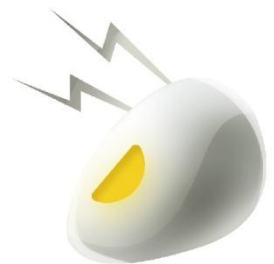


INSTALLATION INSTRUCTION

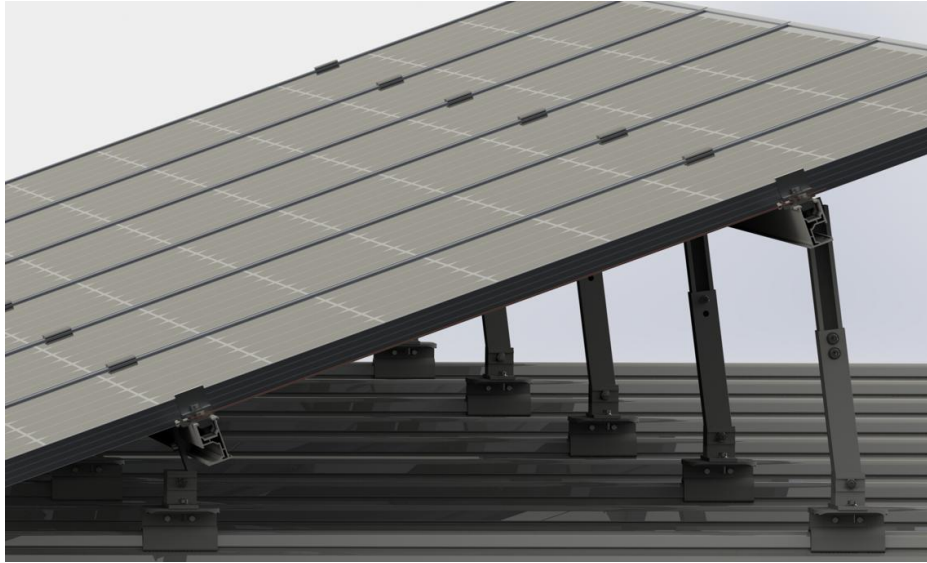
Installation Manual

ANTAI FLAT ROOF TILT SYSTEM

---- ADJUSTABLE TILT LEG



ANTAI
Aluminum & AI Tech for Solar



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I. Safety Precautions

Thank you for using Antai solar mounting products. Please check the manual carefully before installation, operation and maintenance.

• General Notes

Installation is limited to operators who have professional experience and can carry out construction according to the prescribed matters.

Please comply with all applicable local standards and environmental protection regulations of the local country or region.

Please comply with the regulations of labor disaster prevention and the relevant regulations of the insurance union.

Please wear safety clothing. (Especially protective helmets, work boots, gloves, etc.)

There shall be at least 2 operators during installation to have corresponding handling in preventing accidents occur.

Please always have at least one copy of instruction when installing.

When work high above the ground, please set up scaffolding, make sure no falling risk before construction. Please wear gloves and safety belts.

To avoid accidents or malfunctions, please do not change the product style.

To avoid collision injury during construction, please pay attention to the profile section and sharp parts.

Please pay attention to tighten the bolts and nuts of each part, make sure to lock parts well.

To avoid wiring damage, please do not touch profile section during electrical wiring work.

To avoid injury or accidents, please do not use damaged, malfunctioned, or deformed products.

Please use the components specified by our company. please do not modify or replace the product parts.

Please do not apply a strong load or squeeze on the profile, as aluminum profile is easy to have deformation or scratch.

This information is related to the installation of solar mounting system, please consider the characteristics of mounting before carrying out construction of foundation and install of modules, inverters, and electrical wiring.

II. Product Introduction

Antai Flat Roof Tilt System is a roof photovoltaic mounting racks applied to the trapezoidal or Klip-Lok flat roofs. With the telescope type adjustable rear legs, it can achieve the tilt angle by 10-15 degree, 15-30 degree and 30-60 degree.

III. Planning

3.1 Wind Region

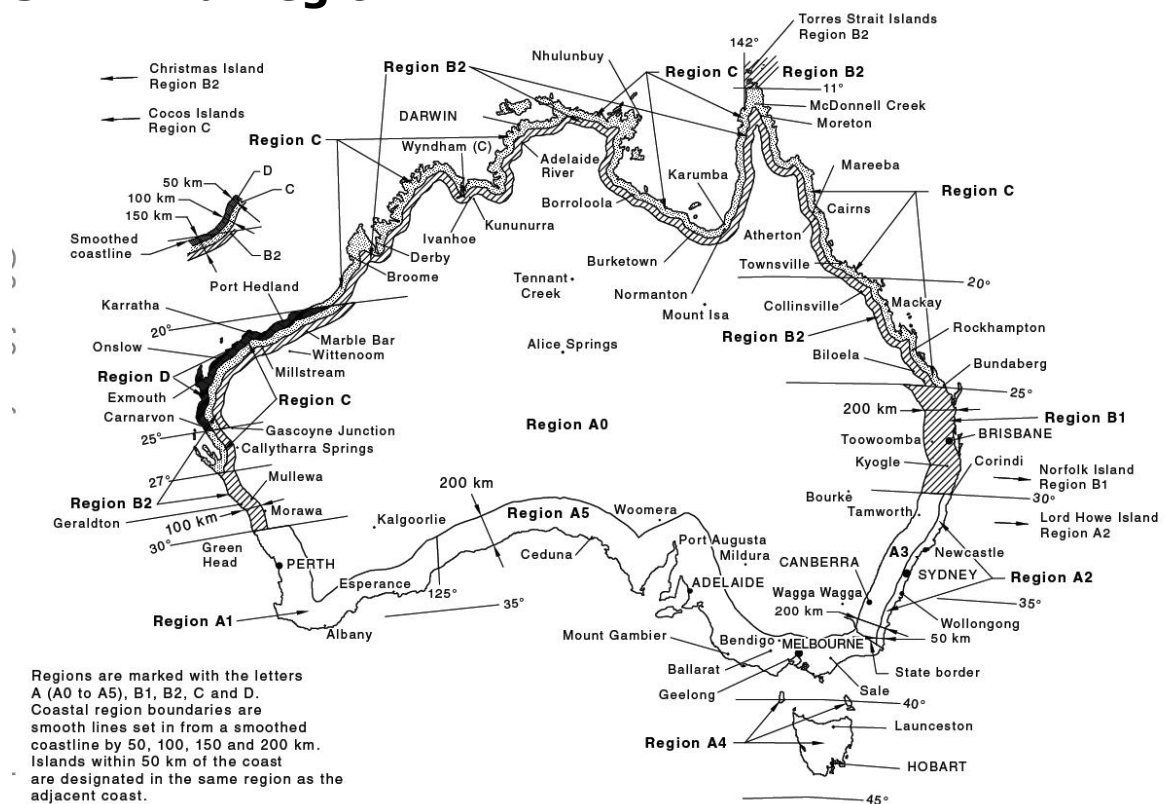


Figure: National wind map (in accordance with AS/NZS 1170.2)

Find out the wind region of your installation site, wind region is independent with surrounding topography or buildings. According to historical data, wind velocity considered in design based on average recurrence of 200 years is listed in the table below.

Regional Wind Speed (m/s)	Non-Cyclonic Region		Cyclonic Region	
	A (0 to 5)	B1, B2	C	D
V ₂₀₀	43	52	64	72

3.2 Determine Wind Terrain Category

Terrain Category 2

Open terrain, including grassland with well scattered obstructions having heights generally from 1.5 meters to 5 meters. Examples include farmland or cleared sub-divisions with isolated trees and uncut grass.

Terrain Category 2.5

Terrain with some trees or isolated obstructions, terrain in developing outer urban areas with scattered houses, or large scale developments with more than two and less than ten buildings per hectare.

Terrain Category 3

Terrain with numerous closely spaced obstructions having heights generally from 3 meters to 10 meters. Examples include typical suburban housing or light industrial areas.

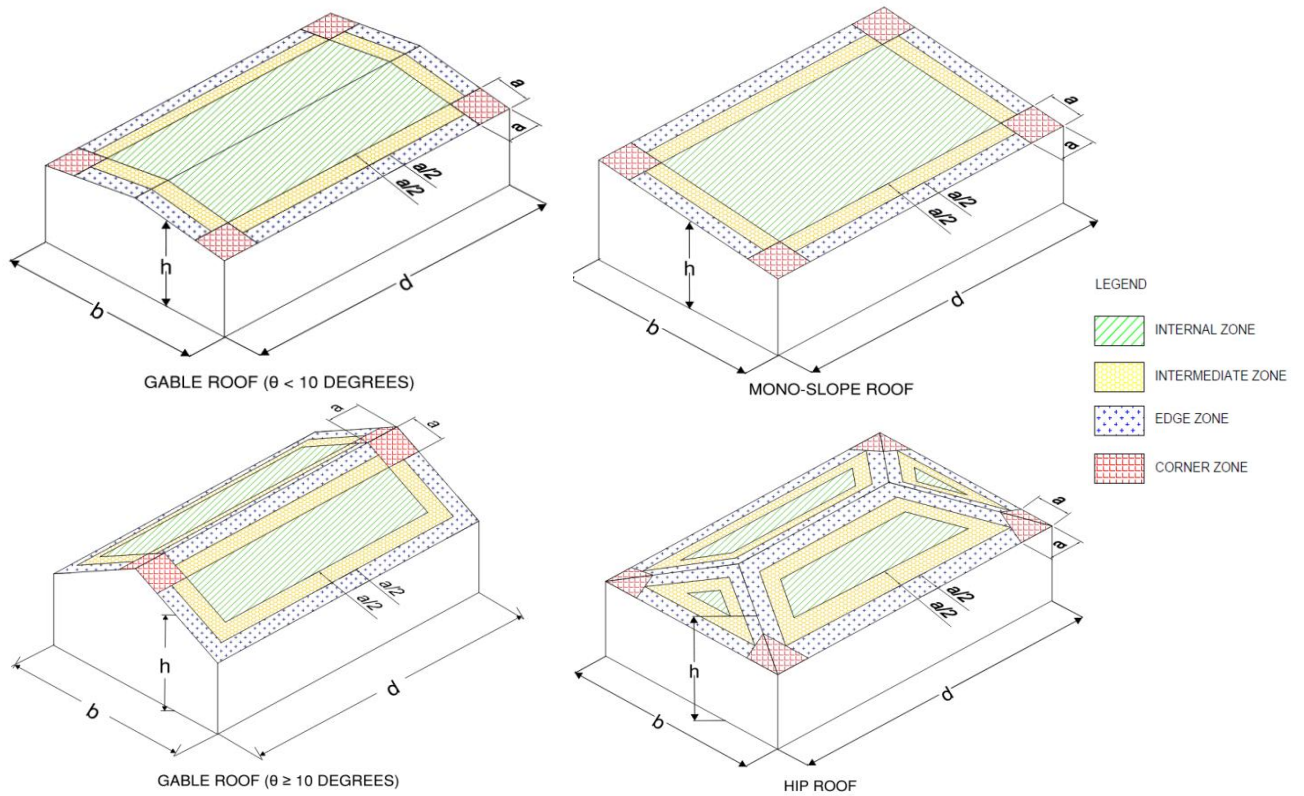
3.3 Determine Roof Zones

Solar panels can be installed anywhere on the roof with sufficient fixings are used. Higher wind speeds are encountered at the edges of roofs and therefore more fixings are required in these areas.

For a tilted array, a roof can be divided into four zones, the internal zone, intermediate zone, edge zone and corner zone.

The width of these outer zones can be determined based on the length, width and average height of the building.

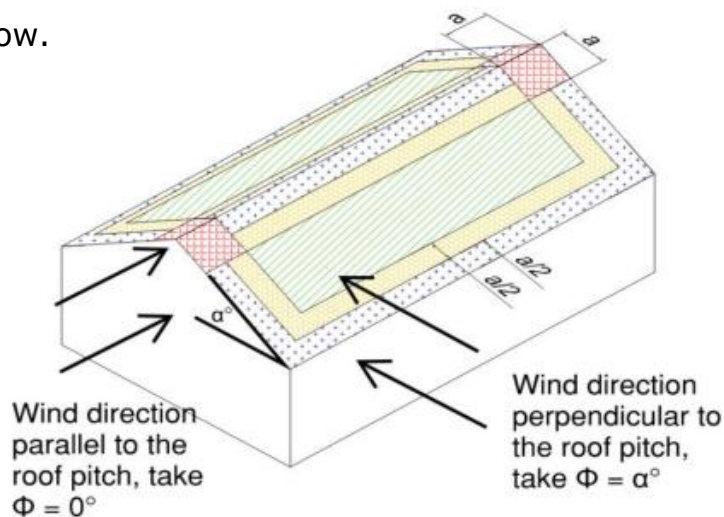
If fixings are located in the intermediate, edge or end zones, then the maximum spacing to the next fixing must be reduced, as per the table in the certifications.



Determining the width of the edge and intermediate zones, 'A' the width of the edge and intermediate zones, 'A' is the minimum of $0.2B$ or $0.2D$, if (H/B) or $(H/D) \geq 0.2$; or $2H$ if both (H/B) and $(H/D) < 0.2$, according to AS/NZS1170.2:2021.

3.4 Determine Roof Slope and Roof Height

The pitch angle Φ in the spacing table shall be determined based on the wind direction and the roof pitch angle by following the figure illustration below.



The roof height "h" represents the average roof height. Average roof height = (pitch height - gutter height)/2.

3.5 Determine the tilt angle

There are 3 types of tilt facing installation including north facing, east/west facing and reverse tilt, please note the tilt angle refer to the ANTAI Engineering Certificate is the angle between the roof and panel.



3.6 Determine maximum installation spacing

Please read the corresponding product Engineering Certificate carefully, including the notes and spacing tables, to determine the installation spacing accordingly. And the panel clamping zones shall follow the instruction from each module suppliers.

3.7 Notice of smaller panels' spacing

ANTAI engineering certificate Spacing tables are given based on 2.3mx1.2m panel, please check the note 5 of certificate for smaller panels' spacing adjustment.

IV. Installation Tools & Equipment

Tools List			
			
6mm Allen Key	Electric Drill	Tape Measure	Markers
			
Torque Spanner	String	Adjustable Wrench	Socket Spanner (M8)

V. Components

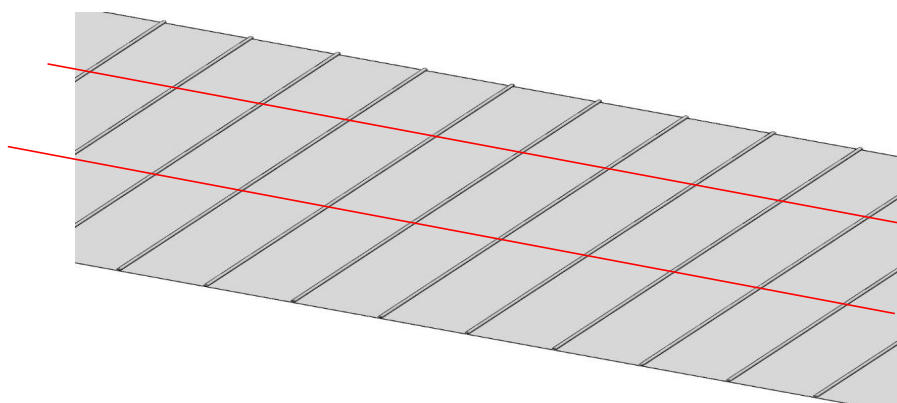
Main Components List			
			
Rail	Rail Splice	Front Leg	End Clamp
			
Mid Clamp	Grounding Lug	Earthing Clip	Adjustable Rear Leg
			
Kliplok 700 Clamp	Longline 305 Clamp	Universal Kliplok 406/700	Kliplok 406 Small Top

VI. Installation Instruction

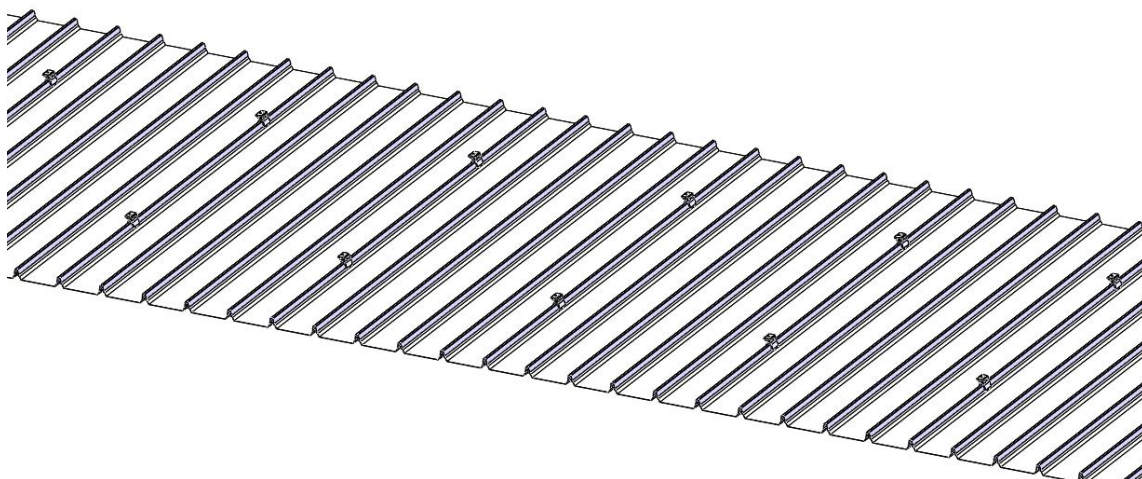
7.1 Installation of Tilt Leg

Mark the positions of tilt legs with strings and markers according to your plan, and make sure all marked positions are aligned. Then fix the legs with screw or Klip-lok clamps on the corresponding positions

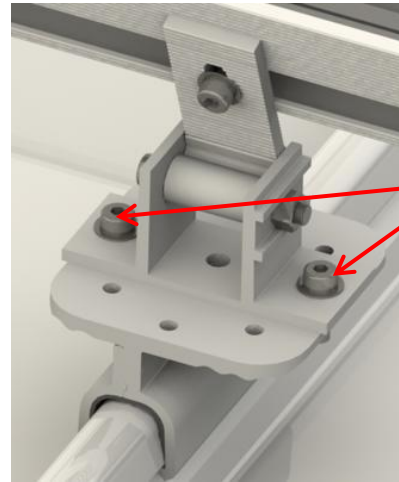
7.1.1 Mark the fixing positions on roof. If it is a penetrative solution, please make sure all self-tapping screws can be fixed to the roof purlins, and align the positions by strings.



7.1.2 For Klip-Lok solution, please install the clamps on the roof seams of marked positions:



7.1.3 Fix the Front leg and Adjustable Rear Leg to the top of Clamps
As below figure:



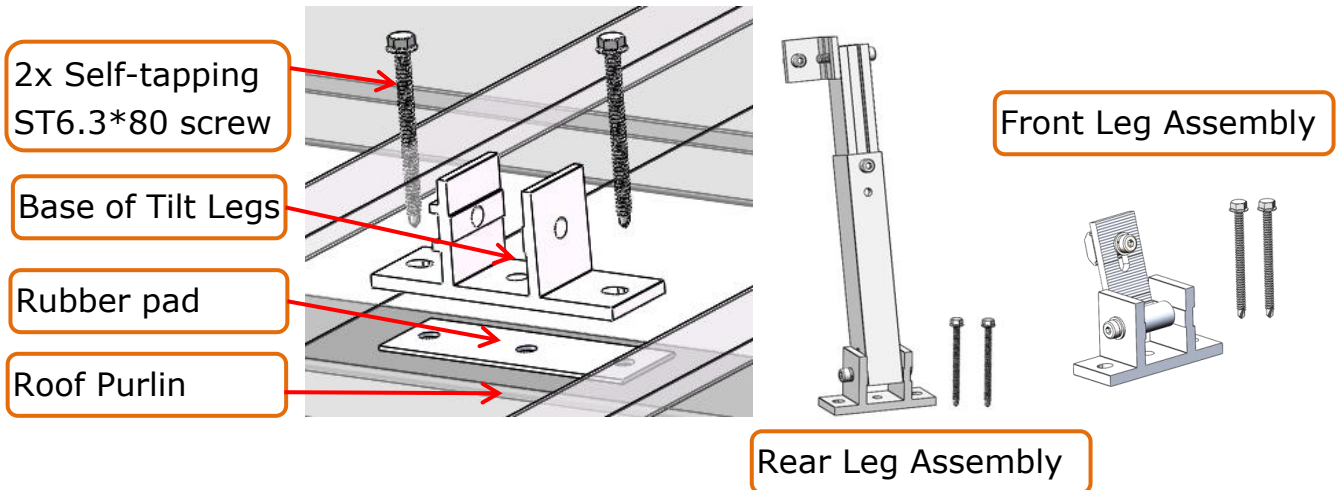
2x
M8 Socket Bolt

Torque M8:
8~10 N*M

Please use 2pcs M8 socket bolt to fix the base on the Klip-Lok clamps.

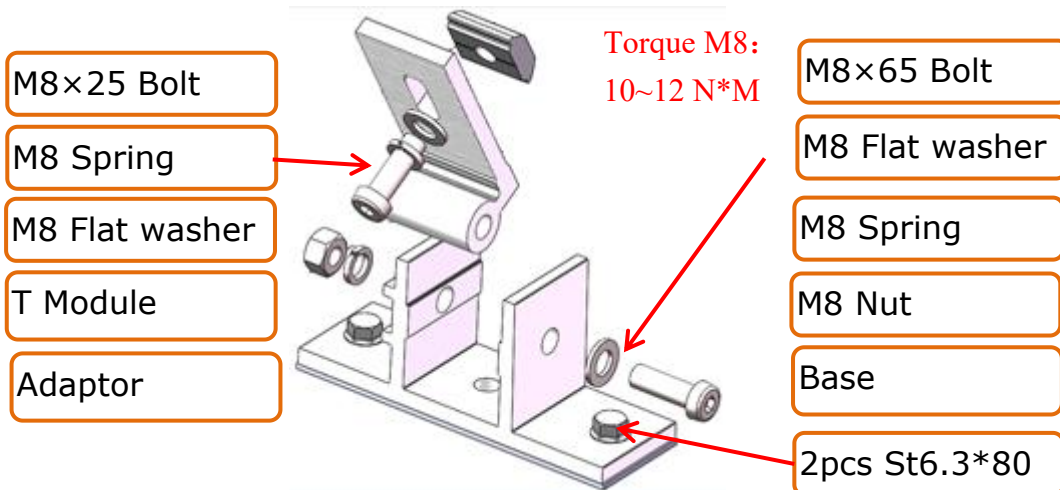
7.1.4 For penetrative solution, please fix the base of front leg and rear leg to the roof purlins.

Screw Torque:
10~12 N*M



7.1.5 Break Down of the Front Leg assembly and Rear Leg Assembly

A. Front Leg



B. Adjustable Rear Leg

M8×65 Bolt

M8 Flat washer

M8 Spring

M8 Nut

Torque M8:
10~12 N*M

T Module

M8×25 Bolt

M8 Spring

M8 Flat washer

Torque To Rail:
10~12 N*M

M8×50 Bolt

M8 Flat washer

M8 Spring

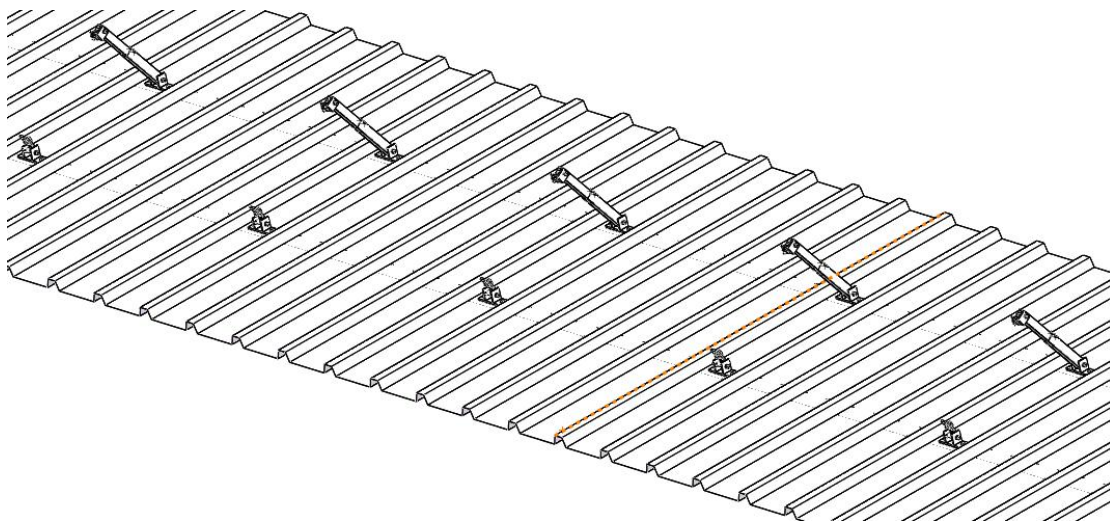
M8 Nut

2x M8×12 Bolts

Torque To Tube:
4~6 N*M

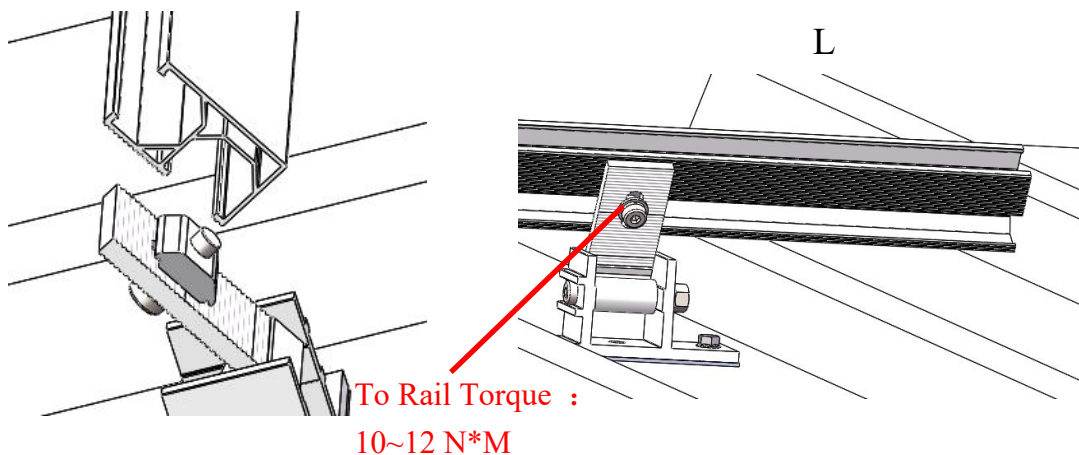
Torque For Telescope:
8~10 N*M

7.1.6 Figure of installed legs

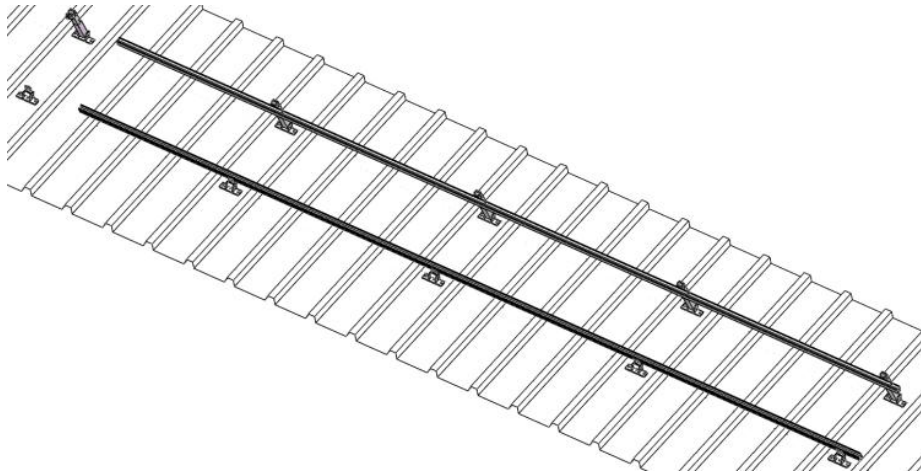


7.2 Installation of rail

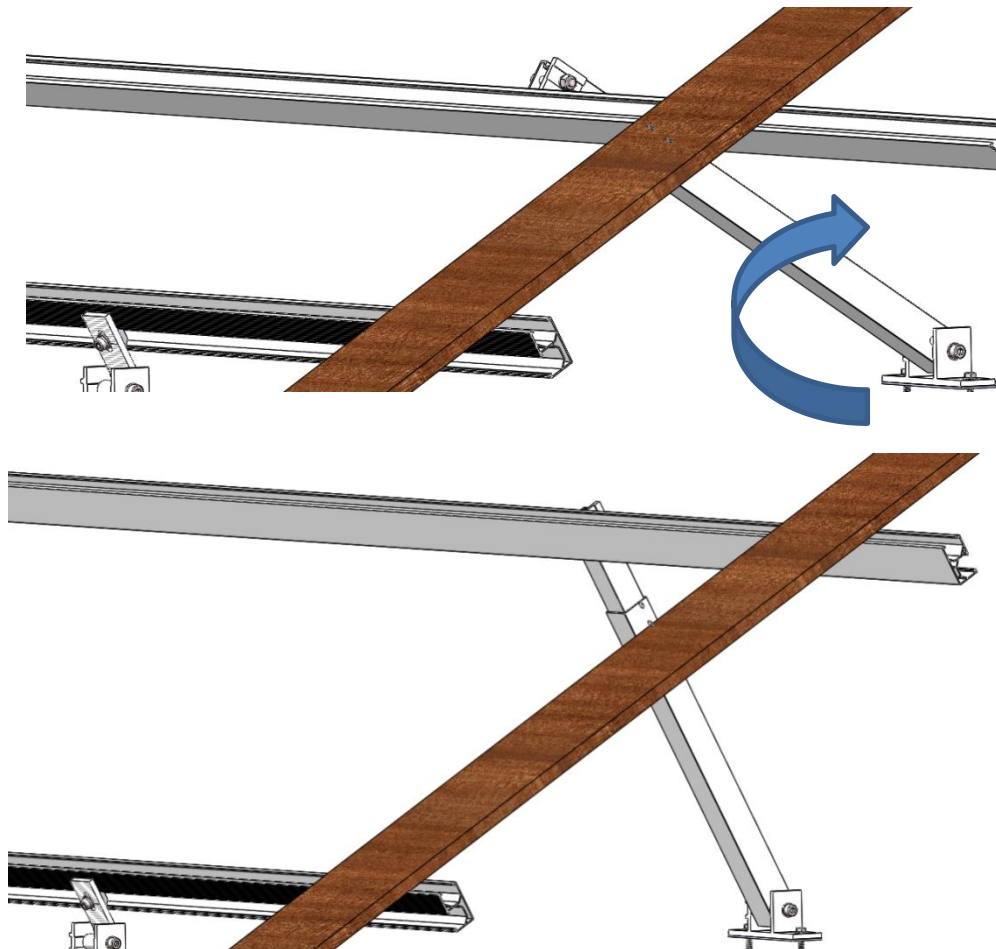
7.2.1 Take a rail according to your plan and slide the T module of Front leg to the rail side channel, then fasten the bolt.



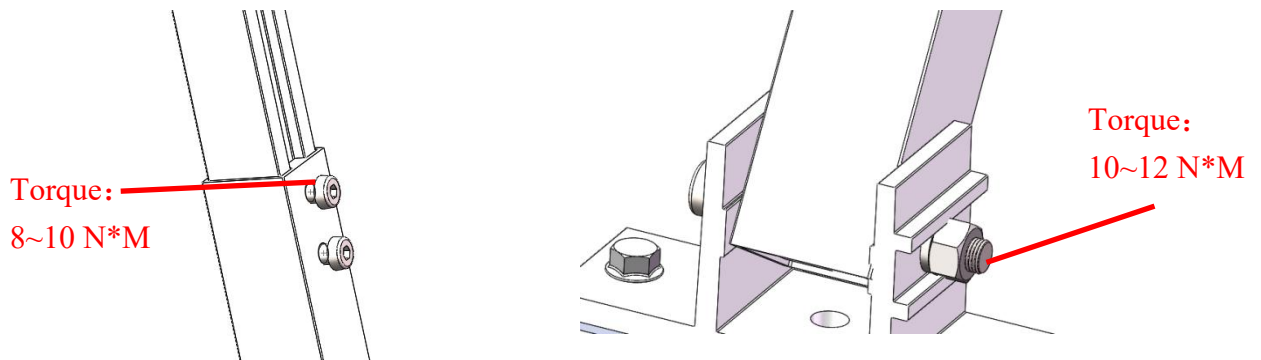
7.2.2 Take another rail and fix the T module of Rear leg to the rail side channel, then fasten the bolt.



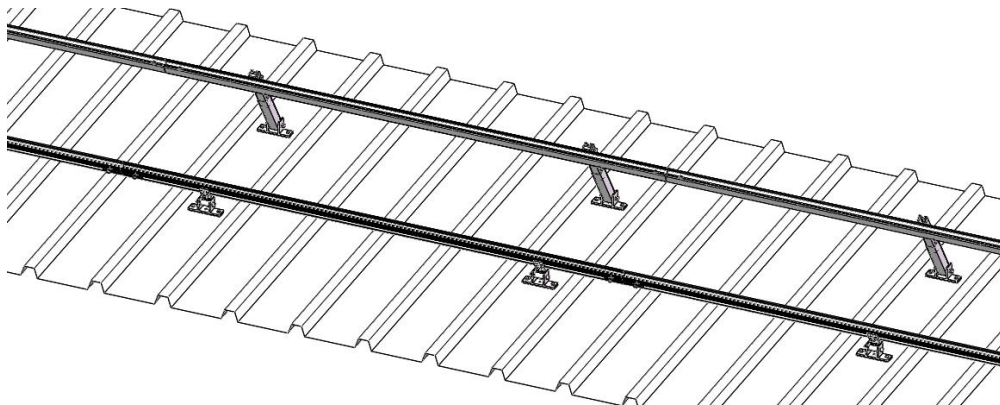
7.2.3 Place the flat board across the 2 rails (upper and lower), rotate the adaptor of front legs and rear legs to make the board placed flatly and adjust the length of telescope tube of Rear leg to meet the required tilt angle. Then fasten all bolts.



Fasten the bolts between inner tube and outer tube, adaptor and base.



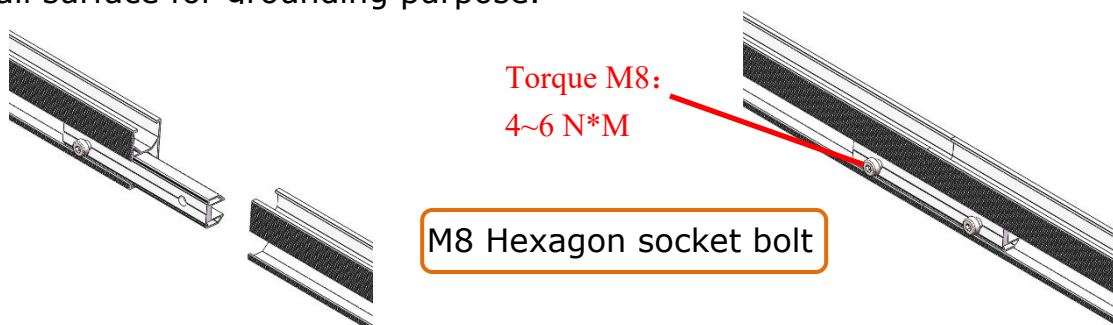
7.2.4 Complete installation of the rest legs and rails, and adjust the tilt angles following above steps.



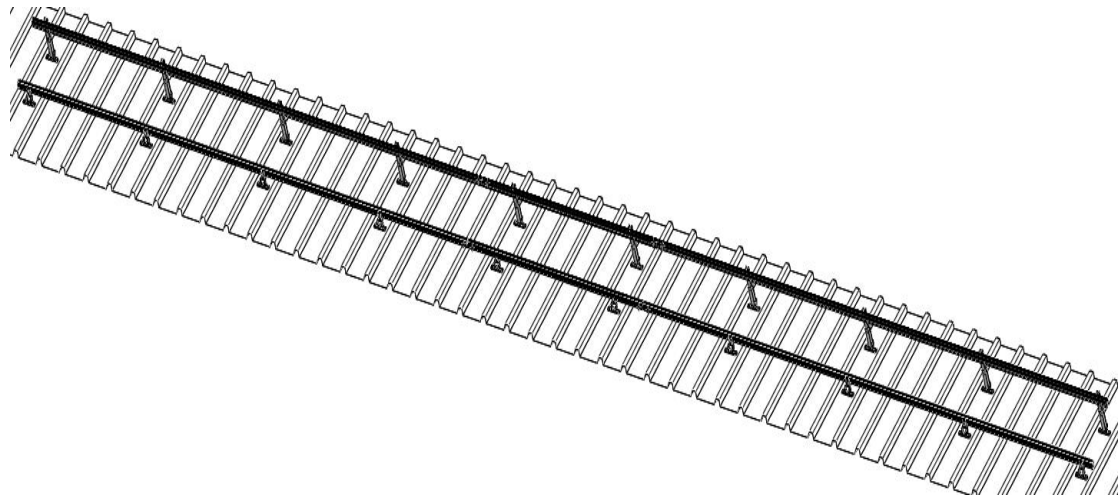
7.3 Installation of Rail Splice

Rail splices shall be used to extend the length of rail.

7.3.1 Slide half of the rail splice into the first rail, adjust the fixed position, and tighten the bolts. Then Slide the second rail into the rail splice, tighten them by bolts when leveled. The bolt shall scratch the rail surface for rounding purpose.

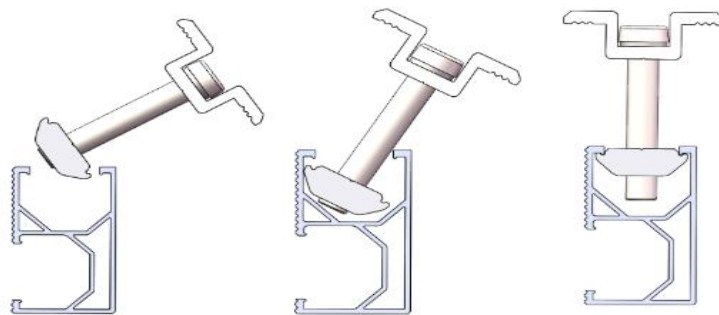


7.3.2 Completed installation is as the pic shown below



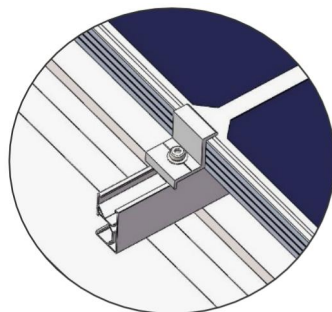
7.4 Installation of PV Module

According to the module clamping zones, place the modules on the rail, and fix them with end clamps and mid clamps.

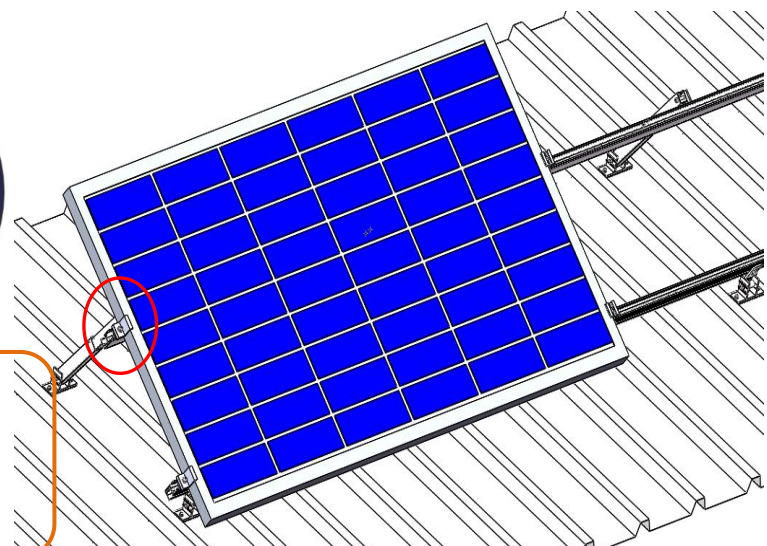


Torque M8:
10~12 N*M

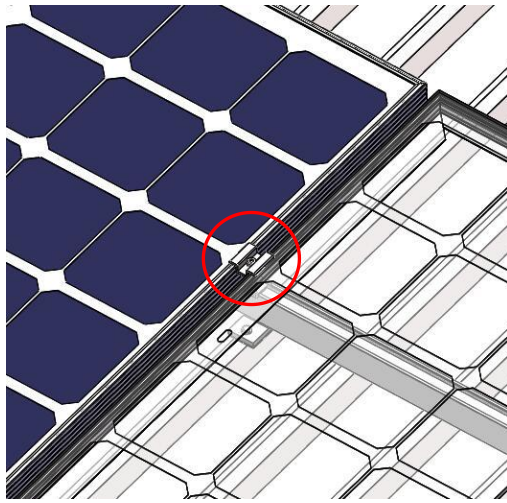
7.4.1 Place the PV module on the rail and adjust the position according to the drawing. Then fix the end clamp into the rail channel and tighten the bolts.



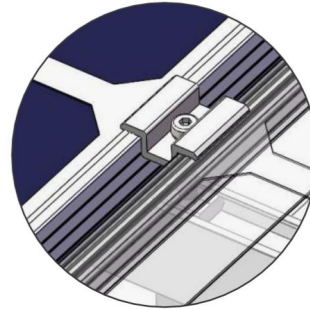
M8 Hexagon socket bolt
Flat washer
Spring washer
T module



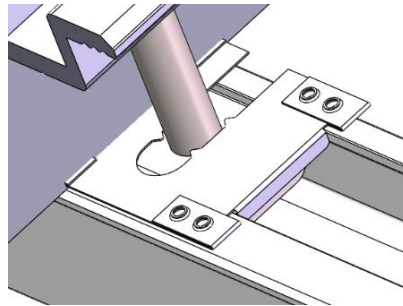
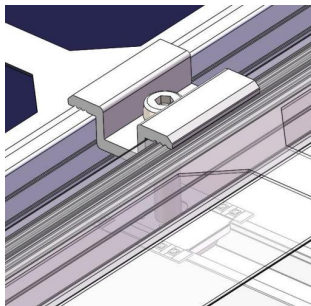
7.4.2 After fixing the end clamp of first PV module, please put the second PV module on the rail at proper position. Connecting firmly the first PV module and the second one with mid clamp and fasten the bolts.



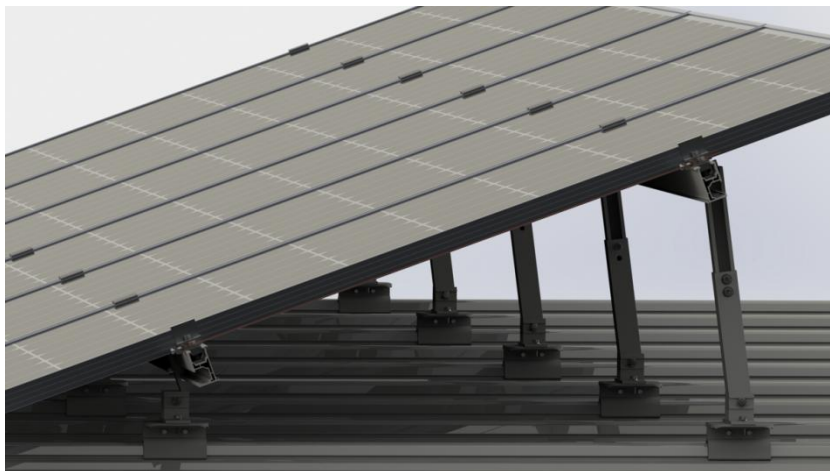
M8 Hexagon socket bolt
Spring washer
T module



7.4.3 Place the earthing clip between the PV modules and rails while installing the mid clamps. Adjusting the position to ensure the sharp spikes on earthing clips are pressed by both PV modules. Then tighten the mid clamps by bolts.



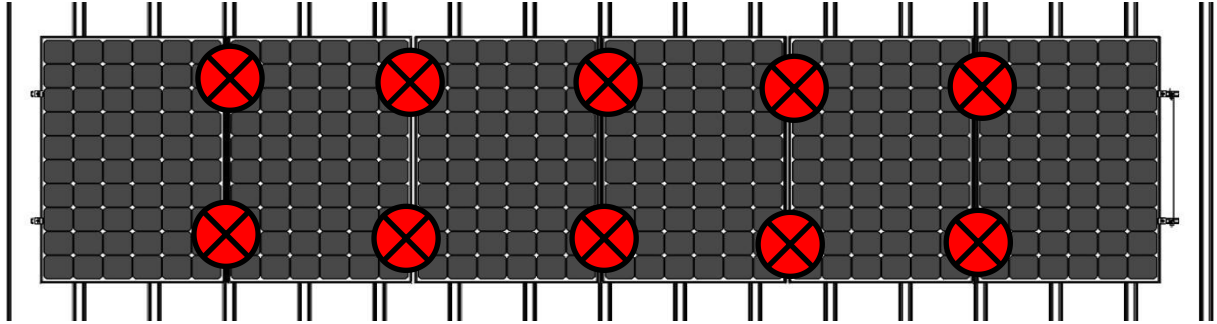
7.4.4 Repeat the steps above. When it comes to the last PV module, fix it with the end clamp and tighten it with bolts.



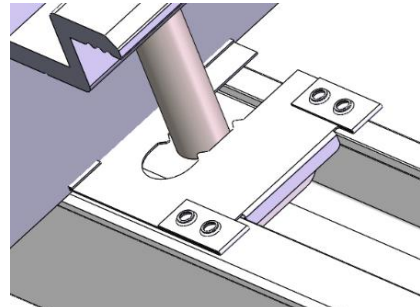
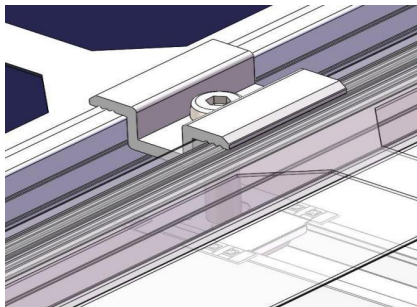
7.5 Installation of Grounding

7.5.1 Installation of Earthing Clip

The earthing clips are required under every mid clamps:



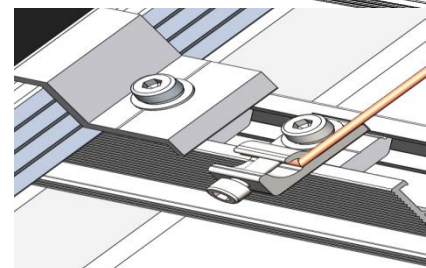
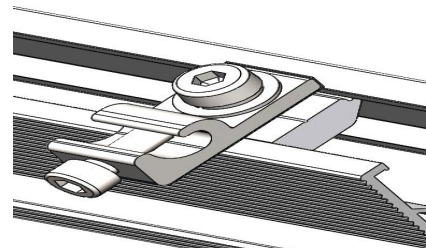
Click the mid clamp into the rail channel and insert the earthing clip to the bolt of mid clamp, then lift up the PV panel slightly and move the mid clamp & earthing clip assembly to the side of first panel. And the pins of earthing clips shall be under the panel frame and on the rail channel to ensure the oxidization film is penetrated. Then place the next panel to the side of mid clamp & earthing clip assembly with the same method and fasten the bolts at last.



7.5.2 Installation of Grounding Lug

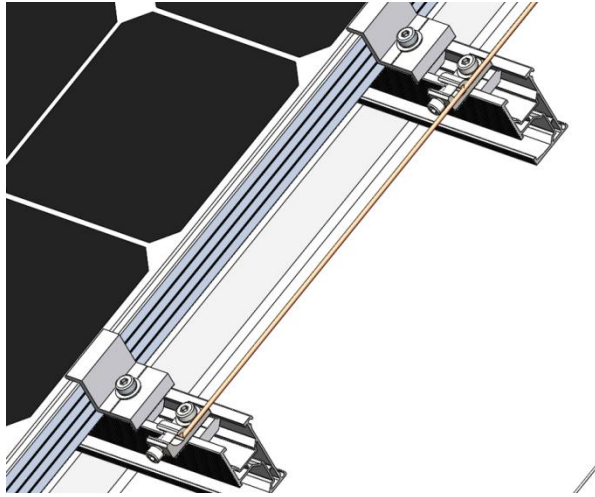
One grounding lug is required at the end of each row of rail, and the earthing cable is fixed on the side channel of grounding lug and connect each solar arrays for grounding.

Click the grounding lug at the end of rail, and make sure the pins of grounding lug are penetrating the rail oxidization film. The torque value for fixing the top M8 bolt is 10~12N*M.



Fix the earthing cable on the side of ground lug with M6 bolt. The torque value for fixing the side M6 bolt is 4~6N*M to ensure the cable is tightly fixed. The earthing cable is going the every grounding lugs to grounding the whole system.

The electrical resistance between rail and earthing cable conductor shall be checked to ensure the bonding is made.



VIII. Notice

1. Notes for Construction Dimension

The specific dimensions of all installations involved are subject to the construction drawings. This installation instruction is only for the description of the product installation method.

2. Notes for Stainless Steel Fasteners

Because of the good ductility for stainless steel, the fasteners have big difference with carbon steel one in nature. If use in improper way, it will result in bolt and nut being "locked", which commonly known as "seizure". Prevention from lock basically has the following ways:

2.1 Reduce the Friction Coefficient

- (1) Ensure that the bolt thread surface is clean and tidy (No dust, grit, etc.);
- (2) It is recommended to use yellow wax or lubricant during installation (such as lubricating grease, 40# engine oil, which are prepared by users).

2.2 Correct Operation Method

- (1) The bolt must be perpendicular to the axis of the thread, and not inclined (Do not tighten Obliquely);
- (2) In the process of tightening, the strength needs to be balanced, tightening torque shall not exceed the prescribed safety torque value;
- (3) Choose torque wrench or socket wrench as far as possible, avoid using adjustable wrench or electric wrench. Lower the rotating speed while have to use electric wrenches;
- (4) Under high temperature conditions, avoid using electric wrenches. Do not rotate fast when using, to avoid rapid rise in temperature and cause "seizure".

HQ Add

30F, W Square, 1801 Huandao East Road
Siming District, Xiamen, China

Production Base Add

Guanshan Industrial Park
Changtai County, Zhangzhou, China

Website

www.antisolar.com

