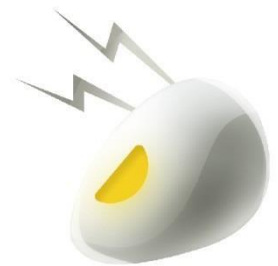


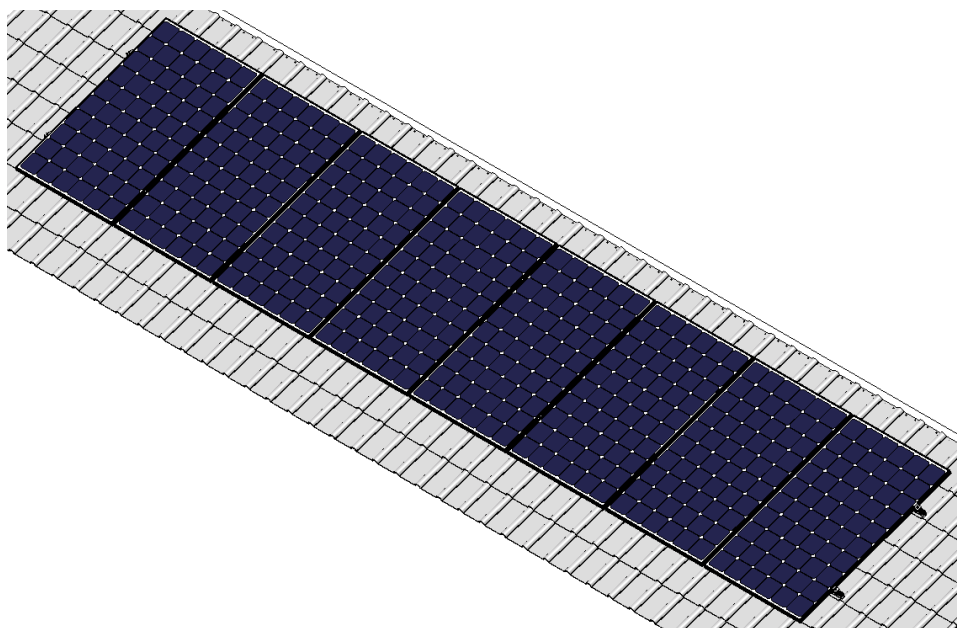
# INSTALLATION INSTRUCTION



## **Tile Roof Mounting System**



**ANTAI**  
Aluminum & AI Tech for Solar



## Content

I. Safety Precautions .....	3
II. Introduction .....	4
III. Tools .....	4
IV. Components .....	5
V. Installation steps .....	6
5.1 Installation of tile hook .....	6
5.2 Installation of Rail .....	7
5.3 Installation of rail splice .....	8
5.4 Installation of PV modules .....	9
5.5 Installation of Grounding Lug (Skip this step if not needed) .....	11
5.6 Installation diagram .....	12
VI. Installation Precaution .....	13
1. Notes for the installation dimensions .....	13
2. Notes for Stainless Steel Fasteners .....	13

# I. Safety Precautions

Thank you for purchasing Antai solar mounting system products. Please refer to this installation instruction before installation, operation, maintenance, and inspection.

## ● General considerations

The installation is limited to those who have professional experience and can carry out construction according to the specified items.

Please abide by the local national or local building regulations and environmental protection regulations. Please comply with the regulations on the prevention of industrial accidents and the relevant regulations of the insurance union.

There must be at least 2 operators during installation to prevent accidents. Please wear safety clothes. (Especially protective helmets, work boots and gloves). Please always prepare at least one installation work instruction when installing.

- When working at heights, please set up scaffolds and carry out construction after eliminating the danger of falling. Please use gloves and seat belts.
- In order to prevent accidents and failures, please do not arbitrarily change the product style.
- Please pay attention to the profile section and sharp parts, and avoid collision and injury during construction.
- Please pay attention to tightening the bolts, nuts, self-tapping screws, etc. of each part, and pay great attention to whether they are locked.
- When working on electrical wiring works, please pay attention not to touch the profile section, which may damage the wiring.
- Please do not use damaged, faulty, or deformed products in case injury or accident happens. Please always prepare at least one installation work instruction when installing.

### Requirement

- Please use the accessories designated by our company for construction parts, and do not arbitrarily transform and change the products.
- Please avoid hitting strongly on the profile as aluminum profile is easy to deform and scratch.
- This information is related to the installation of the system. Please consider the characteristics of the stand during the construction of the foundation, components, inverter, and electrical wiring.

## II. Introduction


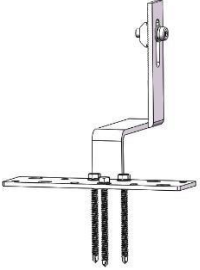

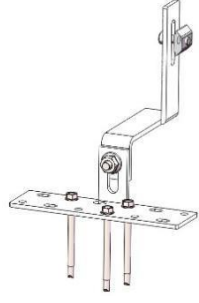
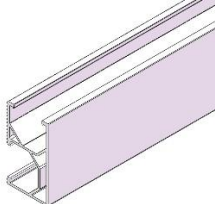
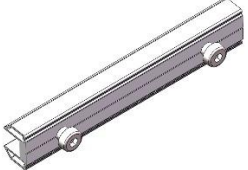
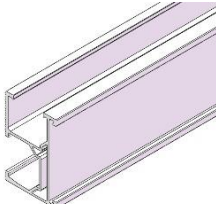
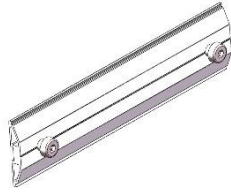
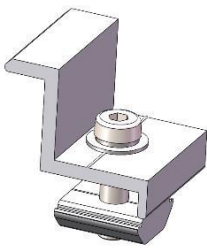
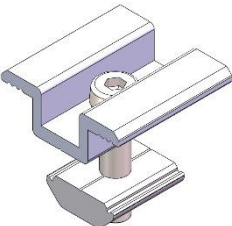
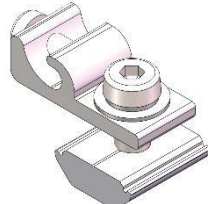
Antai tile hook system is a roof photovoltaic mounting system applied to tile roofs. The hooks are designed based on various types tile roofs. In that case, each roof has its corresponding and fitting hook for installation, which greatly improves the firmness of the connection between mounting system and roof structure. Multiple high-quality components and different types of rails can be used for different types tile roof in different countries and regions, while improving the stability of the overall supports. The whole system has fewer mounting accessories, which saves the users' installation time and cost. It is an efficient solution for large-scale tile roof projects.

Please read the installation manual carefully before installation.

## III. Tools

			
8mm Inner Hexagon Spanner	Electric Drill	Tape Measure	Thin Marker
			
Torque Spanner	String	Adjustable Wrench	Socket Spanner (M8)

## IV. Components

Main Components			
			
Tile hook #1	Tile hook #2	Adjustable hook #1	Adjustable hook #2
			
Rail 1 (Internal splice)	Rail splice 1	Rail 2 (External splice)	Rail splice 2
			
End clamp	Mid clamp	Grounding lug	

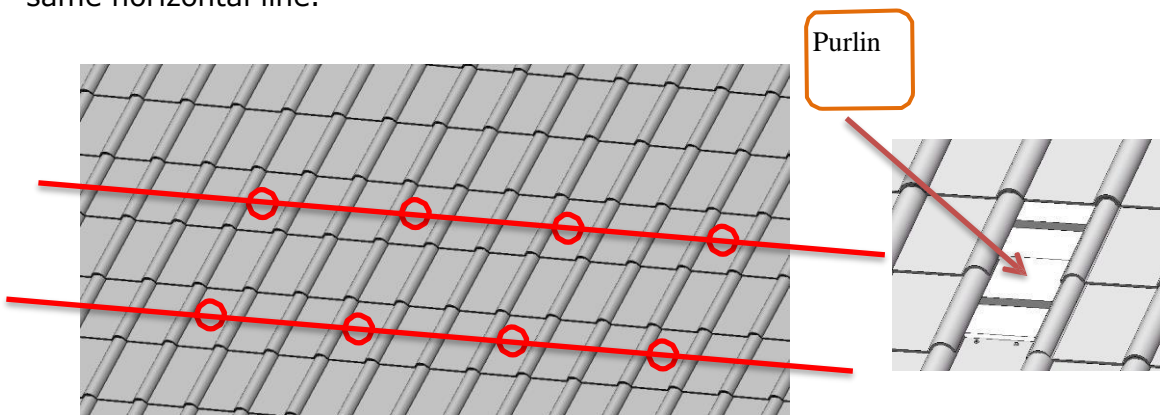
## V. Installation steps

### 5.1 Installation of tile hook

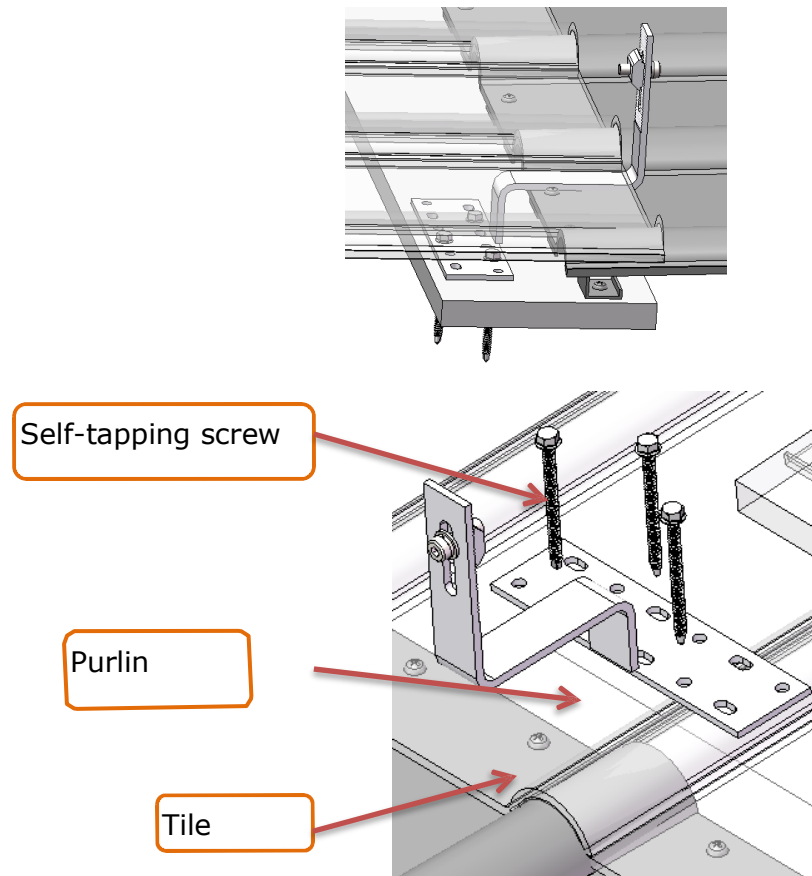
Self-tapping screws of tile hook need to be fixed to the roof purlins. Please mark the positions of tile hook according to shop drawing and make sure all tile hooks are installed on the same horizontal line. Then install the tile hooks accordingly and fasten them to the roof purlins by self-tapping screws.

Shown as bellow:

5.1.1 Mark the positions of tile hook on the roof and make sure they are on the same horizontal line.

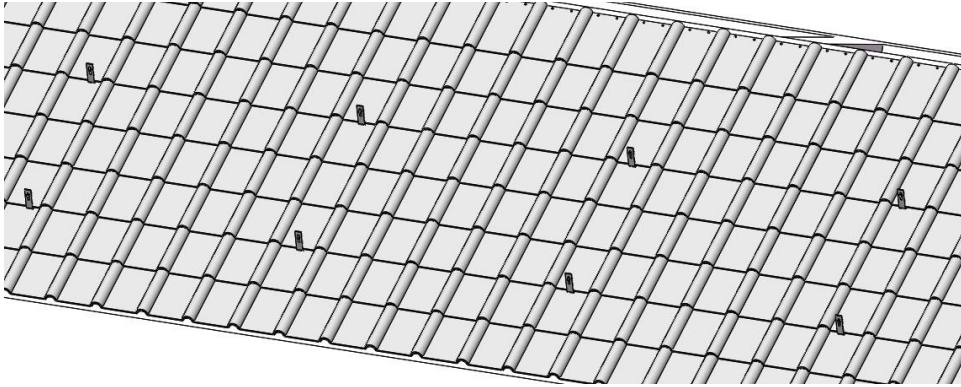


Tile hook installation:





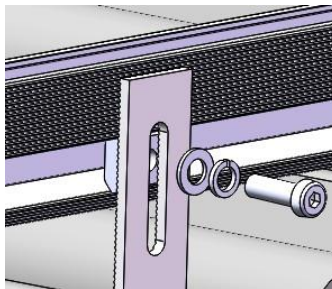
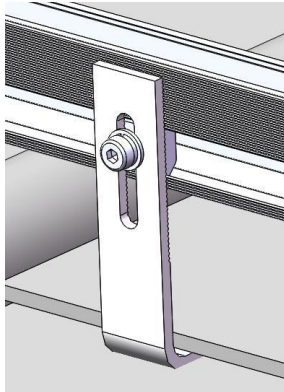
### 5.1.2 Install all hooks to the tile roof.



## 5.2 Installation of Rail

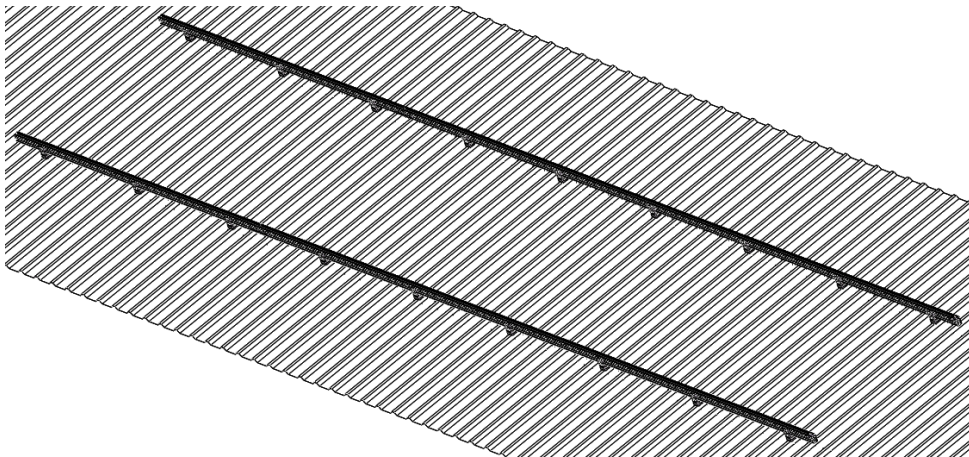
Fix rails to tile hooks after adjusting the length and height and tighten them by bolts.

5.2.1 Fix tile hook and adjust the rail position, slide T module into specified rail (refer to drawings) and then tighten them by bolts.



M8 Hexagon socket bolt  
Spring washer  
Flat washer  
T module

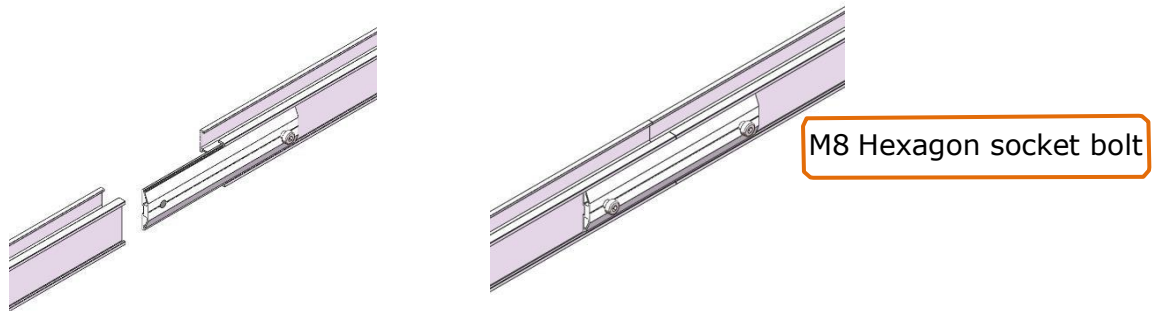
5.2.2 Install other rails accordingly.



## 5.3 Installation of rail splice

Rails should be connected by rail splice if needed, as shown below:

5.3.1 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.

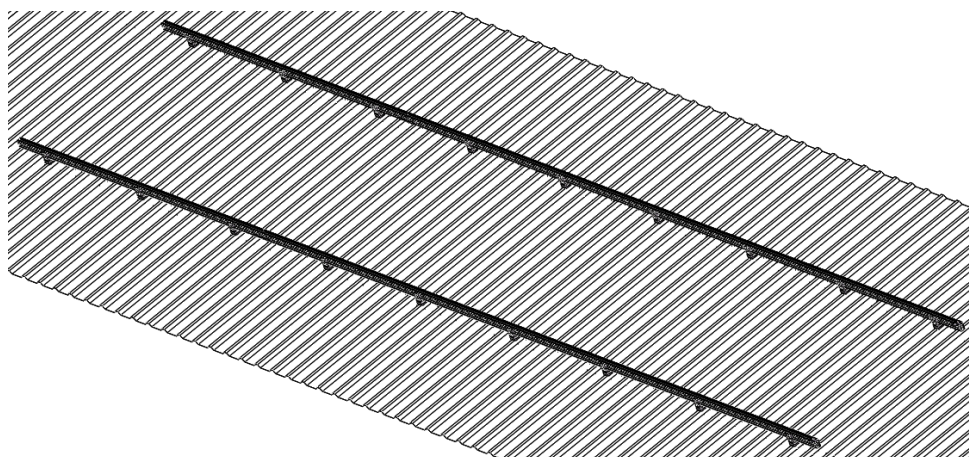


Above are for TYN53、CG019、TYN28 and others by external rail splices.



Above are for CG010、TYN305、TYN355 and others by internal rail splices.

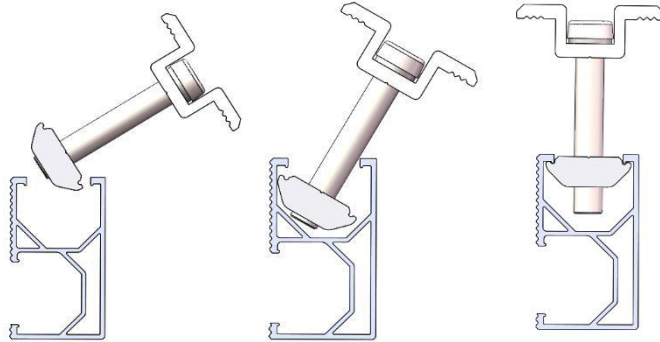
5.3.2 Completed installation is as the pic shown below



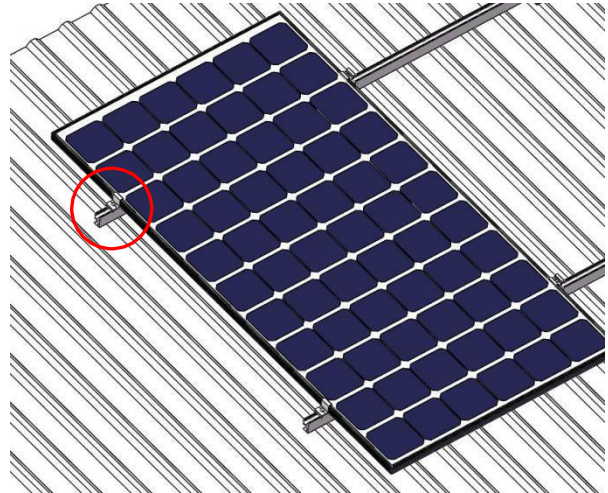
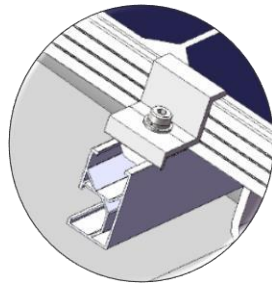


## 5.4 Installation of PV modules

According to the installation dimensions of the drawings, place the modules on the rail, and fix them with end clamps, mid clamps.

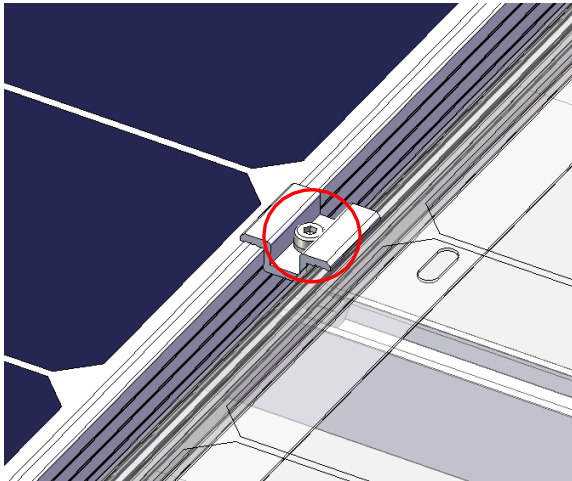


5.4.1 Place the PV module on the rail and adjust the position according to the drawing. Then fix the end clamp into the rail channel, and tighten the bolts.

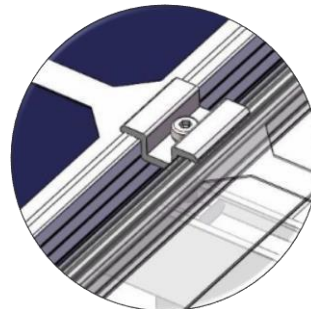


M8×30 Hexagon socket bolt  
Flat washer  
Spring washer  
T module

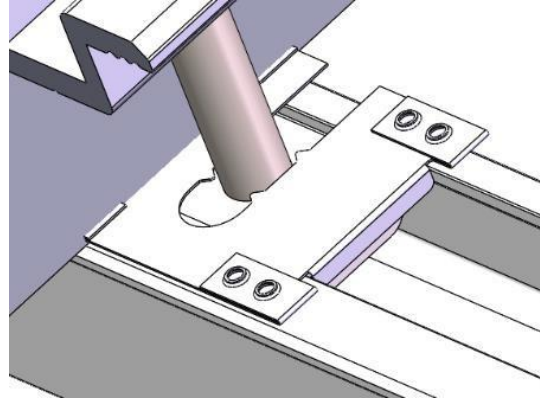
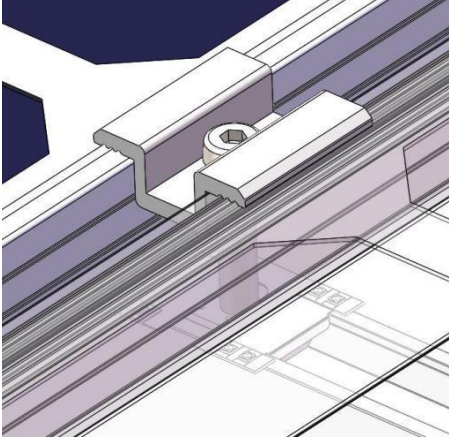
5.4.2 After fixing the end clamp of first PV module, please put the second PV module on the rail at proper position. Connecting firmly the first PV module and the second one with mid clamp and fasten the bolts.



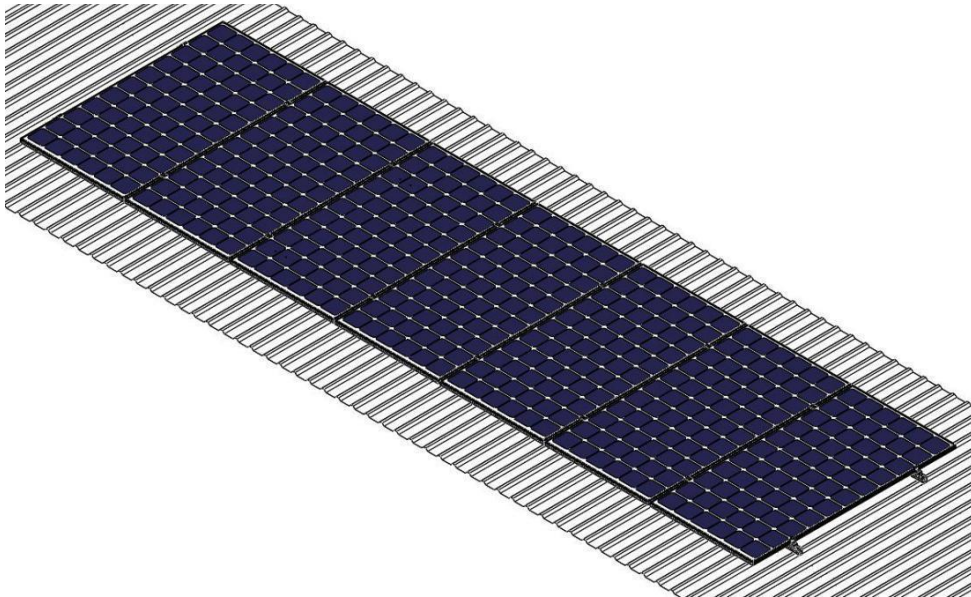
M8 Hexagon socket bolt  
Spring washer  
T module



5.4.3 If there are earthing clips needed, place them 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.

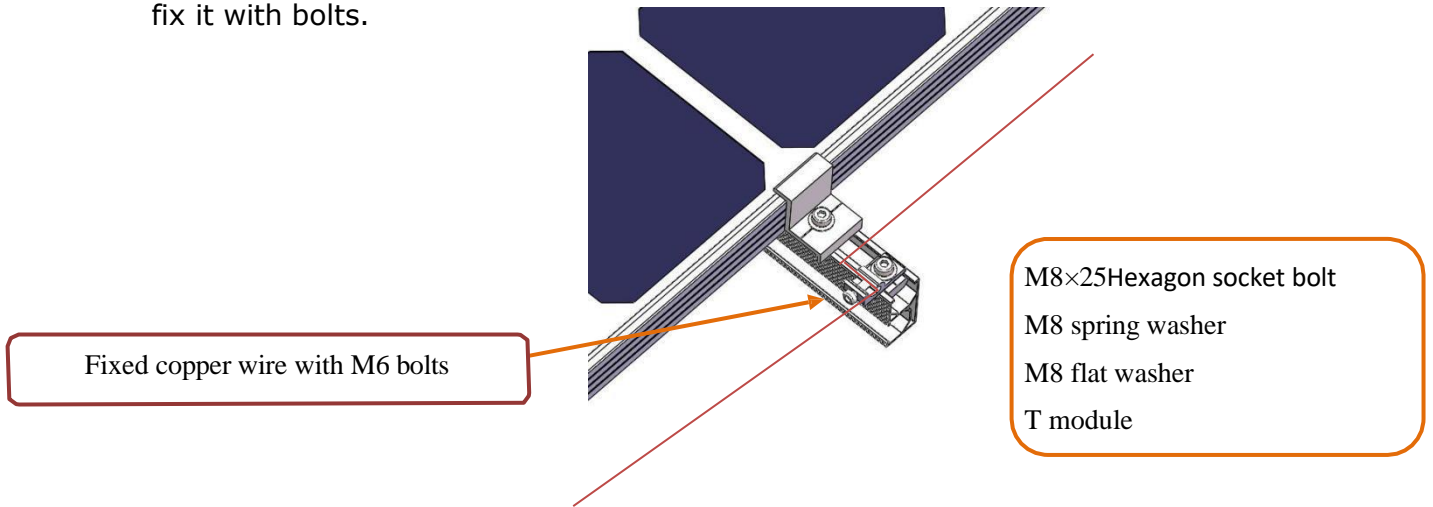


5.4.4 Repeat the steps above. When it comes to the last PV module, fix it with the end clamp and tighten with bolts.

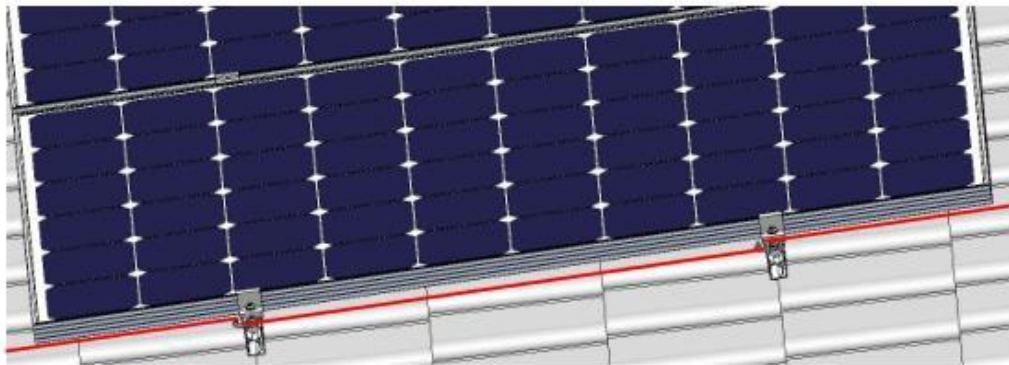


## 5.5 Installation of Grounding Lug (Skip this step if not needed)

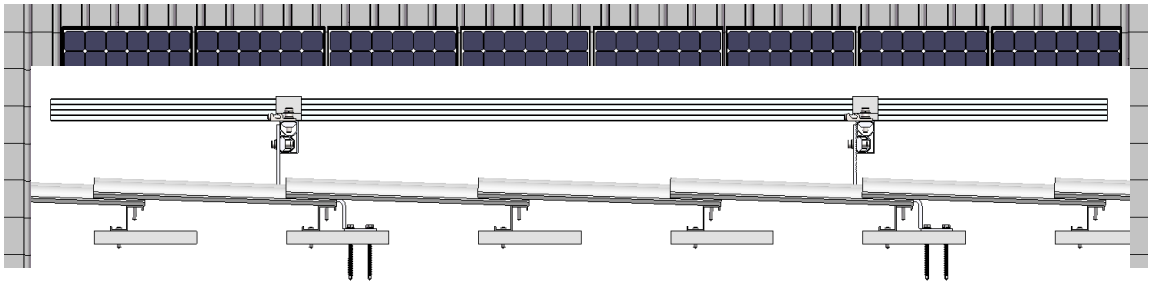
5.5.1 Install grounding lug at the end of the rail as the picture shown below and fix it with bolts.



5.5.2 At the edge of the layout, connect each grounding lug with copper wire, fix the copper wire with M6 bolts, and conduct the end of copper wire to the grounding.

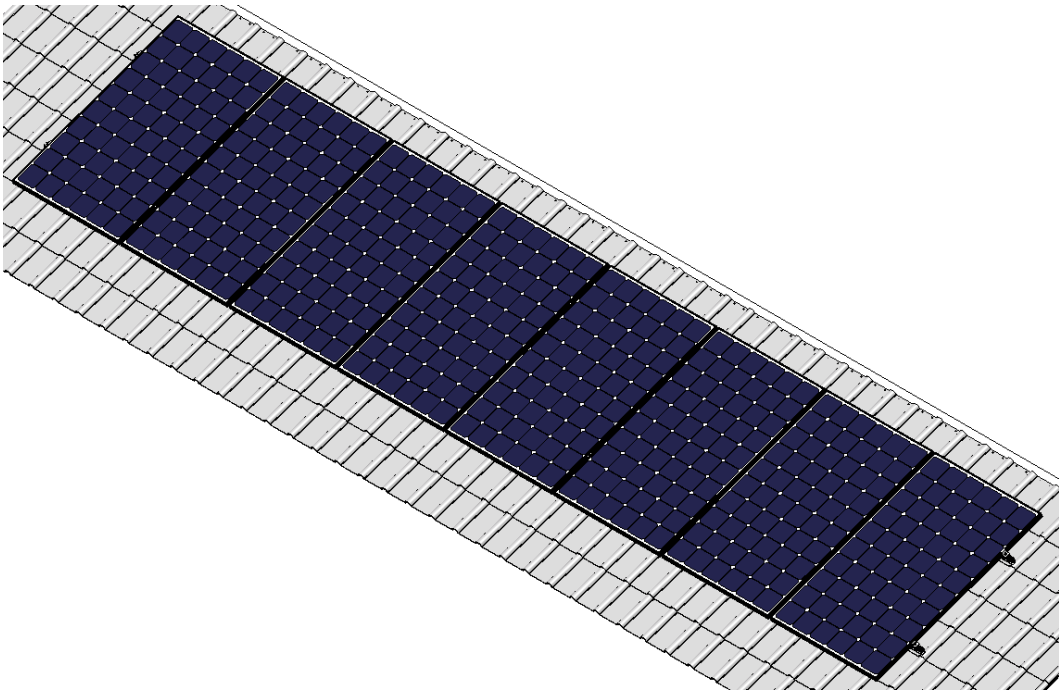


## 5.6 Installation diagram



Top view

Side view



Axonometric drawing

## VI. Installation Precaution

### 1. Notes for the installation dimensions

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) Avoid using electric wrenches etc. under high temperature conditions, do not rotate fast when using, to avoid rapid rise in temperature and cause "seizure".



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## Structural Design Documentation

**Flush Array Frame System Spacing Table For Tile Roof**

**According to AS/NZS 1170.2-2011 (R2016)  
with Rail ATL-TYN-305A  
within Australia Terrain  
Category 2 & 3**

**For: ANTAI SOLAR AUSTRALIA PTY LTD  
Level 1 suite 1.02/309 Pitt St  
Sydney NSW 2000**

**Job Number: 9670-09  
Date: 18 May 2021**



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ISO 9001:2015 Registered Firm  
Certificate No: AU1222

Job No: 9670-09  
Client: ANTAI SOLAR AUSTRALIA PTYLTD  
Project: Flush Array Frame System Spacing Table For Tile Roof  
with Rail ATL-TYN-305A  
Address: within Australia

#### Australian Standards

AS/NZS 1170.0:2002 – Structural design actions, Part 0: General principles

AS/NZS 1170.1:2002 (R2016) – Structural design actions, Part 1: Permanent, imposed  
and other actions

AS/NZS 1170.2:2011 (R2016) – Structural design actions, Part 2: Wind actions

AS/NZS 1664.1:1997 – Aluminium structures - Limit state design

AS 4100:2020 – Steel Structures

AS/NZS 4600:2018 – Cold-formed Steel Structures

Wind Terrain Category: WTC2 & 3

Designed: JD  
Checked: AA

Date: May-21

Client: ANTAISOLAR AUSTRALIA PTY LTD  
 Project: Solar Array Interface Spacing Table  
 Address: within Australia  
 Designed: JD

Job: 9670-09  
 Date: May-21

Checked: AA

Flush Array Frame System Spacing Table for Tile Roof (mm)

Type of Rail: ATL-TYN-305A  
 Type of Interface: Tile Interface AT-TYN-hook01  
 Solar Panel Dimension: 2.3mx1.2m  
 Terrain category: 2

Roof Angle ( $\Phi$ ) -  $\Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	End	Central	End	Central	End	Central	End	Central
A	880	1110	665	890	610	735	555	690
B	725	980	605	725	450	665	315	630
C	--	610	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	End	Central	End	Central	End	Central	End	Central
A	880	1335	665	1065	610	950	555	885
B	725	1175	605	945	450	795	315	725
C	--	705	--	595	--	380	--	--
D	--	430	--	--	--	--	--	--

Roof Angle ( $\Phi$ ) -  $30^\circ \leq \Phi \leq 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal
A	1155	1735	930	1515	785	1335	715	1250
B	1025	1665	760	1330	680	1175	645	1105
C	630	1065	340	820	--	705	--	665
D	255	740	--	615	--	430	--	355

Flush Array Frame System Spacing Table for Tile Roof (mm)

Type of Rail ATL-TYN-305A  
 Type of Interface Tile Interface AT-TYN-hook01  
 Solar Panel Dimension 2.3mx1.2m  
 Terrain category 3

Roof Angle ( $\Phi$ ) -  $\Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	End	Central	End	Central	End	Central	End	Central
A	1100	1390	1100	1390	935	1175	760	1030
B	970	1220	970	1220	785	1035	675	910
C	605	725	605	725	355	630	--	485
D	--	555	--	555	--	270	--	--

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	End	Central	End	Central	End	Central	End	Central
A	1100	1670	1100	1670	935	1420	760	1235
B	970	1470	970	1470	785	1245	675	1085
C	605	945	605	945	355	740	--	665
D	--	665	--	665	--	585	--	330

Roof Angle ( $\Phi$ ) -  $30^\circ \leq \Phi \leq 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal
A	1455	1850	1455	1850	1225	1765	1075	1695
B	1275	1780	1275	1780	1080	1700	945	1545
C	760	1330	760	1330	655	1125	595	985
D	595	910	595	910	320	785	--	690

General Notes

Note 1 Following components are satisfied to use according to AS/NZS 1170.2-2011(R2016)

Components	Part Number	Description
Rail	ATL-TYN-305A	As per drawing & test report provided by client
Splice	ATL-TYN-304/54	
Tile Hook	AT-TYN-hook01	

Note 2 Spacing calculated based on 1.9mm steel purlin or 35mm screw embedment length into timber (JD4 seasoned timber).

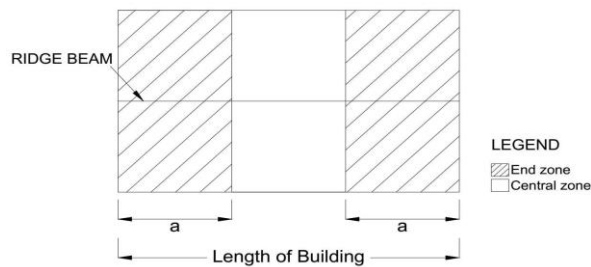
Note 3 Recommended screws

Metal Purlins/Battens 14g-10 TPI Tek screws or approved equivalent  
 Timber Purlins/Battens 14g-10 TPI T17 screws or approved equivalent

Note 4 Maximum uplift wind pressure is limited to 5 kPa. "--" states more uplift pressure.

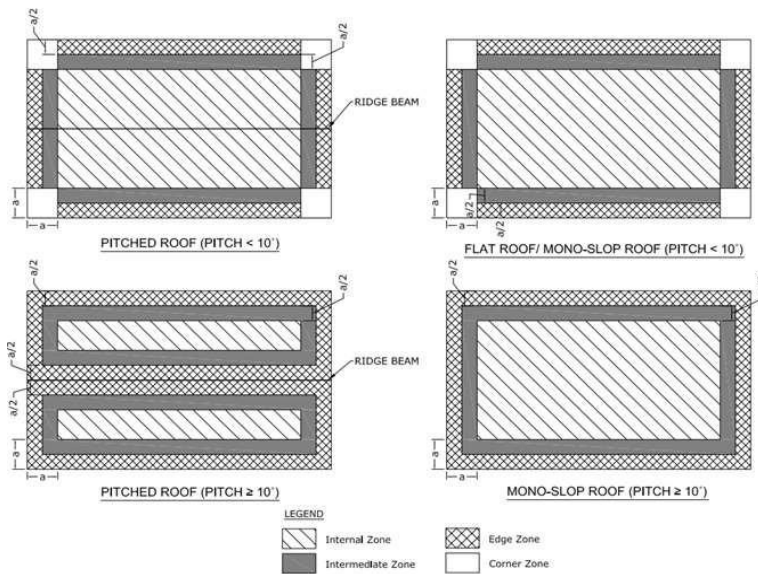
Note 5 Deflection is limited to Minimum of L/120 and 15mm

Note 6 For definition of (End/Central) roof zones, Refer Figure D9 of AS/NZS 1170.2:2011 (R2016) or Figure A as below  
 For definition of intermediate and internal roof zones, Refer Figure B as below



In Figure A, the value of dimension "a" is 1/3 of the length of building

Figure A



In Figure B, the value of dimension "a" is the minimum of 0.2b, 0.2d and h. (b & d are building dimensions and h is its height)

Figure B

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Client: ANTAISOLAR AUSTRALIA PTY LTD  
Project: Solar Array Interface Spacing Table  
Address: within Australia  
Designed: JD

Job: 9670-09  
Date: May-21

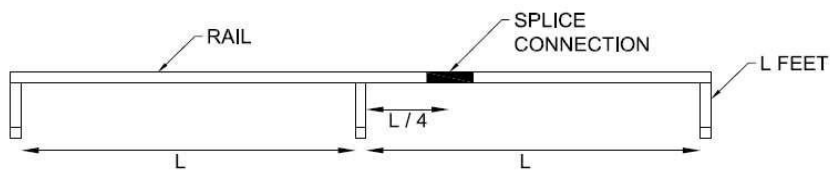
Checked: AA

**Note 7**

Terrain Category 2 (TC2) refers to open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstructions per hectare, e.g. farmland and cleared subdivisions with isolated trees and uncut grass.  
Terrain Category 3 (TC3) refers to terrain with numerous closely spaced obstructions having heights generally from 3 m to 10 m. The minimum density of obstructions shall be at least the equivalent of 10 house-size obstructions per hectare, e.g. suburban housing, light industrial estates or dense forests.

**Note 8**

The optimised location of rail splice connection is at quarter length of the spacing of the interface. No Splice connection should be placed at the centre of spacing or over the interface.







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**According to AS/NZS 1170.2-2011 (R2016)  
with Rail ATL-TYN-305B  
within Australia Terrain  
Category 2 & 3**

**For: ANTAI SOLAR AUSTRALIA PTY LTD  
Level 1 suite 1.02/309 Pitt St  
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**Job Number: 9670-09  
Date: 18 May 2021**



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with Rail ATL-TYN-305B  
Address: within Australia

**Australian Standards**

- AS/NZS 1170.0:2002 – Structural design actions, Part 0: General principles
- AS/NZS 1170.1:2002 (R2016) – Structural design actions, Part 1: Permanent, imposed and other actions
- AS/NZS 1170.2:2011 (R2016) – Structural design actions, Part 2: Wind actions
- AS/NZS 1664.1:1997 – Aluminium structures - Limit state design
- AS 4100:2020 – Steel Structures
- AS/NZS 4600:2018 – Cold-formed Steel Structures

Wind Terrain Category: WTC2 & 3

Designed: JD  
Checked: AA

Date: May-21

Client: ANTAISOLAR AUSTRALIA PTY LTD  
 Project: Solar Array Interface Spacing Table  
 Address: within Australia  
 Designed: JD

Job: 9670-09  
 Date: May-21  
 Checked: AA

Flush Array Frame System Spacing Table for Tile Roof (mm)

Type of Rail: ATL-TYN-305B  
 Type of Interface: Tile Interface AT-TYN-hook01  
 Solar Panel Dimension: 2.3mx1.2m  
 Terrain category: 2

Roof Angle ( $\Phi$ ) -  $\Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	End	Central	End	Central	End	Central	End	Central
A	735	1110	615	740	490	670	--	630
B	665	980	490	665	--	610	--	555
C	--	490	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	End	Central	End	Central	End	Central	End	Central
A	735	1335	615	1065	490	830	--	740
B	665	1175	490	830	--	700	--	665
C	--	645	--	440	--	--	--	--
D	--	--	--	--	--	--	--	--

Roof Angle ( $\Phi$ ) -  $30^\circ \leq \Phi \leq 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal	Intermediate	Internal
A	1155	1685	805	1515	690	1335	655	1250
B	1025	1610	690	1330	630	1175	605	1105
C	580	1065	--	715	--	645	--	615
D	--	680	--	490	--	--	--	--

Flush Array Frame System Spacing Table for Tile Roof (mm)

Type of Rail ATL-TYN-305B  
 Type of Interface Tile Interface AT-TYN-hook01  
 Solar Panel Dimension 2.3mx1.2m  
 Terrain category 3

Roof Angle ( $\Phi$ ) -  $\Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	End	Central	End	Central	End	Central	End	Central
A	1100	1390	1100	1390	815	1175	690	1030
B	970	1220	970	1220	690	1035	620	760
C	490	665	490	665	--	595	--	--
D	--	365	--	365	--	--	--	--

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	End	Central	End	Central	End	Central	End	Central
A	1100	1610	1100	1610	815	1420	690	1235
B	970	1470	970	1470	690	1245	620	1085
C	490	830	490	830	--	675	--	610
D	--	615	--	615	--	400	--	--

Roof Angle ( $\Phi$ ) -  $30^\circ \leq \Phi \leq 60^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 5		5<H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20	
	Intermedi ate	Internal	Intermedia te	Internal	Intermedi ate	Internal	Intermedi ate	Internal
A	1455	1805	1455	1805	1225	1720	1075	1640
B	1275	1735	1275	1735	1080	1645	830	1545
C	690	1330	690	1330	610	1125	440	985
D	450	905	450	905	--	705	--	630

General Notes

Note 1 Following components are satisfied to use according to AS/NZS 1170.2-2011(R2016)

Components	Part Number	Description
Rail	ATL-TYN-305B	As per drawing & test report provided by client
Splice	ATL-TYN-304/54	
Tile Hook	AT-TYN-hook01	

Note 2 Spacing calculated based on 1.9mm steel purlin or 35mm screw embedment length into timber (JD4 seasoned timber).

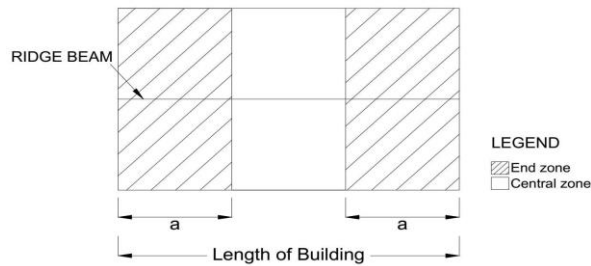
Note 3 Recommended screws

Metal Purlins/Battens 14g-10 TPI Tek screws or approved equivalent  
 Timber Purlins/Battens 14g-10 TPI T17 screws or approved equivalent

Note 4 Maximum uplift wind pressure is limited to 5 kPa. "--" states more uplift pressure.

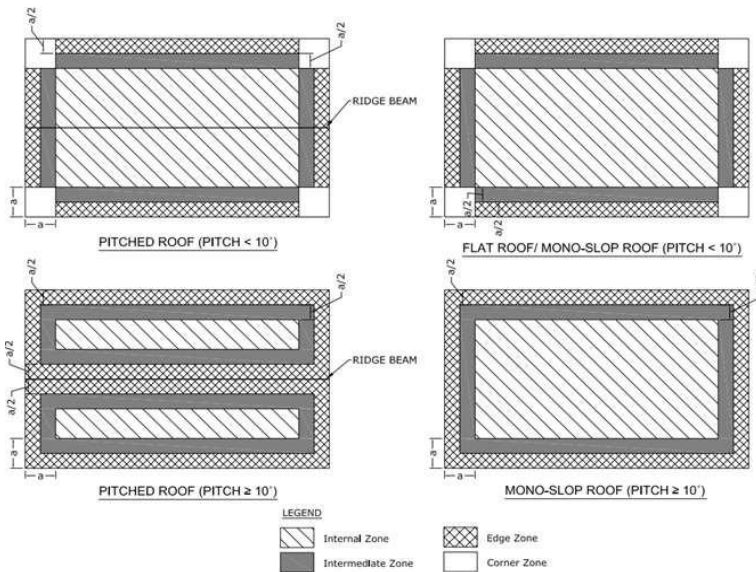
Note 5 Deflection is limited to Minimum of L/120 and 15mm

Note 6 For definition of (End/Central) roof zones, Refer Figure D9 of AS/NZS 1170.2:2011 (R2016) or Figure A as below  
 For definition of intermediate and internal roof zones, Refer Figure B as below



In Figure A, the value of dimension "a" is 1/3 of the length of building

Figure A



In Figure B, the value of dimension "a" is the minimum of 0.2b, 0.2d and h. (b & d are building dimensions and h is its height)

Figure B

**Relationships built on trust**

Client: ANTAISOLAR AUSTRALIA PTY LTD  
Project: Solar Array Interface Spacing Table  
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Note 7

Terrain Category 2 (TC2) refers to open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstructions per hectare, e.g. farmland and cleared subdivisions with isolated trees and uncut grass.  
Terrain Category 3 (TC3) refers to terrain with numerous closely spaced obstructions having heights generally from 3 m to 10 m. The minimum density of obstructions shall be at least the equivalent of 10 house-size obstructions per hectare, e.g. suburban housing, light industrial estates or dense forests.

Note 8

The optimised location of rail splice connection is at quarter length of the spacing of the interface. No Splice connection should be placed at the centre of spacing or over the interface.

