ZA Pitched Roof Solar Mounting System Installation Manual

Contents

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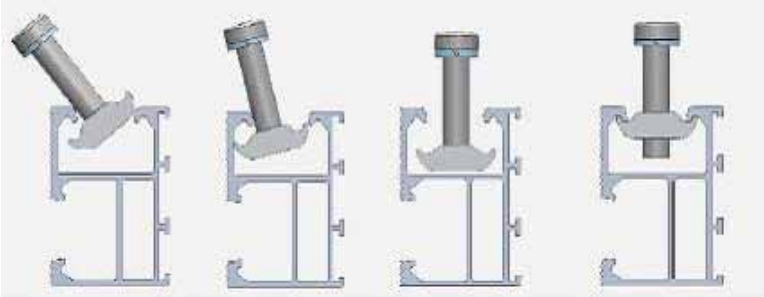
1. General Information

Thank you for choosing the Zeus Appollo solar mounting system. Made from custom-built aluminum extrusions and components, Newsunpower's innovative design and improved frame strength greatly simplify solar panel installation. The easy 4 steps installation makes the Tilt-in modules able to be put into ZA Rail in any position quickly. So, the Tilt-in modules are pre-assembled with the clamp to save your installing time.

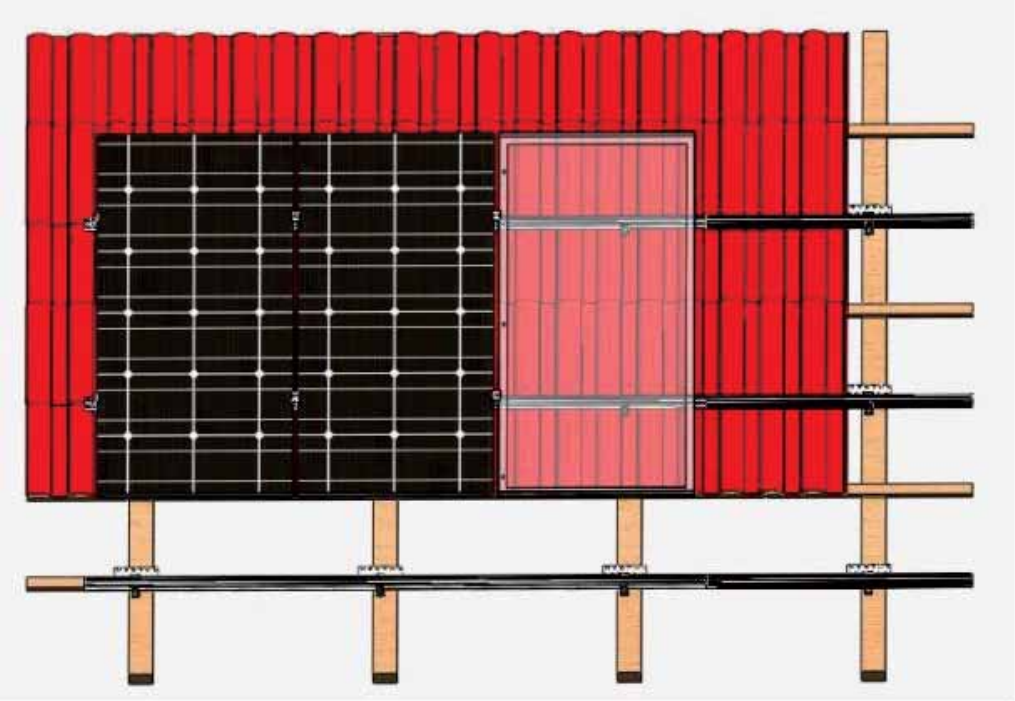


Tilt In Align Lock

Four Steps, Easy Installation!

ZA Rail's versatile design makes it suitable for a wide variety of building types and zones including residential, commercial and remote environments.

Zeus Appollo's solar mounting system is backed by a 10-year warranty and is assessed in accordance with the Australian/New Zealand Standard on Wind Actions (AS/NZS1170.2.2011).



2. Safety and Installer Responsibilities

2.1. Safety and Installer Responsibilities

It is critically important that safety practices are observed when installing

2.1.1 Do not throw or roughly handle any Zeus Appollo components.

2.1.2 Do not bring Zeus Appollo system into contact with sharp or heavy objects.

2.1.3 Do not modify Zeus Appollo components in any way. The exchange of bolts, drilling of holes, bending or any other physical changes not described in standard installation procedure will void the warranty.

2.1.4 It is the installer's responsibility to verify the integrity of the structure to which Zeus Appollo components are fixed. Roofs or structures with rotten timber members, undersized timber members, excessively spaced timber members or rusted sheet metal, or any other unsuitable substructure cannot be used with Zeus Appollo components, and installation on such structures will void the warranty, and could result in death or serious injury.

2.1.5 It is the installer's responsibility not to overload the existing structures due to the weight and additional wind load (liplift) of installation.

2.2. Safety and Installer Responsibilities

AS/NZS1170.2.2011 provides guidance on determining the wind pressures applicable to your Zeus Appollo solar mounting system install sites, taking into account the roof shapes and geographic locations. Sufficient guidance is given in this document, but you may wish to procure a copy of these standards if your company installs Australia/New Zealand wide.

2.2.1 REMEMBER average wind speeds are higher for structure mounted closer to the roof perimeter zone (edge). Refer to 'Fixing within Roof Installation Zone' for more information).

2.2.2 Make sure your installation complies with local and national building codes. Take into account relevant design parameters (wind speed, exposure and topographic factor) when determining the loading for the installation.

2.2.3 If alternative fasteners are used to fix the mounting to the roof (assuming supplied fasteners are unsuitable for any reason), all screw fasteners must conform to corrosion resistance Class 4 Australian Standard AS3566 and be of equal or greater strength to those supplied with your Zeus Appollo mounting system order.

3. Technical Specifications

3.1. Applications

3.1.1 Commercial and residential buildings

3.1.2 Marine applications and remote areas

3.2. Features

3.2.1 6005-T5 Aluminum extrusion

3.2.2 Innovative design of the Tilt-in modules, which can be pre-assembled with the clamp, making the installation easy and quick.

3.2.3 Suitable for different conditions and the most solar panels at present market.

3.2.4 Significantly higher strength-to-weight ratio than other mounting products, providing improved efficiency due to greater lifespans, inherent corrosion resistance resulting in low on-going maintenance and an extended product life.

3.2.5 Assessed in accordance with Australian/New Zealand Standard on Wind Actions, AS/NZS1170.2.2011

3.2.6 Anodized finish

3.3. Materials

Materials	Tensile Strength	
	Ultimate	Yield
Extruded 6005-T5 Aluminum	260MPa	240MPa
Stainless Steel 304	670MPa	300MPa

3.4. Materials

Roof Slope	0°—60°
Building Height	up to 20m
Mounting Structure	Timber
Roof Types	Roman tile, Flat tile, Asphalt shingle/Slate tile, tin and irregular sheet metal,etc.
System Angles	Flushed with the roof

4. Tools for Installation

The following tools are required for installation:

No.	Tool Name	Usages/Notes	Pics
1	6 mm Allen key or hexagonal driver bit.	If using a 6mm driver bit, make sure the cordless power tool used for the driving has a hand-tight clutch setting a fine (soft) impact drive to prevent damage to the fragile glass panels and threads on the structure.	
2	Cordless drill	Drill or impact driver for driving roof material fixings,	
3	Angle grinder	For tile roof installation, and angle grinder fitted with a continuous edge diamond tipped tile Ocutting blade; gloves, hearing protection, a face protection mask, and a suitably rated breathing protection mask for all people in proximity of Grinding.	
4	open-end wrench	For fastening the bolts.	

No.	Tool Name	Usages/Notes	Pics
5	Power socket	For power connection	
6	Gloves	Protect hands from the hazard of the sharp corners.	
7	Spirit level	To maintain each row of rails in same level.	
8	Rule	For measuring lengths and positioning.	
9	Cord and colour pen	Mark the installation position.	 
10	Timber/Wood board	If necessary to shim the roof hooks.	

5. Components Description

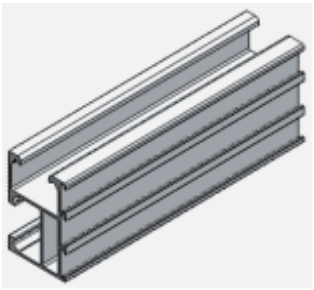
Rails：

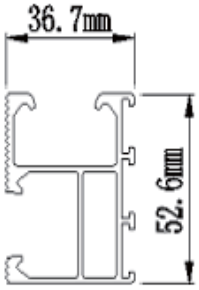
1.Material： 6005-T5 Aluminum.

2.Length： Customized.

3.Applicable： Framed modules in any sizes.

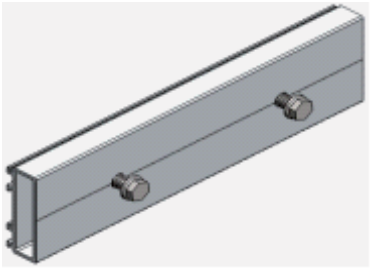
Module width (mm):	Standard rails (mm):
808~826	2560/3400
990~1020	4200





Rail splice kit：

1.To extend ZA Rail to any length as required by the quantity or width of the solar modules.



End Clamp Kit For Firmed Modules:

1.Hold the edge of each end panel
2.Fastened with a 6mm Allen key
3.Standard pre-assembly for the usual panels with thickness 30, 35, 40, 46, 50, 57mm

Inter Clamp Kit For Firmed

1. Fit between two panels
2. Fastened with a 6mm Allen key
3.Standard pre-assembly for the usual panels with thickness 30, 35, 40, 46, 50, 57mm

Roof Hooks：

Stainless Steel Tile Roof Hook #1：

1. Fix to the rafter below Roman tile roof

2. With Tilt-in module kit and lock washers.

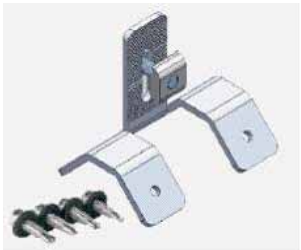
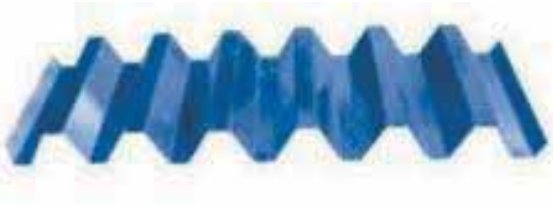
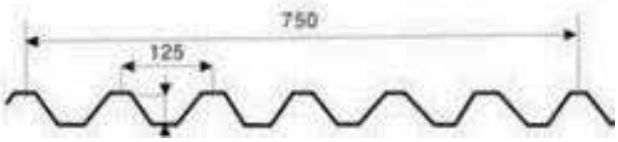
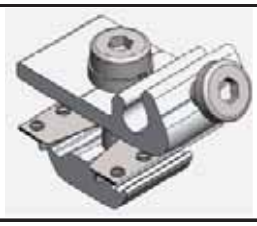
3. Include 3pcs St6.3*14G*80 wood screws

Stainless Steel Tile Roof Hook #3：

1. Fix to the rafter below Roman tile roof

2. With Tilt-in module kit and lock washers.

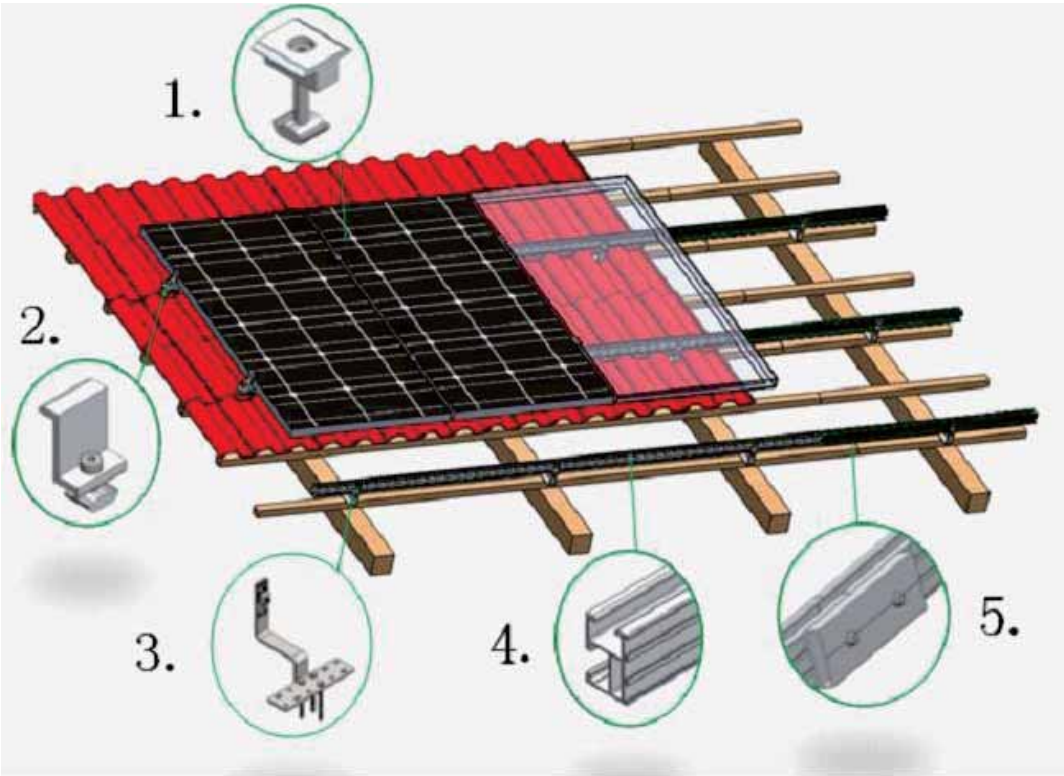
3. Include 3pcs St6.3*14G*80 wood screws

Stainless Steel Tile Roof Hook #4： 1. Fix to the rafter below Asphalt shingle/Slate tile roofs. 2. With Tilt-in module kit and lock washers. 3. Include 2pcs St6.3*14G*80 wood screws	
Stainless Steel Tile Roof Hook #5： 1. Fix to the rafter below Roman tile roof 2. With Tilt-in module kit and lock washers. 3. Include 3pcs St6.3*14G*80 wood screws	
Tin Roof Hook L-Foot &T-Foot： 1. Fix to the purlin on tin roof 2. With Tilt-in module kit and lock washers. 3. Include 1pc St6.3*14G*80 wood screw & 1pc rubber pad	
Stainless steel Trapezoid Sheet Metal Roof Hook Trapezoid-Foot： 1. Fix directly to Trapezoid sheet metal roof 2. With Tilt-in module kit &lock washers. 3. Include 4pcs St5.5*12G*25 self-taping screws. **NOTE:** Trapezoid color steel tile hook is especially for tiles in fixed shape as left pic shows. Other shape cannot use it. Its Advantage is to be free from restrictions of supporting structures. The roofs use this hook are generally factory buildings, and their supporting structures are mainly in concrete ones. The spans between supporting beams are quite large which limit the hooks for rails and thus effect the stability of whole PV system. And this hook just solve this problem with fixing the hook tightly into the roofs by 4 screws.	  
Grounding Clip： 1. Installed under 2 panels, to puncture the anodized cover on the surfaces of the rails, and realize the grounding function of the mounting system.	
Grounding lug： 1. To connect earthing conductive wires.	

6. System Overview

All components of the system are listed below.
The version and quantities of the parts can vary, depending of

type of roof
Site specifications
type of module
No. of module



1.Inter clamp kit

2.End clamp kit

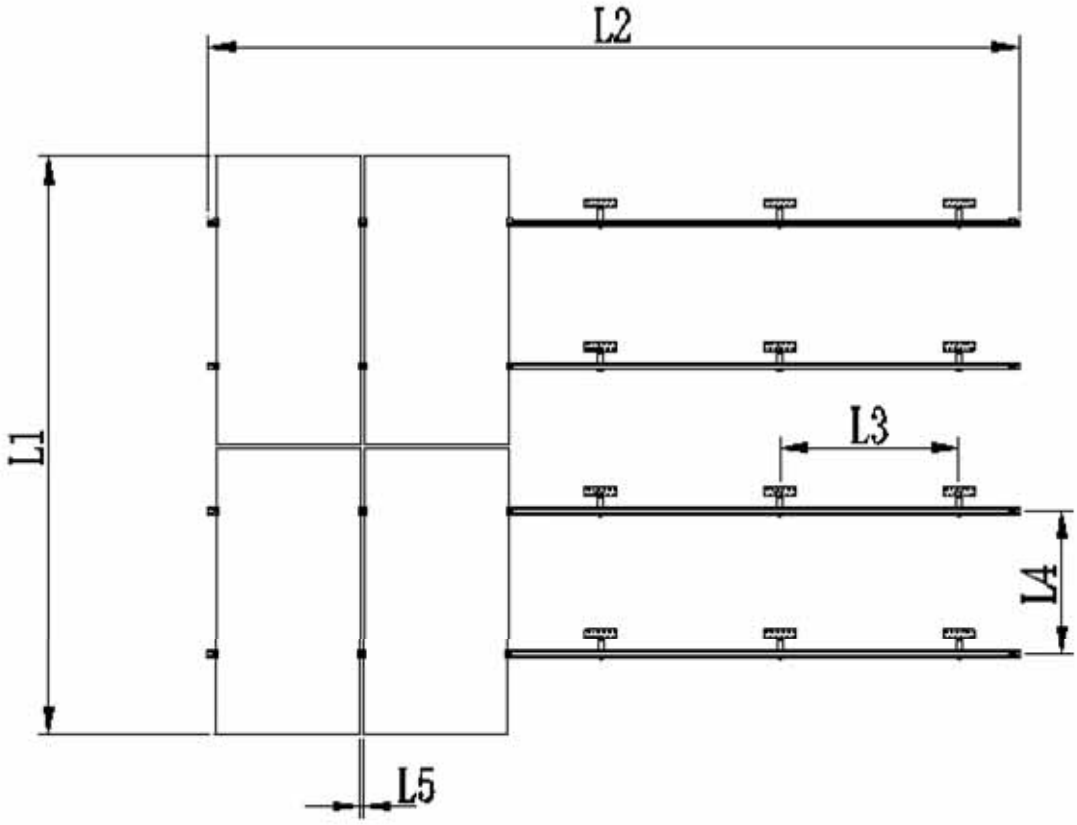
3.Stainless steel hook

4.Rail

5.Rail splice kit

7. Module field planning

Below, the distances between roof connections for a portrait installation are specified. Clamp-on roof hooks need to be installed in specific distances, depending on the distance of rafters and the tolerance of conditions.



1. Height of the module field: module height x number of modules vertically
2. Width of the module field: NO. of modules horizontally x (width of the module+18 mm)+32 mm
3. Distance between roof connections vertically (according to the clamping points pre-defined by the module producer): Quarter-points of the modules, about 1/2 of module height.
4. Distance between roof connections horizontally: Depending on the distance between rafters and on the fixing requirements.
5. Distance between modules: 17 mm

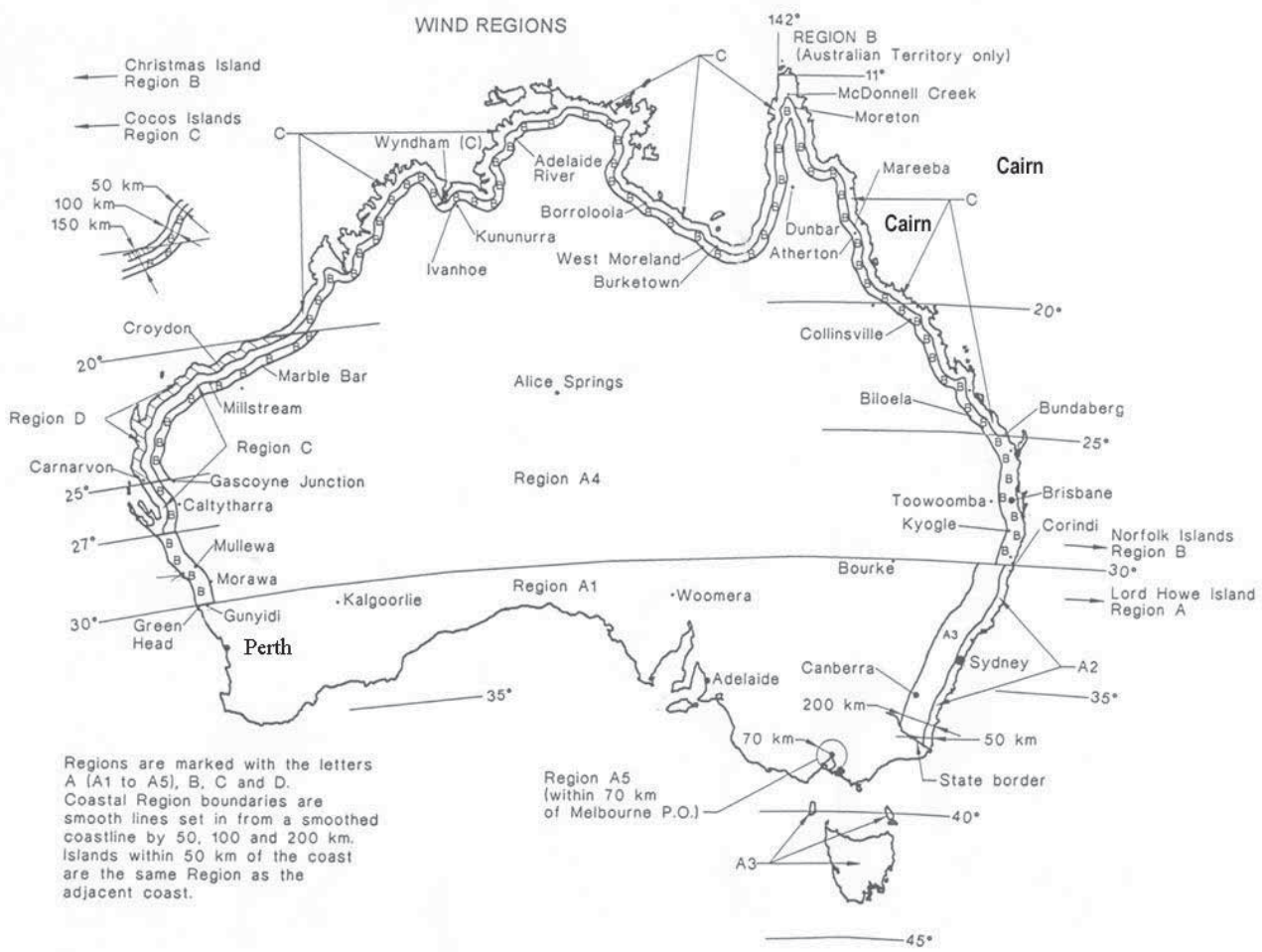
When positioning the modules, please take into consideration that

- the values above are
- dimensions of tiles or other roof covering and the position of the rafters define the precise actual horizontal distance between roof connections
- the clamping points of modules defines the precise actual vertical distance between roof connections.

8. AS/NZS 1170 Compliance Assessment

8.1. Determine the wind region of your installation site.

Region Definition



Wind regions are predefined for all of Australia by Australian Standard 1170.
The Wind Region has nothing to do with surrounding topography or buildings.

- Most of Australia is designated Region A which indicates a Regional Ultimate Basic Wind Speed of 45m/sec.
- Some areas are designated Region B (57m/sec). Local authorities will advise if this applies in your area.
- Region C areas (69m/sec) are generally referred to as Cyclonic and are generally limited to northern coastal areas. Most Region C zones end 100km inland.
- Region D (88m/sec) Australia's worst Cyclonic Region between Carnarvon and Pardoe in Western Australia.
- Region W areas are specially referred to New Zealand region with a wind speed of 51m/sec.

8.2. Determine the height of your installation site.

This document provides sufficient information for solar mounting system installation height less than 10 meters. If your installation site is more than 10 meters in height, please contact Zeus Appollo to obtain engineering data to support your installation.

8.3. Determine the maximum rail support spacing.

Please use the following table to determine ZA Rail support spacing for tile roof installations.

Maximum Rail Support Spacing Charts

(Confirmed by COLAFELLA CONSULTING PTY. LTD. 11.12.2012.)

COLAFELLA CONSULTING PTY. LTD.
CONSULTING STRUCTURAL & CIVIL ENGINEERS

TERRAIN CATEGORY #1 HEIGHT: 5 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 10 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	840	550	445	265	625
INTERMEDIATE ZONE	560	365	N/A	N/A	415
EDGE ZONE	420	N/A	N/A	N/A	315

TERRAIN CATEGORY #2 HEIGHT: 5 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 10 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	1185	755	445	265	870
INTERMEDIATE ZONE	790	504	N/A	N/A	580
EDGE ZONE	595	380	N/A	N/A	435

TERRAIN CATEGORY # 3 HEIGHT: 5 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 10 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	1500	1035	660	380	1090
INTERMEDIATE ZONE	1000	690	440	N/A	725
EDGE ZONE	750	520	330	N/A	545

TERRAIN CATEGORY #1 HEIGHT: 5 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 20 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	1840	1130	905	515	1325
INTERMEDIATE ZONE	1225	755	605	345	885
EDGE ZONE	920	565	455	N/A	665

TERRAIN CATEGORY #2 HEIGHT: 5 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 20 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	2400	1640	905	515	1960
INTERMEDIATE ZONE	1600	1095	605	345	1305
EDGE ZONE	1200	820	455	N/A	980

TERRAIN CATEGORY #3 HEIGHT: 5 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 20 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	2400	2400	1400	765	2400
INTERMEDIATE ZONE	1600	1600	935	510	1600
EDGE ZONE	1200	1200	700	385	1200

TERRAIN CATEGORY # 1 HEIGHT: 10 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 20 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	1100	710	595	465	1120
INTERMEDIATE ZONE	735	475	395	310	745
EDGE ZONE	550	355	300	N/A	560

TERRAIN CATEGORY #2 HEIGHT: 10 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 20 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	1470	925	525	460	1500
INTERMEDIATE ZONE	980	615	350	305	1000
EDGE ZONE	735	465	N/A	N/A	750

TERRAIN CATEGORY #3 HEIGHT: 10 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 20 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	2400	1485	780	600	2400
INTERMEDIATE ZONE	1600	990	520	400	1600
EDGE ZONE	1200	745	390	300	1200

COLAFELLA CONSULTING PTY. LTD.
CONSULTING STRUCTURAL & CIVIL ENGINEERS

TERRAIN CATEGORY # 1 HEIGHT: 10 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 10 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	535	355	300	240	540
INTERMEDIATE ZONE	355	N/A	N/A	N/A	360
EDGE ZONE	N/A	N/A	N/A	N/A	N/A

TERRAIN CATEGORY #2 HEIGHT: 10 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 10 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	680	455	300	N/A	700
INTERMEDIATE ZONE	455	305	N/A	N/A	465
EDGE ZONE	340	N/A	N/A	N/A	350

TERRAIN CATEGORY #3 HEIGHT: 10 metres					
MAXIMUM TILE ROOF HOOK NUMBERS #1, #3, #4 AND #5 SPACINGS (mm) FOR TILED ROOFS OF MINIMUM 10 degree PITCH					
	WIND REGIONS				
ROOF ZONE	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	1075	880	390	305	1090
INTERMEDIATE ZONE	715	585	N/A	N/A	725
EDGE ZONE	540	440	N/A	N/A	545

1. The above figures are based on modules lengths up to 1680mm, maximum weight of 21Kgs.
2. 1680mm modules require 2 rails with fixing as per table above.
3. The above spacing applies for fixing a minimum embedment of 50mm into timber rafters/purlins, i.e. full depth of screw thread.
   (A reduced embedment will reduce the liplift capacity of the roof connections).
4. Tile brackets should fixed to the rafter using 2/3 mounting screws (St6.3*14G*80).

Please use the following table to determine NSP rail support spacing for sheet metal roof installations.

COLAFELLA CONSULTING PTY. LTD.
CONSULTING STRUCTURAL & CIVIL ENGINEERS

TERRAIN CATEGORY #1 HEIGHT: 5 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 10 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	1270	835	680	410	950
INTERMEDIATE ZONE	900,1200	845	555	455	N/A	635
EDGE ZONE	900,1200	635	420	455	N/A	475

TERRAIN CATEGORY #2 HEIGHT: 5 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 10 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	1780	1145	680	410	1320
INTERMEDIATE ZONE	900,1200	1185	765	455	N/A	660
EDGE ZONE	900,1200	890	575	340	N/A	660

TERRAIN CATEGORY #3 HEIGHT: 5 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 10 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	2240	1560	1000	590	1640
INTERMEDIATE ZONE	900,1200	1495	1040	665	395	1095
EDGE ZONE	900,1200	1120	780	500	N/A	820

TERRAIN CATEGORY #1 HEIGHT: 5 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 20 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	2400	1700	1370	790	1980
INTERMEDIATE ZONE	900,1200	1600	1135	915	525	1320
EDGE ZONE	900,1200	1200	850	685	395	990

TERRAIN CATEGORY #2 HEIGHT: 5 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 20 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	2400	2400	1370	790	2400
INTERMEDIATE ZONE	900,1200	1600	1600	915	525	1600
EDGE ZONE	900,1200	1200	1200	685	395	1200

TERRAIN CATEGORY #3 HEIGHT: 5 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 20 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	2400	2400	2090	1160	2400
INTERMEDIATE ZONE	900,1200	1600	1600	1395	775	1600
EDGE ZONE	900,1200	1200	1200	1045	580	1200

TERRAIN CATEGORY #1 HEIGHT: 10 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 10 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	780	530	450	360	790
INTERMEDIATE ZONE	900,1200	520	355	300	N/A	525
EDGE ZONE	900,1200	390	N/A	N/A	N/A	395

TERRAIN CATEGORY #2 HEIGHT: 10 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 10 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	1050	695	465	365	1060
INTERMEDIATE ZONE	900,1200	700	465	310	N/A	705
EDGE ZONE	900,1200	525	350	N/A	N/A	530

TERRAIN CATEGORY #3 HEIGHT: 10 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 10 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	1610	1060	595	N/A	1640
INTERMEDIATE ZONE	900,1200	1075	705	395	N/A	1095
EDGE ZONE	900,1200	805	530	300	N/A	820

TERRAIN CATEGORY #1 HEIGHT: 10 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 20 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	1650	1075	905	710	1680
INTERMEDIATE ZONE	900,1200	1100	715	605	475	1120
EDGE ZONE	900,1200	825	540	455	355	840

TERRAIN CATEGORY #2 HEIGHT: 10 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 20 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	2185	1400	910	710	2235
INTERMEDIATE ZONE	900,1200	1455	935	605	475	1490
EDGE ZONE	900,1200	1095	700	455	355	1120

TERRAIN CATEGORY #3 HEIGHT: 10 metres						
MAXIMUM L-FOOT AND T-FOOT SPACINGS (mm) FOR TIMBER BATTENS FOR SHEETED ROOFS OF MINIMUM 20 degree PITCH						
		WIND REGIONS				
ROOF ZONE	BATTEN SPACING	**A**	**B**	**C**	**D**	**W**
INTERNAL ZONE	900,1200	2400	2210	1180	915	2400
INTERMEDIATE ZONE	900,1200	1600	1475	785	610	1600
EDGE ZONE	900,1200	1200	1105	590	460	1200

1. The above figures are based on modules lengths up to 1680mm, maximum weight of 21Kgs.
2. 1680mm modules requires 2 rails with fixing as per table above.
3. The above spacing applies for fixing with a min embedment of 35mm into timber battens/purlins.
4. L-Feet & T-Feet should be fixed to the purlins under using a min of one mounting screw (St6.3*14G*80mm) through sheet metal roofs with desk rubber.

8.4. Verify acceptable rail end overhang

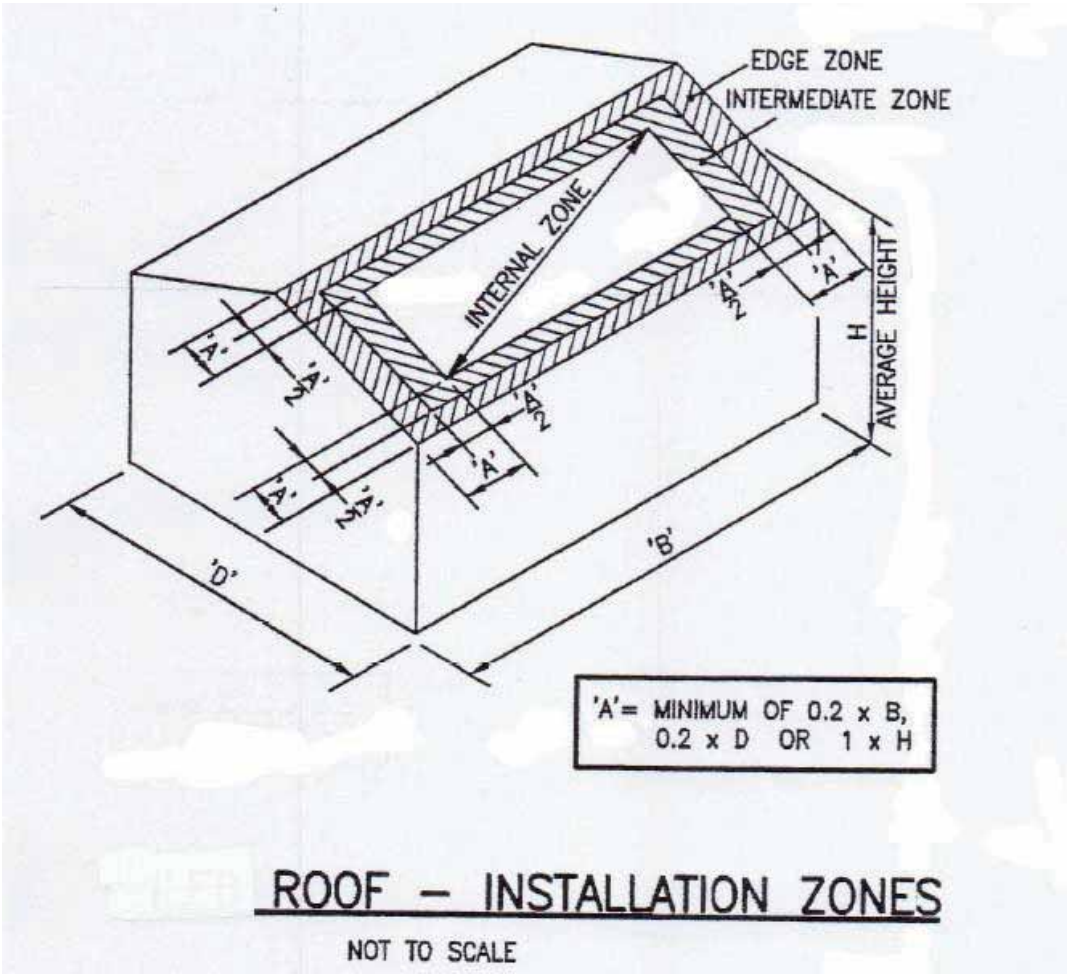
Rail end overhang must not exceed 50% of foot spacing and a maximum of 600mm.
Thus, if foot spacing is 1200mm, the rail end overhang can be up to 600mm.
In this case, two feet can support a rail as long as 2400mm
{1200mm between the feet and 600mm of overhang at each end).

8.5. Determine roof slope

Zeus Appollo solar mounting system can be used for roof slope up to 60 degrees.
Please verify the Installation site roof slope is between 10 degree and 60 degrees.

8.6. Determine roof installation roof areas

Zeus Appollo solar mounting system can be installed anywhere on a roof but fixing centers are required to be reduced at ridges and edges. The diagram below shows the area of higher wind loadings.

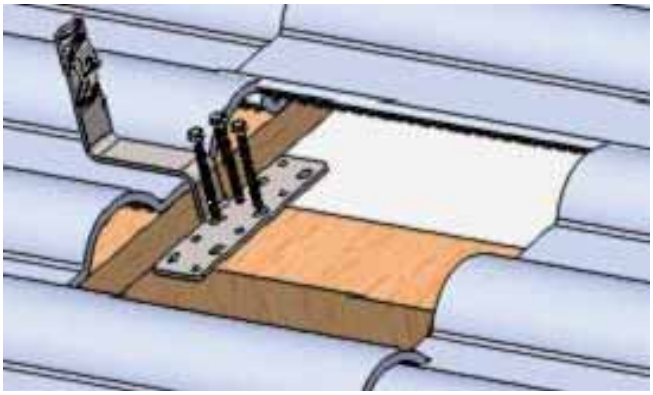


9. Installation

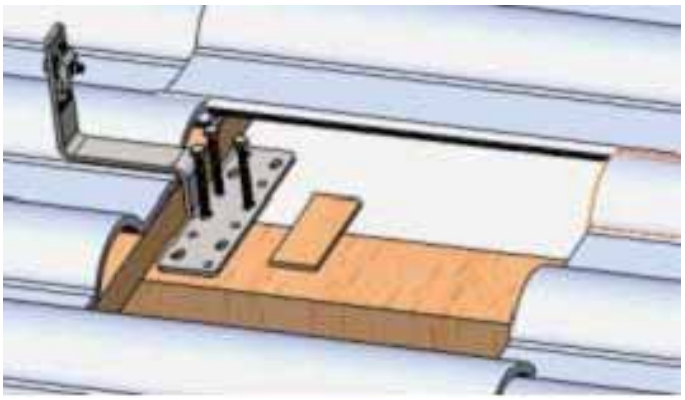
Tile Roof Hook Installation:

1. According to system planning, to determine the hooks installation directions and positions.
Move away the roof tiles at the marked position or simply lift them up slightly.
(See right pic.)

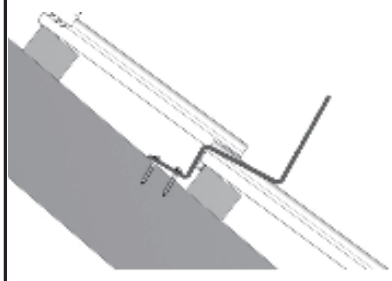
2. Input the roof hook to the marked wooden beam.
Fix the roof hooks with 3x wood screws (St6.3*14G*80) by Cordless drill.
(See right pic.)



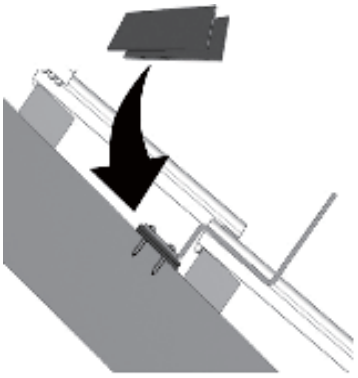
3. Where the beam which for supporting hook handle is too high for the hook to lean on, shim the roof hook with wood board till the corner of the hook handle is in same level with the tile.
(See right pic.)

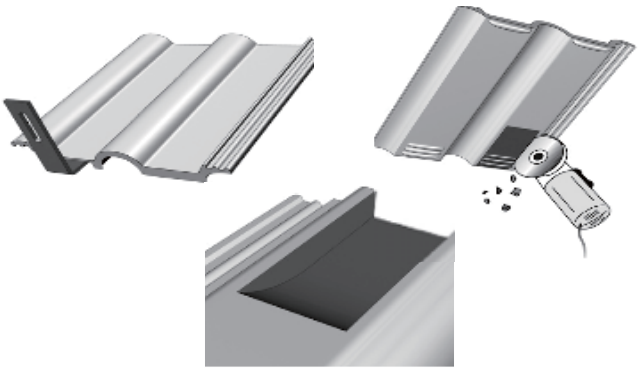
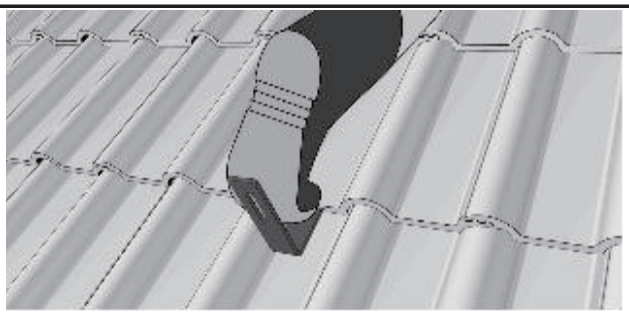
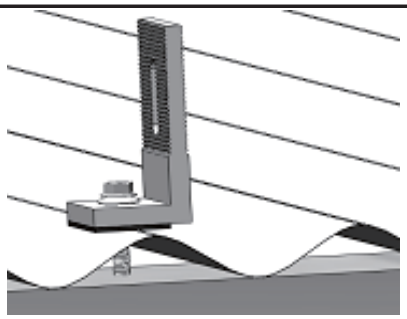
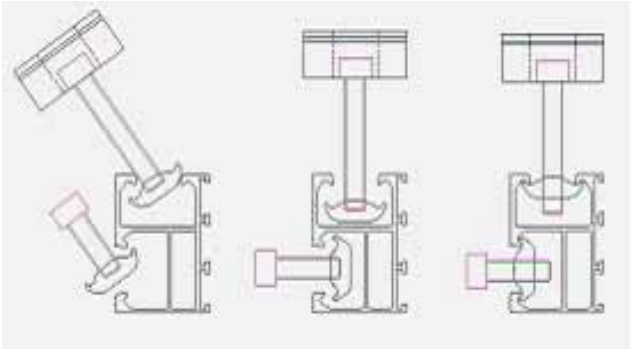


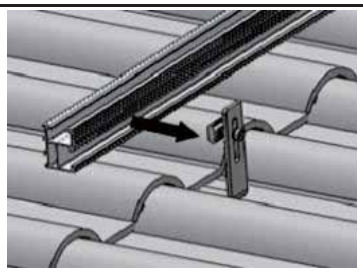
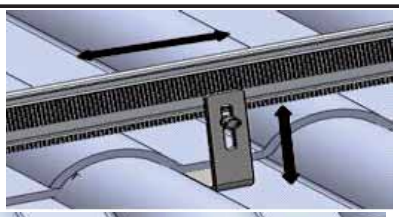
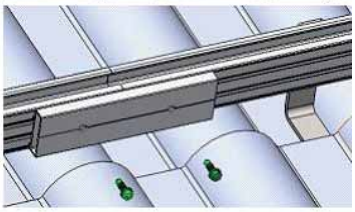
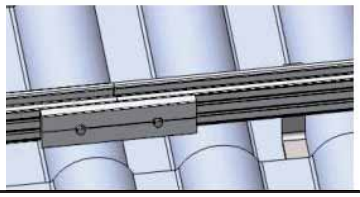
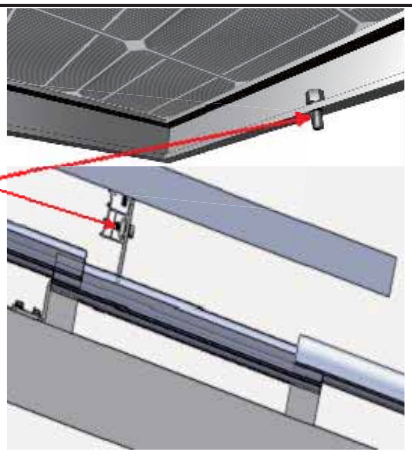
Wrong

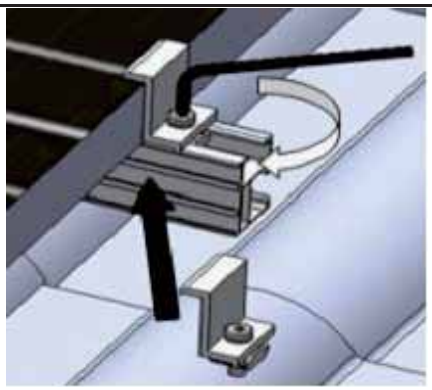
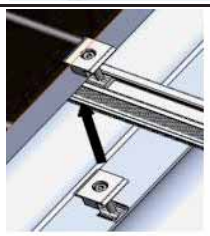
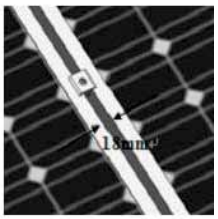


Correct



4. Where the roof tiles pose an obtacles to the hook or blocks the hook to get through, use an angle grinder/hammer to cut the extra part and make the hook handle can closely lean on the tile. (See right pic.)	
5. Caution! Do not step upon the installed hooks as a ladder since such extreme pressure could damage the tile below. (See right pic.)	
Tin Roof Hook Installation:	
6. Mark roof hook installation points and use the Cordless drill to drill the wood screw through the point to fasten the L feet and rubber pad with the purlin. (See right pic.)	
Rail Installation:	
7. Four steps to quick mount the tilt-in module into ZA rail channel.To facilitate tilt-in module into ZA rail channel, please ensure the hexagon socket head bolt won't get through the bottom of the tilt-in module. Fixing tilt-in module in the rail,and screw the bolt in 2-3 rounds slightly. For this time,bolt can still slide in rail freely, slide the bolt to the position where inner clamp kit,end clamp kit and hook will be installed, then fasten tightly with hexagonal driver bit. (Recommend torque force:8 N·m) (See right pic.)	

8. Always install from the shorest when the rails are not in the same lengths. Using M8X25mm hexagonal socket head bolt,locking washers,and tilt-in Module to install all rails on the hooks (Do not fasten in order to facilitate the adjustment of rails later on).(See right pic.)	
9. To adjust rails position. Take advantage of the loose connection between long hook hole,tilt-in module and hexagonal socket head bolt to adjust the rails in horizontal and vertical directions.When the position of rails are well adjusted,fasten the hexagonal socket head bolts with hexagonal driver bit. (See right pic.)	 
10.To install rail splice kit. When rails are not long enough,rail splice kit can be used to connect multiple rails together.When connecting,slide half of splice to one rear side of the pre-assembled rail,then put next rail into the other side of the splice kit. When come togeter,fix 2 hexagonal socket head bolts into the rail splice with cordless drill. (See right pic.)	  
Solar Module Installation:	
11. Before the installation of solar modules, an anti-lip protection should be installed on the bottom row of modules for the security. Therefore,bolts are required to be fastened on holes near the bottom frame of the module.Such protection can prevent the modules from dropping. Refer the right picture to for the details. (See right pic.)	

12. To install end clamp kit. Slide the end clamp kit,firmly stick to the side of module,then use the hexagonal driver bit to fasten the bolt. (Recommend torque force:8 N·m) (See right pic.)	
13. To install inter clamp kit. Slide the inter clamp kit between 2 modules into the right position, then use the hexagonal driver bit to fasten the bolt. (Recommend torque force:8 N·m) (See right pic.)	  
14. Complete the installation of the whole pitched roof solar mounting system. (See right pic.)	

Earthing System Installation:

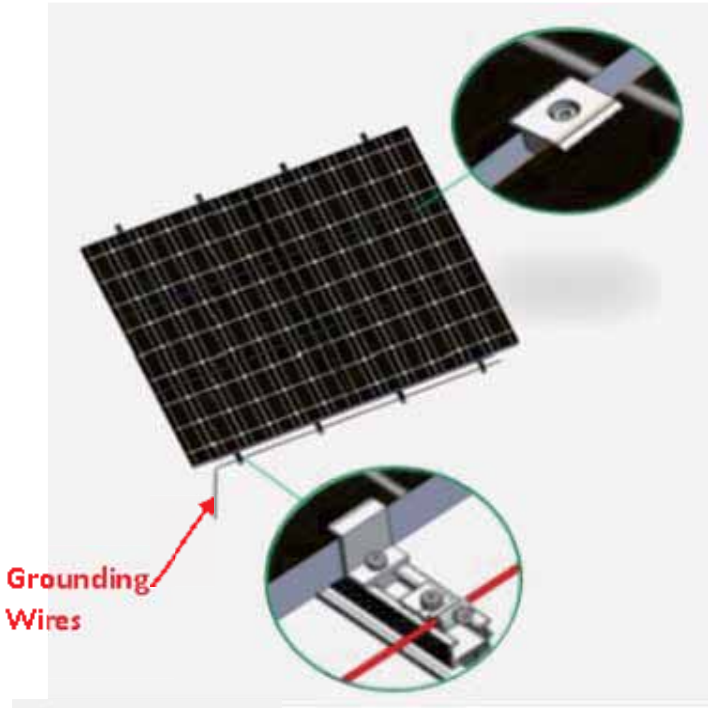
15. To install the earthing system.
To order to protect the mounting system from lightingstrike, grounding device need to be installed on.

First,install grounding clip on inner clamp kit and end clamp kit respectively;

Next, fix grounding lug kit on end of every row of rails;

Last, connect the conductive wires on the grounding lug, with clamp kit to finish the connection of the mounting system with the ground.

(See right pic.)



Grounding Lug Kit

End Clamp Kit

Grounding Lug

Inter Clamp Kit

Grounding Clip