

**Clenergy PV-ezRack SolarRoof  
Code-Compliant Planning and Installation  
With Australia AS/NZS1170**



The Clenergy PV-ezRack™ has been developed as a universal system for roof-mounting on pitched roofs. The use of patented aluminium base rails, the Z module technology and the telescopic mounting technology eliminates custom cutting and enables particularly fast installation.

Please review this manual thoroughly before installing your SolarRoof™ system. This manual provides (1) supporting documentation for building permit applications relating to PV-ezRack SolarRoof™ Universal PV Module Mounting system, and (2) planning and installation instructions for SolarRoof™.

SolarRoof™ products, when installed in accordance with this guide, will be structurally adequate and will meet the AS/NZS1170 standards. During installation, and especially when working on the roof, be sure to observe the appropriate safety regulations and please pay attention to the relevant regulations of your local region. Please check that you are using the current version of the installation manual by contacting Clenergy Australia by email on [Sales@clenergy.com.au](mailto:Sales@clenergy.com.au), or your local representative in Australia.

### **The installer is solely responsible for:**

- Complying with all applicable local or national building codes, including any that may superseded this manual;
- Ensuring that PV-ezRack and other products are appropriate for the particular installation and the installation environment;
- Ensuring that the roof, its rafters, connections, and other structural support members can support the array under building live load conditions (this total assembly is hereafter referred to as the roof rafter assembly);
- Using only PV-ezRack parts and installer-supplied parts as specified by PV-ezRack (substitution of parts may void the warranty and invalidate the letter of certification on page 2);
- Ensuring that lag screws have adequate pullout strength and shear capacities as installed;
- Maintaining the waterproof integrity of the roof, including selection of appropriate flashing; and
- Ensuring safe installation of all electrical aspects of the PV array.

### **Installation tools**

- 6 mm Allen key;
- Cordless drill;
- Open-end spanner set 9, 10, 17, 19 mm (required only for mounting with hanger bolts);
- Torx-30 (AW 30) bit;
- Angle grinder with stone disk;
- Power Cord;
- If necessary, timber to shim the roof hooks.

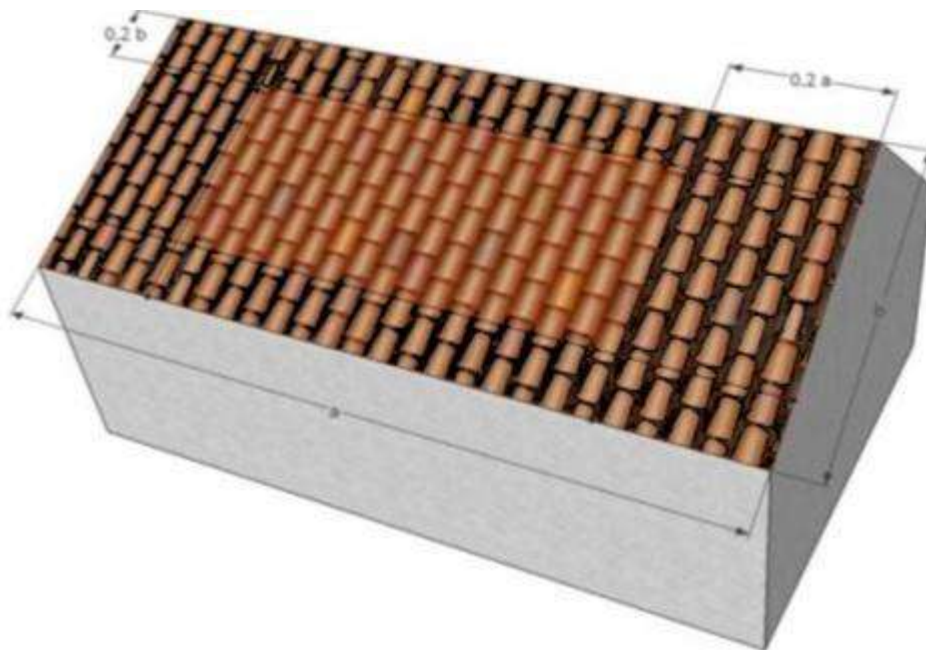
This document is designed to support for installations using SolarRoof™ PV Module Mounting System, manufactured by Clenergy Co. Ltd. Follow the six steps below and the installation instructions section to install SolarRoof™ in compliance with the AS/NZS1170.

Before proceeding, note the following:

- This document addresses only wind loads on the assumption that wind produces the maximum load factor affecting an installation. Verify that other local factors, such as snow loads and earth quake effects, do not exceed the wind loads. Give precedence to any factor that does. Wind loads are considered to act on the entire projected area, or may be perpendicular to any surface.
- The roof on which the SolarRoof™ will be installed must have the capacity to resist the combined Design Dead Load and Live Load per footing.
- To determine the part you need you can use our PV-ezRack SolarRoof Calculator.

### 1. Determine the installation area on the roof

Clenergy PV-ezRack SolarRoof may be installed anywhere on a roof but fixing centres are required to be reduced at ridges and edges. The diagram below shows the area of higher wind loadings within 0.2a and 0.2b of a roof edge or ridge (where a and b are the plan dimension of the building).



Roof area 1



Roof area 2

The following table will help you determine the maximum rail support spacing for your project.

Also note that if the roof slope is less than 10 degree the reduction on spacing does not apply.

## 2. Determine the wind region of your installation site

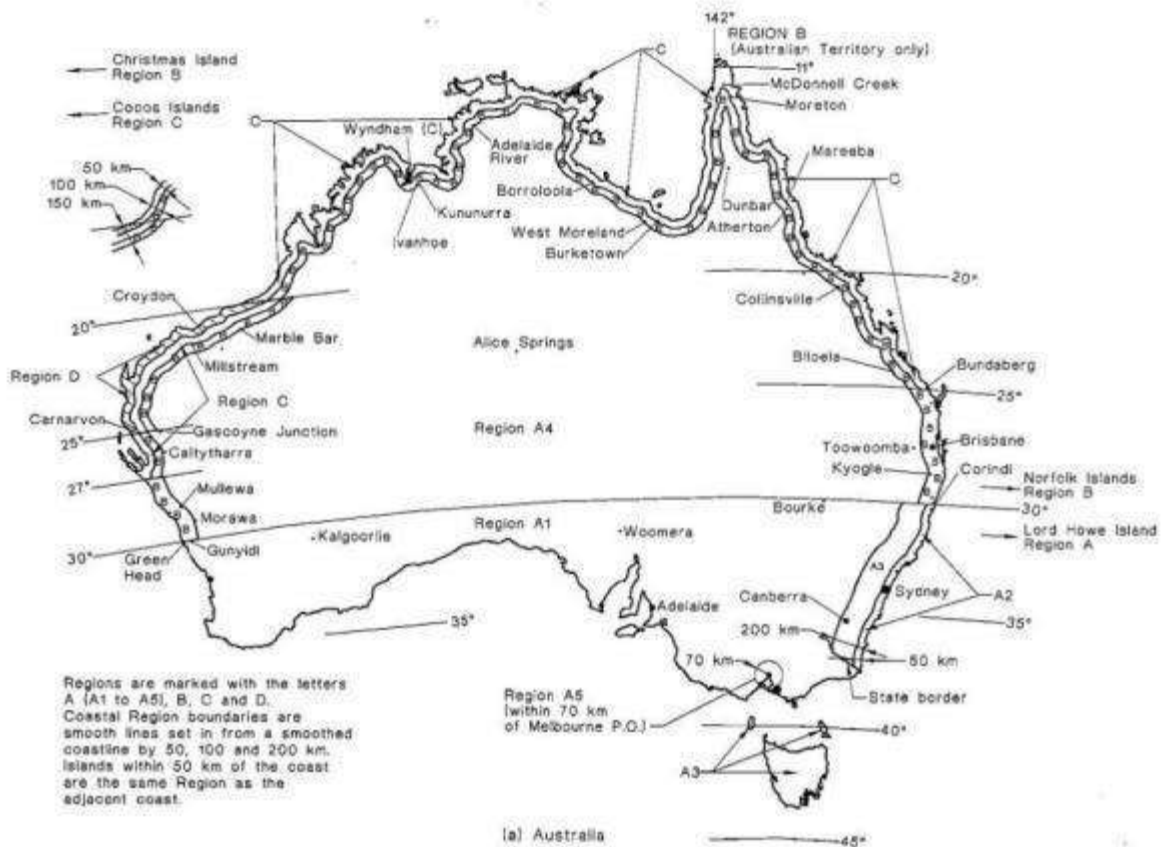


FIGURE 3.1 (in part) WIND REGIONS

### Region Definition:

Wind regions are pre defined 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 Velocity of 45msec.
- Some areas are designated Region B (57msec). Local authorities will advise if this applies in your area.
- Region C areas (66msec) are generally referred to as Cyclonic and are generally limited to northern coastal areas. Most Region C zones end 100km inland.
- Region D (80msec) Australia's worst Cyclonic Region between Carnarvon and Pardoo in Western Australia.

## 3. Determine the height of your installation site

This document provides sufficient information for SolarRoof™ system installation height less than 20 meters. If your installation site is more than 20 meters in height, please contact Clenergy to obtain engineering data to support your installation.

#### 4. Determine the Maximum Rail Support Spacing

##### a) Tile roof

Please use the following table to determine the base rail support spacing for tile roof installations (mm).

	Wind Region A		Wind Region B		Wind Region C		Wind Region D	
	Roof 1	Roof 2	Roof 1	Roof 2	Roof 1	Roof 2	Roof 1	Roof 2
<b>5 Meters</b>	2130	1500	1690	1200	1380	980	1080	
<b>10 Meters</b>	1940	1370	1540	1090	1260	890	990	
<b>15 Meters</b>	1840	1230	1460	980	1190	800	940	
<b>20 Meters</b>	1740		1380		1130		890	

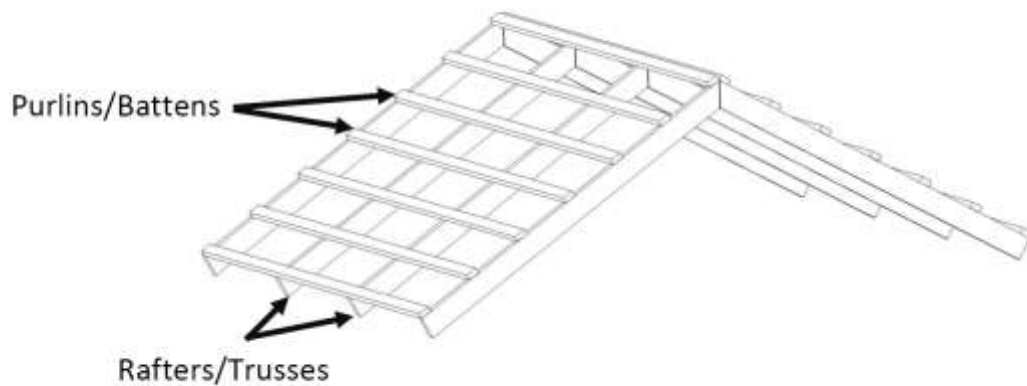
- The figures above are based on attaching 200W PV modules (length of 1675 mm, weight of 23 kg) to SolarRoof system. These figures should be sufficient for installing smaller PV modules. Please consult Clenergy for installing PV modules greater than length of 1675mm and weight of 23 kg.
- The Tile roof hooks should be fixed to the rafter using at least two 12Gx80mm wood screws minimum.

##### b) Tin roof

Please use the following table to determine the base rail support spacing for sheet metal roof installations (mm).

	Region A & B		Region C		Region D	
	Roof 1	Roof 2	Roof 1	Roof 2	Roof 1	Roof 2
<b>5 Meters</b>	1320	990	770	550	770	
<b>10 Meters</b>	1200	900	700	500	700	
<b>15 Meters</b>	1140	810	665	450	665	
<b>20 Meters</b>	1080		630		630	

- The figures above are based on attaching 200W PV modules (length of 1675mm, weight of 23 kg) to SolarRoof system. These figures should be sufficient for installing smaller PV modules. Please consult Clenergy for installing PV modules greater than length of 1675mm and weight of 23 kg.
- The L Feet should be fixed to the purlins under using 12GX90 screws through sheet metal roofs with gasket.
- The above spacings apply for fixing through thin sheet purlins (greater than 1mm thickness) or a minimum embedment of 50mm into timber purlins.
- **Based on an embedment depth of 35mm (fixing into the battens) the spacings remain unchanged for region A and B. For region C, the spacings should be reduced by 10% and for region D, the spacings should be reduced by 30%.**















## **5. Verify acceptable Rail End Overhang**

Rail End Overhang must equal 50 percent or less of foot spacing. Thus, if foot spacing is 1200 mm, the Rail End Overhang can be up to 600 mm. In this case, two feet can support a rail of as much as 2400 mm (1200 mm between the feet and 600 mm of overhang at each end).

## **6. Determine Roof slope**

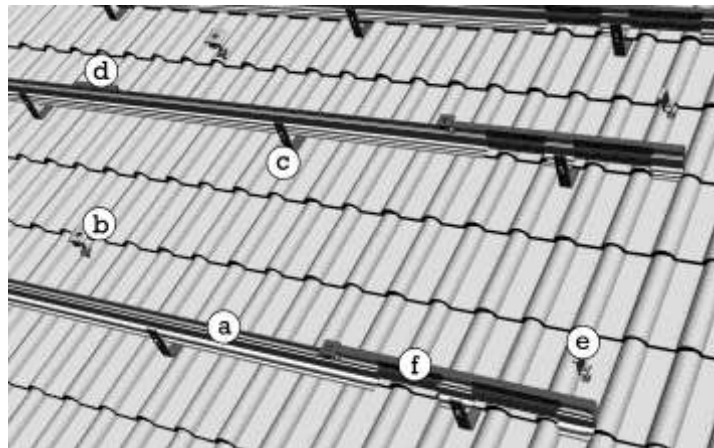
SolarRoof™ system can be used for roof slope up to 60 degrees. Please verify the Installation site roof slope should be between 0 degrees and 60 degrees.

Overview of system components for Tile Roof			
			
<i>PV-ezRack Rails</i>	<i>PV-ezRack Splice</i>	<i>Inter Clamp with Z Module</i>	<i>End Clamp with Z Module</i>
			
<i>Tile interface with Z module</i>	<i>Wood screw 6x80 mm</i>		

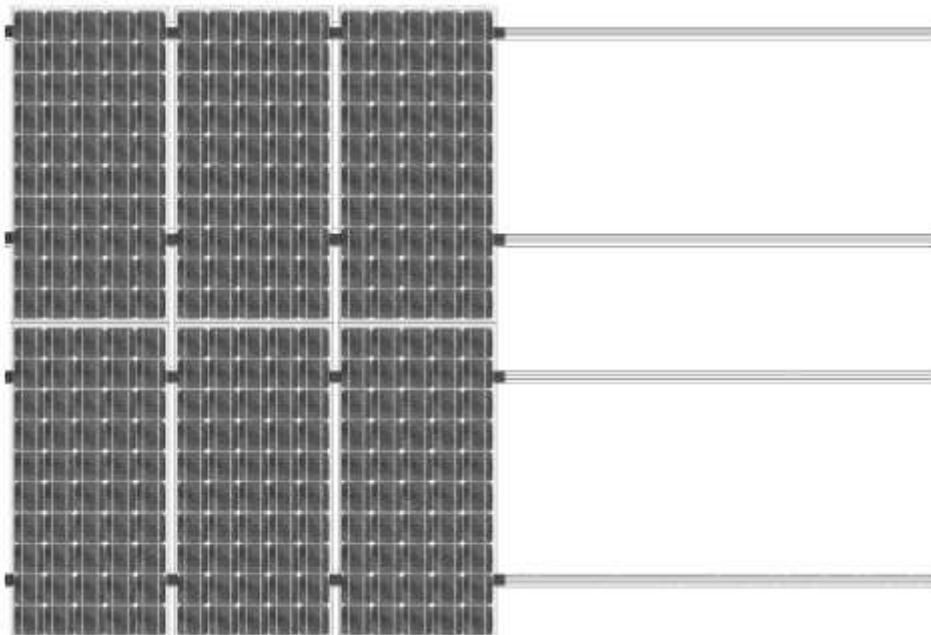
Overview of system components for Tin Roof			
			
<i>PV-ezRack Rails</i>	<i>PV-ezRack Splice</i>	<i>Inter Clamp with Z Module</i>	<i>End Clamp with Z Module</i>
			
<i>Tin interface with Z module</i>	<i>Wood screw 6x90 mm</i>		

### Overview of system components

- a PV-ezRack rails
- b Inter Clamp
- c Roof hook
- d Splice
- e End Clamp
- f Telescopic mounting (optional)



### Planning the module area



1. Number of modules in the vertical direction x module height (please check also the installation manual of the manufacturer of the solar module)
2. Number of modules in horizontal x (module width + 18mm) + 32mm
3. Horizontal spacing of the roof hooks up to 2.0 m
4. Vertical spacing of the roof hooks = approx. 1/2 to 3/4 of module height
5. Distance between the modules: 17 mm

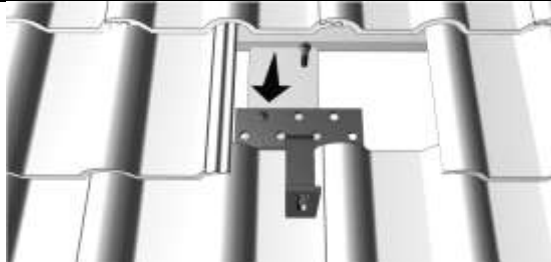


**Tile Roof Hook Installation**

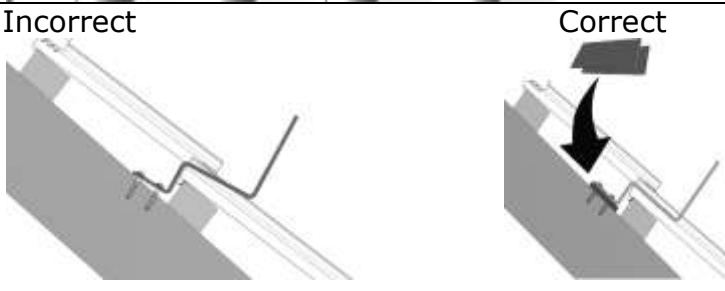
1. Determine the positions of the roof hooks according to your plans. Remove the roof tiles at the marked positions or, if possible, simply lift them up slightly.



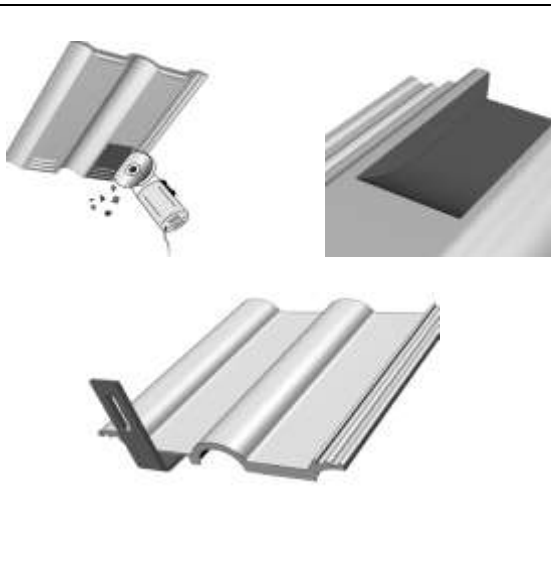
2. Fix the roof hooks to the rafter using three 6 x 80 mm wood screws.



3. The roof hook must not press against the roof tile. If necessary, shim the roof hook with wood.



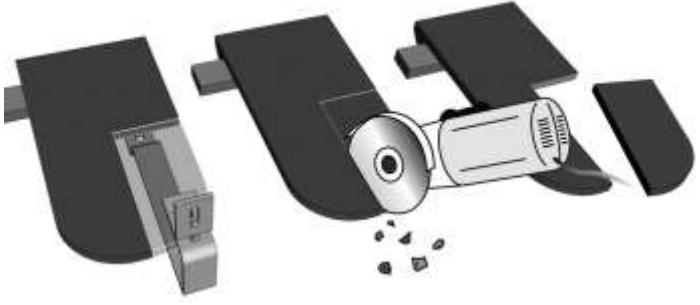
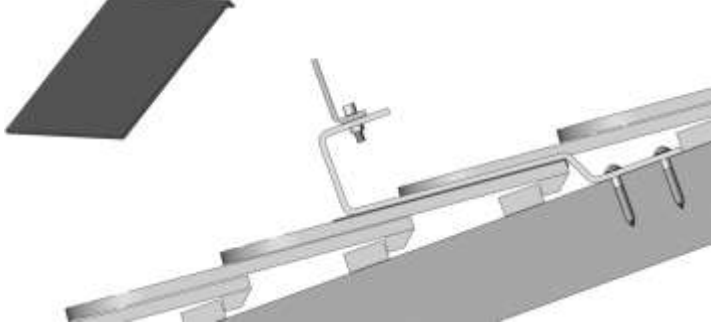

4. If necessary, use an angle grinder or hammer to cut a recess in the tile that covers the roof hook at the point where the roof hook comes through so that the tile lies flat on the surface. If grooved tiles are used, it will also be necessary to cut a recess in the lower tile.



5. Caution! Do not use fitted roof hooks as a ladder, as this extreme point load could damage the tile below.

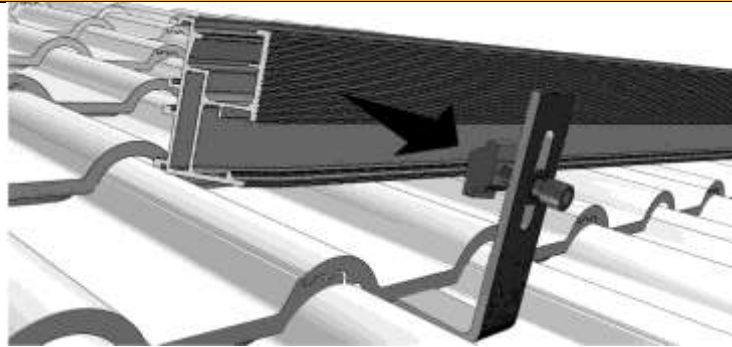


**Tile Roof Hook Installation**

<p>6. Variation for installation on plain tile roofs With plain tile roof cladding, a recess must be cut into the tiles around the position of the roof hook.</p>	
<p>7. A titanium zinc metal sheet must be cut to fit on site, with an overlap of at least 20 mm around the recess, and installed under the roof hooks. Caution! Please take note of Figure 3.</p>	
<p>8. For easy use of the Z module, you must make sure that the thread of the screws does not project through the lower side of the Z Module (max. flush). Position the Z Module in the rail channel and fasten it loosely with 2 to 3 turns of the screw. The screws can still be freely moved in the rail channel. Slide the screws to their final position in connection with the inter-module clamp, module end clamp or roof hooks/hanger bolts and fasten firmly (recommended torque is 8 Nm).</p>	

**Tile Roof Hook Installation**

9. Installation of the rails on roof hooks.  
 If your set of rails consists of rails of different lengths, always begin with the shortest piece. Install the framing for each row of modules loosely on the roof hooks, using an M8 x 25 mm Allen bolt, washers, retaining washers and the Z Module (2 to 3 turns of the screw are adequate for loose installation). Please take note of Figure 10.



10. An optimum adjustment of the vertical and horizontal position can be made by taking advantage of the long hole in the roof hooks and the still loose connection of the Z Module or T-head bolts in the rail. Please take note of Figure 13 below.  
 Position

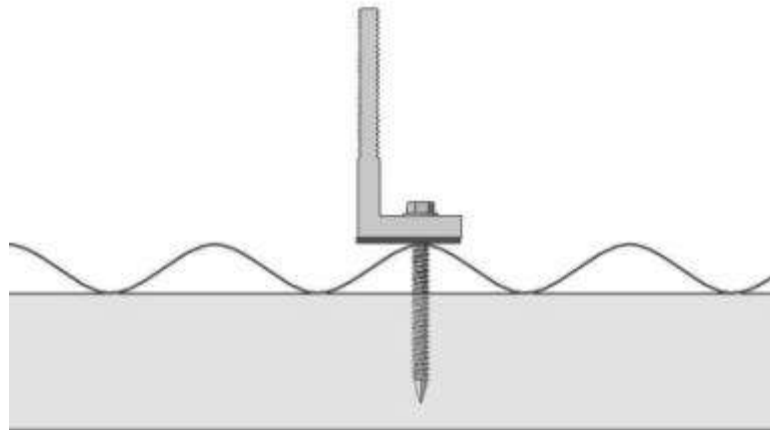


### Tin Roof Hook Installation

11. In the case of corrugated roof cladding, hanger bolts are used instead of roof hooks. Drill through the roof cladding at the planned location and screw the hanger bolts into the purlins. Then mount the L-brackets.



12. Cross-section of a hanger bolt installation. Take special care that the nut tightly fastens the sealing washer without damaging the roof cladding. When performing the installation, take care that the thread of the hanger bolt does not cover the long hole in the L-bracket.



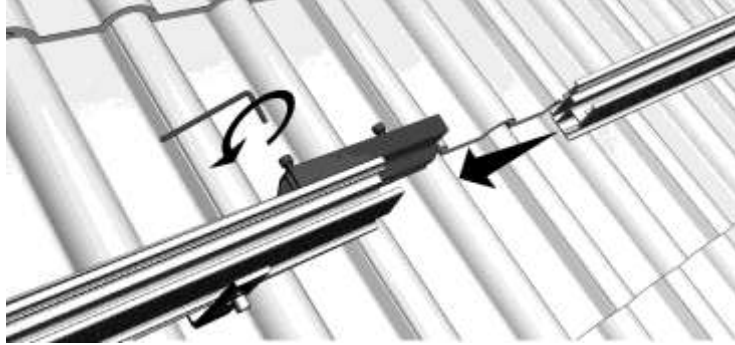
### Base Rail Installation

13. Position the first frame rails for each row and fasten them temporarily to the roof cladding using a cord. Tighten the Allen bolts or the nuts on the T-head bolts that are used to fasten the roof hooks/hanger bolts (recommended torque is 8 Nm). Please also pay attention to Figure 10.



### Base Rail Installation

14. To connect multiple rails together, slide the splices on the rear side of the pre-assembled rails halfway to the side. Fasten the first M8 Allen bolt firmly using the Allen key. Now slide the next rail segment into the splice.



15. Tighten the second M8 Allen bolt using the Allen key. The connection is finished. An expansion gap at the rail joints is recommended. For this purpose, leave a gap about the same width as a finger between the rail joints and then loosely tighten the M8 allen bolt.

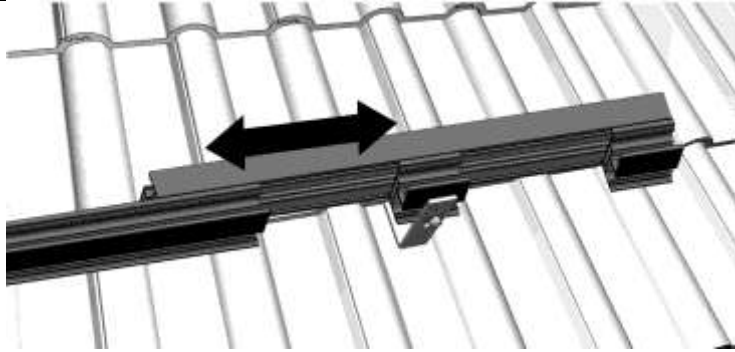


16. When planning a system using a telescopic mounting, please mount a telescopic mounting at the end of every row of rails. To do this, you insert the end of the telescopic mounting into the rail. The mountings can be adjusted to their correct positions later. For this reason, you should not yet fasten the M8 Allen bolt to the rear of the telescopic mounting.



### Base Rail Installation

17. Fasten any remaining roof hooks to the movable rail element of the telescopic mounting. Please repeat steps 14 to 16 until all base rail rows in your system are installed.

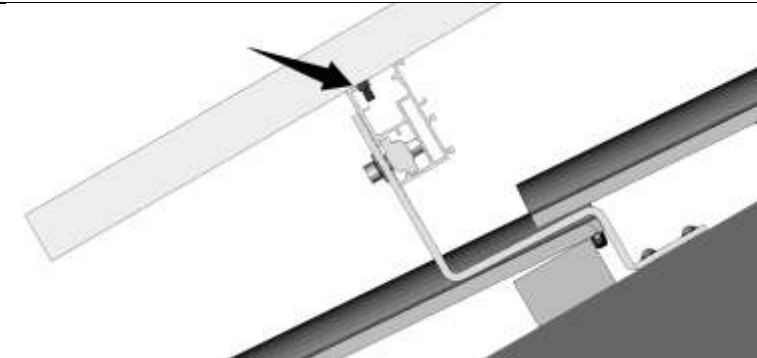


### PV Module Installation

18. Before installing the modules, add anti-slip protection to the lowest row of modules (horizontal rail installation only). To do this, fasten M6 x 20 mm bolts (with the shank downwards) to the lower mounting holes of the module frame using M6 nuts. When installing large modules (e.g. ASE250) M8 x 20 mm bolts must be used.

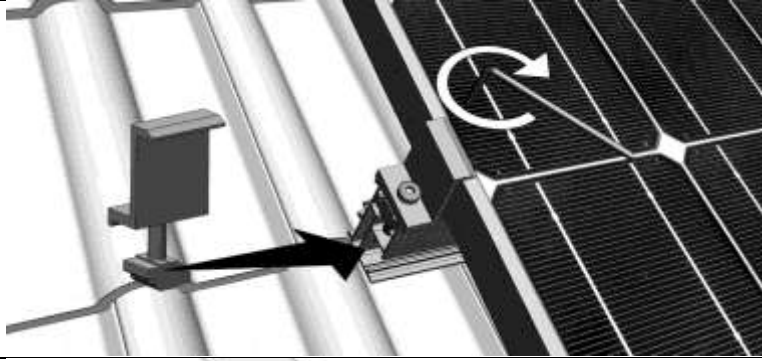


19. Place the first module of the bottom row so that the anti-slip protection sits in the rail channel of the lowest row of rails.

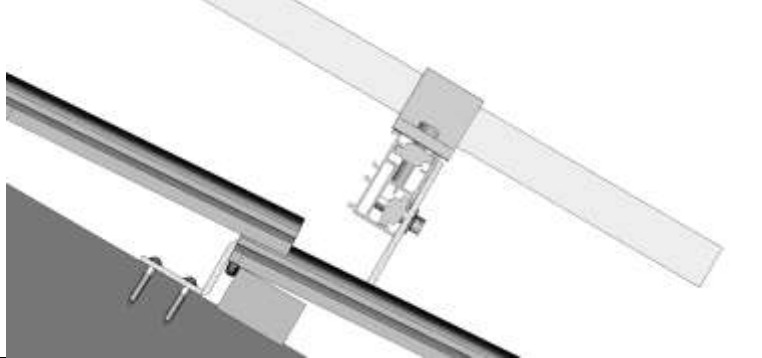


**PV Module Installation**

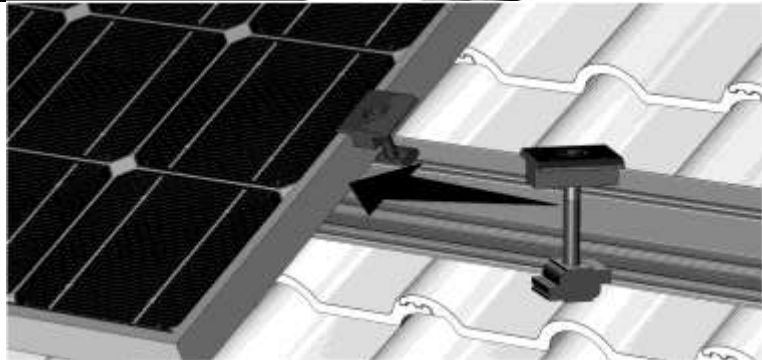
20. Slide the module end clamp tightly against the module and fasten tightly using the Allen bolt (recommended torque is 8 Nm). Please take note of Figure 10.



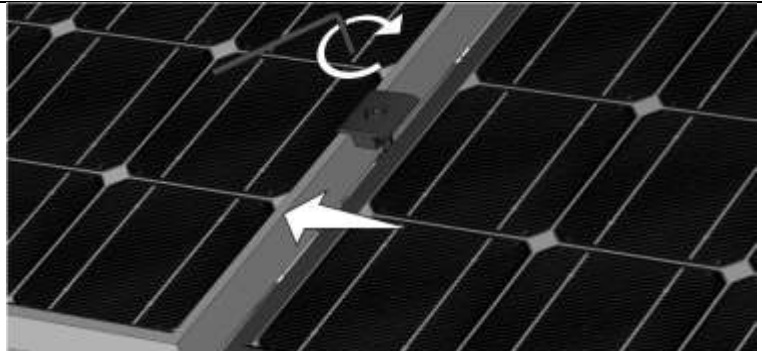
21. Cross-section through the module end clamp when installation step 20 has been correctly performed.



22. Slide the pre-assembled inter-module clamp into the rails from above, place it firmly against the module and fasten loosely (approx. 2 - 3 turns). Please also take note of Figure 10.

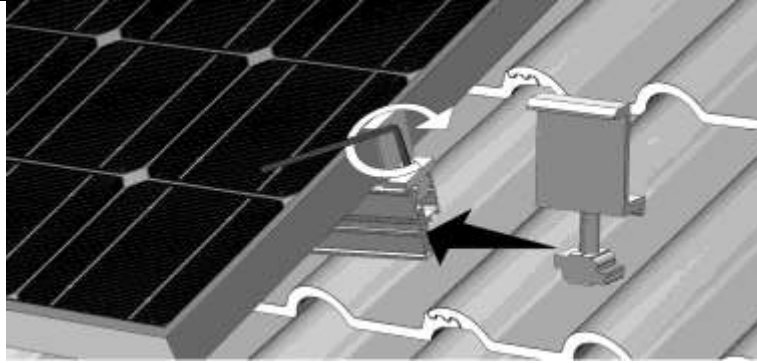


23. Now slide the next module against the previously installed module and tighten the inter-module clamp using the Allen key (recommended torque is 8 Nm). Take care that the anti-slip protection sits in the rail channel of the lowest row of rails. Please also take note of Figure 10.



**PV Module Installation**

24. If your system does not use a telescopic mounting, position the last module of the row in the base rail and fasten the module using the module end clamp (recommended torque is 8 Nm). For systems with telescopic mountings, please take note of Figure 25 below.



25. Installation using telescopic mounting Position the telescopic mounting, which was loosely mounted in step 16, so that there is sufficient room for the last module, the last inter-module clamp and the end clamp (calculation: module width or length in mm + 43 mm). Now tighten the telescopic mounting using the Allen key.



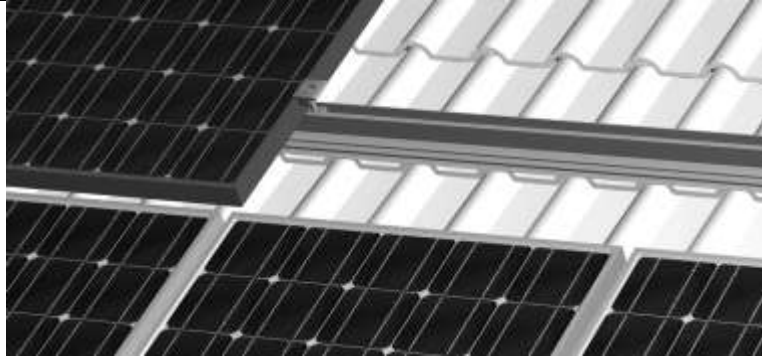
26. Place the last module in the row on the rails (with the first row of modules, take care that the anti-slip protection sits properly in the rail channel) and fasten the last inter-module clamp and the module end clamp using the Allen key (torque 8 Nm).





### **PV Module Installation**

27. Now slide in the first module of the next row from above onto the corresponding module of the row beneath. A separation from the lower module can be maintained for optical reasons. An inter-module clamp can be used as a separator, so that the vertical and horizontal separation of the modules is identical. Continue mounting the modules as described in steps 20 to 26 until all modules are installed. The installation is finished.





## 10 year limited Product Warranty, 5 year limited Finish Warranty

Clenergy co. Ltd warrants to the original purchaser ("Purchaser") of product(s) that it manufactures ("Product") at the original installation site that the Product shall be free from defects in material and workmanship for a period of ten (10) years, except for the anodised finish, which finish shall be free from visible peeling, or cracking or chalking under normal atmospheric conditions for a period of five (5) years, from the earlier of 1) the date the installation of the Product is completed, or 2) 30 days after the purchase of the Product by the original Purchaser ("Finish Warranty").

The Finish Warranty does not apply to any foreign residue deposited on the finish. All installations in corrosive atmospheric conditions are excluded. The Finish Warranty is VOID if the practices specified by AAMA 609 & 610-02 – "Cleaning and Maintenance for Architecturally Finished Aluminum" ([www.aamanet.org](http://www.aamanet.org)) are not followed by Purchaser. This Warranty does not cover damage to the Product that occurs during its shipment, storage, or installation.

This Warranty shall be VOID if installation of the Product is not performed in accordance with Clenergy's written installation instructions, or if the Product has been modified, repaired, or reworked in a manner not previously authorized by Clenergy IN WRITING, or if the Product is installed in an environment for which it was not designed. Clenergy shall not be liable for consequential, contingent or incidental damages arising out of the use of the Product by Purchaser under any circumstances.

If within the specified Warranty periods the Product shall be reasonably proven to be defective, then Clenergy shall repair or replace the defective Product, or any part thereof, in Clenergy's sole discretion. Such repair or replacement shall completely satisfy and discharge all of Clenergy's liability with respect to this limited Warranty. Under no circumstances shall Clenergy be liable for special, indirect or consequential damages arising out of or related to use by Purchaser of the Product.

Manufacturers of related items, such as PV modules and flashings, may provide written warranties of their own. Clenergy's limited Warranty covers only its Product, and not any related items.