AERORACK 2.0

by KB RACKING®

INSTALLATION MANUAL

AERORACK 2.0 EAST WEST

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Revision NW-06 | Jan 2026

BEFORE YOU BEGIN

Read all instructions carefully and completely.

IMPORTANT

Always observe all governing codes and ordinances.

For Reference Only – Images and diagrams used in this manual are for reference only. Your project will have specific documents and dimensions (provided separately).

Secure & Dry Storage – Store parts in a secure, dry location during installation. Wet storage stains are prevented by sufficient ventilation and protection from moisture.

Roof Flooding – Ensure proper rooftop drainage. Constant submersion of PV supports in water may damage parts. Consult with a KB Racking® Project Manager if this is the case.

Check Parts – Ensure the correct type and quantities of parts have been delivered.

Damaged Parts – If you have received damaged parts, immediately notify your KB Racking® Project Manager.

Modules – Racking system to be used with modules where compatibility from manufacturer has been approved.

Fire Rating - Racking system is to be mounted over a fire-resistant roof covering rated for the application.

Grounding – Racking system may be used to ground and/or mount a PV module complying with UL1703 or UL61730 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. Refer to page 4.

FOR YOUR SAFETY

While installing the PV system, proper safety equipment should be worn.

⚠ CAUTION/ATTENTION

KB Racking® components may have shifted during shipping. Take extra care when moving and unpacking components.

Les composants de KB Racking® peuvent ont déplacé au cours du transport. Prendre des précautions supplémentaires lorsque vous déplacez et déballage les composants.

⚠ DANGER

Only qualified professionals should install solar panels, DC cabling, and any anti-lightning safety devices.

Seulment les professionels qualifié devrait installer les panneaux solaires, les fils CC, et les dispositifs de sécurité contre la foudre.

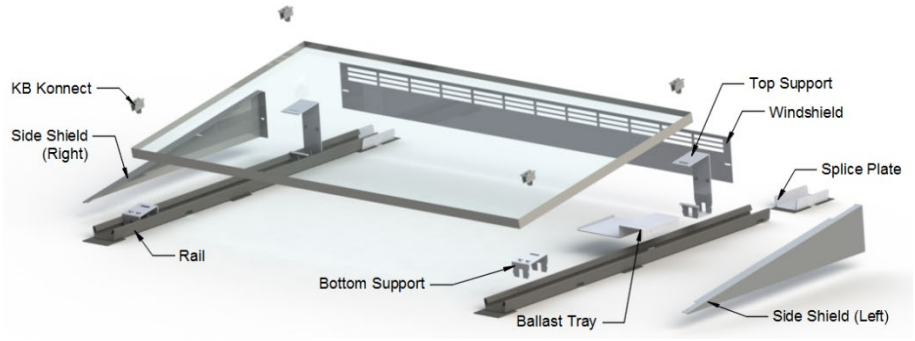
KB RACKING® IS NOT RESPONSIBLE FOR ANY DAMAGES INCURRED ONCE SHIPMENT HAS BEEN SIGNED FOR AND RECEIVED.

Table of Contents

UL2703 List of Approved Modules

Module Manufacturer	Module Type
Boviet	Boviet 35mm Module Frames: BVMYYYYM-xxx-H-HC-BF-ZZ Where “YYYY” can be 6610 / 6612 / 7610 / 7612 & “ZZ” can be DG or Blank.
Canadian Solar	Canadian Solar 35mm Module Frames: CS7N-xxxMB-AG
JA Solar	JA Solar 30mm, 35mm & 40 mm Module Frames: JAMYYZZZ-xxx/AA Where “YY” can be 54 / 72 / 78; “ZZZ” can be D10 / D30 / S10 / S30 / S31 & “AA” can be MB / MR
Jinko	Jinko 40mm Module Frames: JKMxxxM-72HL4-Y Where “Y” can be v / tv
Longi	Longi 35mm Module Frames: LRY-72ZZZ: Where “Y” can be 4 / 5 & “ZZZ” can be HBD / HPH
Qcells	Qcells 35 mm Module Frames: Q.YYY ZZZ Where “YYY“ can be PEAK DUO / TRON & “ZZZ” can be XL-G10.2 / XL-G10.3 / XL-G10.c / XL-G10.d / XL-G10.3 BFG / XL-G10.d BFG / XL-G11.3 / XL-G11.3 BFG / XL-G11S.3 BFG* / XL-G2.3 BFG
Silfab	Silfab 35 mm Module Frames: SIL-xxx-YY Where “YY” can be HC+ / HM / BG / HC / HN
Talesun	Talesun 30 mm Module Frames: TD6IYYM Where “YY” can be 60 / 72
Trina	Trina 35 mm Module Frames: TSM-YYY Where “YYY” can be DEG18MC.20(II) / DEG21C.20
VSUN	VSUN 35 mm Module Frames: VSUNxxx-144YYY Where “YYY” can be BMH-DG / BMH(BB) / M(BB/BW) / MH(BW)
ZnShine	ZnShine 30 & 35 mm Module Frames: ZXMY-AAA-xxx/M Where “Y” can be 6 / 7 & “AAA” can be SH144 / NHLDD144 / SHLDD144 / NH120 / NH144 / SH108

System Overview



Standard Components

☐	Axx-04B	AeroRack 2.0 – xx Deg. Module Top Support
☐	Axx-03B	AeroRack 2.0 – xx Deg. Module Bottom Support
☐	A00-01B-xx	AeroRack 2.0 Rail – xx mm
☐	A00-02B-TEK	AeroRack 2.0 – Rail Splice with TEK Screw
☐	A00-13B-TEK	AeroRack 2.0 – Double Ballast Tray
☐	Axx-0xB	AeroRack 2.0 – xx Deg. Windshield
☐	Axx-0xB-TEK	AeroRack 2.0 – xx Deg. Side Shield *(Left or Right, optional)*
☐	C02-35E	KB Konnect Clamp
☐	KB00-AL-01-xx	KB Konnect End Clamp, xx mm (30, 35, 40)
☐	C01-xxE	End Block, xx mm (Used for Alternative End Clamp Thickness)
☐	RPM3-45	3mm Roof Protection Mat 4 x5” *(un-attached)* *
☐	9410-53258-SSTEK	Hex Washer TEK Screw, #8x5/8”
☐	9111-M616-SS0	Hex Bolt, M6x16, Serrated Flange

**Pre-attached Roof Protection Mats are included on the following components: Rail, Rail Splice, and Ballast Tray. Unattached mats are placed under exposed Rail edges, per “Installing the Rails” section of this manual.*

Tools and Equipment Required for Installation

☐	5mm Allen Bit	☐	Spacer Sticks* (Pre-cut wooden spacers to consistently space supports – not supplied)
☐	10mm Hex Socket / Wrench	☐	Torque Wrench
☐	¼” Hex Socket / Wrench	☐	Safety Glasses
☐	Power Drill	☐	Safety Gloves

Preparing for Installation

1 Clean roof surface and remove all dirt and debris.

IMPORTANT

Inspect roof for damage prior to installation and record any existing damage with a digital camera.

2 Ensure proper drainage on the roof. Water accumulations may lower the load reserve of the rooftop and decrease lifespan.

3 Ensure the correct type and quantities of parts have been delivered.

If you have received damaged or missing parts, immediately notify your KB Racking® Project Manager.

⚠ CAUTION

Wear safety gloves when handling parts. Newly fabricated parts may have sharp edges.

⚠ PLEASE READ THE FOLLOWING ⚠

If roof/building edge has a fall distance of 10ft (3m) or greater,

Appropriate safety measures must be taken (i.e. harnesses) for installation of panels closer than 6.5ft (2m) to roof edges or skylights.

NOTE: Please note that KB Racking® Inc. requires all arrays to be no closer than 3ft (0.9m), unless otherwise stated, from a building's roof edge to validate wind load calculations and ensure the system is safely ballasted.

Installing the Rails

1 Before you begin, ensure you have the following documents **provided separately**: *Layout Diagram, Rail Table* and *Spacing Diagram*.

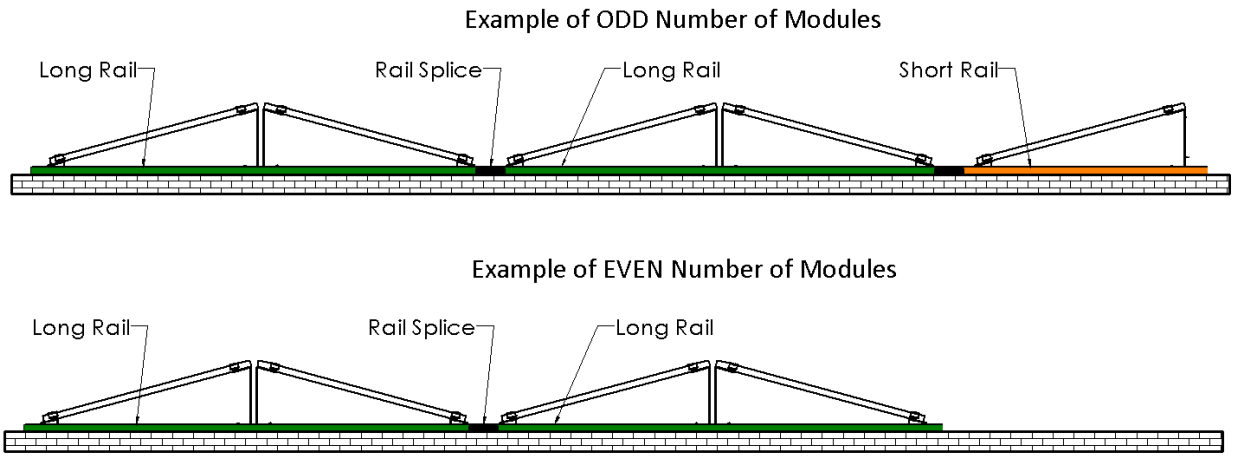


Figure 1 – Use your Rail Table to determine which size of Rail to use

2 Place your first Rail for an array. Refer to your *Rail Table* and *Layout Diagram* (Figure 1). The *Rail Table* provides the Rail size (short or long). The *Layout Diagram* provides the system location relative to the roof edge.

Tip: Your first Rail for a column of panels may be SHORT or LONG, depending on the number of panels in a column. Use your *Rail Table* to determine which combination of Rails to use, per Figure 1.

SHORT Rails are only used:

1. At the end of an E/W column, AND
2. Where there are an odd number of panels in an E/W column.

Note: Your project may use one OR two sizes of rails. See your *Rail Table*.

3 Use your *Spacing Diagram* to obtain the E/W Rail Spacing (see example, Figure 9).

4 Complete the first row of Rails of the array. Lay Rails adjacent to each other. Use chalk lines or spacer sticks to consistently align Rails and ensure Rails remain parallel to each other (Figure 2 and Figure 3).

5 Continue installing rows of Rails as required. Use your *Rail Table* and *Layout Diagram* to determine specific quantities and combinations of Rails.

6 Install Rail Splices to connect Rails. Equally space two Rails within a Splice. Use the pre-punched holes on the Splice to align and install 4x TEK Screws (Figure 4 and Figure 5). **Torque to 7.5 Nm (5.5 ft-lbs).**

7 Complete the Rail installation by placing Roof Protection Mats at the ends of Rails as needed. Peel the mask off the double-sided tape and adhere the Mat to the underside of a Rail to cover the Rail edge (Figure 6 and Figure 7).

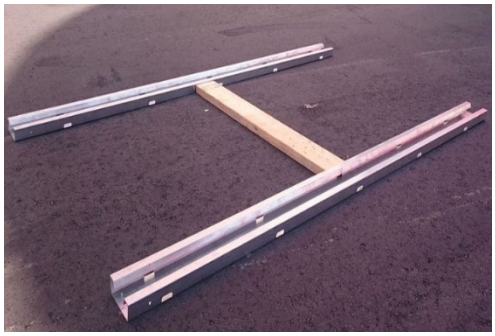


Figure 2 – Use spacer sticks to aid placement

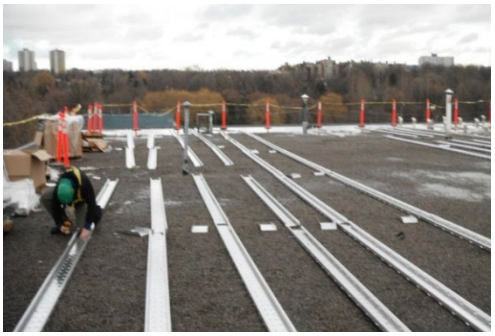


Figure 3 – Align Rails

Figure 4 – Assemble Rail and Splice Plate

Figure 5 – Connect two (2) Rails with Splice Plate

Figure 6 – Peel mask off tape

Figure 7 – Mat covers exposed Rail edge

How to Use Your Layout Diagram

1 From the layout, use the N/S and E/W dimensions at a corner of your roof as the ORIGIN (i.e. the beginning) of your installation.

2 Note the following items on your project specific *Layout Diagram*

NORTH ARROW **DIMENSIONS** **LEGEND**

ARRAY NUMBERS **ROOF STRUCTURES**

Use your *Spacing Diagram* to obtain the N/S Rail Spacing (see example, Figure 9).

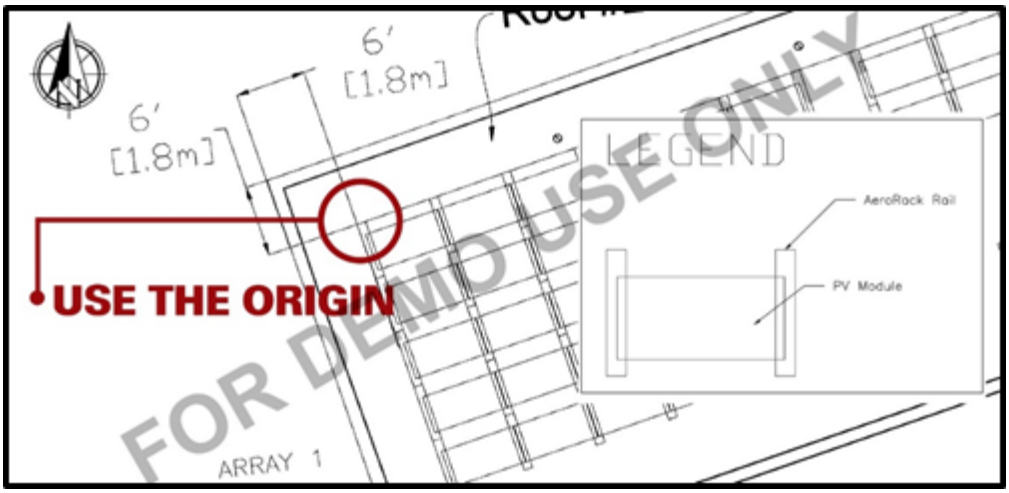


Figure 8 – Sample Layout Diagram

How to Use Your Spacing Diagram

1 Your *Spacing Diagram* will indicate the following important dimensions:

E/W SUPPORT SPACING (E/W distance between Supports)

INTER-SUPPORT SPACING (inter-row distance between Supports)

N/S RAIL SPACING (N/S distance between Rails)

INTER-ROW SPACING (E/W distance between rows on Rail)

END SPACING (E/W distance between edge of rail and first Support)

ROW SPACING (E/W distance between similar points)

Record these numbers and do not confuse them.

2 *Recommended:* Create spacer sticks for the first five dimensions above.

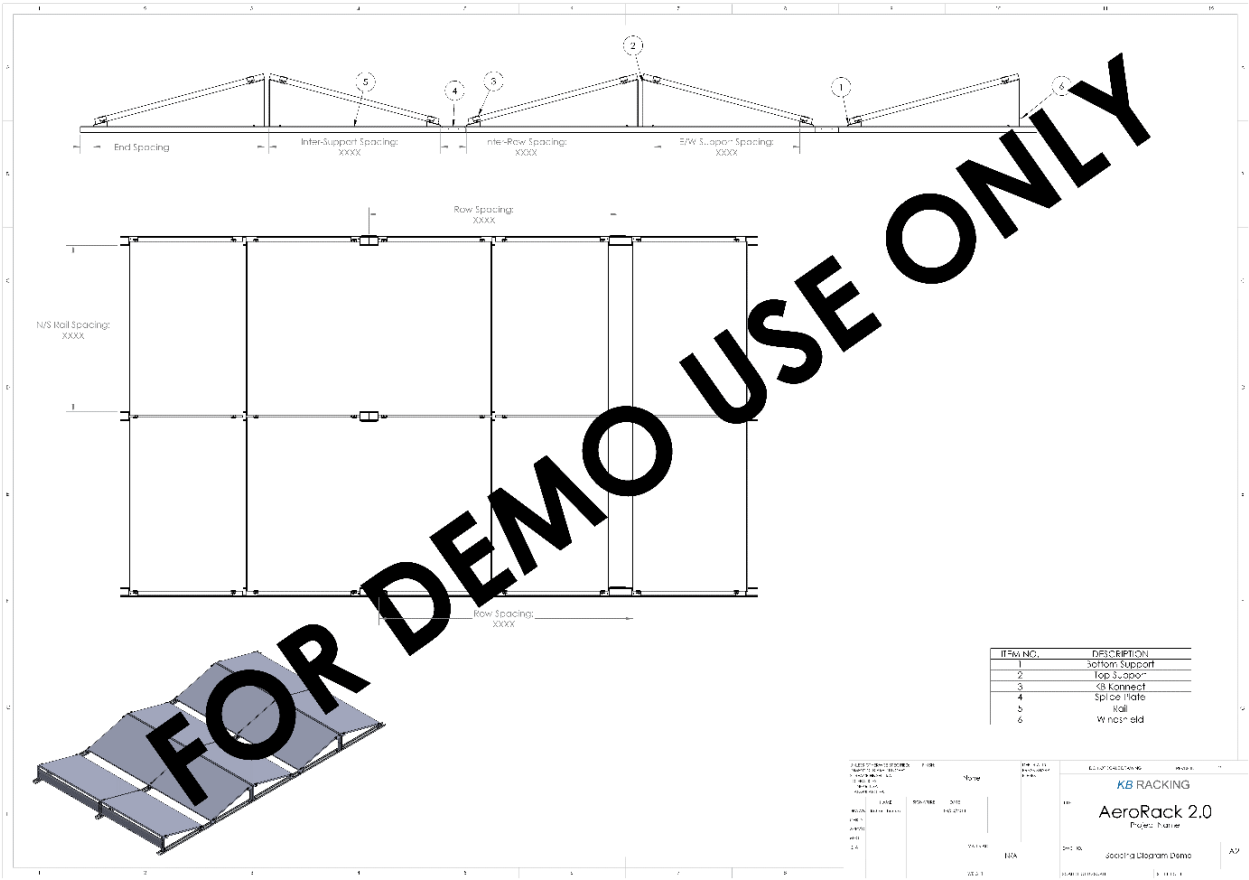


Figure 9 – Sample Spacing Diagram

Installing Module Supports

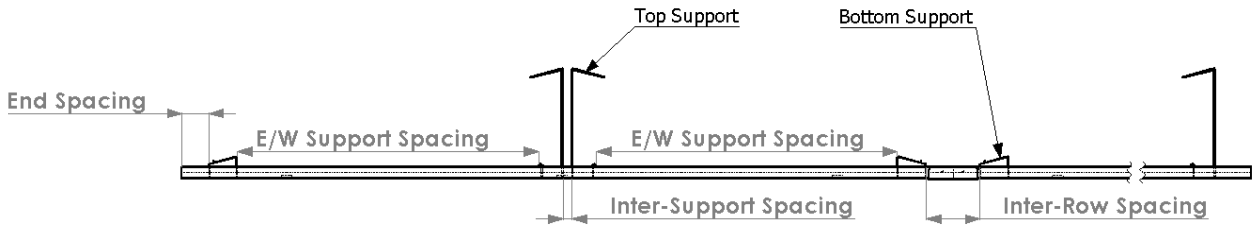


Figure 10 - Installing Module Supports

Note: *The steps below outline how to install the above configuration of E/W and single-panel bays. You can use your layout diagram to determine which steps/configurations are relevant to your installations.*

1. Mark the *End Spacing* at the West edge of a Rail (Figure 11).

2. Click-in the first Bottom Support by aligning the front of the Support at the *End Spacing* mark. Apply downward pressure by stepping on the Support (Figure 18). All four (4) click-in features of the support must be engaged with the Rail.

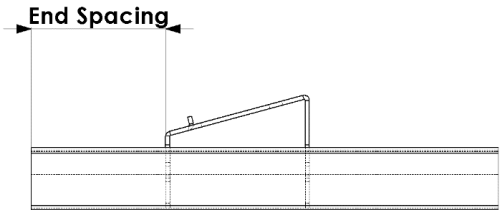


Figure 11 - End Spacing

3. Use the Spacing Diagram to obtain the *E/W Support Spacing*.

4. Click-in the first Top Support at the distance obtained in Step 3, with your spacing stick (see example, Figure 12).

   Tip: Hold the support at the top flange with both hands. Centre the support within the Rail channel and apply pressure by stepping on the bottom flange of the support. Applying pressure at the bottom flange first will click-in this flange alone. To completely click-in the Top Support, apply pressure with hands on the top flange. (Figure 20)

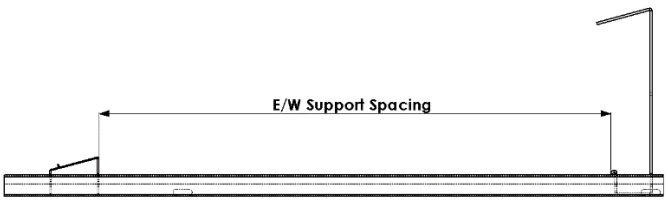


Figure 12 - First E/W Row Support Spacing

5. Use the Spacing Diagram to obtain the *Inter-Support Spacing*.

6 Click-in a Top Support at the distance obtained in Step 5, with your spacing stick. Ensure that the Top Support mirrors the one installed in Step 4, as shown in Figure 13.

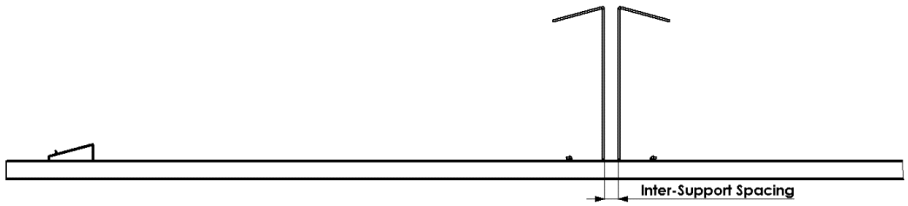


Figure 13 - Inter-Support Spacing

7 Complete the E/W bay by clicking in Bottom Support at the *E/W Support Spacing*, with your spacing stick. Ensure the Bottom Support mirrors the one installed in Step 2, as shown in Figure 14.

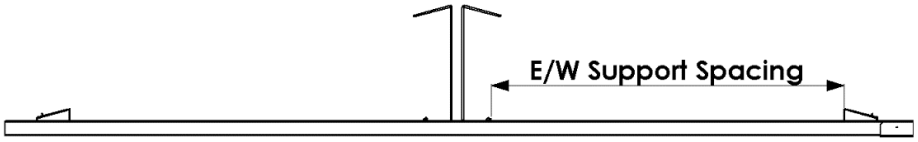


Figure 14 - Second E/W Row Support Spacing

8 Use the Spacing Diagram to obtain the *Inter-Row Spacing*.

9 Click in a Bottom Support at the distance obtained in Step 8, as shown in Figure 15.

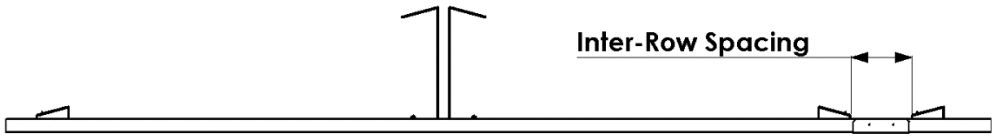


Figure 15 - Inter-Row Spacing

10 Complete the single-panel bay by clicking in a Top Support at the *E/W Support Spacing*, as shown in Figure 16.

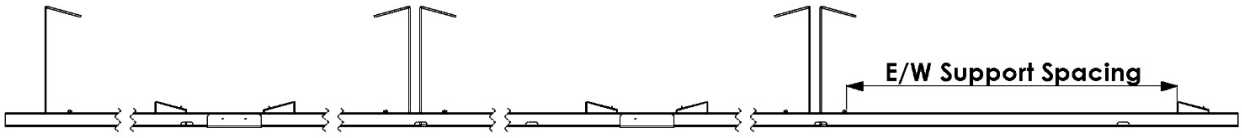


Figure 16 – Single-Panel Bay E/W Support Spacing

11 Repeat process from Steps 3 to 9 for the remaining Rails.

IMPORTANT

Complete the first row before installing additional rows to fix the distances between the module supports.

Figure 17 – Measure the first Bottom Support of the row

Figure 18 – Click in the Module Bottom Support

Figure 19 – Use pre-cut wood spacers to evenly space supports

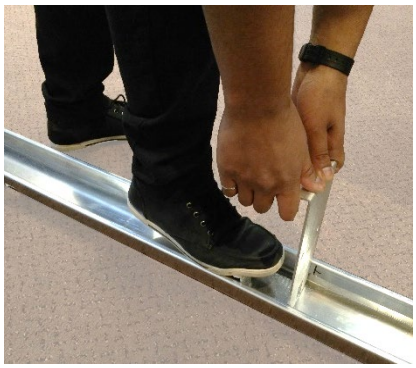


Figure 20 – Click-in the Module Top Support

⚠ PLEASE READ THE FOLLOWING ⚠

Following the installation of the module supports, ensure that the surface of the roof is well protected at the E/W ends of each column of rails. Any rail excess that may pose a threat of damage to the roof structure should have some roof protections pads placed underneath. Alternatively, these excess sections could be cut off with a Circular Saw.

NOTE

The system requires at least 9cm (3.5”) of rail extending beyond supports at each end of a column of rails.

Installing Double Ballast Trays

1 Double ballast trays are only required wherever they are shown on the *Ballast Layout* (see example, Figures 25).

2 Install Ballast Trays under PV panels, top-down, onto rails (see example illustration, Figure 21). Refer to the *Shading Diagram*, provided separately, for configuration requirements. Install 4 TEK screws through tray and rail.

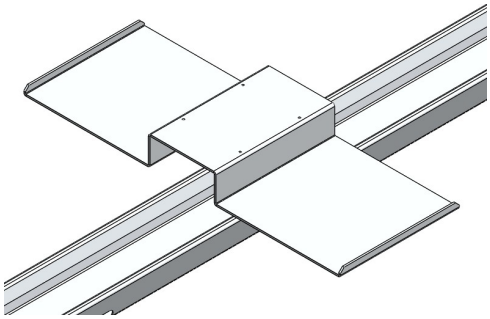


Fig. 21 – Install Tray 'top-down' on Rail

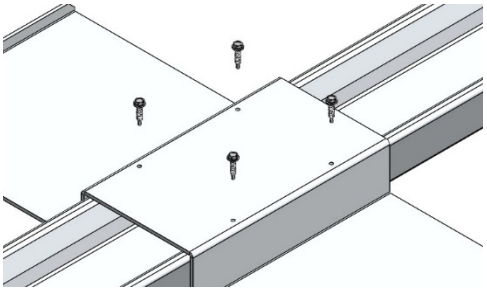


Fig. 22 – Install TEK Screws

3 Place Ballast under panels according to your project specific *Ballast Layout* and *Shading Diagram* (see example, Figure 16-17).

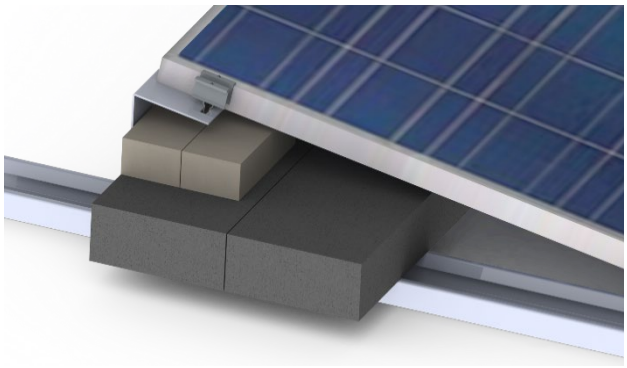


Fig. 23 – Example of ballast on rail

Fig. 24 – Example of ballast on tray

How to Use Your Ballast Layout

1 Ensure you have the *Ballast Layout* and *Shading Diagram* documents, both provided separately.

The *Ballast Layout* shows the combinations of stones required <u>at each rail</u>, to ballast the adjacent panels.

The *Shading Diagram* shows sample arrangements of stones (Figure 26).

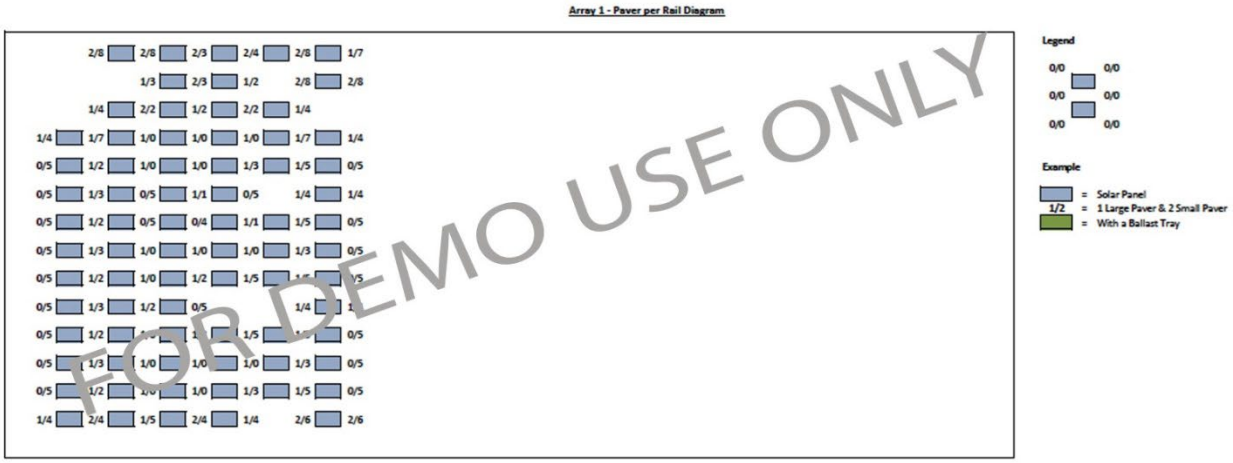


Figure 21 – Sample Ballast/Paver Layout

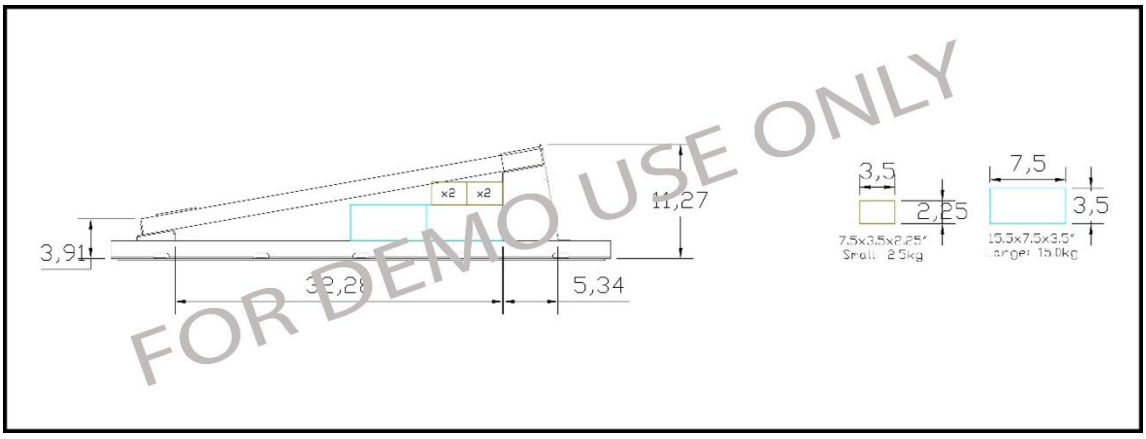


Figure 22 – Sample Ballast/Paver Shading Diagram

IMPORTANT

Photos of ballast arrangement are required as part of product warranty requirements – capture these photos before panels go down.

Installing PV Modules

1. Begin at an array edge. Place a PV module across two Bottom Supports.

2. Lay down the PV module onto the Top Supports.

3. Align the module. Each support features an etching. The edge of a PV module must be on this etching to ensure the panel is centered across all four supports (N/S).

IMPORTANT
Strong winds can lift modules. Once installed, PV Modules should not be left unsupervised without windshields installed.

4. Continue placing PV modules for an entire row.

5. Secure PV modules beginning at the start of a row. Clamps at module edges require End Blocks, OR KB Konnect End Clamps. Click Clamps into slots on the Support and use a 5mm Allen key to secure the Clamp (Figure 27 to Figure 29).

IMPORTANT
End Blocks provided by KB Racking® are designed to match your PV Module thickness. This ensures the clamp sits flat. If end clamps do not sit flat, you have the incorrect block. Notify your builder immediately.

IMPORTANT
Each solar panel requires FOUR (4) clamps.

IMPORTANT

To prevent damage to solar panel and clamp, do not exceed recommended torque setting below.

Do not use hammer drills, impact drivers, or long Allen keys.

6 Continue installing adjacent PV modules. To ensure proper clamping, pull panels firmly together while installing (see examples, Figure 30 and Figure 31).

7 **Torque KB Konnect to 8.3Nm (6.1 ft-lb).** Clamps must sit flush to each panel being clamped. This ensures the panel frames are pierced.

8 Begin the next row. Repeat steps 1-7 until all modules are installed.

IMPORTANT

KB Konnect clips are designed for single use only.

If clips are removed for maintenance purposes, new KB Konnect clips must be re-installed. Clamp body and bolt are multi-use.

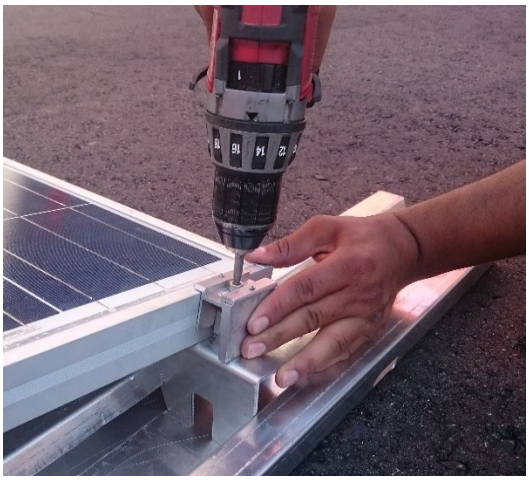


Figure 23 – Fasten KB Konnect End Clamp, with End Block

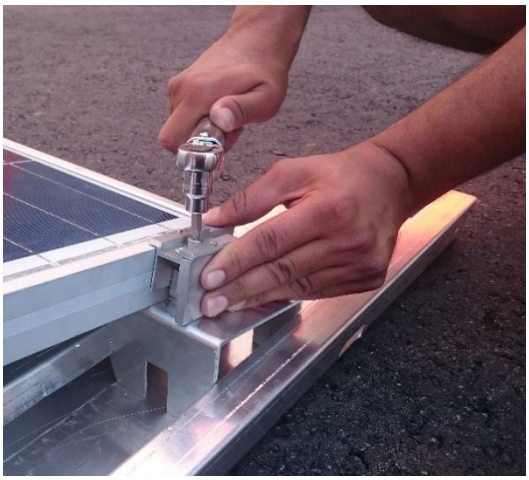


Figure 24 – Torque KB Konnect End Clamp, with End Block

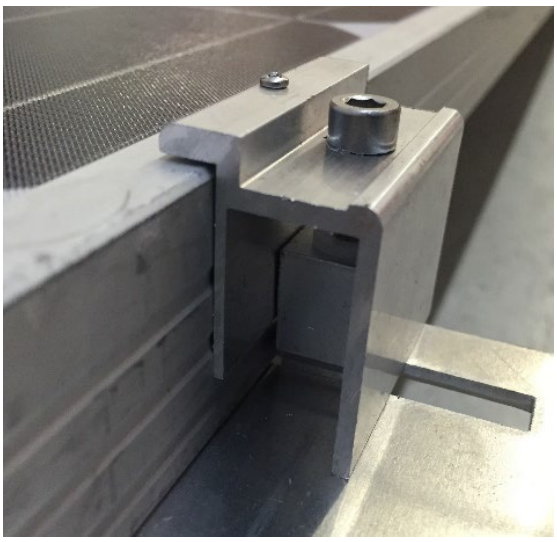


Figure 25 – KB Konnect End Clamp

Figure 26 – Two adjacent modules pullet together prior to securing clamp

Figure 27 – Two adjacent modules pulled together while securing clamp

Installing Cable Systems

1 After all modules are in place, string cables can be put into the middle notch of the Module Top Supports and Bottom Supports.

Tip: Rails can be used as cabling channels either under or to the side of the supports, within the rail channel.

Figure 28 – Rail cabling through supports

IMPORTANT

In case there are any anti-lightning safety devices on the roof, a qualified professional should integrate them into the solar installation.

Installing Windshields

NOTE: *Windshields are only required on Top Supports that are at the edge of an array. In other words, Windshields are only required at single-panel bays.*

1. At the end of a row place the windshield flat against the Top Support. ***Flanges face away from supports.***

2. Align slots on the shield to the Windshield mounting holes on the Top Supports. ***Slide the shield as far to the outside edge of the array as permitted by the slots.*** (Figure 33)

3. Use two M6 bolts and nuts to secure the shield to two supports. ***Torque to: 11.8 Nm (8.7 ft-lbs).*** (Figure 34)

4. Install remaining shields. Continue sliding shields to fit.

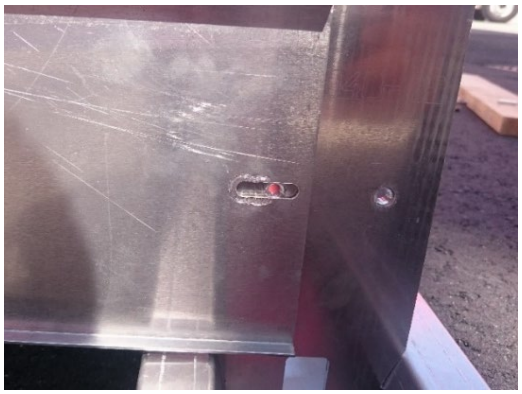


Figure 29 – Align shield with mounting holes

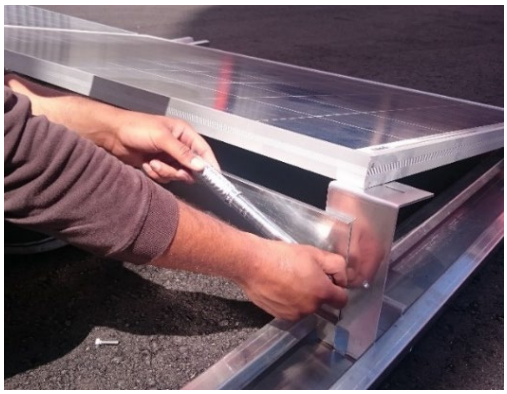


Figure 30 – Torque shield to the Module Top Support

IMPORTANT

Windshields are designed to accommodate various lengths of panels. For smaller 60 Cell panels, it may be necessary to overlap and/or flip windshields.

<u>Windshields must be mounted through the provided slot, and may slide along this slot to fit the system.</u>

60 CELL WINDSHIELDS CAN OVERLAP/FLIP

Installing Side Shields (Optional)

1. Install Side Shields at the end of rows (Figure 35). Left and/or Right-hand shields can be installed depending on your project requirements.

2. Place Side Shield by aligning the rear slot with the outer press-fit nut on a Top Support. Use an M6 bolt to hand-tighten the rear of the shield.

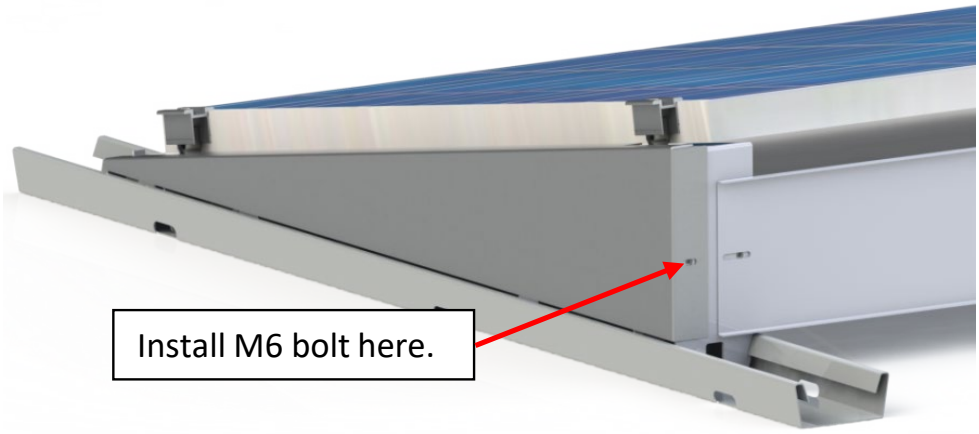


Figure 31 – Side Shield aligned with outer press-fit nut

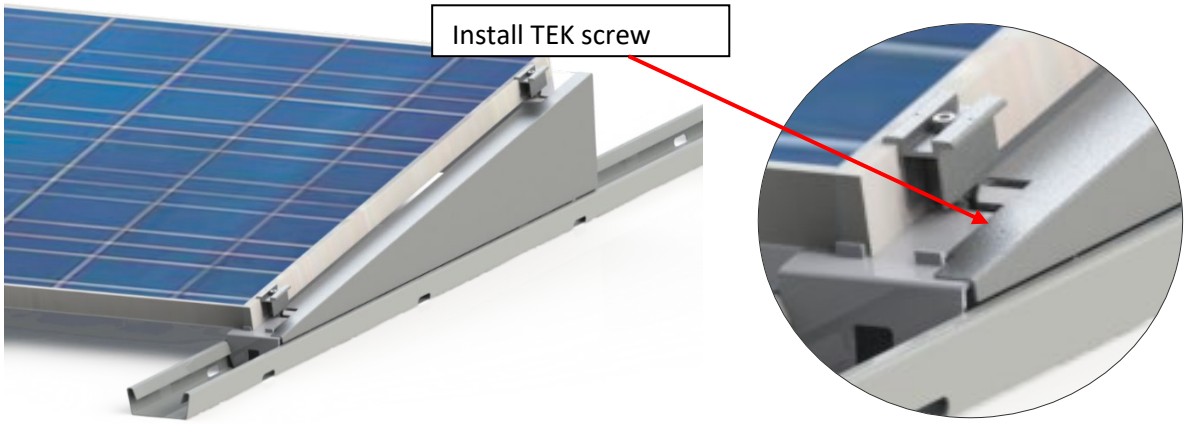


Figure 32 – Side Shield alignment and securement

3. Using the pre-punched hole at the front of the side shield to locate and install a TEK Screw (Figure 36). **Torque to 7.5 Nm (5.5 ft-lb).**

4. Torque the M6 bolt at the rear of the shield to **11.8 Nm (8.7 ft-lb)**.

Installing ETL Certified Grounding Lugs

Ilsco Grounding Lug

1 Fasten grounding lugs (not provided) onto any one Rail per Array. Tighten bolt. **Torque to: 5Nm (3.69ft-lb).**

2 Insert #6 AWG – RW75 uninsulated copper ground wire into wire slot. Tighten bolt. **Torque to: 5.08Nm (3.75ft-lb).**

Figure 37 - Grounding Lug Schematic (Tyco model, 2058729-1 shown as an example)

IMPORTANT

For the purpose of electrical bonding, only one grounding lug is required per array per 25x20 panels in the E/W x N/S directions, respectively. Panels may be installed in landscape or portrait orientation. If array area exceeds 25x20 panels, then additional grounding lugs are required, per each additional area.

Maximum Series Fuse Rating: 30 Amps

PLEASE READ THE FOLLOWING

The module clamps contain protruding screws that pierce the panel frame to provide an electrical bonding connection between the panel and racking. The grounding continues through the racking to the base Rail where the system is connected to a grounding wire through grounding lugs.

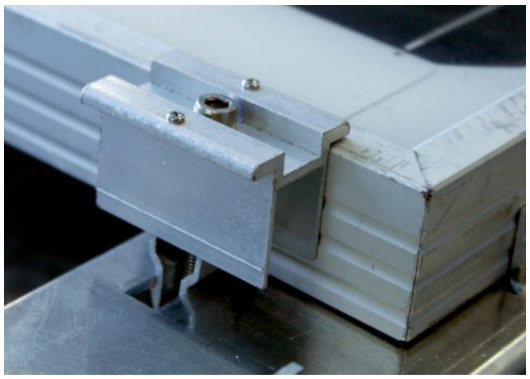
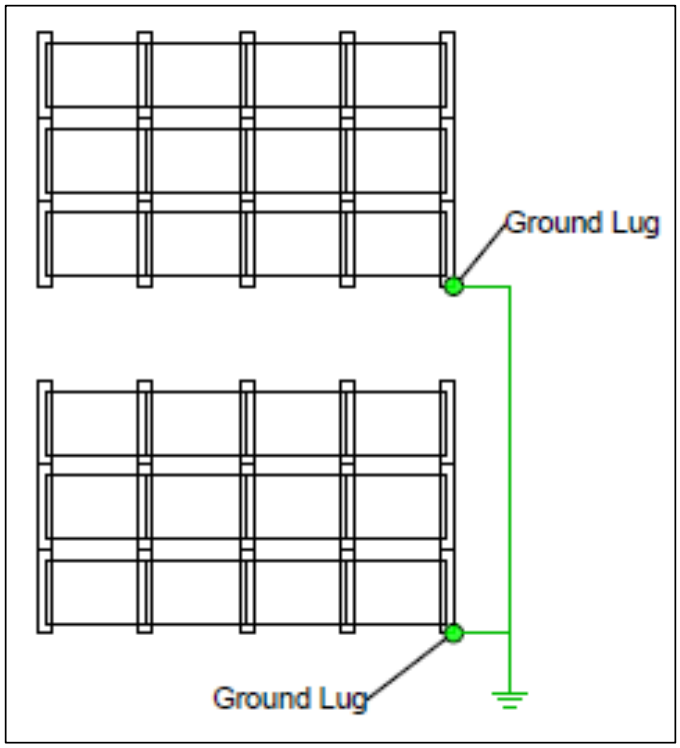


Figure 38 – Module Clamp with pierce screws

For the purpose of electrical bonding, only one grounding lug is required per array per 25x20 panels in the E/WxN/S directions, respectively. Panels may be installed in landscape or portrait orientation. If array area exceeds 25x20 panels, then additional grounding lugs are required, per each additional area.



Basic Wiring Diagram, Use as Example Only

⚠ PLEASE READ THE FOLLOWING ⚠

Installer is responsible for and shall provide an appropriate method of direct-to-earth grounding in accordance with the latest edition of the Canadian Electrical Code Part 1, CSA 22.1 Safety Standard for Electrical Installations or the National Building Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems.

Please refer to your local Building and Electrical Codes.

⚠ PLEASE READ THE FOLLOWING ⚠

Keep Copper away from Aluminum components in a fashion that maintains a minimum of ¼" separation.

⚠ PLEASE READ THE FOLLOWING ⚠

The bonding path for grounding is a result of the interconnection of all components in the array;

During scheduled maintenance, the removal of modules, windshields or other components must be carefully and methodically considered. By removing a row of modules and windshields, you may be disrupting the bonding path in the North-South direction.

At all times, the array must be interconnected to the grounding lug (as well as during maintenance).

Completing the Installation

1 For each array, ensure the following items are correctly installed and torqued:

i. Module Clamps
ii. Grounding lugs
iii. Windshields

Product Maintenance Information

To maximize life span and ensure peak performance, KB Racking® recommends routine maintenance checks. The following checks should be completed every 6 months to maintain the system's integrity.

- □ Remove debris from rooftop that can damage panels or stop solar absorption.
- □ Clean solar panels and remove bird waste.
- □ Check clamps and hardware to ensure intended connections are secured.
- □ Check components for damage (warping, bent).
- □ Check that windshields are in place and secured.