

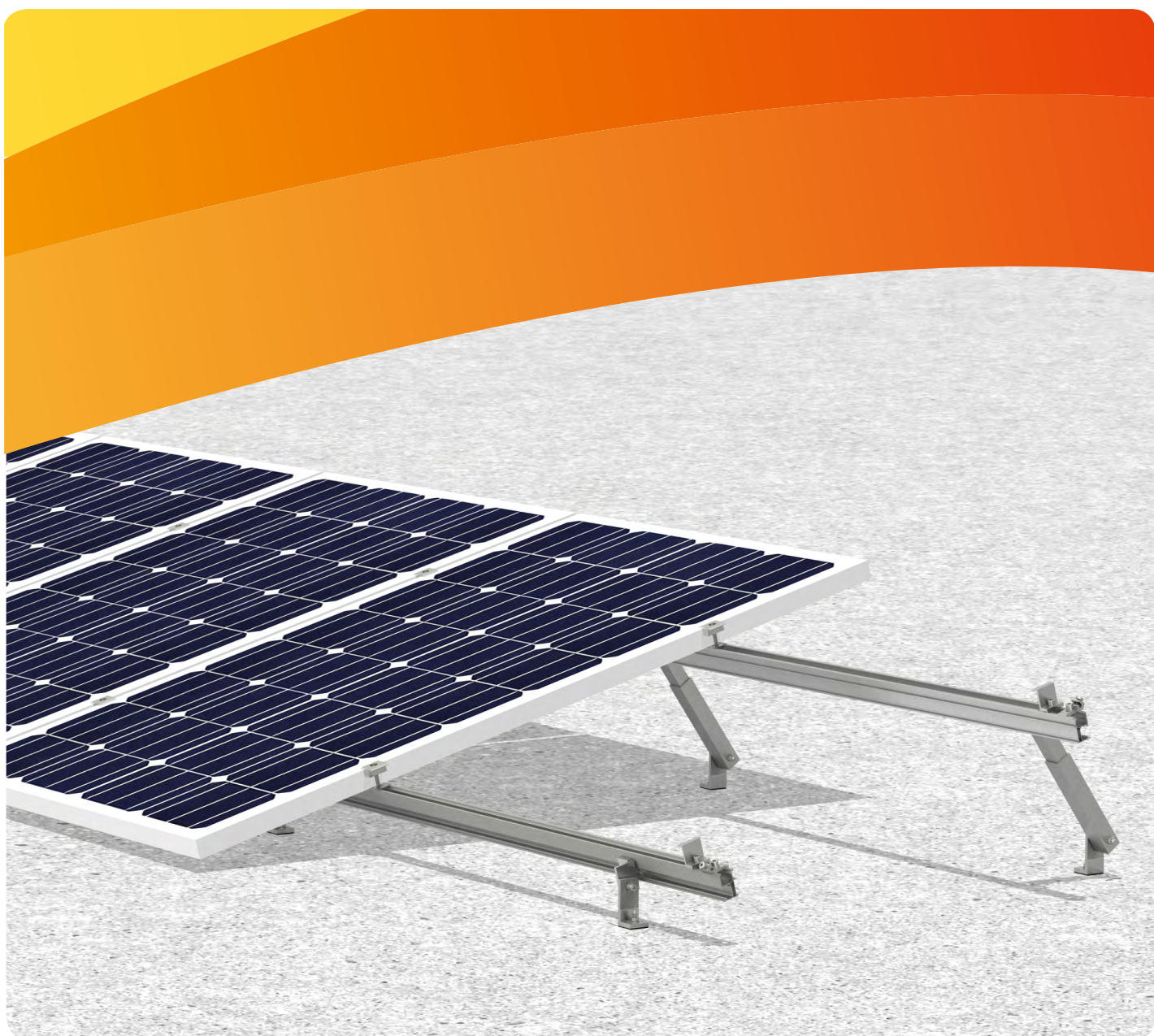
# PV-ezRack®

By Clenergy 

## SolarRoof™ ChemSet™ Anchor Stud

Code-Compliant Planning and Installation Guide V1.0

Complying with AS/NZS1170.2-2011 AMDT 2-2016



<b>1. Introduction</b>	<b>01</b>
<b>2. Planning</b>	<b>02</b>
2.1 Determine Concrete Compressive Strength	02
2.2 Determine Anchor Stud Specifications	02
2.3 Determine the Wind Region of your Installation Site	02
2.4 Determine the Terrain Category	03
2.5 Verify Atmospheric Corrosivity Zone of Installation Site	03
2.6 Determine the Installation Height, Installation Area and Maximum Interface Spacing	04
2.7 Verify Maximum Rail End Overhang	04
2.8 Acquire PV Modules Clamping Zone Information	04
<b>3. Tools and Components</b>	<b>05</b>
3.1 Tools	05
3.2 Components	05
<b>4. System Overview</b>	<b>07</b>
4.1 Overview of PV-ezRack SolarRoof on Concrete Roofs	07
4.2 Precautions during Stainless Steel Fastener Installation	09
4.2.1 General installation instructions:	09
4.2.2 Safe Torques	09
<b>5. Installation Instruction</b>	<b>10</b>
5.1 ChemSet™ Anchor Stud Installation	11
5.2 Tin Interface Installation	12
5.3 Tilt Legs Installation	12
5.4 Rail Installation	13
5.5 ComT Installation	14
<b>6. Certification Letter and Interface Spacing Table</b>	<b>16</b>
<b>7. Warranty</b>	<b>18</b>

## 1. Introduction

ChemSet™ Anchor Studs are made from quality Grade 5.8 carbon steel to get the most out of adhesive tensile capacities and meets Australian Standards. Assembly with Clenergy Tin Interfaces and Tilt Legs, PV-ezRack® SolarRoof™ ChemSet™ Anchor Stud offers easy and fast PV installation on concrete roofs.

Please review this manual thoroughly before installing PV-ezRack® SolarRoof™ ChemSet™ Anchor Stud. This manual provides:

1) Supporting documentation for building permit applications relating to PV-ezRack® SolarRoof™ ChemSet™ Anchor Stud Universal PV Module Mounting System,

2) Planning and installation instructions.

Health and Safety regulations. Please also pay attention to any other relevant State or Federal regulations. Please check that you are using the latest version of the Installation Manual, which you can obtain by contacting Clenergy Australia via email on [tech@clenergy.com.au](mailto:tech@clenergy.com.au) or contacting your local distributor in Australia.

### The installer is solely responsible for:

- Complying with all applicable local or national building codes, including any that may supersede this manual.
- Ensuring that PV-ezRack and other products are appropriate for the installation and the surrounding environment.
- Using only PV-ezRack parts and installer-supplied parts as specified by the PV-ezRack project plan. (substitution of parts may void the warranty and invalidate the letter of certification).

- Recycling: Recycle: according to the local relative statute.
- Removal: Reverse installation process.
- Ensure that there are no less than two professionals working on panel installation.
- Ensure the installation of related electrical equipment is performed by licenced electricians.
- Ensuring safe installation of all electrical aspects of the PV array. This includes adequate earth bonding of the PV array and PV-ezRack® SolarRoof™ components as required in AS/NZS 5033-2014 AMDT 2 2-2018.
- Ensuring that the roof can support the array under building live load conditions.
- Ensuring that screws to fix interfaces have adequate pull-out strength and shear capacities as installed.
- Maintaining the waterproof integrity of the roof, including selection of appropriate flashing.
- Verifying the compatibility of the installation considering preventing electrochemical corrosion between dissimilar metals. This may occur between structures and the building and between structures, fasteners and PV modules, as detailed in AS/NZS 5033: 2014.
- Verifying atmospheric corrosivity zone of installation site by referring to AS 4312-2008 or consulting local construction business to determine appropriate products and installations.

## 2. Planning

### 2.1 Determine Concrete Compressive Strength

The minimum concrete compressive strength of the roof slab to be 20MPa.

### 2.2 Determine Anchor Stud Specifications

The minimum pull-out capacity of the anchor studs should be 6.1kN to withstand the forces on the mounting system. The corresponding anchor stud embedment to achieve this capacity should be determined from manufacturer's datasheet.

For instance, when using Ramset ChemSet™ Anchor Stud, a minimum embedment of 80mm into the concrete slab is required to achieve 6.1kN minimum pull-out capacity.

### 2.3 Determine the Wind Region of your Installation Site



#### Region Definition:

Wind regions are pre-defined for the whole of Australia by the Australian Standard 1170.2. The Wind Region is an independent factor of surrounding topography or buildings.

- Most of Australia is designated Region A which indicates a Regional Wind Velocity of 43 m/s with wind average recurrence of 200 years.

- Some areas are designated Region B (52 m/s). Local authorities will advise if this applies in your area.
- Region C areas (64 m/s) are generally referred to as Cyclonic and are generally limited to northern coastal areas. Most Region C zones end 100km inland.
- Region D (79 m/s) is Australia's most extreme Cyclonic Region, located between the town of Carnarvon and Pardoo Station in Western Australia.

## 2.4 Determine the Terrain Category

You will need to determine the terrain category to ensure the installation meets the required standard.

Terrain Category 1 (TC1) – Very exposed open terrain with few or no obstructions and enclosed, limited-sized water surfaces at serviceability and ultimate wind speeds in all wind regions, e.g. flat, treeless, poorly grassed plains; rivers, canals and lakes; and enclosed bays extending less than 10km in the wind direction.

Terrain Category 1.5 (TC1.5) – Open water surfaces subjected to shoaling waves at serviceability and ultimate wind speeds in all win regions, e.g. near-shore ocean water; larger unenclosed bays on seas and oceans; lakes; and enclosed bays extending greater than 10km in the wind direction. The terrain height multipliers for this terrain category shall be obtained by the linear interpolation between the values for the TC1 and TC2.

Terrain Category 2 (TC2) – Open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5m to 5m, with no more than two obstructions per hectare, e.g. farmland and cleared subdivisions with isolated trees and uncut grass.

Terrain Category 2.5 (TC2.5) – Terrain with a few trees or isolated obstructions. This category is intermediate between TC2 and TC3 and represents the terrain in developing outer urban areas with scattered houses, or larger acreage developments with fewer than ten buildings per hectare. The terrain-height multipliers for this terrain category shall be obtained by linear interpolation between the values for the TC2 and TC3.

Terrain Category 3 (TC3) – Terrain with numerous closely spaced obstructions having heights generally from 3m to 10m. The minimum density of obstructions shall be at least the equivalent of 10 house sized obstructions per hectare, e.g. suburban housing or light industrial estates.

Terrain Category 4 (TC4) – Terrain with numerous larger, high (10m to 30m tall) and closely-spaced constructions buildings, such as large city centers and well-developed industrial complexes.

If your installation site is not at TC 2, 2.5 or 3, please contact Clenergy to obtain a project specific engineering certificate to support your installation.

## 2.5 Verify Atmospheric Corrosivity Zone of Installation Site

Please refer to “AS 4312-2008 Atmospheric Corrosivity Zones in Australia” or consult local construction business to verify corrosivity category of installation site to determine appropriate products and interface spacing. When standard products are installed in high corrosivity zones, like C4/C5, interface spacing reduction factor need to be applied. Please refer to the generic notes of Certification Letter for the details.



## 2.6 Determine the Installation Height, Installation Area and Maximum Interface Spacing

The installation height, area and interface spacing depend on the setup of the racking system. Please refer to the generic certificates below based on the chosen mounting system setup:

Product [Solar Roof System + Anchor Stud]	Generic Certificate	Maximum Interface Spacing, Installation Height and Area
ChemSet™ Flush	Tin and Tile Certificate CL-088-S-REV H	The Generic Certificates on 2 <sup>nd</sup> Column contains the installation height, area and spacings for the flush, tilt and commercial tilt (ComT) systems, which applies to ChemSet™ Flush and Tilt systems, respectively.
ChemSet™ Tilt – Adjustable Tilt Legs	Penetrative Tilt Certificate CL-530-S	
ChemSet™ Tilt – Commercial Tilt	Penetrative Commercial Tilt Certificate 00150-REVB	

## 2.7 Verify Maximum Rail End Overhang

Rail end overhang should be not over 40% of the interface spacing. For example, if the interface spacing is 1500mm, the Rail end overhang can be up to 600mm only.

## 2.8 Acquire PV Modules Clamping Zone Information

It is recommended to acquire PV modules clamping zone info. from PV modules manufacturer, which can help to plan interfaces positions on the roof and rails orientation and positions.

# Tools and Components

## 3. Tools and Components

### 3.1 Tools

#### Tools



Screw Driver  
(for M8 Hexagon Socket Screw)



Torque Spanner



Spanner



5m Tape



ChemSet™ Anchoring Kit



String & Marker Pen

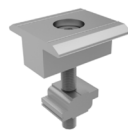
### 3.2 Components

#### Component list

- Manufacturer: Clenergy -



ER-EC-ST  
End Clamp



ER-IC-ST  
Inter Clamp



C-U/30/46-G  
Universal Clamp  
with Grounding



C-U/30/46  
Universal Clamp



ER-EC-DU35/40  
End Clamp, Dual 35 or  
40mm



ER-EC-DU40/46  
End Clamp, Dual 40 or  
46mm



ER-R-ECO  
ECO Rail



ER-SP-ECO  
Splice for ECO Rail



ER-I-05  
Tin Interface



ER-I-05/CM  
Tin Interface with Click  
Module



ER-I-05A/EZC/ECO  
Tin Interface A with  
ezClick connection



ER-TL-10/15/PS  
ER-TL-15/30/PS  
Adjustable Tilt legs,  
preassembly

## Component list

- Manufacturer: Clenergy -



TL-10/15/L/PS  
TL-15/30/L/PS  
Adjustable Tilt Legs with  
L-feet, preassembly



ER-TL-5/PS  
ER-TL-10/PS  
Fixed Tilt Legs,  
preassembly



FL-COMT/Z/G/10  
Front Leg Assembly,  
10°, with Z-Module and  
Grounding Pins



RL-COMT/Z/G/10  
Rear Leg Assembly, 10°, with  
Z-Module and Grounding  
Pins



EZ-GC-ST  
Grounding clip



EZ-GL-ST  
Grounding Lug

- Manufacturer: Ramset\* -



ChemSet™ Anchor  
Stud\* M8x110mm



Anchoring Adhesive\*

\*Non-Clenergy components are to be sourced externally. The technical specifications of these components can vary one manufacturer to the other.

In order to source anchor studs with similar specification, please refer to section 2.2 for information on the required technical specifications.

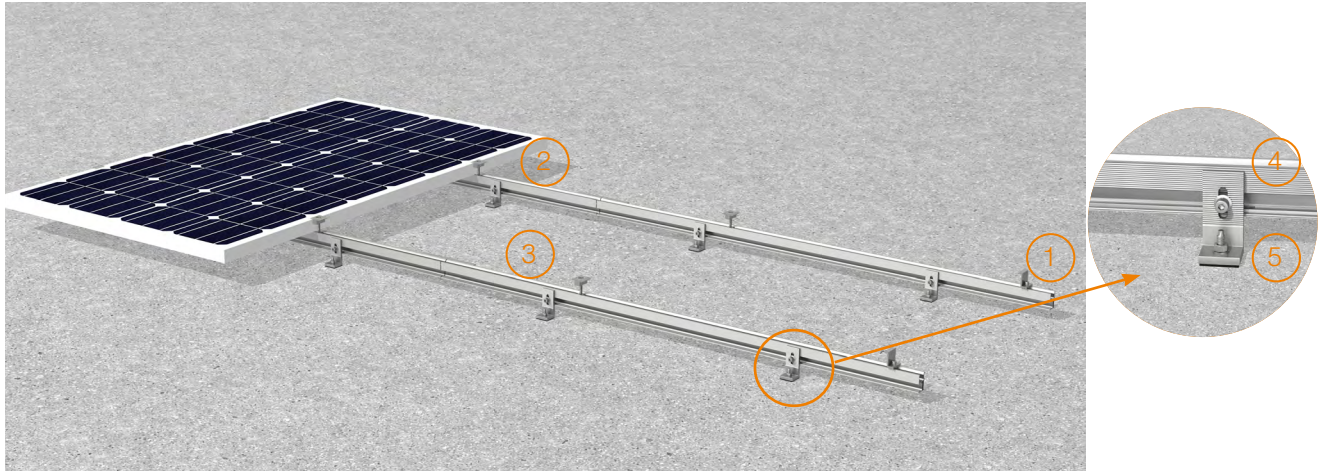


# System Overview

## 4. System Overview

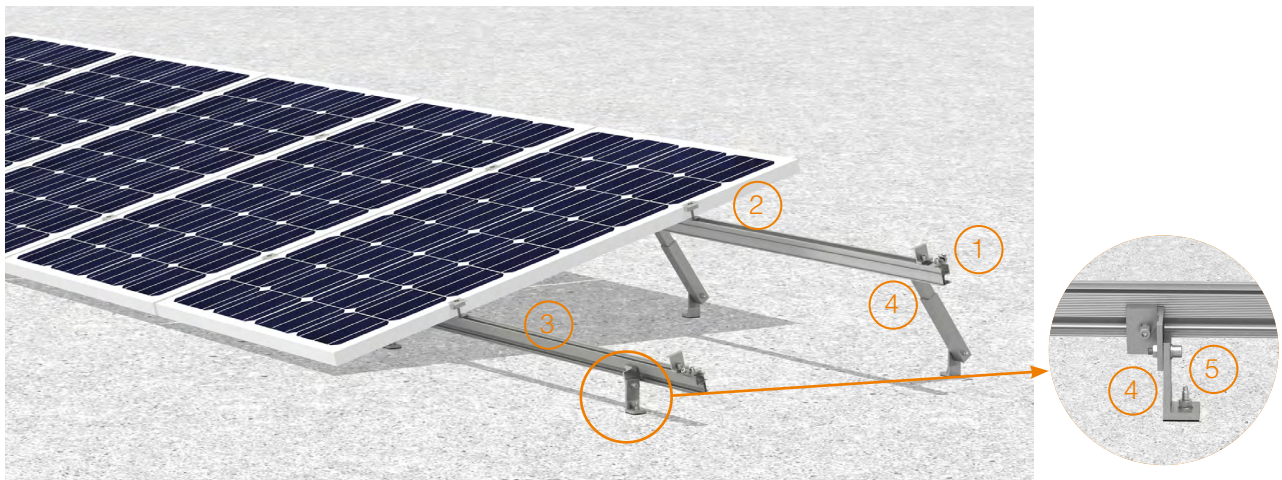
### 4.1 Overview of PV-ezRack SolarRoof

- With Tin Interface



- ① End Clamp    ② Inter Clamp    ③ ECO Rail    ④ Tin interface    ⑤ Anchor Stud

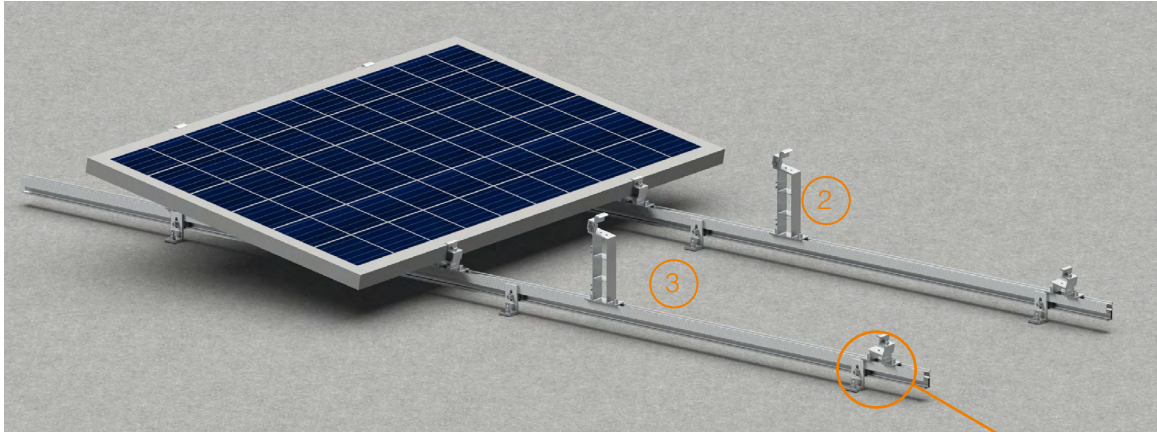
- With Tilt Legs



- ① End Clamp    ② Inter Clamp    ③ ECO Rail    ④ Tilt Legs    ⑤ Anchor Stud

# System Overview

- With ComT



- ① Front Leg Assembly
- ② Rear Leg Assembly
- ③ ECO Rail
- ④ Tin interface
- ⑤ Anchor Stud

- With ComT East-West



- ① Front Leg Assembly
- ② Rear Leg Assembly
- ③ ECO Rail
- ④ Tin interface
- ⑤ Anchor Stud



## 4.2 Precautions during Stainless Steel Fastener Installation

Improper operation may lead to deadlock of Nuts and Bolts. The steps below should be applied to stainless steel nut and bolt assembly to reduce this risk.

### 4.2.1 General installation instructions:

- (1) Apply force to fasteners in the direction of thread
- (2) Apply force uniformly, to maintain the required torque
- (3) Professional tools and tool belts are recommended
- (4) In some cases, fasteners could be seized over time. As an option, if want to avoid galling or seizing of thread, apply lubricant (grease or 40# engine oil) to fasteners prior to tightening.

### 4.2.2 Safe Torques

Please refer to safe torques defined in this guide. When fixing mid and end clamps, if the torques range specified by the panel manufacturer is different, it should be used instead. In case power tools are required, Clenergy recommends the use of low speed only. High speed and impact drivers increase the risk of bolt galling (deadlock) If deadlock occurs and you need to cut fasteners, ensure that there is no load on the fastener before you cut it. Avoid damaging the anodized or galvanized surfaces.

## 5. Installation Instructions

The installation instructions vary based on the mounting system setup for the PV system. Please refer to the navigation guide below for corresponding to the relevant sections of the installation process in the following pages:

### I. ChemSet™ Anchor Stud Installation

This step is common for any PV mounting system setup, explained in [section 5.1](#).

### II. Choice of Mounting System Interface

This varies based on the panel orientation of the PV system as follows:

a. [Solar Roof Flush](#) [detailed in [section 5.2](#)]

Panels are flush to the roof surface.

Tin Interfaces and Anchor Studs are utilised for this setup.

b. [Solar Roof Adjustable Tilt](#) [detailed in [section 5.3](#)]

Panels are tilted to the roof surface using adjustable tilt legs.

Tilt legs and Anchor Studs are utilised for this setup.

c. [Solar Roof ComT](#) [detailed in [section 5.5](#)]

Panels are tilted to the roof surface using commercial tilt legs.

Commercial Tilt [ComT] legs and Anchor Studs are utilised for this setup.

### III. Rail Installation

Based on the chosen interface, the rail installation to interface varies:

a. [Flush and Adjustable Tilt Leg systems](#) – Please visit [section 5.4](#) for details.

b. [Commercial Tilt systems](#) – Please visit [section 5.5](#) for details.

### IV. PV Module Installation

The PV modules are clamped based on the chosen mounting system:

a. [Flush and Adjustable Tilt Leg systems](#) – Please refer to our [PV-ezRack® Grounding System](#) manual for details.

b. [Commercial Tilt systems](#) – Please visit [section 5.5](#) for details.

### V. System Grounding

Please refer to our [PV-ezRack® Grounding System](#) manual for information on our mounting system grounding process.

## 5.1 ChemSet™ Anchor Stud Installation

5.1.1 Drill a hole with a diameter of 10mm and a depth between 80 and 90mm.

5.1.2 Remove dust and debris by brushing and blowing 3 times each as shown in Figure 5.1A (If hole is wet or flooded, remove excess water with wet/dry vacuum).

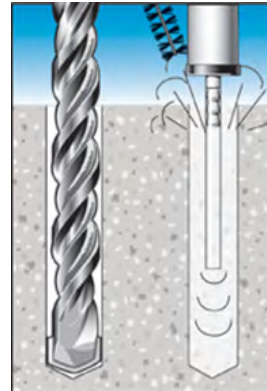


Figure 5.1A

5.1.3 Screw mixing nozzle onto cartridge and dispense 2-3 trigger pulls of adhesive to wait until colour is green / grey with no streaks

5.1.4 Insert mixing nozzle to bottom of hole. Fill hole with adhesive to 3/4 the hole depth slowly, ensuring no air pockets form as shown in Figure 5.1B.

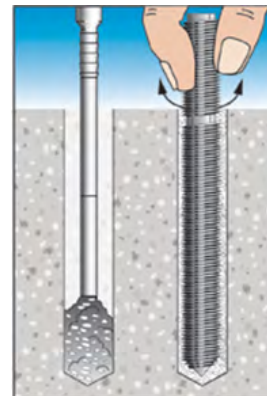


Figure 5.1B

5.1.5 Insert Ramset™ ChemSet™ Anchor Stud/rebar to bottom of hole while turning as shown in Figure 5.1B.

5.1.6 Wait until adhesive has fully cured before loading as shown in Figure 5.1C.

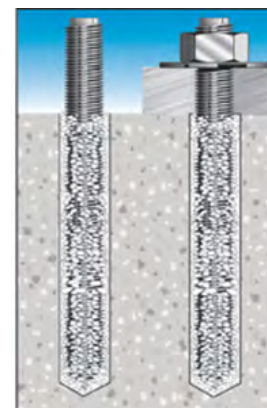


Figure 5.1C

# Installation Instruction

Note: Load should not be applied to anchor until the adhesive has sufficiently cured as specified in Figure 5.1D.

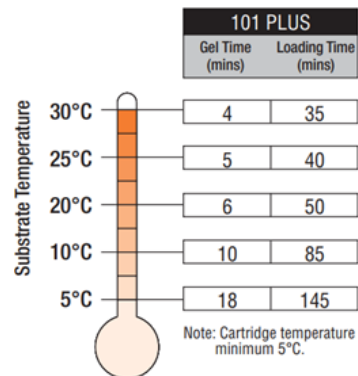


Figure 5.1D

## 5.2 Tin Interface Installation

Connect and adjust tin foot position on the anchor stud. Tighten with washer and nut as per manufacturer's instruction.

The interface base should sit flat on the roof surface. For any required clearance between interface base and roof surface, please contact [engineering@clenergy.com.au](mailto:engineering@clenergy.com.au).



Figure 5.2A

## 5.3 Tilt Legs Installation

### 5.3.1 Front Leg Installation:

Connect and adjust front tilt leg position on the anchor stud, as shown in Figures 5.3A and 5.3B. Tighten with washer and nut as per manufacturer's instructions.

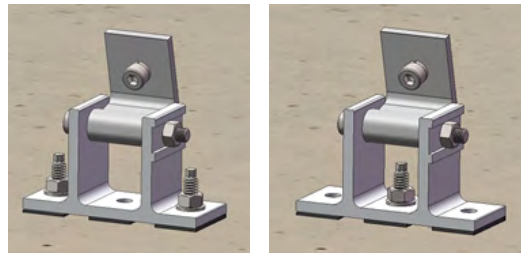


Figure 5.3A

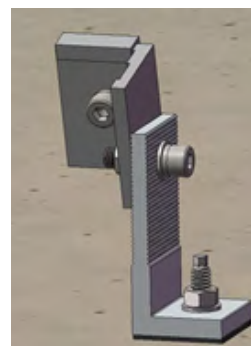


Figure 5.3B



# Installation Instruction

## 5.3.2 Rear Leg Installation:

According to the installation plan, after confirming the length L of the Rear Leg, fasten washer, nut and M8\*12 bolts as shown in Figures 5.3C and 5.3D.

Two Ramset™ ChemSet™ Anchor Studs are used to install rear leg.

Recommended torque for M8\*12 bolts is 16~20 N·m

The tilt leg base should sit flat on the roof surface. For any required clearance between interface base and roof surface, please contact [engineering@clenergy.com.au](mailto:engineering@clenergy.com.au).

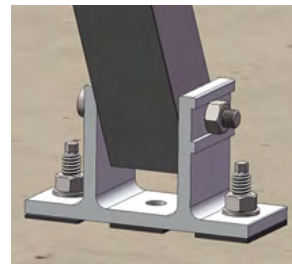


Figure 5.3C

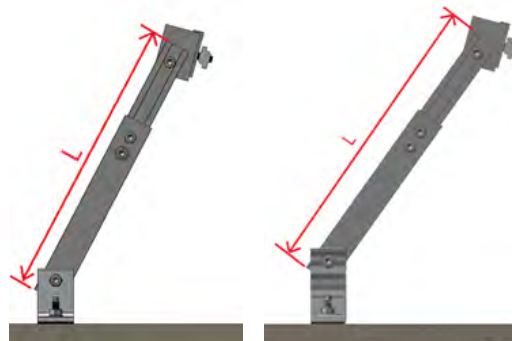


Figure 5.3D

## 5.4 Rail Installation

5.4.1 To connect several rails together, slide half of the splice into the rear side of the rail. Fasten the first M8 Bolt using an Allen key, and slide the next rail into the splice as shown in Figure 5.4A. Tighten the second M8 Bolt using an Allen key. The total rail length is recommended not to be over 30 meters considering rails thermal expansion problem. Splice provides the electrical connection between the 2 rails through the pressure bolts. This eliminates the need of using 2 earthing lugs

Recommended torque is 10 ~12 N·m.

5.4.2 After confirming the position of rail, fasten with Tin Interface or Front and Rear Leg, as shown in Figure 5.4B.

Recommended torque for M8 bolts is 16~20 N·m.

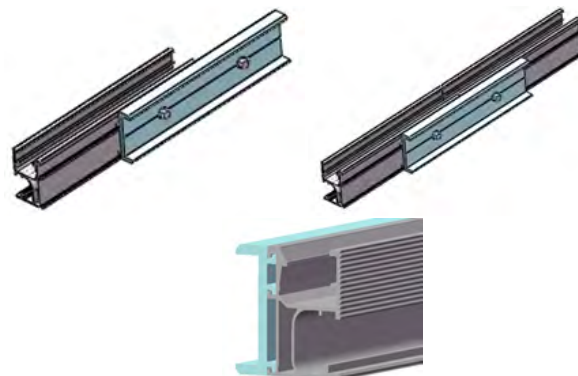


Figure 5.4A

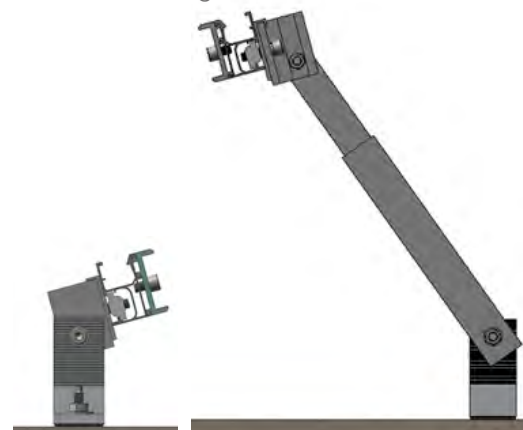


Figure 5.4B

## 5.5 ComT Installation

5.5.1 Fix the Front Leg into the top channel of ECO Rail, then fasten the Front Leg after the position is adjusted properly as shown in Figures 5.5A and 5.5B  
Recommended torque for M8 bolts is 16-20 N·m.

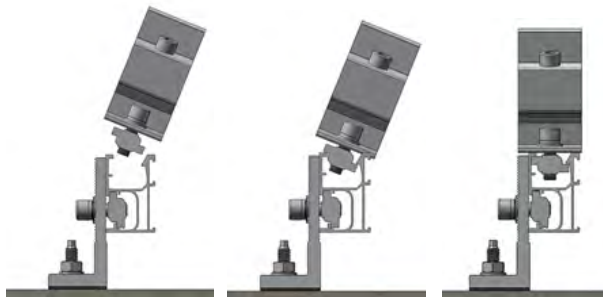


Figure 5.5A

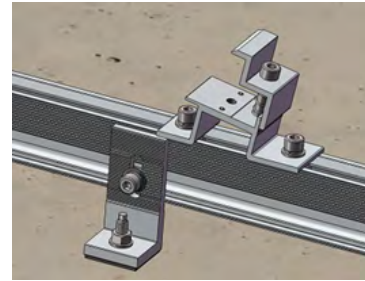


Figure 5.5B

5.5.2 Fix the Rear Leg into the top channel of ECO Rail, then fasten the Rear Leg after the position is adjusted properly as shown in Figures 5.5C, 5.5D and 5.5E.  
Recommended torques: M8 Bolt: 16-20 N·m.

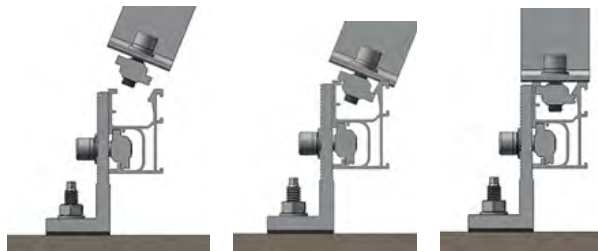


Figure 5.5C

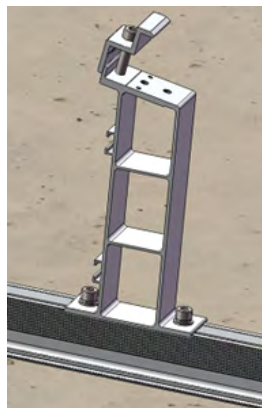


Figure 5.5D South/North facing solution

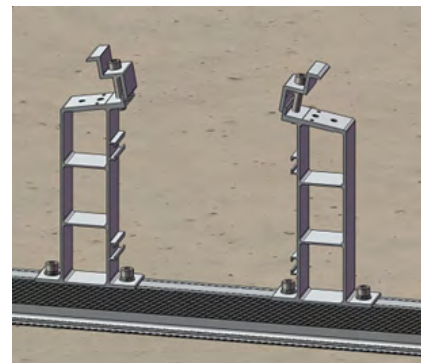


Figure 5.5E East-West facing solution

# Installation Instruction



Figure 5.5F

5.5.3 Place the PV Modules on the Front and Rear Leg as shown in Figure 5.5F. The outside edge of the frame of the PV Modules must overlap the marking lines on the Front and Rear Legs as shown in Figure 5.5G. The pins of Front and Rear legs are used for creating earthing continuity from PV modules to both legs.

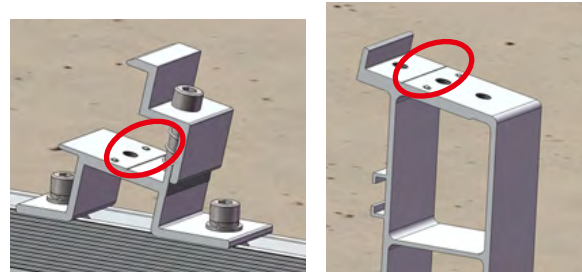


Figure 5.5G

5.5.4 Fix the clamp on the Rear Leg shown in Figure 5.6H and fasten the clamps of Front and Rear legs till the PV Modules are properly installed in Figure 5.5I. Recommended torques: M8 Bolt: 16-20 N·m.

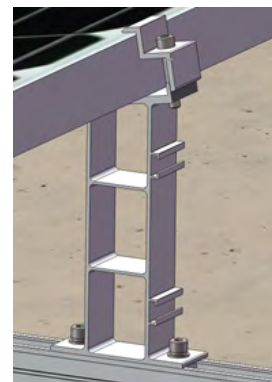


Figure 5.5H

5.5.5 Repeat the above steps to install other Front and Rear Legs, and PV modules.



Figure 5.5I

# Certification Letter and Interface Spacing Table

As the manufacturer of quality solar mounting systems, Clenergy Australia provides a warranty for all PV-ezRack products it supplies in Australia and New Zealand ("Products"). The warranty provided by Clenergy Australia is subject to the conditions contained in this document ("Warranty"). No other warranty provision implied or otherwise is to be assumed. Your Warranty coverage is in accordance with this document.

## Product Warranty Table for Installations in Corrosivity Category 1, 2, 3, 4 and 5 (ISO 9223)

# Product	Material	Standard or Customized Product	Product Warranty			
			Corrosivity Category 1, 2 and 3	Corrosivity Category 4	Corrosivity Category 5	
1	6005CL-T5 mill finish	Standard	10 years	10 years*	10 years*	
	6005-T5 anodized to 10 microns	Standard	10 years	10 years*	10 years*	
	6005-T5 anodized to 15 microns	Customized	10 years	10 years	10 years*	
	6005-T5 anodized to 20 microns	Customized	10 years	10 years	10 years	
2	Galvanized Steel Components	Galvanized Steel at 85 microns in average	Standard	10 years	10 years	Not warranted
3	Stainless Steel Components	SUS304	Standard	10 years	10 years	10 years
4	Fasteners (bolts/nuts/washers)	SUS304	Standard	10 years	10 years	10 years
		SUS316	Customized	10 years	10 years	10 years
5	Buildex Screws for Tile Interface	Carbon Steel SAE 1022 with Climaseal 3 Finish	Standard	10 years	10 years**	10 years**
6	Buildex Screws for Tin Interface	Carbon Steel SAE 1022 with Climaseal 3 Finish	Standard	10 years	Not warranted	

\* Subject to interface spacing reduction as advised by Clenergy Australia. Please contact us for more details.

\*\*The screws under tile interface are assumed to be installed a category 1, 2 or 3 micro-climate within the roof structure.

### Warranty Scope:

Your solar mounting Product has been manufactured to high standards, however, should any manufacturing defect arise, please contact Clenergy Australia. We will arrange for an inspection of the affected Product(s) to determine the extent of the problem.

Details are provided below as to the extent of your Warranty coverage and any exclusions that may apply. Please read these provisions carefully to ensure you receive the appropriate assistance and support in a timely manner. Please also contact Clenergy Australia if any part of this Warranty is unclear, or you wish to discuss your rights and remedies under this Warranty.

If your Product fails during the Warranty periods set out in the Warranty table above due to a defect in:

- (a) materials and/or workmanship on and from the date of the Product's delivery; or
- (b) structural integrity on and from the date of the Product's installation,

Clenergy Australia will at its election either repair or resupply the defective Product provided that:

- The Product was installed correctly by a Clean Energy Council ("CEC") accredited or equivalent accreditation installer, following the Clenergy installation manual provided at time of purchase.
- The Product has been maintained correctly in accordance with section "Care of your Product" below.

### Warranty Conditions:

- Any and all costs for repair or replacement outside the Warranty period are the responsibility of the customer.
- Where Clenergy attends a site and finds that the Product is not faulty, the costs for the visit will be payable by the customer.
- Defective Products shall be uninstalled and/or reinstalled at the customer's expense and risk.
- Under certain conditions, the Warranty can be extended to more than 10 years at an extra cost, available upon request.

### Warranty Exclusions:

- Product finish (natural surface oxidation) or any natural impairment or surface corrosion that does not compromise the structural integrity.
- Products sold or installed outside of Australia and New Zealand unless approved previously in writing by Clenergy Australia.
- Damage caused by transport, mishandling, incorrect storage, improper loading or willful conduct.
- Any Product not correctly installed in accordance with our installation manual, or any specific design instruction or special conditions as advised by Clenergy Australia.
- Damage caused by the Product being modified in any way unless previously agreed to in writing by Clenergy Australia.
- The use of the Product for purposes other than the mounting of PV solar panels.
- Installations where the environment is excluded in the "Products Warranty Table" above, and for galvanized steel ground system Products, where the pH level is outside the range of 6-8, unless agreed to in writing by Clenergy Australia prior to installation.

# PV-ezRACK® 10 Year Product Warranty

- Damage caused by extreme weather conditions or any other natural or man-made event outside of our control.
- Damage caused by attachments not designed or approved for connection to the Product.
- Damage caused by lightning strikes or excessive currents through the earthing/grounding clamps, clips or lugs.

Our Products may come with guarantees that cannot be excluded under the Australian Consumer Law. You may be entitled under statute to a replacement or refund for a major defect in the Products. You may also be entitled under statute to have the products repaired for any defect which does not amount to a major defect. The benefits given by this Warranty are in addition to any statutory rights and remedies you may have under Australian law.

## Product Care:

Clenergy Products are designed to be durable with minimal care, however it is important that you maintain your mounting Product in accordance with proper practices. This includes regular maintenance and inspection to avoid damage.

The aluminum components are made from either AL 6005CL-T5 or AL6005-T5 and may also have a clear anodization. The aluminum may undergo some surface oxidization in service. Please note that this is normal and part of the natural ageing process. The result may even be beneficial to the longevity of the Product, as the oxidization can provide additional protection against degradation by pollution and atmospheric corrosion.

- The torque values of fastener connections on mounting system must be checked annually and corrected if needed in accordance with Clenergy Australia's installation manual.
- Regular cleaning to remove any soil or other possible contaminants must also be performed. Cleaning should be performed in accordance with guidelines recommended by the Galvanizers Association of Australia (GAA) (for Products supplied in Australia) or the Galvanizers Association of New Zealand (GANZ) (for Products supplied in New Zealand) or any other similar organisations (as applicable). When using tin interfaces for installation works, screws not exposed to frequent rain should be washed down with fresh water at least every 6 months.
- You should not use harsh chemicals or highly abrasive materials that may damage Product surfaces. Use only cleaners that are designed for aluminium and always wash them off with clean water afterwards. Steel components should be inspected before and after installation and any damage to the galvanizing should be treated immediately to prevent rusting. It is normal for galvanized Products to develop a surface barrier (the 'patina'), which helps to protect the surface from contaminants in the atmosphere and does not adversely affect the Product.
- You should also ensure that if the Product is stored prior to installing that it is not contaminated by contact with rusty items or other impurities such as dirt and chemicals. Should this occur, you must clean the Product and make any repairs using approved methods such as galvanized paint and antirust treatments immediately before installation.





## Innovating renewable energy

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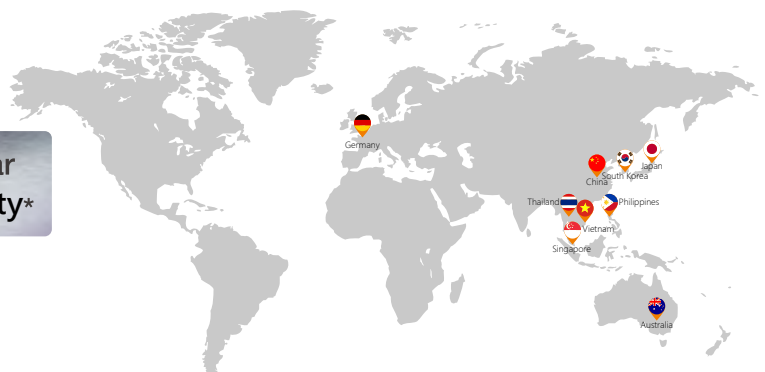
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Clenergy Installation Guide\_PV-ezRack SolarRoof  
 ChemSet Anchor Stud V1.0 (March 2021)