



INSTALLATION INSTRUCTIONS

POWER TUBE CRS™ (COMMERCIAL RACKING SYSTEM)



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Introduction

The Power Tube CRS (Commercial Racking System) is designed to mount on most flat roof types with a pitch not more than 1/12. With the arrays set at 10° (from horizontal) the mounting system is rated for 90 mph winds. If the arrays are set at 5° the Power Tube system can be used in areas with a Class C exposure category and a wind speed rating of 125 mph. The array tilt-angle is pre-set and non-adjustable.

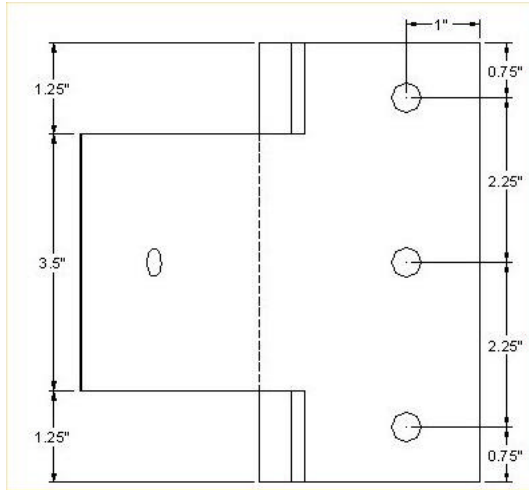
The Power Tube CRS system is designed to achieve two objectives. First, no roof penetrations are required for the Power Tube CRS system. Secondly, the available roof area for PV modules may be maximized by using a low (5° or 10°) tilt angle. The airflow permitted by the mounting system reduces the temperature of the PV modules vs. being placed flat on the roof. An additional benefit of the mounting system is the shading provided to the roof surface offering the potential to reduce the cooling load.

Preparation

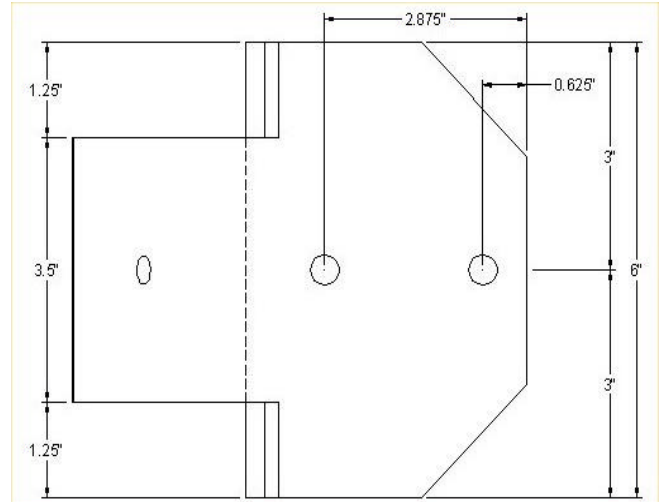
Prior to installing the Power Tube Mounting System clear the array roof area of any tree branches, debris, etc. If there are any electrical conduits where the array is to be installed move them to another area where the Power Tube grid will not be placed on top of them.

Components

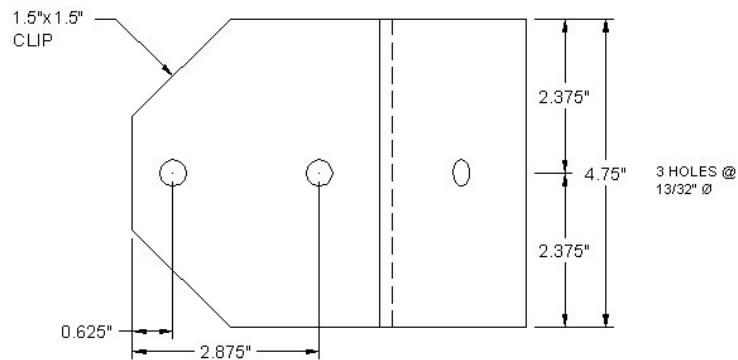
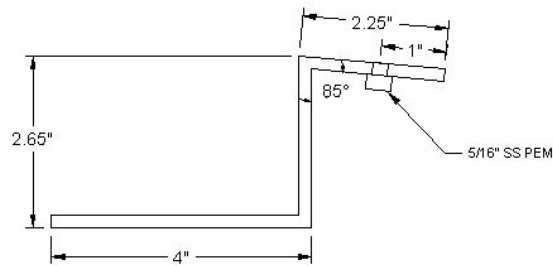
The Power Tube CRS system is composed of several components. The North-South Power Tube rail base, East-West Power Tube base rail (used at the south end and the north end of the array) and East-West Formed Channels. The Power Tube and the Formed Channels are cut to length for your project. There are three different Module Mounting Brackets: Front Joiner Bracket, Front Mid-Point Bracket, and Back Brackets. Below are diagrams of the brackets.



FRONT JOINER BRACKET



FRONT MID-POINT BRACKET



BACK BRACKET

(the height of the back bracket varies with module width and tilt angle)

In addition to the three Module Mounting Brackets shown above there are also various plates to connect the system together. These include:

- **2-Hole Corner Plate** to connect the NE and NW Corners together (5" long)
- **3-Hole Tie-Plate** is used to connect the northern most EW lateral tubes at the NORTH ends of the NS Power Tubes (7.5" long)
- **Ballast Trays** for 2.3"x8"x16" concrete blocks (provided by installer)
- **Splice Plates** for long runs of North-South Power Tube (11.5" long)

- EPDM rubber insert (see below for installation)
- Stainless Steel End-Clamps
- Stainless Steel Mid-Clamps
- 5/16" Stainless Steel Bolts (to attach modules)
- 3/8" Stainless Steel Bolts and Nuts (to assemble Power Tube Base)

NOTE: ALL of the East-West pieces of Power Tube and Formed Channel are placed between the North-South tubes – not at the ends of the North-South tubes.

RUBBER INSERT

A custom UV resistant EPDM rubber extrusion is included with the system. This rubber extrusion provides two functions: It protects the roof from abrasion from the corners of the aluminum Power Tube and secondly it increases the friction coefficient between the roof and the PV array. ***This rubber extrusion is only used on the North-South pieces of Power Tube.***

1. First cut the EPDM extrusion into 4 foot lengths.
2. Apply a soapy solution to the side of the rubber extrusion that slides into the groove on the wide-side of the aluminum Power Tube that lies on the roof.
3. Slide, or push, the rubber into the groove leaving 6" gaps between the 4 foot lengths of rubber. This gap will allow for the flow of water (if needed) and also for expansion of the EPDM as it heats.

ASSEMBLY BOLTS

The assembly bolts for the Power Tube gird are placed in the slot in the WIDE side of the Power Tube opposite the EPDM rubber. The bolts for attaching the block Ballast Trays go into the slots on the narrow side of the East-West lateral pieces of Power Tube. Three bolts are used for each 48" Ballast Tray.

NOTE: These bolts need to be installed before assembling the grid.

Layout

The dimensions of the Power Tube are calculated and the lengths are cut for each project. Once the components have been identified using the drawings the items can be laid out on the roof as shown in the drawings. The drawings show the various lengths of N-S Power Tube, E-W Power Tube, E-W Formed Channel, Block Ballast Trays, brackets, Splice Plates, Ties Plates, etc and illustrate where the components are to be mounted onto the Power Tube.

Assembly

NOTE:

When assembling the Power Tube base structure do not try to square the overall frame before placing the modules on the frame. It will square itself as you mount the modules

The best method to assemble the system is to start at the southeast corner and work across the array toward the west and then start the next row to the north. An alternate method is to assemble each column of north-south column and work towards the west as each column is complete.

4. Lay out the Power Tube rails on the roof to prepare for the system assembly.
5. Begin by connecting the lateral East-West Power Tubes at the south ends of the long North-South Power Tubes. It should be noted that Power Tube extrusion is used only for the south and north end east-west members. All intermediate east-west members are formed aluminum channel. Each of these channels has holes punched in it for attaching the ballast trays.

NOTE:

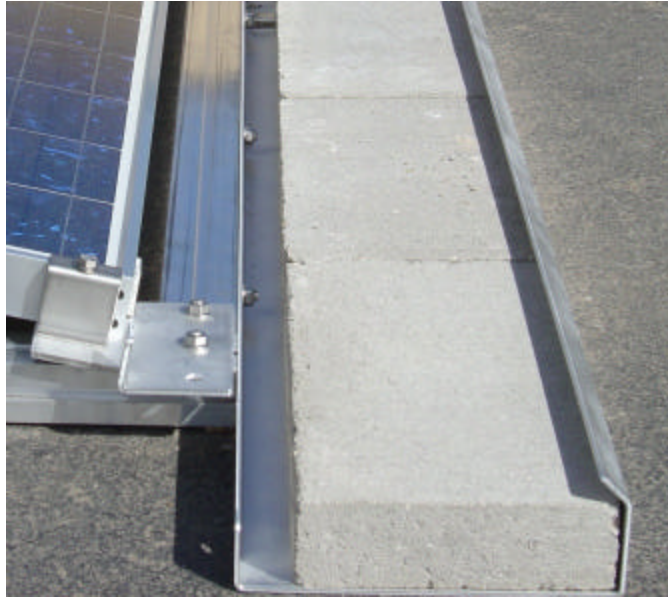
The long North-South tubes butt against the Block Ballast Pans with the short East-West Tubes located between the long tubes. See photos.

6. After the south end is assembled follow the length of each NS Tube and attach the remaining brackets and lateral EW Braces. Refer to diagrams and use the two supplied spacers for proper placement of the module mounting brackets.

#1 – UNDER-MODULE SPACER JIG (has up-turned ends)

#2 – INTER-MODULE SPACER JIG (plain ends)

7. Place the concrete blocks into the Ballast Trays before installing the solar modules.
8. After the Power-Tube Grid has been assembled tighten each 3/8" flange nut (for the Tie-Plates, Front Joiner Brackets, and Ballast Trays) to 35 foot-pounds.
9. The modules may now be mounted. Be cautious installing the modules so that none of the modules are blown off of their Mounting Brackets during the assembly process.
10. Using the Stainless Steel End-Clamps and Mid-Clamps secure the modules onto the Power Tube gridwork. Tighten each 5/16" bolt to 15 ft-lbs. Over-tightening can cause damage to the solar module.

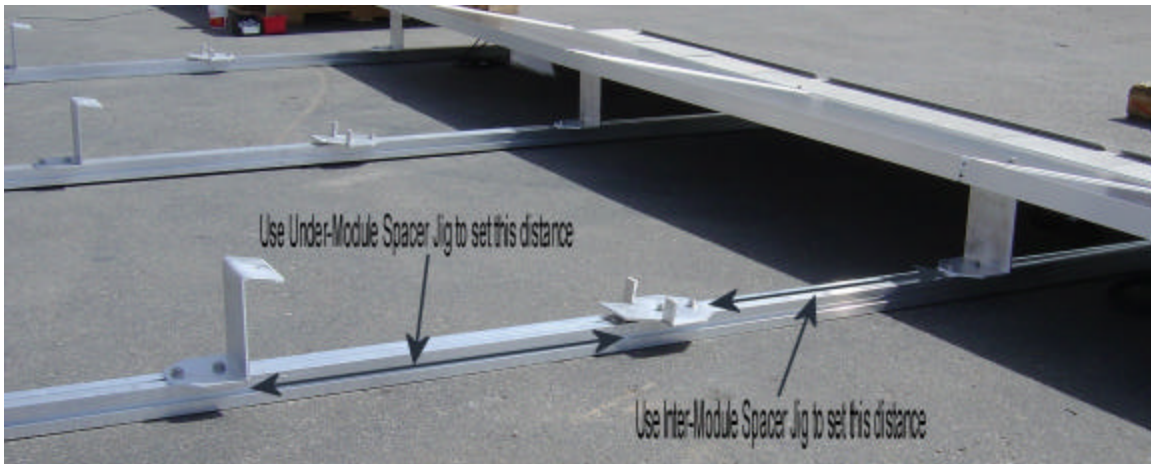


This photo shows several details of the southern-most Block Ballast Pan:

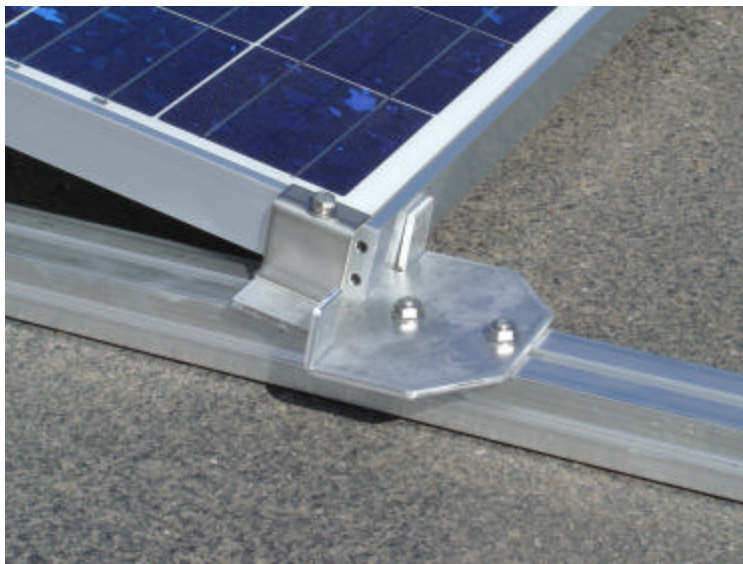
- 1) The use of the Front-Joiner Bracket
- 2) Location of EW lateral tubes to the NS Power Tube
- 3) Bolting of Ballast Pan to EW lateral tube



The photo illustrates how the Front Mid-Point Joiner Bracket is used on the array's southern side



This photo shows where to use the supplied spacer jigs to set the distance for the Back Brackets and the Front Mid-Point Brackets



Front Mid-Point Bracket with Module End-Clamp

MAINTENANCE

After three months from the date of installation it is advised that all of the bolts be re-tightened. The 5/16" module clamps should be tightened to 15 foot-pounds and the 3/8" bolts be tightened to 35 foot-pounds.

Re-tighten all bolts to the original specifications annually.

This manual does not cover other aspects of the system such as the maintenance of the electrical system. Refer to the solar module manual for information on this topic.