PV-ezRACK®

Grounding System

Code-Compliant Planning and Installation Guide V 2.2
Complying with AS/NZS 5033: 2021

Last Updated - Mar.2025

Introduction

The Clenergy PVezRack® Grounding system provides important guide for installers to achieve earthing continuity from PV modules to earthing cable. It includes two important parts: grounding clips layout design and grounding lug installation.

Please review this manual thoroughly before installing PVezRack® Grounding system.

During installation, and especially when working on the roof, please comply with the appropriate Occupational 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 do by contacting Clenergy Australia via email on tech@clenergy.com.au, or contacting your local distributor in Australia.

List of contents

Product Warranty:
Please refer PVezRack® Product Warranty on our website.

The installer is solely responsible for:

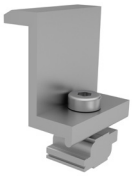
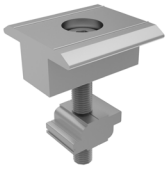
- Complying with all applicable local or national building codes, including any that may supersede this manual;
- Ensuring that PVezRack and other products are appropriate for the particular installation and the installation environment;
- Using only PVezRack parts and installer-supplied parts as specified by the PVezRack 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.
- Ensuring that there are no less than two professionals working on panel installation;
- Ensuring 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 PVezRack® SolarRoof components as required in AS/NZS 5033: 2021;
- Verifying the compatibility of the installation considering preventing electrochemical corrosion between dissimilar metals. This may occur between structures, fasteners and PV modules, as detailed in AS/NZS 5033: 2021.

Tools and Components

Tools

				
Screw Driver with 6 mm Hex Head drive bit	**Tape**	**String & Marker Pen**	**Spanner**	**Torque Spanner**

Components

				
ER-EC-ST End Clamp Standard	**ER-IC-ST** Inter Clamp Standard	**ER-IC-ST/G** Inter Clamp Standard with Grounding Pins	**C-U/30/46-G** Akashi Clamp with Grounding clip	**C-U/30/46** Akashi Clamp
				
ER-IC-28/42/L50/G Zano Inter Clamp	**ER-EC-28/42/L50** Zano End Clamp	**ER-EC-DU35/40** End Clamp, Dual 35 or 40mm	**EZ-GL-ST/UC** Grounding lug with U-shape copper channel	**EZ-GL-AT** The Austin – Commercial Grounding Lug with SUS316
				
EZ-GC-ST Grounding Clip				

Installation Instructions

PV Module Clamps Installation

The guide below is for PV module clamps installation. For PV Module installation, please follow manual provided by the manufacturer.

Before module and clamps installation, it is important to arrange how to position grounding clips to achieve earthing continuity between each PV modules and rails. The Clenergy recommends three different methods for Grounding Clips Layout Arrangement.

Note

When installing earthed inter clamps or Zano inter clamps, grounding clips are not required because earthed inter clamp and Zano inter clamp has integrated grounding pins to achieve earthing continuity between PV module and rail.

Method 1: "Even and Odd"

• When there is an even number of PV Modules in each row, install the grounding clips at the positions marked X in Figure 1, where the number of Grounding Clips = number of PV Modules. Figure shows 4 x PV Modules requiring 4 x grounding clips.

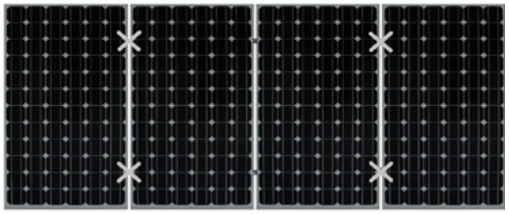


Figure 1

• When there is an odd number of PV Modules in each row, install grounding clips at positions marked X in Figure 2, where the number of Grounding Clips = number of PV Modules + 1. Figure shows 5 x PV Modules requiring 6 x grounding clips.

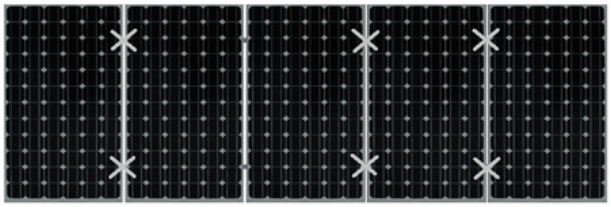


Figure 2

Method 2: "Zig Zag"

Install the grounding clips at the positions marked X in Figure 3, where the number of Grounding Clips = number of PV Modules + 1. Figure shows 5 x PV Modules requiring 6 x grounding clips.

Notes:

- Please consult local PV Module supplier to check whether "Zig Zag" grounding clips layout has any effect on PV modules.
- Grounding clips are not suitable for Dual End Clamp.

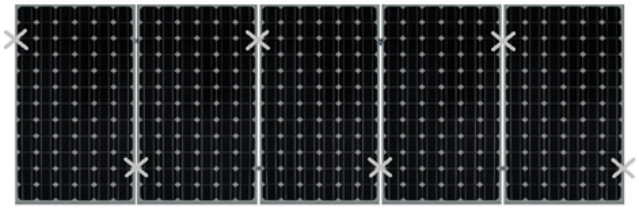


Figure 3 "Zig Zag" Grounding Clips Layout

Method 3: "All Inter Clamps"

Install the grounding clips at the positions marked X in Figure 4, where the number of Grounding Clips = (number of PV Modules -1) x 2. Figure shows 5 x PV Modules requiring 8 x grounding clips.

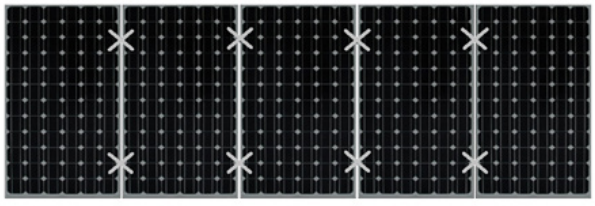


Figure 4 "All Inter Clamps" Grounding Clips Layout

Important Notes for any of method above:

- When replacing defective PV Modules, it is required to replace the grounding clips under the defective PV Modules;
- When removing defective PV Modules, it is required to keep sufficient grounding clips to maintain all other PV modules' earthing continuity with the rail. It is required to install grounding clips under end clamps when necessary to achieve this;
- For array requiring more than 2 rows of rails, the layout and quantity of grounding clips are the same as those for 2 rows of rails.
- For a single PV Module row requiring end clamps only, minimum any two of end clamps need to install grounding clips to maintain PV Module earthing continuity with the rail.

There are three types of clamps for PV Modules Installation.

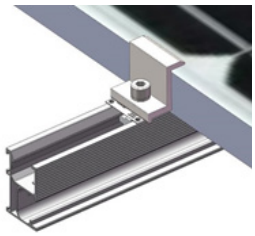


Figure 5

Option 1: Standard Inter and End Clamps

Place the first PV Module on the Rail according to your plan, and fix it in place using the End Clamps. Then fasten lightly as shown in Figure 5. If arranging grounding clips using "Zig Zag" layout method above, a grounding clip needs to be installed under an end clamp as shown in Figure 6.

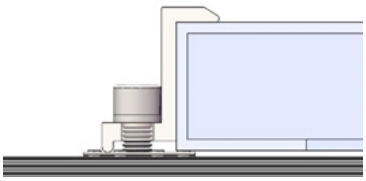


Figure 6

Inter Clamp Standrad

Slightly lift the PV Module and slide Inter Clamps and Grounding Clips into position. The teeth on Grounding Clip will automatically align when the Inter Clamp is properly installed as shown in Figure 7.

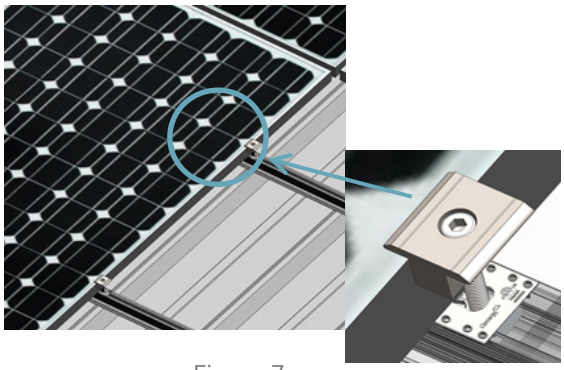


Figure 7

Loosely place the next framed PV Module into the other side of the Inter Clamp and Grounding Clip as shown in Figure 8.

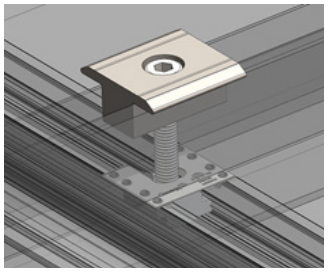


Figure 8

Important Notes:

- To fix the Grounding Clip properly, ensure the frames of PV Modules are completely pressed against End and Inter Clamps and Grounding Clips. Visually check that Grounding Clips are positioned properly;
- Grounding Clips are intended for SINGLE USE ONLY! Only fasten the bolts down with recommended torque of 16~20 N·m when the position of the PV Module is finalized. (Only slightly tighten bolts to keep PV Modules in place prior to the final check).

Inter Clamp Standrad with Grounding Pins

Slightly lift the PV Module and slide Inter Clamps with Grounding pins into position as shown in Figure 9.

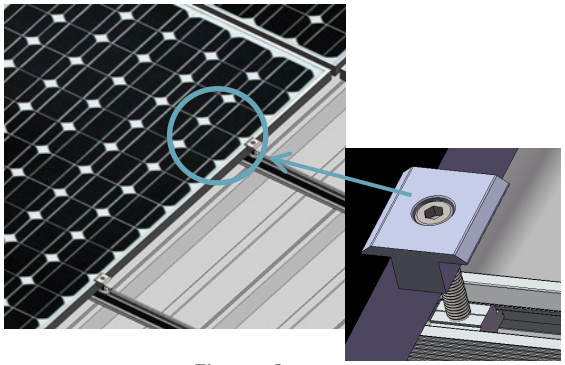


Figure 9

Loosely place the next framed PV Module into the other side of the Inter Clamp as shown in Figure 10.

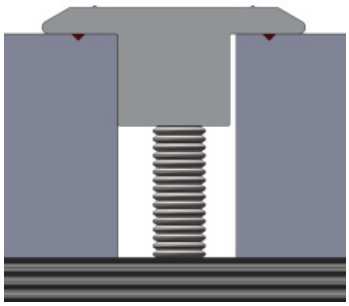


Figure 10

Option 2: Akashi Clamps

Turning the top plate of the Akashi Clamp to switch the functionality between End and Inter Clamp as shown in Figure 11.

Note: Akashi Clamp with part number of C-U/30/46 has no pre-fitted grounding clip and Akashi Clamp with part number of C-U/30/46-G has pre-fitted grounding clip. Please use one of grounding clips layout arrangement methods above to position them correctly.

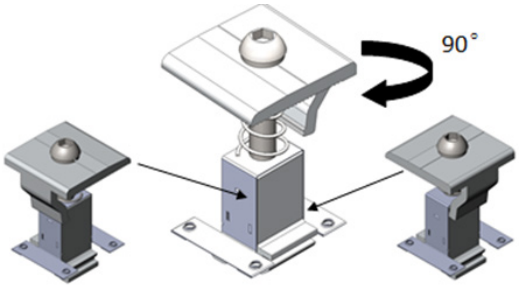


Figure 11

Incline the Akashi Clamp to fit the lower channel of clamp against the lower rib of the Rail and press module of the Akashi Clamp to click in the rail channel. Please make sure the upper channel of clamp fits against the upper rib of rail as shown in Figure 12.

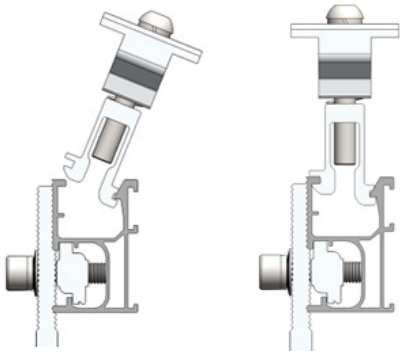


Figure 12

Note: Before clicking in, make sure there is enough room between two "claws" of the module otherwise it needs to screw up the bolt as shown in Figure 13.

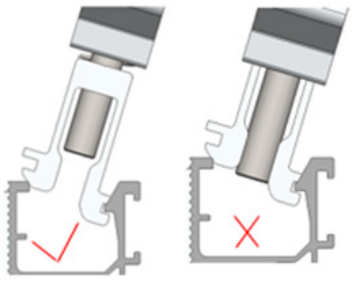


Figure 13

Place the first PV Module on the Rails and apply the Akashi Clamp as the End Clamp and fasten slightly. Make sure the frame of the PV Module is fully in contact with the Akashi Clamp as shown in Figures 14 and 15. Visually check the Akashi Clamp and PV module are properly installed.

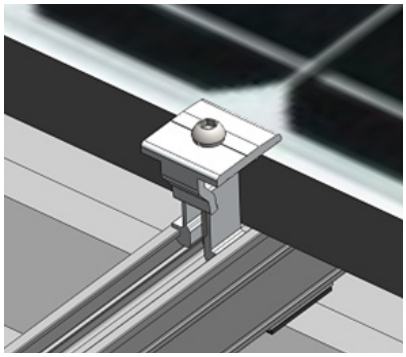


Figure 14

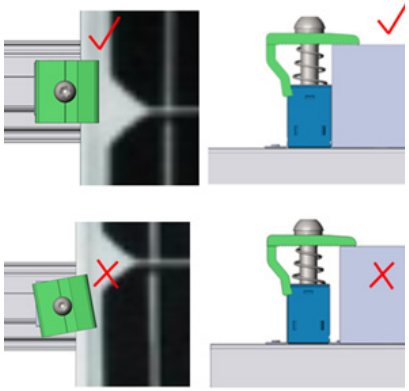


Figure 15

When using as an Inter Clamp, click the Akashi Clamp into the rail channel and slightly lift the framed PV Module to ensure the Grounding Clip is properly positioned as shown in Figure 16.

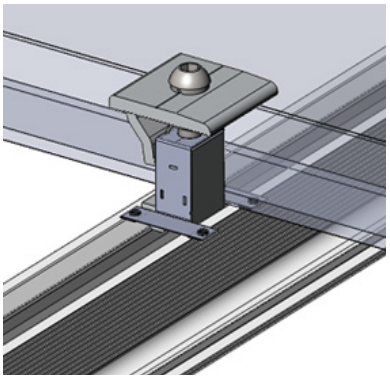


Figure 16

Loosely place the next framed PV Module into the other side of the Akashi Clamp. Ensure the Grounding Clip is properly positioned, and the frame of the PV Module is in proper contact with Akashi Clamp as shown in Figures 17 and 18.

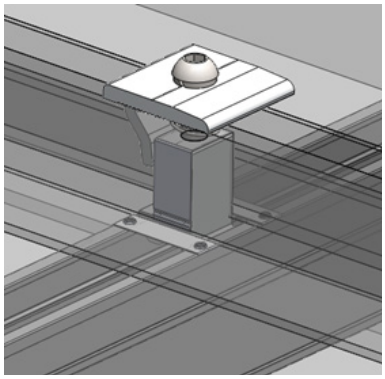


Figure 17

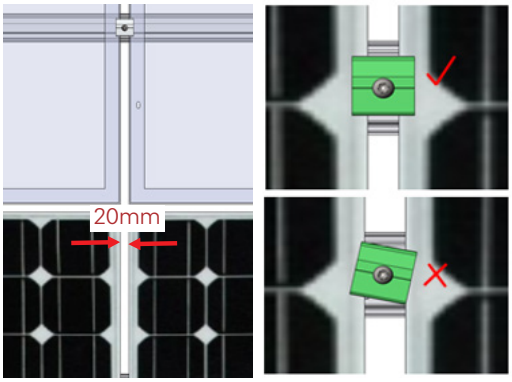


Figure 18

Note: The gap between two adjacent PV Modules generated by Akashi Clamp is 20mm. The recommend torque for Akashi Clamp as Inter and End Clamp is 13~16 N·m.

Option 3: Zano Inter and End Clamps

Incline the Zano Clamp to fit the lower channel of clamp against the lower rib of the Rail and press module of the Zano Clamp to click in the rail channel. Please make sure the upper channel of clamp fits against the upper rib of rail as shown in Figure 19.

Note: Before clicking in, make sure there is enough room between two"claws" of the module otherwise it needs to screw up the bolt as shown in Figure 20.

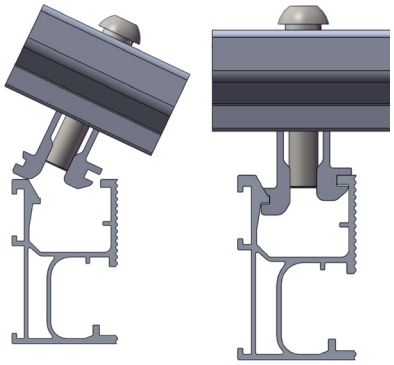


Figure 19

Important Notice: Before installation, confirm with the panel manufacturer whether the panel type is compatible with grounding pins. This is especially critical for the Zano panel clamp due to its integrated grounding pin. Improper installation, including over-torquing, may result in panel damage or shattering. Clenergy is not responsible for damage caused by incorrect installation or failure to follow these guidelines.

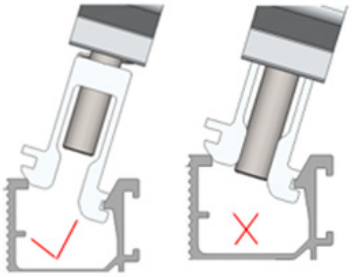


Figure 20

Place the first PV Module on the Rails and apply the Zano End Clamp and fasten slightly. Make sure the frame of the PV Module is fully in contact with the Zano Clamp as shown in Figures 21 and 22. Visually check the Zano Clamp and PV module are properly installed.

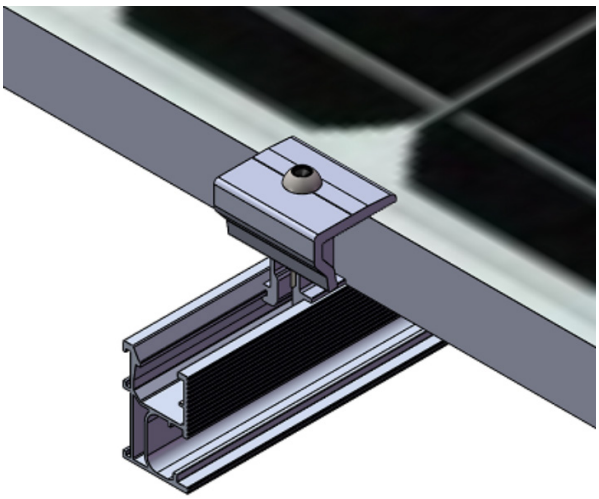


Figure 21

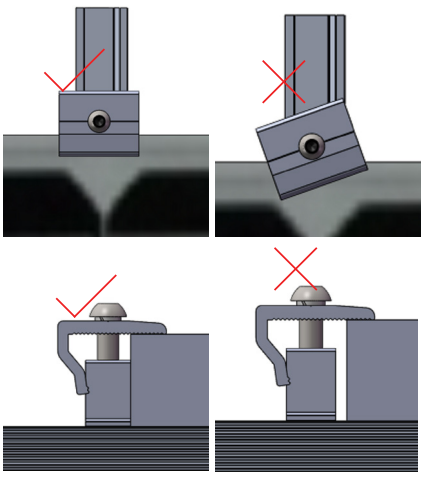


Figure 22

Loosely place the next framed PV Module into the other side of the Zano Inter Clamp as shown in Figure 24.
Note: The earthing continuity between each PV modules and rails is achieved by the grounding pins preassembled in clamp module as shown in Figure 23.

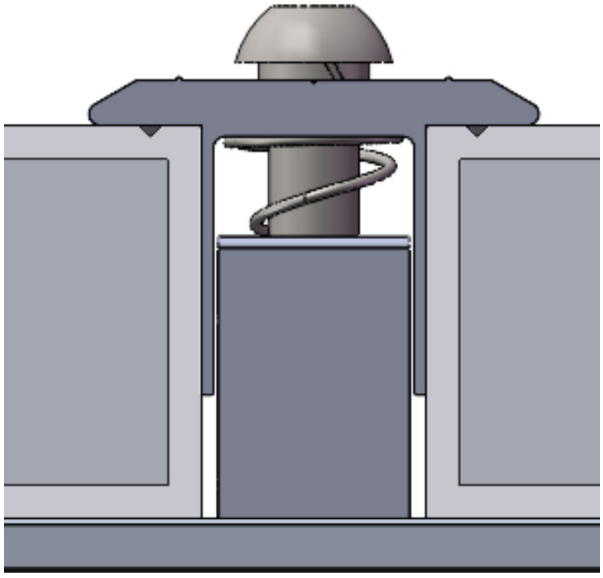


Figure 23

1. The gap between two adjacent PV Modules generated by Zano Clamp is 20mm. The recommend torque for Zano Inter and End Clamps is 13~16 N•m.

2. Zano inter clamp has integrated grounding pins and grounding clips are not required.

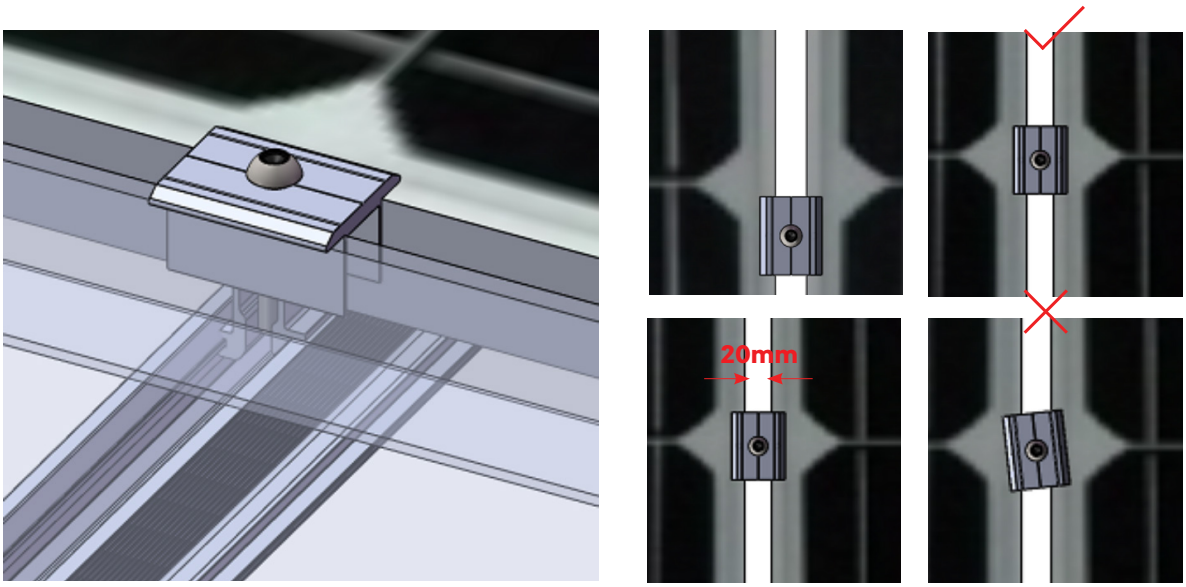


Figure 24

Grounding Lug Installation

The Clenergy provides two types of grounding lugs to meet different installation requirements, such as required earthing cable sizes. In order to meet the minimum earthing electrical resistance requirement by AS/NZS 5033:2021, it is required to install one Grounding Lug per row of rail.

A. Grounding Lug with U-shape Copper Channel (EZ-GL-ST/UC)

The recommended fasten torque of the bolt M8*25 is 16~20 N·m.

Once grounding lug fixing with rail, insert U-Shape Copper Channel into grounding lug as shown in Figure 25. Strip earthing cable (the maximum size is 10 mm^2), insert the conductor into the Copper Channel and tighten the bolt M6*14 with 5~6 N·m to ensure the earthing cable is tight.

Note: Please check the electrical resistance between rail and earthing cable conductor to ensure the bonding is made.

There are three options for Grounding Lug installation.

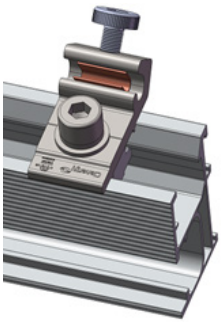


Figure 25

Option 1

Fix the Grounding Lug into the top channel of Rail as shown in Figure 26.

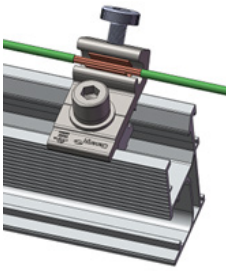


Figure 26

Option 2

Fix the Grounding Lug into the top channel of Rail where just under the PV Module as shown in Figure 27. Total height of grounding lug allows installation under 28mm high PV module.

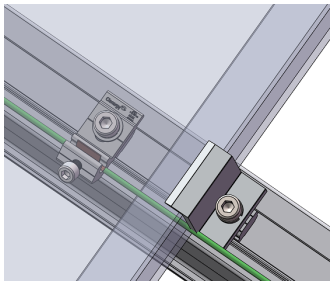


Figure 27

Option 3

Fix the Grounding Lug at the side channel of Rail as shown in Figure 28.

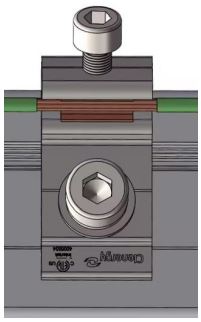


Figure 28

B. The Austin – Commercial Grounding Lug (EZ-GL-AT)

Place the grounding lug on top of rail and ensure z module is on the right position and lug sits flush on the rail surface as shown in Figure 29. Do not fully tighten the bolt.

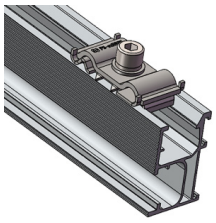


Figure 29

There are two channels to fit different earthing cables.

Channel one is for earthing cable of 4, 6, 10 and 16 mm^2 and channel two is for earthing cable of 25, 35, 50 mm^2

Lift up one side of top plate of lug, insert the conductor of earthing cable into channel and tighten the bolt to ensure lug is well fixed on the rail and earthing cable is tight.

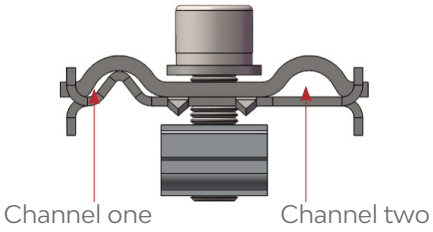


Figure 30

Note:
Please check the electrical resistance between rail and earthing cable conductor to ensure the bonding is made.

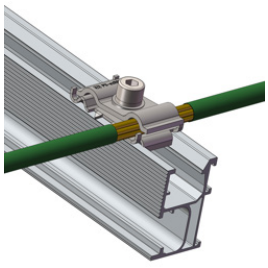


Figure 31

There are two options for Grounding Lug installation.

Option 1

Fix the Commercial Grounding Lug into the top channel of Rail as shown in Figures 32a and b.

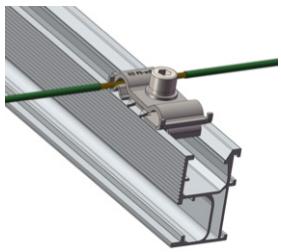


Figure 32a Installed in channel one

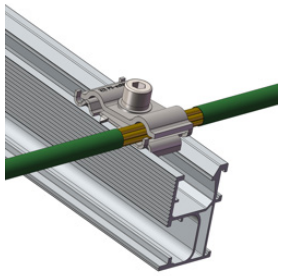


Figure 32b Installed in channel two

Option 2

Fix the Commercial Grounding Lug into the top channel of Rail where is under the PV Module as shown in Figure 33. The height of grounding lug above the rail is less than 20 mm.

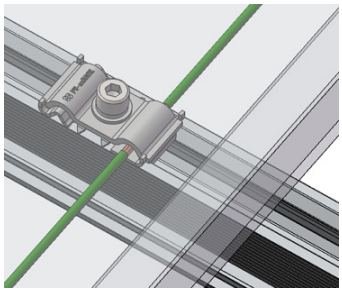


Figure 33

Certification

MW Engineering Melbourne

CIVIL & STRUCTURAL ENGINEERS
RESIDENTIAL - INDUSTRIAL - COMMERCIAL - PRODUCT DEVELOPMENT
info@mwengineering.melbourne
Phone: 1300 MWENG-0 (1300 69364-0)
www.mwengineering.melbourne
ABN 37 605 815 585

Clenergy Australia
3/10 Duerdin Street
Clayton, VIC 3168

Date: 16 / 10 /2024

Zano Inter and End Clamps CERTIFICATION LETTER

MW Engineering Melbourne, being Structural Engineers within the meaning of Australian regulations, have assessed and certified the Zano panel inter clamps (ER-IC-28/42/L50/G, ER-IC-28/42/L50/G/BA) and end clamps (ER-EC-28/42/L50, ER-EC-28/42/L50/BA) to be used with the following documents:

Ref. Number	Certificate
CL-088-S	Tin and Tile Interface spacing tables
CL-343-S	Klip-lok Flush Interface spacing tables
CL-406-S	Klip-lok Tilt Interface spacing tables
CL-530-S	Penetrative Tilt Interface spacing tables
CL-563-S	Adjustable Tile Interface spacing tables
Cl-619-S	Commercial Tilt Interface spacing tables
CL-620-S	Klip-lok Commercial Tilt V2.0 spacing tables
CL-693-S	Tin and Tile Interface spacing tables V500
CL-1151-Y	Corrugated Profile Roof Adaptor Interface (ECO and Elite rails)
CL-688-S	SADL Bracket Flush Mounting for Kingspan Roof (ECO and Elite rails)
CL-1168-Y	Penetrative Flush and Tilt Interface (ELITE rails)
CL-1171-Y	Tin and Tile penetrative Flush Interface (ELITE rails)
CL-1172-Y	Klip-lok Flush Interface (ELITE rails)
CL-1173-Y	Klip-lok Flush and Tilt Interface (ELITE rails)

The certificates will be valid unless an amendment is issued on any of the following codes:

- **AS/NZS 1170.0- 2002 AMDT 4 2016** **General Principles**
- **AS/NZS 1170.1- 2002 AMDT 4-2016** **Imposed Loadings**
- **AS/NZS 1170.2- 2021** **Wind Loadings**
- **AS/NZS 1664.1- 1997 AMDT 1:1999** **Aluminium Code**

Should you have any queries, do not hesitate to contact us.
Best Regards,

Alberto Escobar
Civil/Structural Engineer
BEng MIEAust NER
PE 0003615 RPEQ 18759 BDC 3134 BPB (NT) 262228ES BSP (TAS)
845530344
info@mwengineering.melbourne

PV-ezRACK®

Clenergy

3/10 Duerdin St
Clayton VIC 3168
Australia

Phone: +61 3 9239 8088
Email: sales@clenergy.com.au
Web: www.clenergy.com.au

@ClenergyGlobal / @ClenergyClub / ClenergyAUS @Clenergy @ClenergyClub
@Clenergy_global @Clenergy

A Clenergy Technologies Company