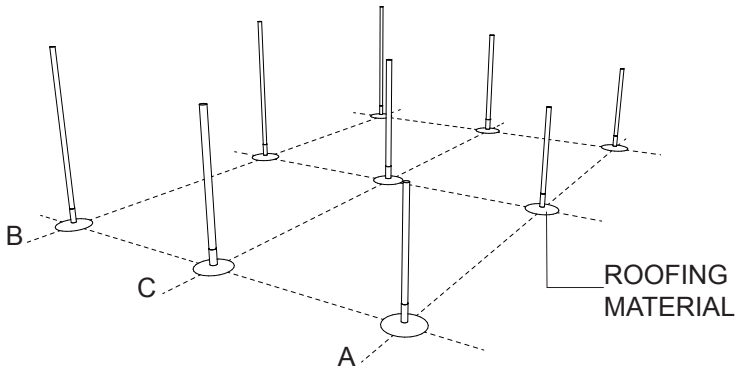
TPP-SR CONFIGURATIONS

1. LAYOUT AND FASTEN SWIFS TO ROOF STRUCTURE



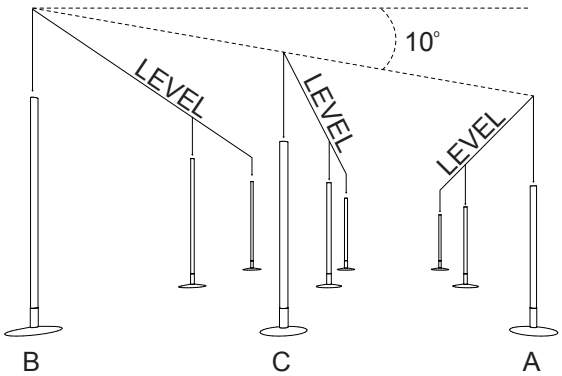
- The distance between RAILS A, B, and C is determined by the distance between the CLAMPS as specified by the PV PANEL Manufacturer's installation manual.
- Locate the SWIFS on the roof.
- Access the Roof Structure and secure the SWIFS with the appropriate fasteners.
- Ensure SWIFS are square and plumb.

2. INSTALL FINISHED ROOF



- Install the finished roof, encapsulating the SWIF penetrations per the roof manufacturer's specifications.
- If installing on an existing roof, close the existing roof around the SWIFS per the roof manufacturer's specifications for roof penetrations.

3. LEVEL SWIFS

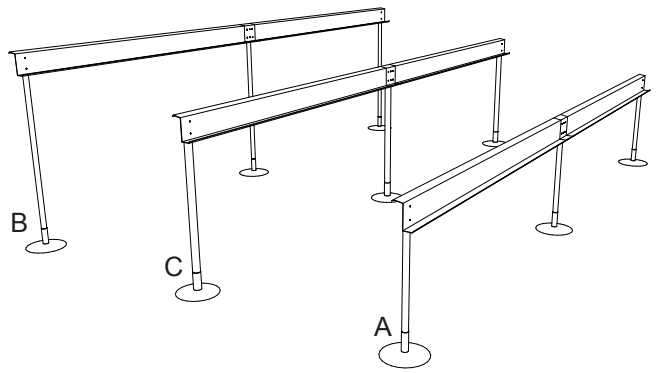


- Where required, trim the top of the SWIFS level across each row of the ARRAY. Apply a single coat of COLD GALVANIZED PAINT uniformly on cut edges.
- Where required, trim the top of the SWIFS to achieve a 10 degree slope between RAILS A, C and B.
- Maintain a minimum height of 24" above the finished roof plane to the top of the SWIF.

INSTALL SEQUENCE

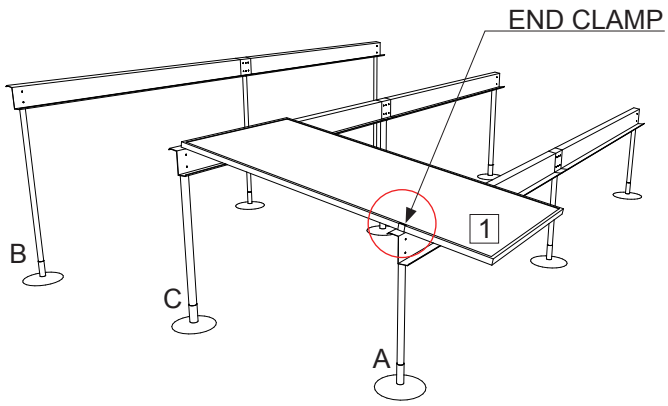
TPP-SR CONFIGURATIONS

4. INSTALL RAILS



- RAILS may be trimmed to length in the field. Apply a single coat of COLD GALVANIZED PAINT uniformly on any cut edge.
- Mount RAILS A, B and C onto the SWIFS with SELF DRILLING BOLTS - SHORT.
- Connect the RAILS with a RAIL SPLICE where required using the SELF DRILLING BOLTS - SHORT.

5. INSTALL PV PANEL1

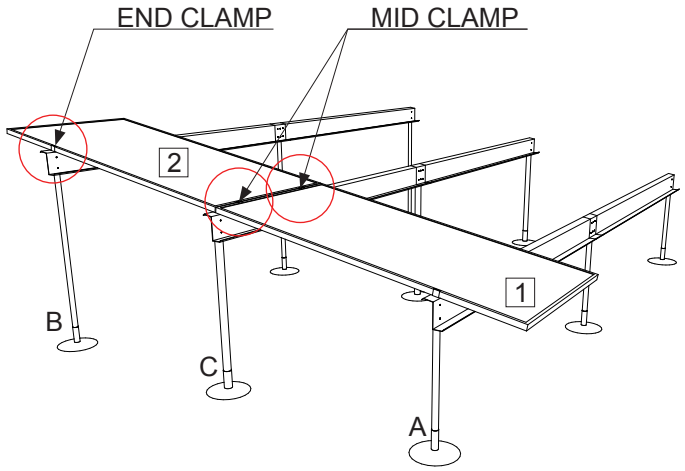


- Lay PV PANEL 1 on RAILS A and C.
- Drill a 5/16” hole at the center line of the top flange of RAIL A and centered 5/16” from PV PANEL 1.
- Attach PV PANEL 1 to RAIL A with an END CLAMP ASSEMBLY.
- Drill 5/16” holes at the center line of the top flange of RAIL C, inset from the corners of the PV PANEL the distance required for clamp placement by the PV PANEL Manufacturer and centered 3/16” from PV PANEL 1.

INSTALL SEQUENCE

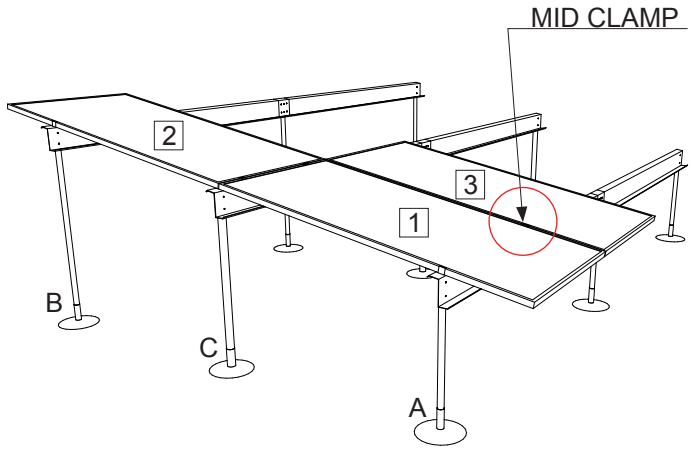
TPP-SR CONFIGURATIONS

6. INSTALL PV PANEL 2



- Lay PV PANEL 2 on RAILS B and C, aligned with PV PANEL 1.
- Place MID CLAMPS between PV PANELS 1 and 2.
- Snug PV PANEL 2 to the MID CLAMP panel spacing flaps between the PV PANELS.
- Confirm the PV PANELS are aligned.
- Attach PV PANELS to RAIL C with two MID CLAMP ASSEMBLYS.
- Drill a 5/16” hole at the center line of the top flange of RAIL B and centered 5/16” from PV PANEL 2.
- Attach PV PANEL 2 to RAIL B with an END CLAMP ASSEMBLY.

7. INSTALL PV PANEL 3

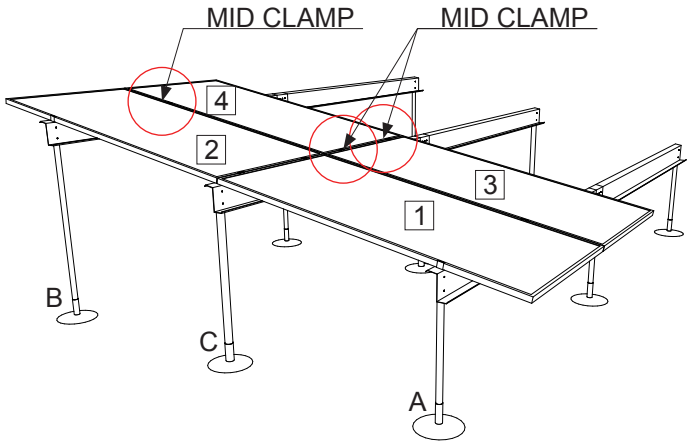


- Drill a 5/16” hole at the center line of the top flange of RAIL A, centered 3/16” from PV PANEL 1.
- Lay PV PANEL 3 on RAILS A and C, adjacent to PV PANEL 1.
- Place a MID CLAMP between PV PANELS 1 and 3.
- Snug PV PANEL 3 to the MID CLAMP panel spacing flaps between the PV PANELS.
- Confirm the PV PANELS are aligned.
- Attach PV PANELS to RAIL A with a MID CLAMP ASSEMBLY.
- Drill 5/16” holes at the center line of the top flange of RAIL C, inset from the corners of the PV PANEL the distance required for clamp placement by the PV PANEL Manufacturer and centered 3/16” from PV PANEL 3.
- Drill a 5/16” hole at the center line of the top flange of RAIL B, centered 3/16” from PV PANEL B.

INSTALL SEQUENCE

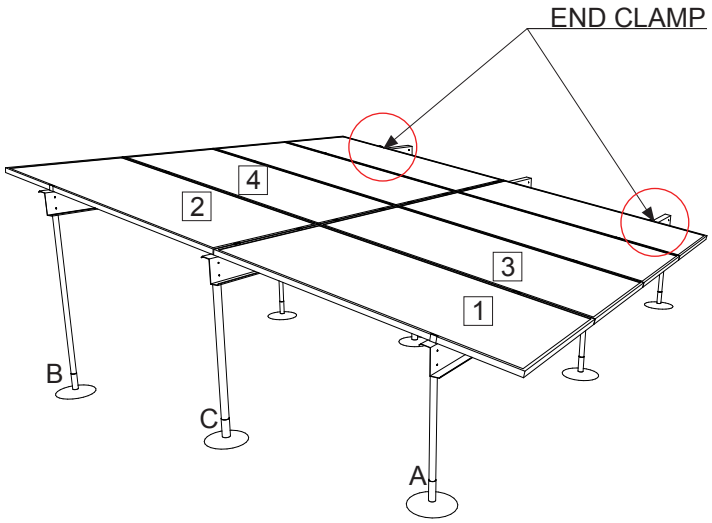
TPP-SR CONFIGURATIONS

8. INSTALL PV PANEL 4, AND ONWARD



- Lay PV PANEL 4 on RAILS B and C.
- Place MID CLAMPS between PV PANELS 3 and 4.
- Place a MID CLAMP between PV PANELS 2 and 4.
- Snug PV PANEL 4 to the MID CLAMP panel spacing flaps between the PV PANELS.
- Confirm the PV PANELS are aligned.
- Attach PV PANELS to RAIL C with two MID CLAMP ASSEMBLYS.
- Attach PV PANELS to RAIL B with a MID CLAMP ASSEMBLY.
- Repeat steps 7 and 8 with the remaining PV PANELS in the ARRAY.

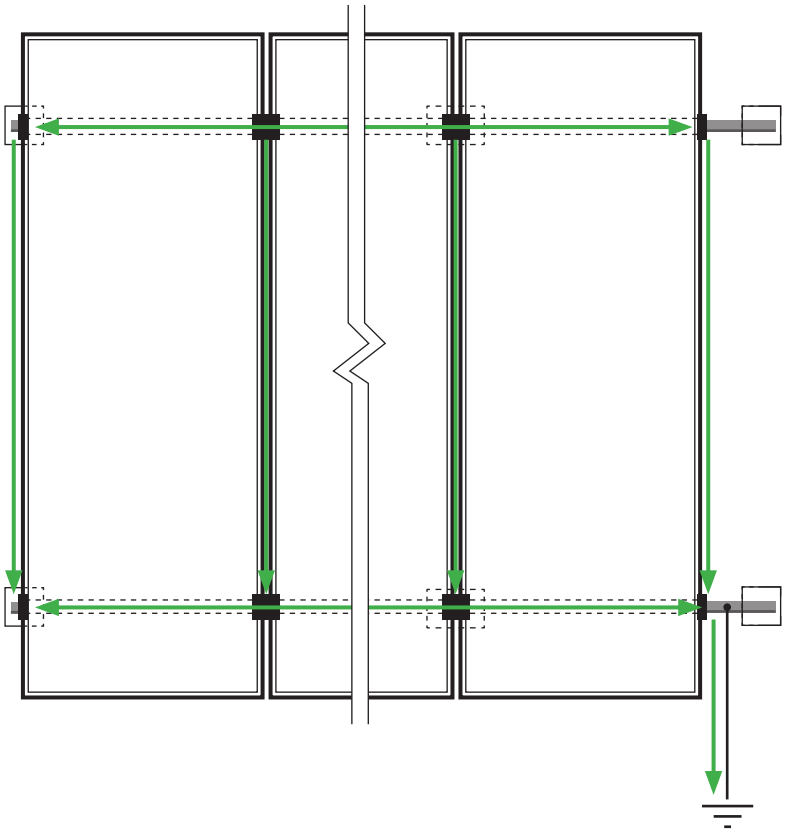
9. INSTALL LAST PV PANELS IN ARRAY



- Secure the terminal side of the last 2 PV PANELS of the ARRAY to RAILS A and C with END CLAMP ASSEMBLYS in the same manner as PV PANELS 1 and 2.

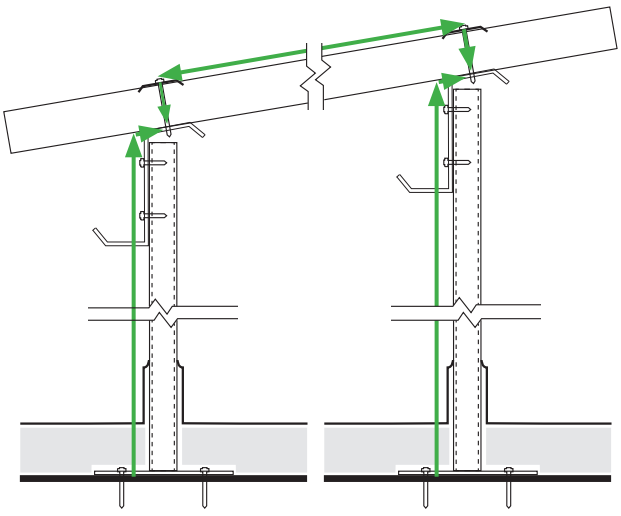
BONDING CONNECTION GROUND PATH

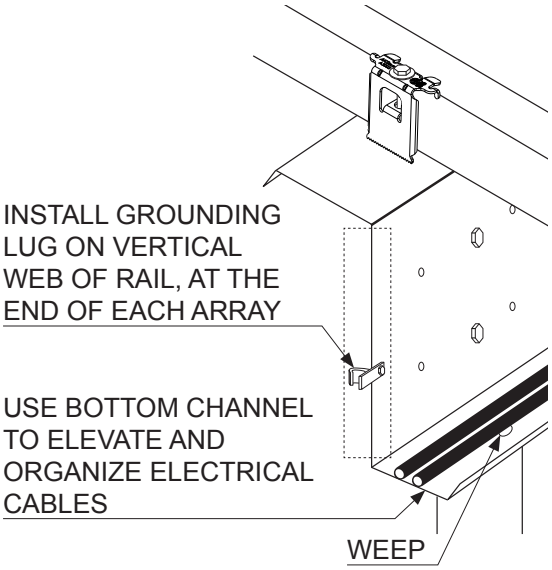
SPP CONFIGURATIONS



KEY

GROUNDING PATH	→
BONDED END CLAMP	▮
BONDED MID CLAMP	■
BONDED RAIL SPLICE	⊡
GROUNDING LUG AND BARE #6 STRANDED COPPER GROUND WIRE	⏚



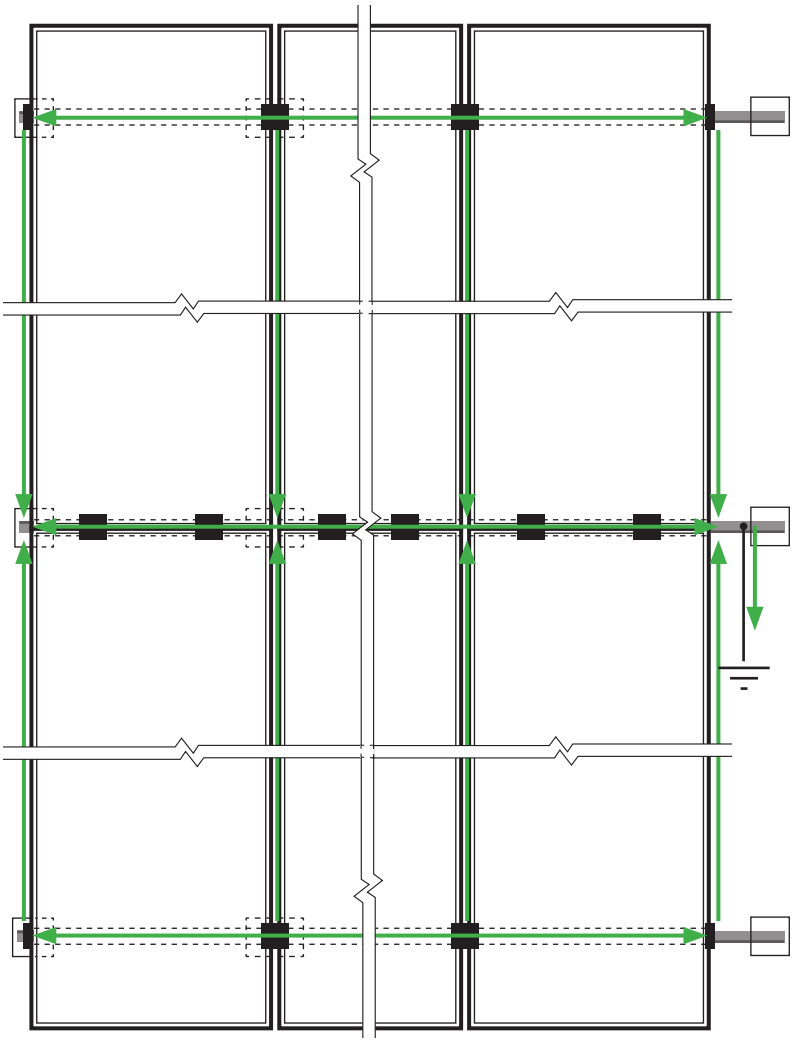


KEY

GROUNDING PATH	→

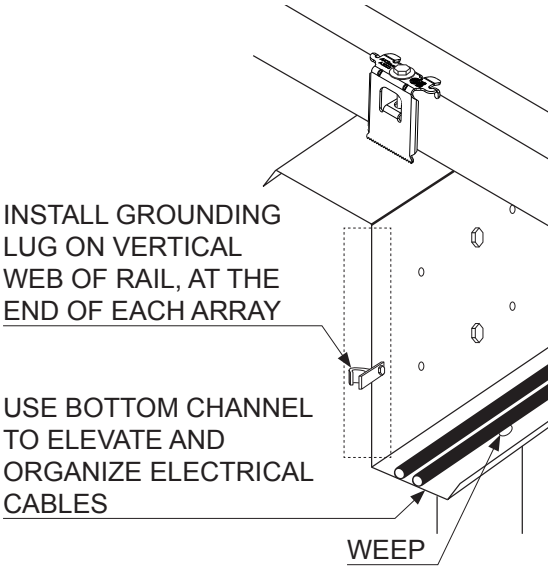
BONDING CONNECTION GROUND PATH

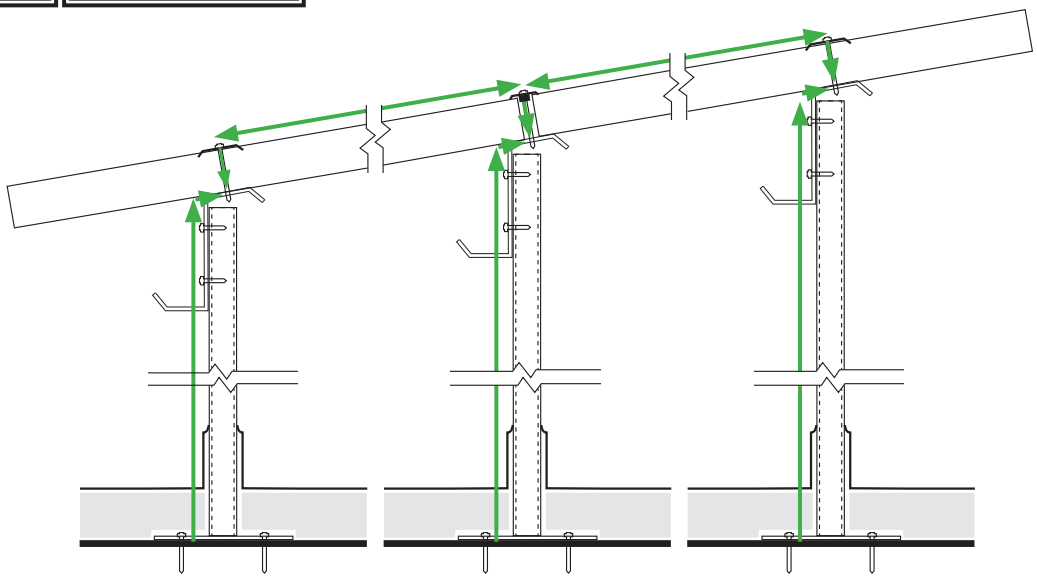
TPP-SR CONFIGURATIONS



KEY

GROUNDING PATH	→
BONDED END CLAMP	▮
BONDED MID CLAMP	■
BONDED RAIL SPLICE	⊹
GROUNDING LUG AND BARE #6 STRANDED COPPER GROUND WIRE	⏚





KEY

GROUNDING PATH	→

PANEL COMPATIBILITY

UL 2703 LIST OF APPROVED MODULES

All modules listed have been certified for Bonding & Grounding when used with SWIF Solar Racking. Type 1 and Type 29 modules have demonstrated a System Fire Class Rating of Class A with UL 61730-2. Refer to the PV module manufacturer's Installation Manual for approved clamp configurations.

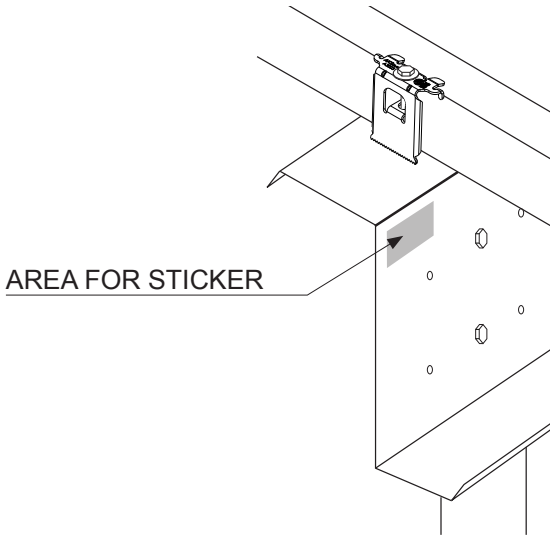
PV MODELS		FIRE RATING
Hanwha Q Cells		
Q. PEAK DUO XL-G10.2	470, 475, 480, 485, 490, 495	Type 1
Q. PEAK DUO XL-G10.3	475, 480, 485, 490, 495	Type 1
Q. PEAK DUO XL-G10.3/BFG	475, 480, 485, 490	Type 29
Q. PEAK DUO XL-G10.c	475, 480, 485, 490, 495	Type 1
Q. PEAK DUO XL-G10.d	475, 480, 485, 490, 495	Type 1
Q. PEAK DUO XL-G10.d/BFG	475, 480, 485, 490	Type 29
Jinko Solar		
JKM395M-72HL-V		Type 1
JKM400M-72HL-V		Type 1
JKM405M-72HL-V		Type 1
JKM410M-72HL-V		Type 1
JKM415M-72HL-V		Type 1
Canadian Solar		
CS3U-350|355|360|365PB-AG		Type 3 *(metal frame only)*
CS3U-370|375|380|385MB-AG		Type 3 *(metal frame only)*
CS3W-400|405|410|415|420|425PB-AG		Type 29
CS3W-435|440|445|450|455MB-AG		Type 29
CS1Y-390|395|400|405MS		Type 1
CS3N-380|385|390|395|400|405|410MS	(F23 frame only)	Type 1
CS6R-380|385|390|395|400|405MS-HL		Type 1

Note: Canadian Solar Modules:
Wattage restricted (size less than 27.4 sq. ft.)

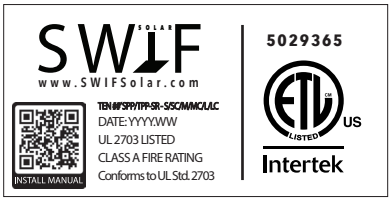
PV module options continue to grow and improve every day. Contact SWIF Solar (april@SWIFSolar.com) if the PV module you want to use for your project is not included in this list yet, if the clamp mounting configuration you require isn't approved by the PV module manufacturer yet or if the PV module is not yet evaluated for a Fire Rating. We can evaluate the panel for use with our system and then work with the module manufacturer and an UL evaluating entity to ensure compatibility.

MARKINGS

PLACEMENT OF MARKING



- Product markings are located on a UL 969 compliant sticker applied to RAIL A of each ARRAY.



- See Page 11 for a complete list of model names
- “YYYY” denotes the year of manufacture.
- “WW” denotes the week of manufacture of 52 weeks in a year.