



Revolutionary Solar Racking Systems



# BallastRack Install Instructions

(IR-45ASA, 45ASAB)

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IntegraRack® backs all of its products with a 25 year limited product warranty. We fully stand by the quality and guarantee that they will hold up under the harshest conditions when properly installed.

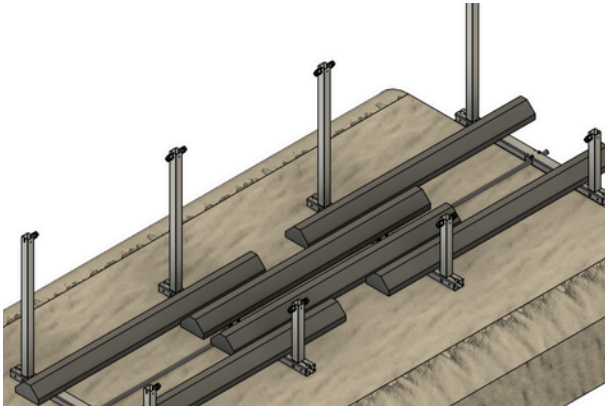
## Disclaimer

The instructions detailed in this manual will provide the knowledge and requirements necessary for proper installation of the given product. Be sure to read them thoroughly and make sure that you fully understand them before proceeding with installation. Any improper use or installation of these products will void any and all warranty coverage, and may cause failure, property damage or personal injury. IntegraRack is not responsible for any damages caused by improper use. All IntegraRack products are only intended to be installed by professional, licensed installers.

### **IT IS THE RESPONSIBILITY OF THE INSTALLER TO:**

- Comply with any and all applicable local or national codes and regulations.
- The installation methods shown in this manual are tested and approved for use by IntegraRack. Any other method for mounting will void the manufacture warranty.
- Ensure all products are appropriate for the installation according to the environmental and loading conditions.
- Ensure ground at installation site is level and suitable for the desired mounting.
- Disconnect AC power before servicing or removing modules, micro-inverters or power optimizers.
- Review manufacturer's documentation for compatibility and compliance for solar modules and 3rd party systems.
- If loose components or loose fasteners are found during periodic inspection, re-tighten immediately. Any components showing signs of corrosion or damage that compromise safety shall be replaced immediately.
- 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.
- Ensure safe installation of all electrical aspects of the solar system (All electrical installation and procedures should be conducted by a licensed and bonded electrician or solar contractor). Regular maintenance of a module or panel shall not involve breaking or disturbing the bonding path of the system. All work must comply with national, state and local installation procedures, product and safety standards.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- Ensure provided information is accurate. Issues resulting from inaccurate information are the installer's responsibility.



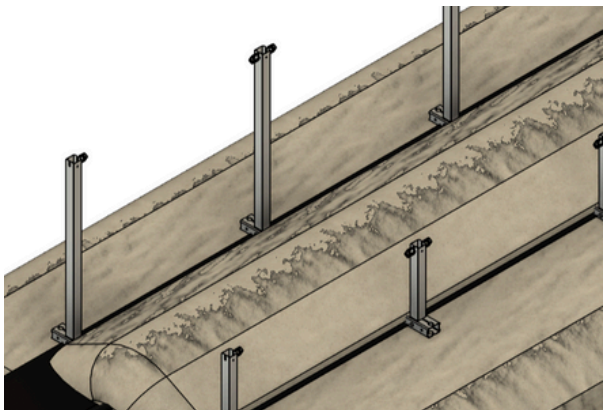


## Base Ballasted Installation

Each IR-45ASA can be mounted using water tote tanks or concrete curb stops for temporary or permanent mounting of solar modules. Water tote tank not provided (minimum weight and dimensions listed on Page 17).

Concrete curb stops can be sourced locally minimum weight and dimensions listed on Page 17).

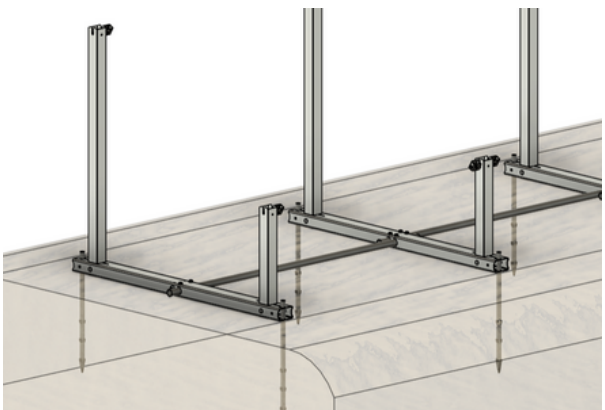
**3/8 x 12" concrete forming steel stakes recommended**



## IR EarthBallast™ Installation

Our IR EarthBallast™ Kit comes with pre-cut rolls of strong geotextile made for retaining walls and a high-strength tested 15 minute epoxy to hold the geotextile to the frames. This creates a large surface area to hold the dirt mound. Each module section requires a mound of dirt, road base, or gravel. See [Stamped Engineering & Datasheets](#) for the IR-45ASA for specific weight requirements. A shovel or skid-steer can be used to cover the frames with earth fill.

**3/8 x 12" concrete forming steel stakes required**



## IR AnchorSpike™ Installation

Our IR AnchorSpike™ Kit comes with our specially designed 30" barbed aluminum spikes, which have a hollow structure to allow our super strong two-part epoxy to flow deep into the soil and create a solid anchor in the soil rated for up to 1,000 pounds of uplift per spike in most soil types. Each frame has clamps at each end to clamp onto the 2 IR AnchorSpikes which allows for fast and easy leveling of the system. IR AnchorSpikes must be tested in soil at installation site to ensure they can withstand a minimum of 1,000 pounds of uplift.



## Concrete Slab/Footing Anchor Bolt Installation

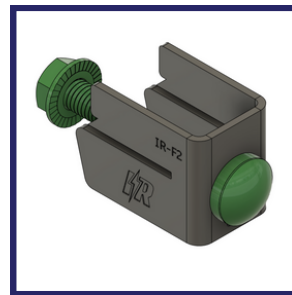
Our IR Concrete Anchor Bolt Mounting Kit provides 22 concrete anchor bolts and 44 washers for the strongest possible mounting, and allows for easy installation of up to 10 solar modules. The frames can be direct bolted to pre-cast concrete footings or most existing concrete surfaces, such as patios and driveways (local site specific engineering required).



# Included Components

## IR-45ASA Components (Per Frame)

- (1) IR-45ASA Base Tube
- (1) IR-45ASA Adjustable Leg
- (1) IR-45ASA Short Leg
- (4) IR-F2 Flange Clamp Bonding Brackets
- (2) Washers (for IR-F2 clamps on short leg only)
- (4) Bolt As
- (4) Bolt Bs
- (4) Nut As



IR-F2 Solar Module Flange  
Clamp Bonding Bracket



Washer



Bolt A



Bolt B



Bolt C



Nut A

## IR-45ASAB Components (Per Frame)

- (1) IR-45ASAB Base Tube
- (1) IR-45ASAB Adjustable Leg
- (1) IR-45ASAB Short Leg
- (4) IR-F2 Flange Clamp Bonding Brackets
- (2) Washers (for IR-F2 clamps on short leg only)
- (4) Bolt As
- (4) Bolt Bs
- (4) Nut As

## Required Tools

- Screw Gun with 1/2" Socket (**DO NOT USE AN IMPACT GUN**)
- Small 1/2" / 13mm Wrench
- 4' Level
- Tape Measure
- String Line
- 18" x 3/8" Concrete Forming Stakes (**OPTIONAL**)

## Required Additional Materials

- 1" EMT (Electrical Metal Tubing) / Conduit Pipe

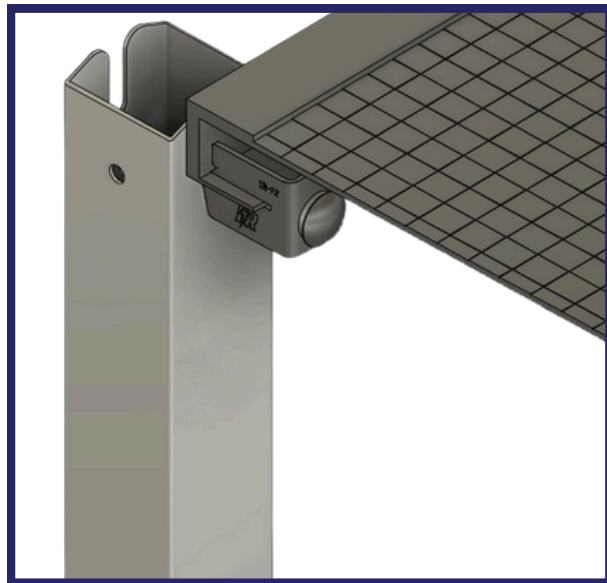
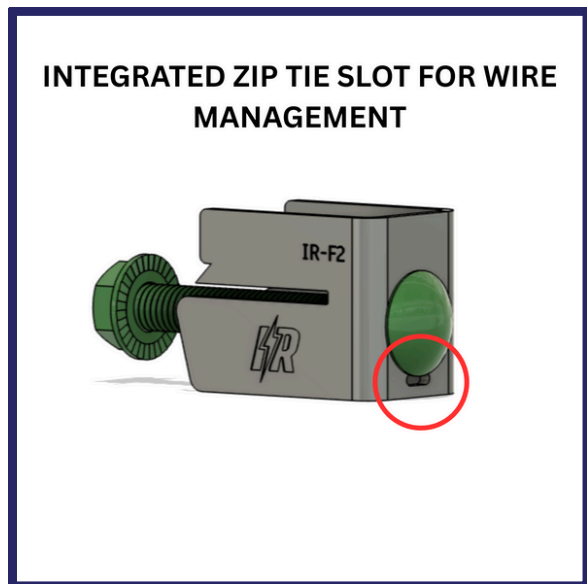
\*Can be sourced at most local hardware stores

**\*NOT REQUIRED FOR CONCRETE MOUNTING**

# IR-F2 Bracket

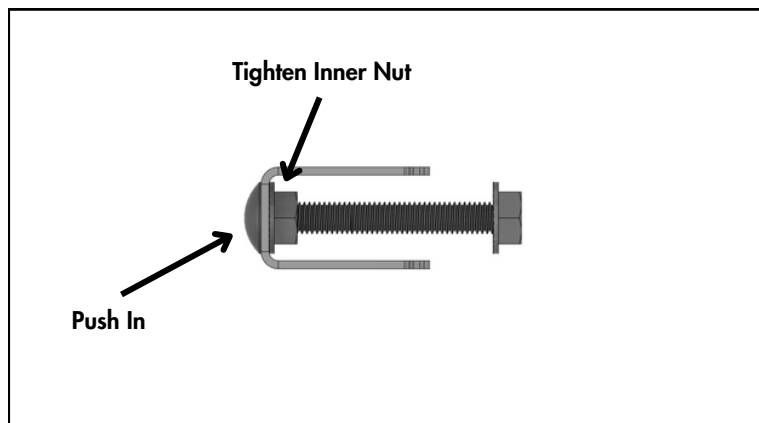
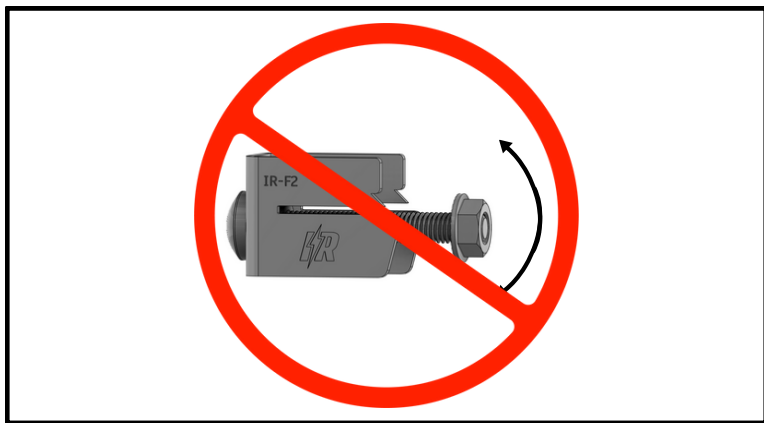
## IR-F2 Solar Module Flange Clamp Bonding Bracket

The IR-F2 is designed to hold your solar module firmly in place while bonding them together. The included washers must be used with the clamps attached to the short legs of the IR-45ASA.



### IMPORTANT

It is important to make sure that the bolt in each IR-F2 is NOT loose. If you find any that are loose follow the instructions below to make sure that it is firmly in place.



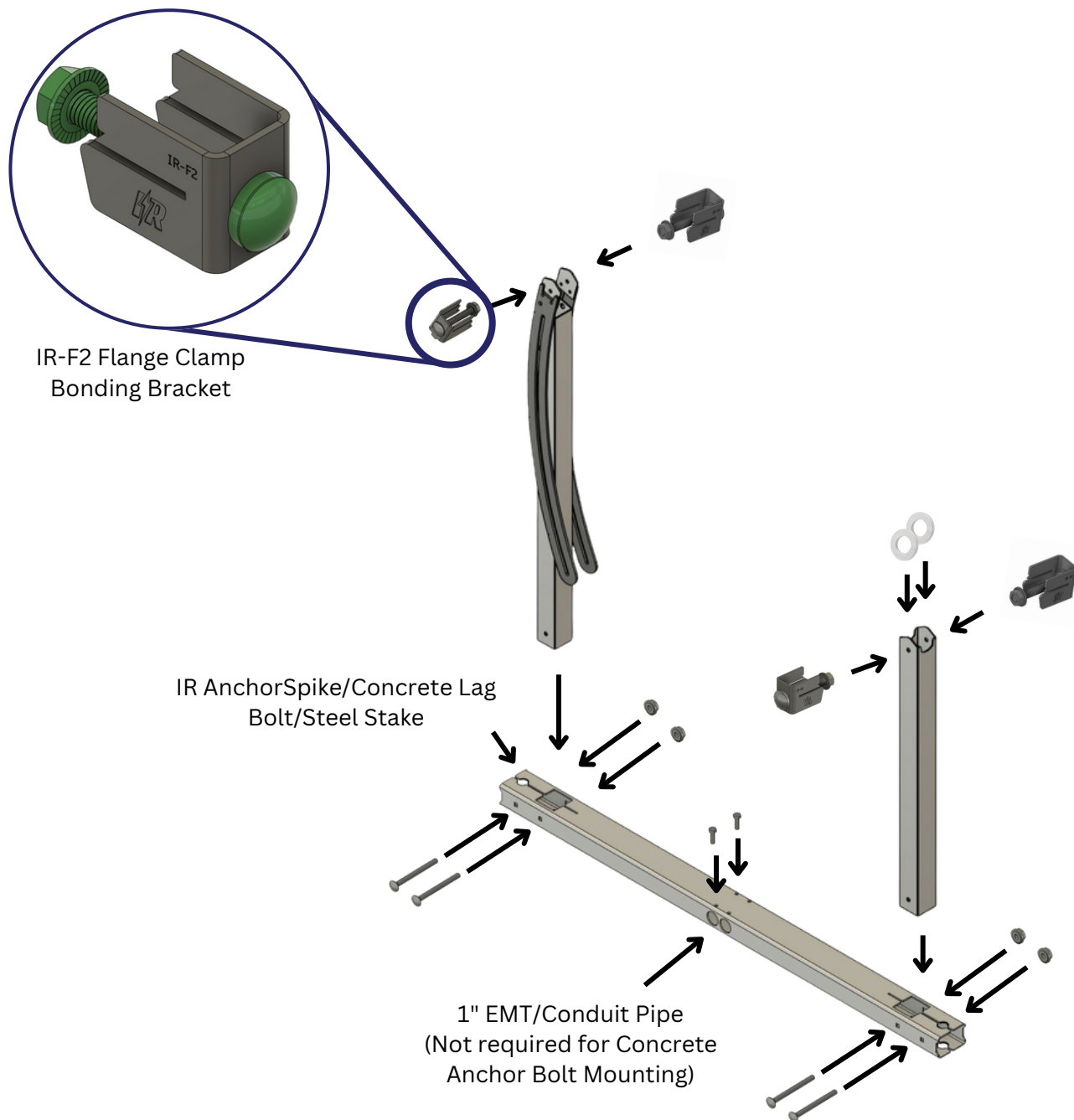
### 1. Checking For Loose Clamps

As you take the IR-F2 Clamps out of the hardware box check each one by holding the main body of the clamp in one hand and shake the bolt with the other. If it doesn't feel firm, it must be tightened.

### 2. Tightening The Inner Nut

First, push the head of the bolt in (make sure that the square shoulders of the bolt fit into the square opening of the main body) and tighten the inner nut by hand. Make sure the bolt no longer moves up and down. If possible, use a socket wrench with a deep 1/2" or 13mm socket to tighten the inner nut.

# Assembly & Fastener Locations

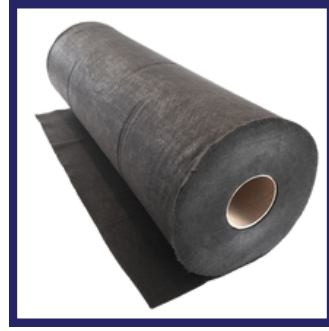




# Mounting Kit Components

## IR EarthBallast Kit

- Quick Cure 15 Epoxy Resin
- Extra Mixing Nozzle
- 3' x 50' Roll of Geotextile Material
- Alcohol Wipes
- Scuff Pad
- 13mm Open-Ended Ratcheting Wrench



## IR AnchorSpike Kit

- (10/22) IR AnchorSpikes
- Epoxy Resin A
- Epoxy Resin B
- Mixing Cup
- 3oz Measuring Cups
- Stirring Stick
- Funnel
- Gloves
- 13mm Open-Ended Ratcheting Wrench



## Concrete Anchor Bolt Kit

- (22) 3/8" x 2.5" Titen HD Anchor Bolts
- (44) Washers
- (2) 3/8" Concrete Drill Bits
- 13mm Open-Ended Ratcheting Wrench



## Additional Tools Required For Mounting Kits

### IR Earth Ballast Kit

- Caulk Gun
- Shovel
- Skid-Steer Loader (Optional)
- 3/8" Concrete Forming Steel Stakes

### IR Earth Spike Kit

- Small Sledge Hammer
- SDS Plus Hammer Drill
- 3/4" x 30" SDS Max Concrete Drill Bit

### Concrete Slab/Footing Kit

- SDS Plus Hammer Drill
- Chalk Line

## IMPORTANT

- Make sure to leave the system locked in the lowest position until full installation is complete.

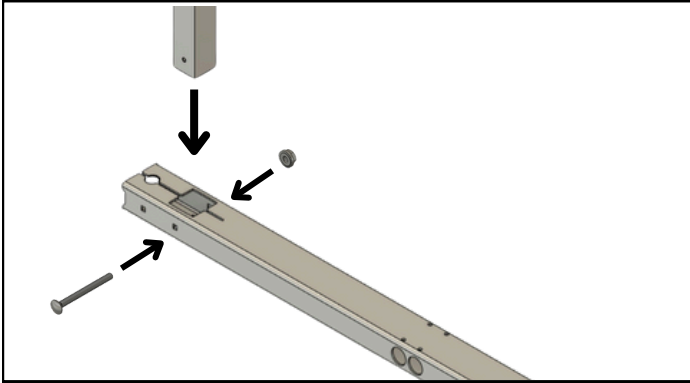


Figure 1

### 1. Install The Long Leg

Insert the long leg into the square opening at the back of the base tube and make sure the bottom of the adjustable arm is pointed towards the front of the base tube. Use a single Bolt A and Nut A to lock it in place.

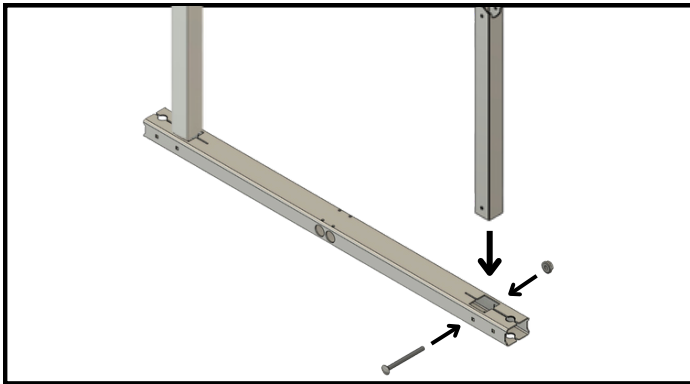


Figure 2

### 2. Install The Short Leg

Use the same process to install the short leg, making sure that the holes for the solar panel clamps are facing the sides of the base tube.

*Repeat Steps 1 & 2 until all frames are assembled.*

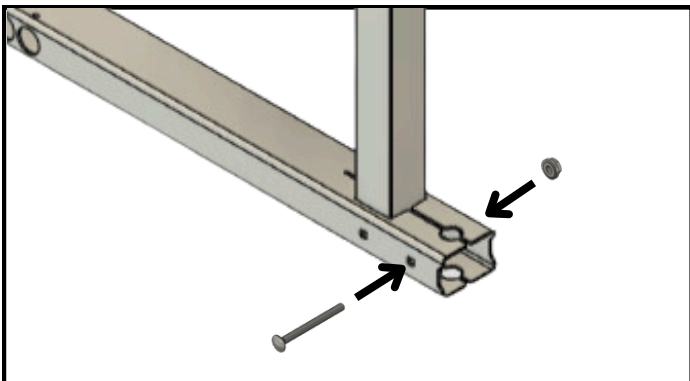


Figure 3

### FOR DIRECT BOLTED INSTALL ONLY

If you are direct bolting your system to concrete, use the remaining Bolt As to clamp the ends of each base tube (See Figure 3) and skip to **Page 16** for installation.

## ! IMPORTANT

- If direct bolting this system to a concrete surface or otherwise, skip to **Page 16**.
- Make sure to measure the space in between the base tubes and not in between the legs for frame spacing. Always measure along the conduit pipe for accurate spacing.
- Screw gun is required for self threading Bolt Bs. Be careful not to strip the bolts and only loosen them again if necessary.

### SPACE BETWEEN FRAMES

#### IR-45ASA (Aluminum)

(Solar Panel Width) minus 1"

#### IR-45ASAB (Black Steel)

(Solar Panel Width) minus 3/4"

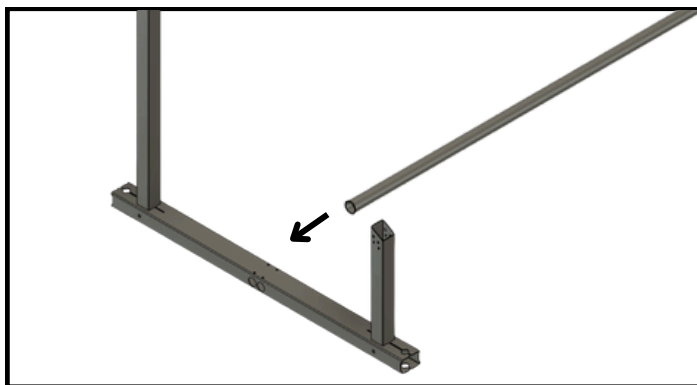


Figure 4

### 3. Insert 1" EMT/Conduit Pipe

Once all frames are assembled, place one at the start of the row and insert the conduit pipe into one of the openings in the side of the base tube (See Figure 4). Slide the pipe all the way through, but leave at least 2" extra on each end of the system.

*1" conduit pipe NOT required for Concrete Anchor Bolt Mounting*

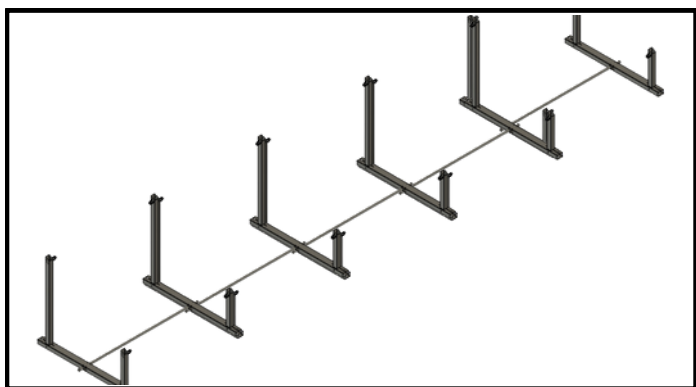


Figure 5

### 4. Spacing Frames Apart

Slide the next frame along the conduit pipe and space them roughly where they will need to be according to your solar module's width (make sure the conduit pipe goes through the same opening on each frame). Once the end of the first conduit pipe is reached, insert the next conduit pipe through the other opening on the last frame (See Figure 6). Repeat this until all frames are connect by the conduit pipes and are spaced roughly to your solar module's width.

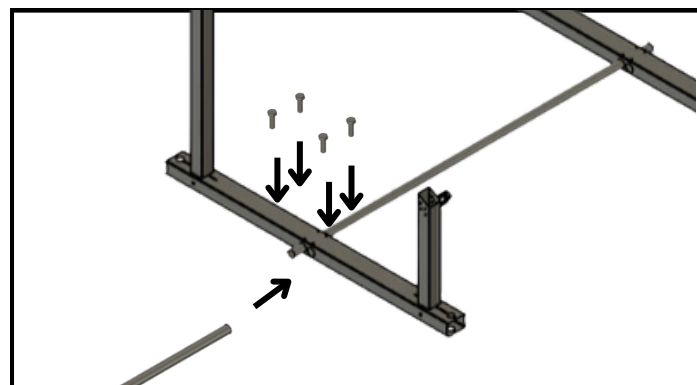


Figure 6

### 5. Lock Frames In Place

The frames must be spaced the width of your solar panel minus 1" (IR-45ASAB: solar panel width minus 3/4"). Be sure to measure in between the base tubes along the conduit pipe for most accurate spacing. Slide the frames along the conduit pipe and use a screw gun to insert all Bolt Bs into the top of base tubes to lock frames in position. Only two bolts are required per frame except for frames that are connected to two conduit pipes, which require four Bolt Bs (See Figure 6). *No cutting or coupling of the conduit pipe is required.*



## Leveling Frames

### ⚠️ IMPORTANT

- Even when placing frames on pre-leveled ground, there can still be some irregularities in the frame system. Before leveling the system, it is important to make sure that all frames are lined up in straight rows using a string line.
- After lining up the frames, stakes can be hammered in place at the front and back of each frame. Stakes are optional, but recommended to keep system in line and for assisting with leveling the frames.

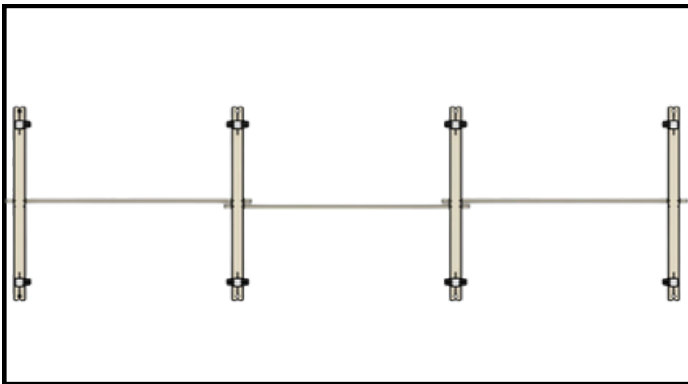


Figure 7

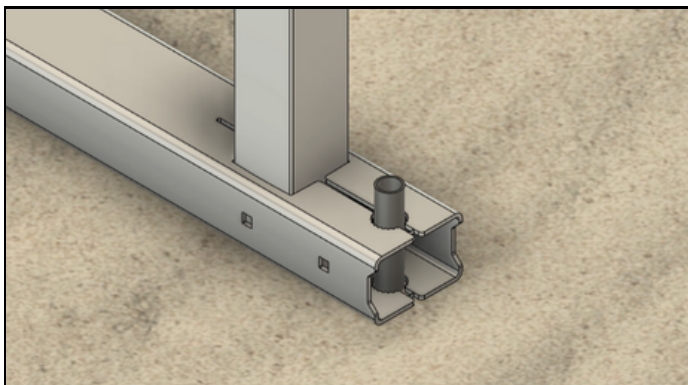


Figure 8

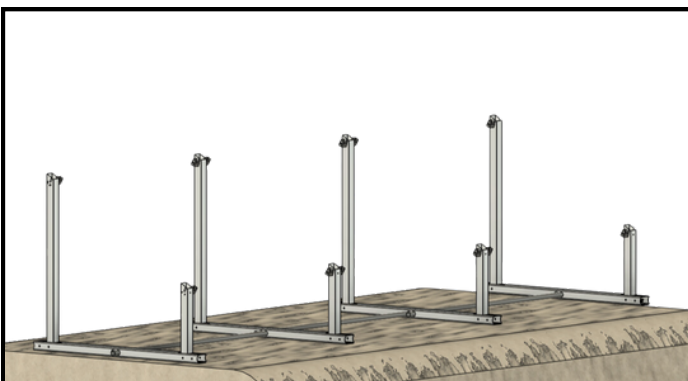


Figure 9

## BALLAST WEIGHT REQUIREMENTS

To see the specific weight requirements for your chosen BallastRack Model, view our [Stamped Engineering & Datasheets](#)

### 1. Line Up The Frames

Run a string line from the long leg of the first frame, stretch it along the frame system to the long leg of the last frame. Adjust the system as necessary until all frames are aligned with the stringline.

### 2. Place Steel Stakes

Concrete forming steel stakes provide fast and easy leveling as well as added racking strength to the entire system while keeping all of the frames in line. Use a small mallet to hammer concrete stakes into the ground through the stake openings at the end of each base tube. Each base tube can now be leveled using a level/stringline and clamped to the stakes by tightening the bolts at the end of each base tube.

### 3. Leveling The Frames

Tie a string line from one end of the row to the other. Then, raise the end frames until they are level with each other and higher than all other frames. If there is a high spot in the middle of the row, remove dirt from under that frame so it is below the end frames. Raise all frames up to the string line and clamp them to the stakes to keep them level (see steps 8-9 on page 15). Now, use a shovel to pack dirt underneath the frames to support them at this new height.

## Attaching Geotextile

### ⚠️ IMPORTANT

- It is important to properly prep the top surface of each base tube using the scuff pads and alcohol wipes included with the IR EarthBallast Kit before applying the epoxy adhesive.
- Keep in mind that the epoxy will set up in 15 minutes, so be sure to roll the geotextile along the way as the epoxy is applied.

#### System Three Technical Specs



Minimum Application Temp.: 40°F (4°C)

Minimum Storage Temp.: 40°F (4°C)

Cure Time: 12 Minutes at 70°F (21°C)

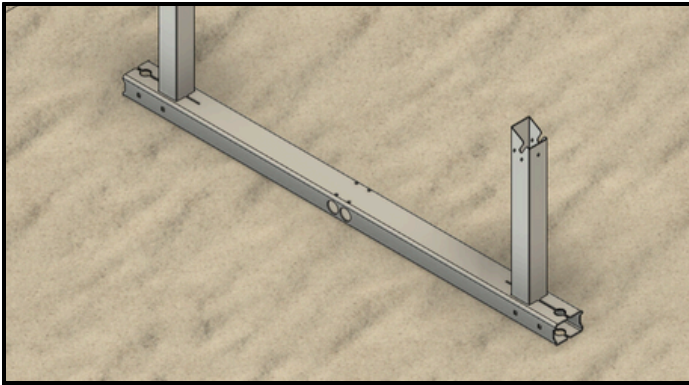


Figure 10

### 4. Prep Adhesive Surface

Use the included scuff pad to scuff the top of each base tube and remove the surface layer of oxidization and to promote better adhesion. Just before applying the epoxy, clean the surface using the provided alcohol wipes.

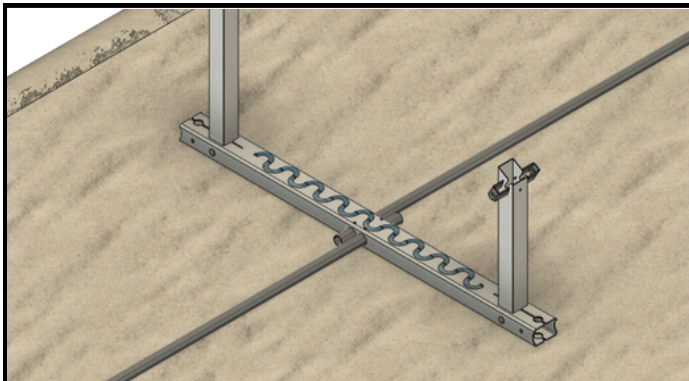


Figure 11

### 5. Apply Adhesive

Remove the twist cap and pull the sealing plug from the included epoxy and attach the mixing nozzle. Using a caulk gun, apply the epoxy in a zig zag pattern along the top of each base tube in between the two upright legs (See Figure 11).

*It is important to note that epoxy only requires 15 minutes to set up, so larger installations may require rolling the Geotextile Material after every 10-12 frames have had the epoxy applied to them.*

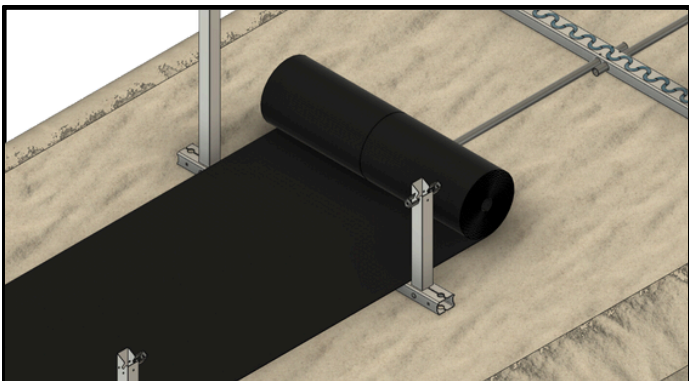


Figure 12

### 6. Roll Out The Geotextile Material

Secure the first foot of the geotextile roll with weights or rocks ahead of the first frame and pull lightly while unrolling it across the top of the wet epoxy. Keep light tension between each frame section before pulling the material down onto each frame. Before epoxy sets up, use rubber gloves to lightly rub the geotextile material into the wet epoxy before the 15 minutes has lapsed.



## Earth Filling Frames

### ⚠️ IMPORTANT

- It is recommended to determine the weight of the soil being used for ballasting, to determine how much is needed. Please see our [Engineering & Datasheets](#) for specific weight requirements for the IR-45ASA.
- It is best to use compactable soil for ballast system as loose soil or sand may be displaced by high winds.
- Earth mound should be uniform in shape and size across the entire system to ensure even ballasting.
- Ensure highest point of the earth mound is slightly closer to the long legs for better weight distribution.



Figure 13

### 7. Earth Fill Frames

Using a shovel or a skid-steer, dump a pile of material onto the geotextile fabric in between each frame.

Please see our [Engineering & Datasheets](#) for specific weight requirements for the IR-45ASA.

*Repeat this step until every frame is covered.*



Figure 14

### 8. Pack The Earth Mound

Use a shovel to pack the earth mound down and form it with a shovel/rack into a uniform shape. Make sure the center of the mound is closer to long legs for better weight distribution.



Figure 15

**Proceed To Page 18 For Module Installation**



# Drilling Holes For IR AnchorSpike

## ⚠ IMPORTANT

- Ensure that soil is compacted otherwise IR AnchorSpike will not be as effective.
- The IR AnchorSpike system is only recommended for frost depths of up to 18".
- It is recommended to test a single IR AnchorSpike in the soil at the installation site to ensure to ensure that they can withstand the proper amount of uplift (see our Stamped Engineering & Datasheets).
- Make sure to drill holes as straight as possible.

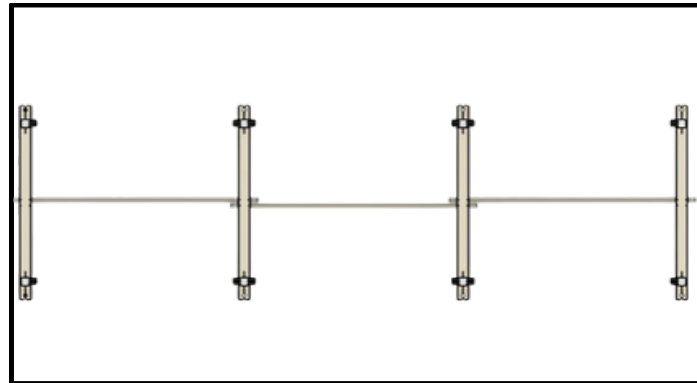


Figure 16

### 1.Line Up The Frames

Run a string line from the long leg of the first frame, stretch it along the frame system to the long leg of the last frame. Adjust the system as necessary until all frames are aligned with the stringline.

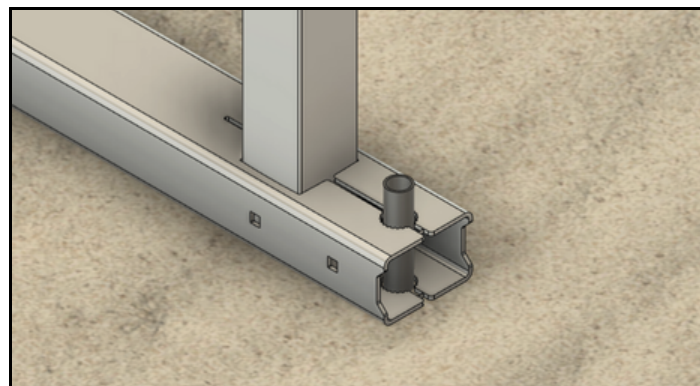


Figure 17

### 2.Mark Drilling Locations

Hammer one of the AnchorSpike 1-2" into the ground through the open holes at each end of the base tube and remove it to mark the ground for the AnchorSpike pre-drilling locations.

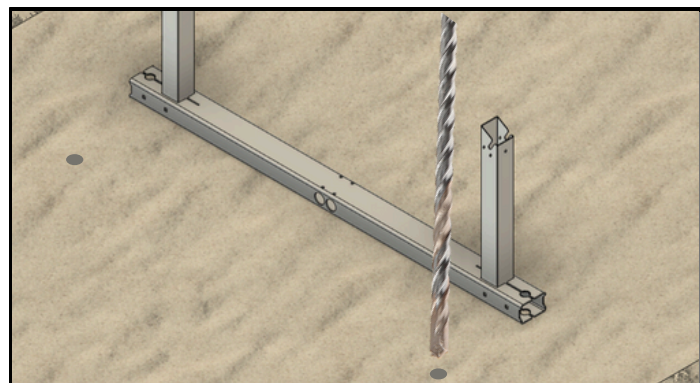


Figure 18

### 3.Drill Holes For IR AnchorSpike

Move the entire system 2-3" left or right so the holes can be drilled with the frames out of the way for drilling. Using an SDS Hammer Drill and a 3/4" x 30" SDS Concrete Drill Bit to drill a hole that is at least 26" deep at each of the marked locations.

## Installing IR AnchorSpike

### ⚠ IMPORTANT

- Make sure to thoroughly mix the two part epoxy for the recommended time.
- It is important to not fill measuring cup more than 1/4" (6mm) from the top.
- Epoxy takes approximately 8 hours to set up.
- Wear the provided rubber gloves to avoid getting epoxy on skin.



Figure 19

### 5. Installing The AnchorSpike

Use a hammer to tap the AnchorSpike into the pre-drilled holes. Be sure to leave approximately 6-8" of the spike above ground for easy leveling later on. Lift up the BallastRack frames and slide them onto the AnchorSpike (See Figure 19).



Figure 20

### 6. Mixing The Epoxy

Pour the A and B Epoxy components into the provided mixing container and stir for 2-3 minutes with the included stirring stick.

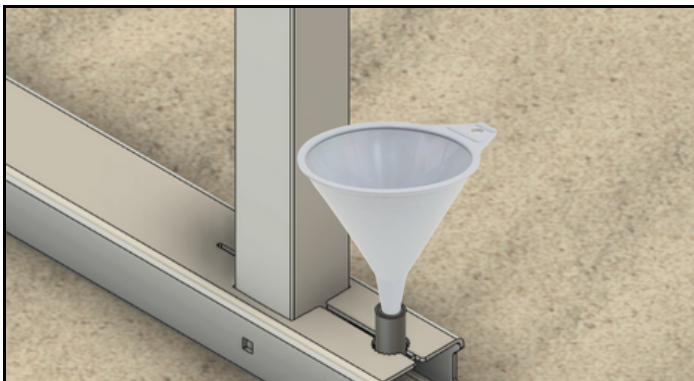


Figure 21

### 7. Pour The Epoxy Into The IR AnchorSpike

Pour the mixed epoxy into the small measuring cup 1/4" (6mm) down from the top (be careful not to fill more than necessary). Now pour the epoxy through the top of each IR AnchorSpike and wait 8-10 hours for the epoxy to harden before proceeding to the next step.

## Leveling Frames

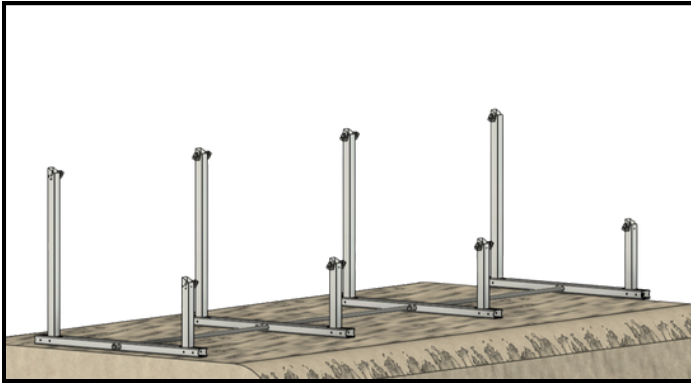


Figure 22

### 8.Leveling Frames

The easiest way to level the system is to run a string line along the tops of the base tubes and bring them all up to the string line. Level each frame one at a time and clamp the base tubes to the AnchorSpike to keep them level. Once level, proceed to the next step.

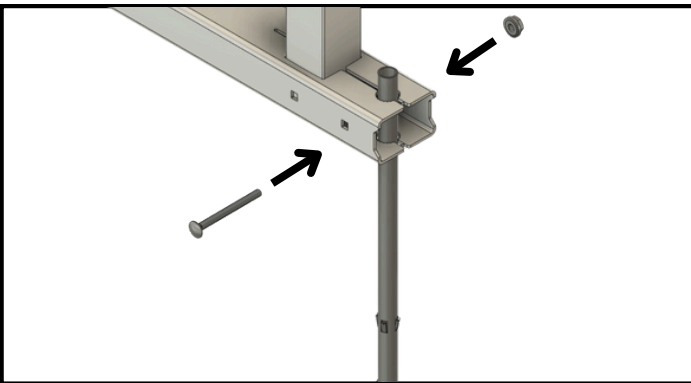


Figure 23

### 9.Clamp AnchorSpike

Use the remaining Bolt As to clamp the ends and lock the base tube in a level position by clamping it onto the AnchorSpike (See Figure 23).



Figure 24

**Proceed To Page 18 For Module Installation**



## Measuring & Installation

### ⚠ IMPORTANT

- Make sure to measure the space in between the base tubes and not in between the legs for frame spacing.

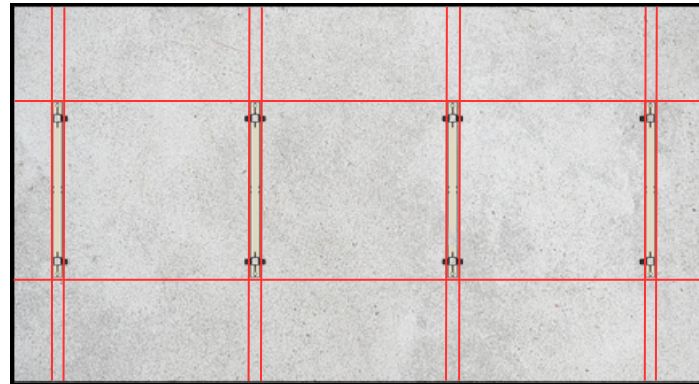


Figure 25

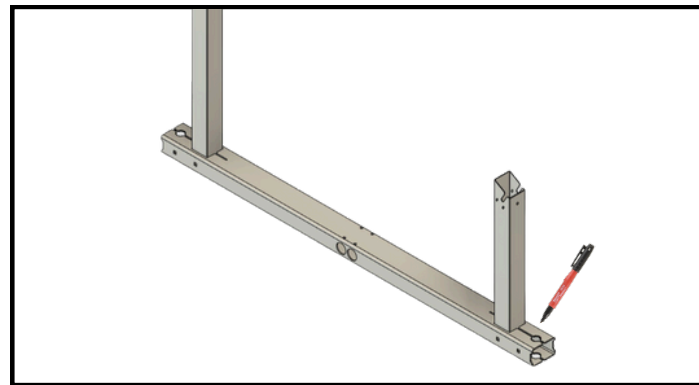


Figure 26



Figure 27

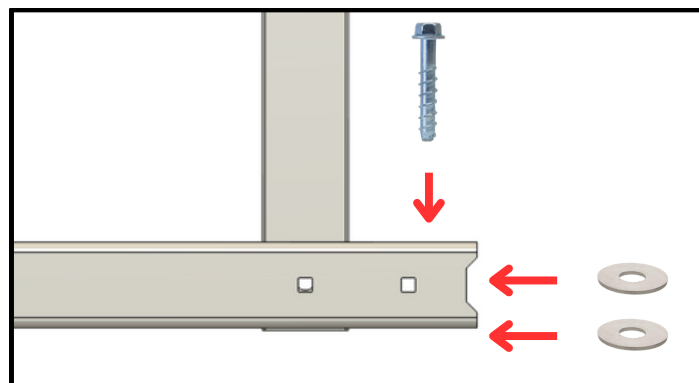


Figure 28

### 1. Measure & Chalkline Frame Placement

The frames must be spaced (width of your solar panel) minus 1". Place all frames at the exact spacing and mark both sides of each base tube. Make sure the frames at each end of the row are lined up straight and mark from the first frame to the last frame and chalk a line in between (See Figure 25).

*Double check spacing between frames*

### 2. Mark The Drilling Locations

Move each frame into their marked positions and use a permanent marker to outline the opening at the end of each base tube where the concrete anchor bolts will go into the concrete.

### 3. Drill Pilot Holes

Move all frames out of the way and use an SDS Hammer Drill and the included 3/8" Concrete Drill Bit to drill a 3" deep hole in the middle each of the marked locations on the concrete.

### 4. Bolt The Frames To The Concrete

Move all frames back into their marked locations, and bolt them in place using the provided concrete anchor bolts and washers. Make sure to place one washer under the base tube and one under directly under the head of the bolt (See Figure 28).

## Placing Ballast

### IMPORTANT

- Steel stakes are recommended for this mounting option to prevent movement of system.
- For Water Tank Ballast, treated lumber or another weather resistant material may be needed as a platform to hold the water tank above the bolt heads on the base tube.

## Flat Water Tank Ballast



Figure 29

### Recommended Water Tank

For water tank ballasting, we recommend using RecPro's 100 gallon tank or a similar water tank with the dimensions outlines below. This water tank can be used to ballast up to three solar modules.

### Water Tank Dimensions

- Minimum Length: Width of Solar Panel + 6"
- Maximum Width: 34"
- Maximum Height: 12"

### Placing Water Tank

Place water tank flat inside of the "U" shaped frames and up against the rear legs to properly distribute the weight for uplift.

## Concrete Curb Stop Ballast



Figure 30

### Concrete Curb Stop Weight

- Minimum Weight: See [Stamped Engineering & Datasheets](#)

### Placing Concrete Curb Stop

Place concrete curb stop across at least two of the IR-45ASA base tubes. Multiple curb stops can be used per module as long as the minimum weight is met.

## IMPORTANT

- The IR-45ASA requires a washer for each clamp attached to the short legs of the frame.
- Solar module height can be adjusted after mounting by sliding them along the flange clamps before tightening serrated nuts.
- Have IR-F2 Flange Clamp Bonding Brackets readily available before placing modules for fast mounting.
- The flange of the module will fit into the slot cut into the side of the IR-F2 and the pointed barbs should be inside the flange for bonding of the modules.
- Make sure to remove the serrated nut before placing the IR-F2 clamp onto the flange of the solar panel.

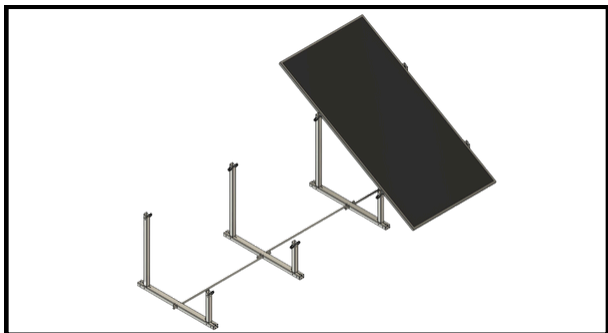


Figure 31

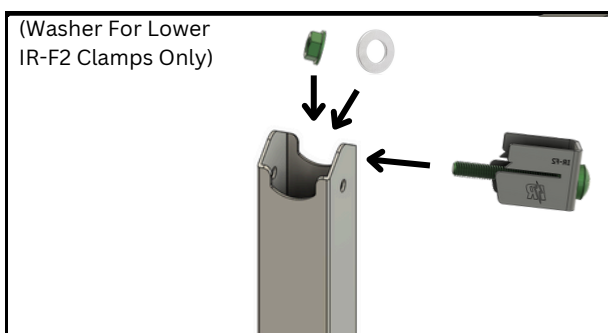


Figure 32

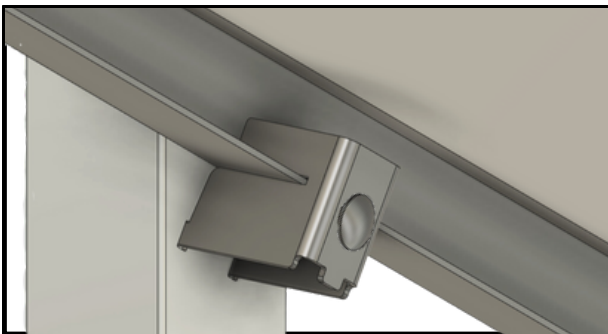


Figure 33

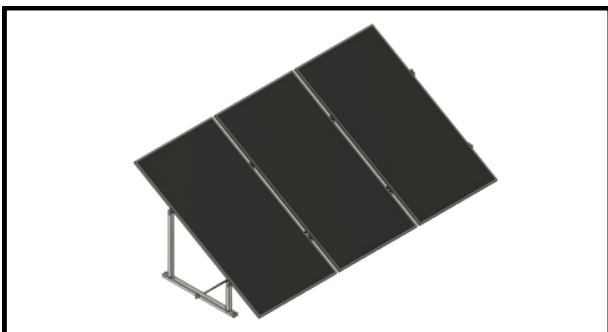


Figure 34

### 1.Position The First Solar Module

Remove the serrated nuts from the end of each IR-F2 Clamp and keep them readily available for mounting. Carry solar module and place it into position between the the first two frames. Set the module roughly where it will be mounted.

### 2.Mount Upper IR-F2 Brackets

Lift the top of the solar module to the top of the long legs of the frames and get ready to place the IR-F2 Clamp on one side of the module. Slide the clamp onto the flange of the panel, insert the bolt through the opening at the top of the tall leg, and fastened the nut onto the end of the bolt and tighten by hand for now. Repeat this process on the other side of the panel.

### 3.Mount Lower IR-F2 Brackets

Now lift up the bottom of the solar module to the top of the short legs and attach the lower IR-F2 Clamps in similar fashion to the upper clamps. If washers are included with your frame, the lower clamps will require a washer for easier rotation during angle adjustment. Insert the bolt into the opening, fasten the included washer and nut onto the end of the bolt, and tighten by hand for now. Repeat on both sides.

### 4.Adjust Solar Module Height

Once all solar modules are in place, they can be slid up and down to ensure that they are all the same height for a clean looking system. The serrated nuts may need to be loosened before doing so. Simply slide the modules to the desired position and use the ratchet wrench included with your base mounting kit to tighten all of the serrated nuts and lock the modules in place. If you did not purchase a mounting kit most 1/2" or 13mm wrenches will work provided they are small enough to fit in between the bolts. Make sure not to over-tighten.

# Adjusting The Sun Angle

## Sun Angle Markings

The image below shows the entire assembly of the adjustable leg for each IR-45ASA. You can see that each Adjustable Angle Plate is marked every 5° to help you set it to the desired angle. The following page will explain how to adjust the sun angle for each panel now that they are mounted.

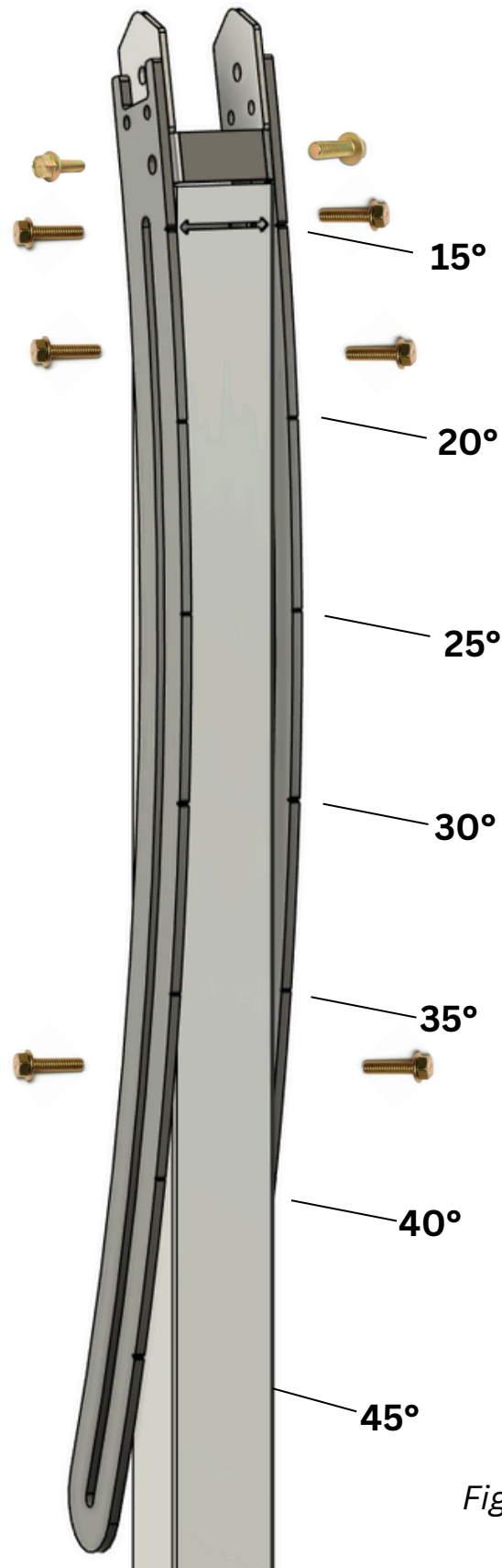


Figure 35

# Adjusting The Sun Angle

## IMPORTANT

- Before adjusting the system, you will need to remove the coupler bolted in between the panels and safety bolts currently fastened near the bottom of the adjustable arms.
- There is no need to remove the other four bolts, as the adjustable arms are meant to slide along these bolts.
- Do NOT forget to reattach the coupler after setting the sun angle.

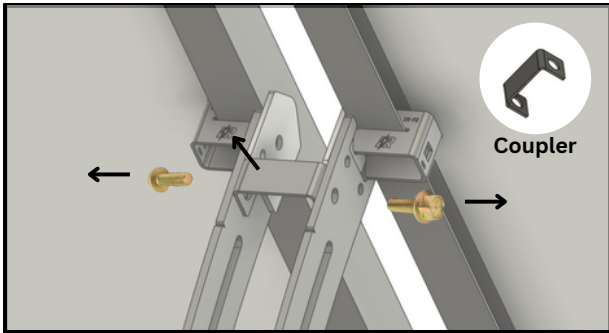


Figure 36

### 1.Remove The Couplers

Before you can adjust each panel independently, use a screw gun or wrench to remove the coupler in between the two adjustable arms of each frame.

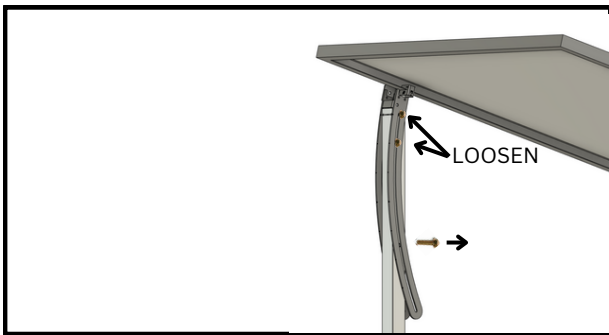


Figure 37

### 2.Adjust The Sun Angle

Each adjustable arm is attached to the leg by three Bolt Ds. The lowest bolts will need to be removed to slide the arm to its maximum height. Using one hand to hold the panel, use a screw gun to loosen both of the upper bolts on each side. You can now adjust the angle of the panel freely.

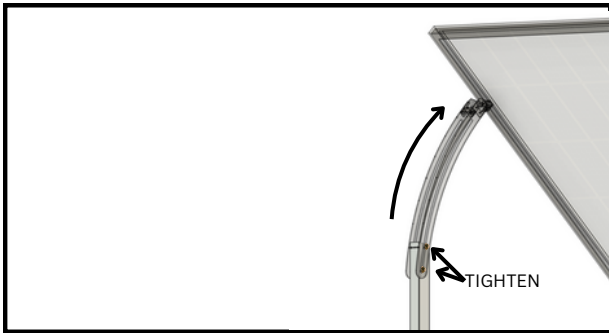


Figure 38

### 3.Setting The Sun Angle

Each frame should be set at 15° when you take it out of the box. Slide it up and find the desired angle using the notches on the back of the adjustable arms. Each notch represents a 5° increment from 15°-45°. Align the desired angle marker with the arrows on the leg and tighten the upper bolts.

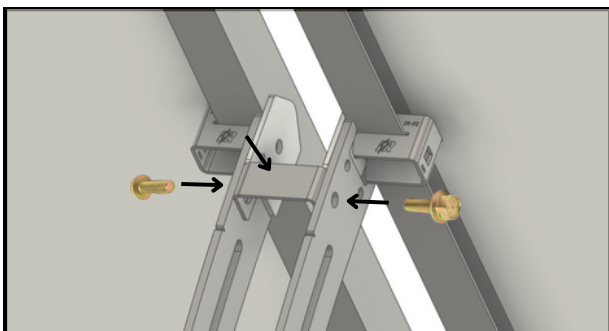


Figure 39

### 4.Reattach The Couplers

Once you have finished adjusting your panels, be sure to reattach the couplers. All panels must be set to the same angle to attach the couplers.





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