PV-ezRACK®

ComT 2.0: 5°, 10° and 15°

Code-Compliant Planning and Installation Guide V2.1
Complying with AS/NZS 1170.2:2021

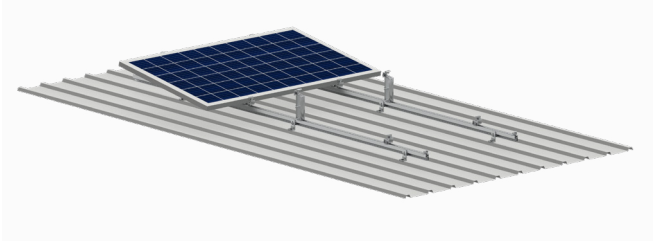
Last Updated - Dec. 2023

Introduction

The PVezRack® ComT is developed for PV installation on flat or pitched roofs. The unique fixing parts can be quickly and easily installed with simple tools.

Please review this manual thoroughly before installing PVezRack® ComT. This manual provides:
1) Supporting documentation for building permit applications relating to PVezRack® ComT.
2) Planning and installation instructions.

The PVezRack® ComT parts, when installed in accordance with this guide, will be structurally sound and will meet the AS/NZS 1170.2:2021 standard. 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 obtain by contacting Clenergy Australia via email at 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 updates that may supersede this manual.
- Ensuring that PVezRack® and other products are appropriate for the installation and the surrounding environment.

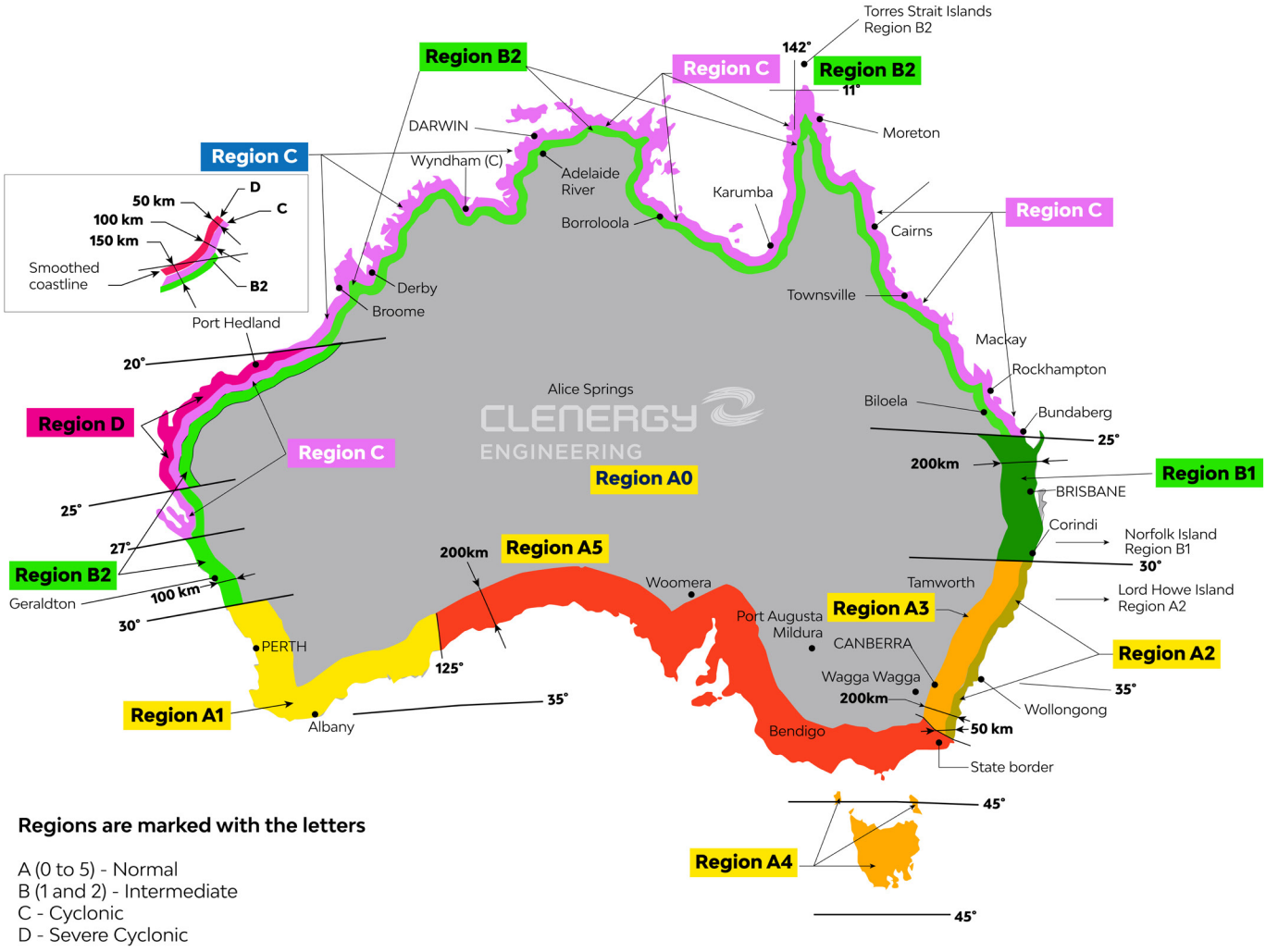
Product Warranty:
Please refer PVezRack® Product Warranty on our website.

List of contents

- Using only PVezRack® parts and installer- supplied parts as specified by 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.
- Ensuring that the roof, its rafters/purlins, connections, and other structural support members 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 the 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 also between structures, fasteners and PV modules, as detailed in AS/NZS 5033:2021.
- Verifying atmospheric corrosivity zone of installation site by referring to AS 4312-2008 or consulting local construction business to determine appropriate products and installation.

Planning

Determine the Wind Region of Installation Site



Wind Regions – Australia

Wind regions are pre-defined for the whole of Australia by the Australian Standard 1170.2:2021. Comparing to 1170.2:2011, 2021 version has a lot of changes in wind regions.

- Central Australia is now classified as Wind Region A0 and Terrain Classification 2 instead of Wind Region A4
- Region A1, previously most of the South coast of Australia, now is divided into Regions A1 and A5.
- Tasmania is now Region A4.
- Region B has been divided into regions B1 and B2. This will affect installations in Northern NSW, Gold Coast, Brisbane, Sunshine Coast, and Gladstone.
- Region B1 was increased to include more inland cities around Brisbane. This will likely mean extra structural requirements such as extra rail for installs.

Determine the Terrain Category

It requires to determine the right terrain category to ensure the installation meets the maximum interface spacing specified in the engineering certificate.

In 1170.2-2021, Terrain category 1.5 was removed and Terrain category 2.5 was added. See the definitions below.

Terrain Category 1 (TC1) – Very exposed open terrain with very few or no obstructions, and all water surfaces (e.g. flat, treeless, poorly grassed plains; open ocean, rivers, canals, bays and lakes).

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

Terrain Category 2.5 (TC2.5) – Terrain with some trees or isolated obstructions, terrain in developing outer urban areas with scattered houses, or larger acreage developments with more than two and less then 10 buildings per hectare.

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

Terrain Category 4 (TC4) – Terrain with numerous large, high (10 m to 30 m tall) and closely spaced constructions, such as large city centres 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.

Determine the Maximum Rail Support Spacing

Please refer to the Certification Letter and Interface Spacing Table. There are many factors affecting maximum interface spacing, such as wind region, building height, panel size... There is one factor specially for ComT, which is row spacing between panels. Please refer to note 22 to find out reduction and increase factors for different row spacing.

Row spacing	Spacing +/- (North facing)	Spacing +/- (East-West)
0 mm to < 200 mm	- 20 %	- 20 %
< 200 to < 400 mm	-10%	-10%
< 400 mm to < 650 mm	Apply the same table spacings	Apply the same table spacings
> 650 mm	+20%	+ 10 %

If a project specific Certification Letter has been provided, please refer to the support spacing in this letter.

Determine System Tilt Angle

The PVezRack® ComT system is a fixed 5°, 10° and 15° tilt system.

Determine Roof Pitch

The PVezRack® ComT system can be used for roof slopes up to 10°. Please verify that the Installation site roof pitch is less or equal to 10°.

Determine the Installation Area of Roof

Please refer to PVezRack® ComT Interface Spacing Table in Certification Letter.

Verify Rafter/Purlin Properties of Building

Please verify the rafter/purlin properties of the building, which could affect the interface spacing. For example, the tin interface spacing on the metal purlin in the certification letter is based on steel purlins G450 1.9 mm thick. If the steel purlin is less than 1.9 mm in thickness, the corresponding reduction factor of the interface spacing will be applied. For different grade of timber purlin, the different spacing will apply as well. Please refer to the generic notes for details.

Determine the Maximum Rail Support Spacing

There are other additional factors (such as PV module dimensions, number of rails per PV module, row spacing between PV modules) related to maximum rail support spacing. Please refer to the notes of Certification Letter. If a project specific Certification Letter has been provided, please refer to the support spacing in the provided letter.

Verify Maximum Rail Overhang

Maximum rail overhang is 150 mm for interface fixing (or installed) spacings equal or over 700 mm. For interface fixing spacings less than 700 mm, max rail overhang is 50 mm.

Verify PV Module's Clamping Requirements

It is important to check PV modules clamping requirements (for example clamp dimensions, clamping distance from the end of panel) from PV modules manufacturer before installations, which can help to avoid using incorrect size of clamps and help to plan interface's positions on the roof and rail's orientation and position.

Tools and Components

Tools

				
Impact Driver (Max. torque≥20N.m, for M8 bolt and nut)	**Torque Spanner**	**Spanner**	**Tape**	**String**
				
Marker Pen	**6mm Hex Driver Bit** (in the carton provided by the Clenergy)	**Open Spanner 14mm**		

Components

				
FL-COMT/Z/G/5 Front Leg Assembly, 5°, with Z-Module and Grounding Pins	**RL-COMT/Z/G/5** Rear Leg Assembly, 5°, with Z-Module and Grounding Pins	**FL-COMT/Z/G/10V2** Front Leg Assembly, 10°, with Z-Module and Grounding Pins, version 2	**RL-COMT/Z/G/10V2** Rear Leg Assembly, 10°, with Z-Module and Grounding Pins, version 2	**FL-COMT/Z/G/15** Front Leg Assembly, 15°, with Z-Module and Grounding Pins
				
RL-E-COMT/G/15 Rear Leg Extender, 15°, with Grounding Pins	**ER-R-ECO** ECO Rail	**ER-R-T50** T50 Rail	**ER-R-T110** T110 Rail	**S-MT/240** MT-Rail Support

Components

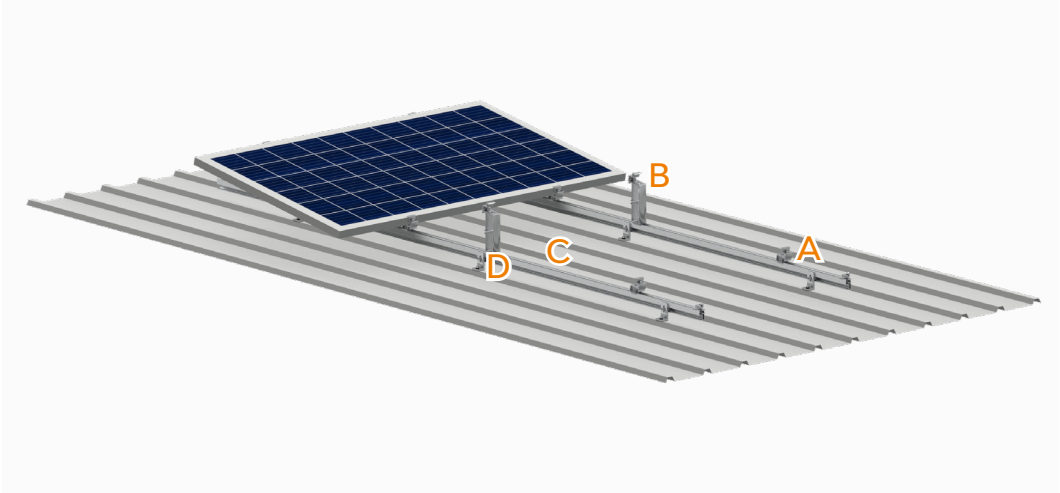
				
ER-I-05 Tin Interface	**ER-I-05/CM** Tin Interface with Click Module	**ER-I-05A/EZC/ECO** Tin Interface A with ezClick connection	**ER-I-25** Tin Interface with Curved Base for Corrugated Roof	**ER-RC-T/DM** Rail Clamp for T-Rail, with Diamond Module


EZ-GL-ST/UC Grounding Lug with U-Shape Copper Channel

System Overview

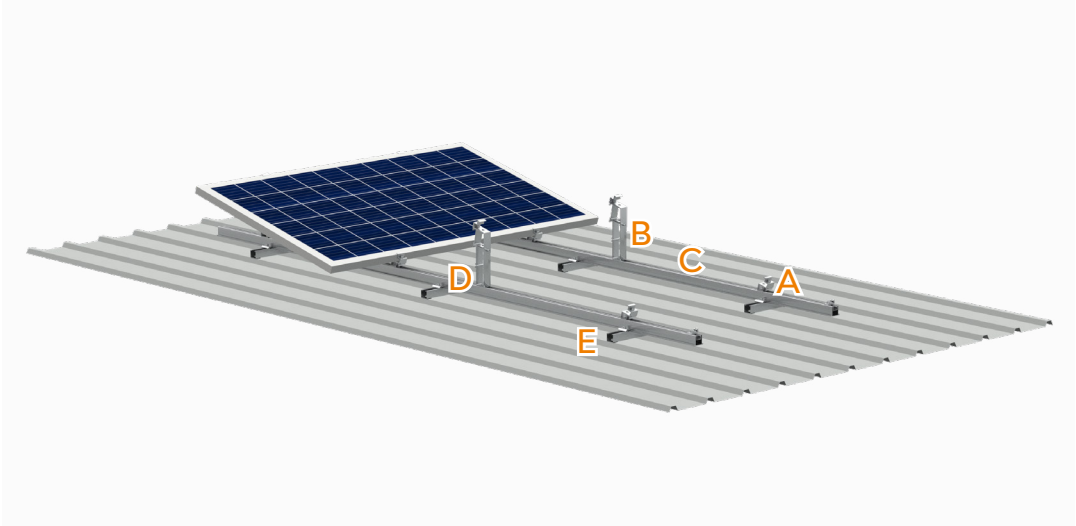
Overview of PVezRack® ComT (North Facing)

Tin Interface with Eco Rail



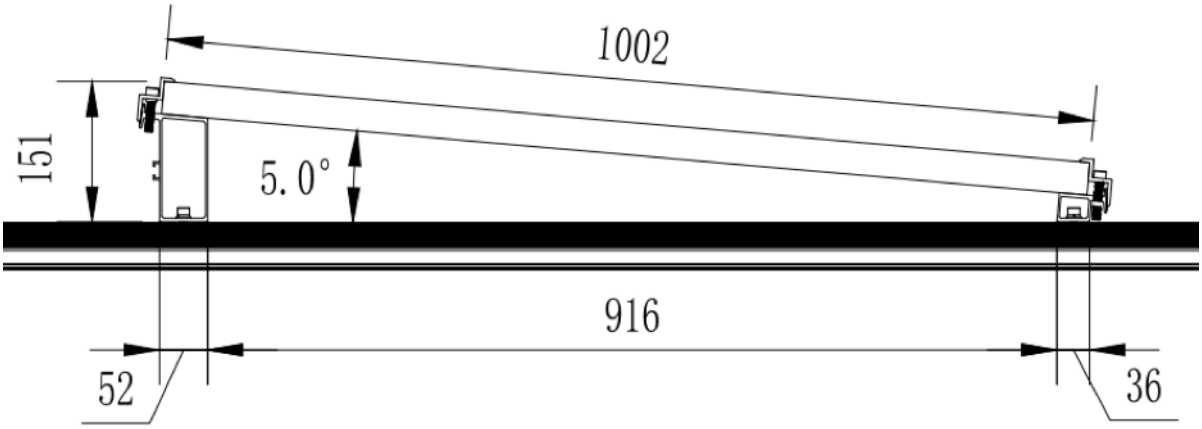
A. Front Leg Assembly B. Rear Leg Assembly C. ECO Rail D. Tin Interface

MT-Rail Support with T50/T110 Rail

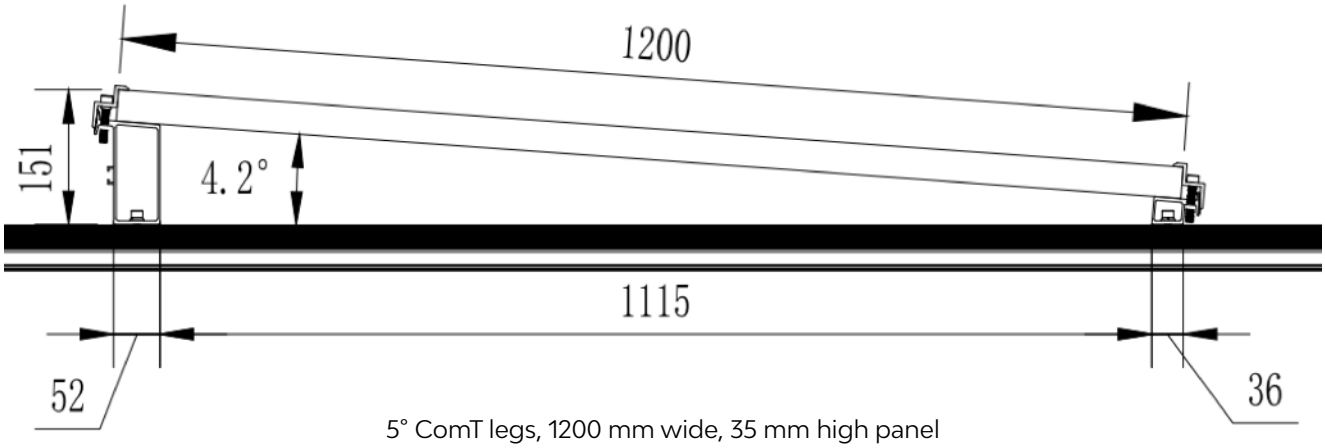


A. Front Leg Assembly B. Rear Leg Assembly C. T50 Rail/T110 Rail D. Rail Clamp for T-Rail
E. MT-Rail Support

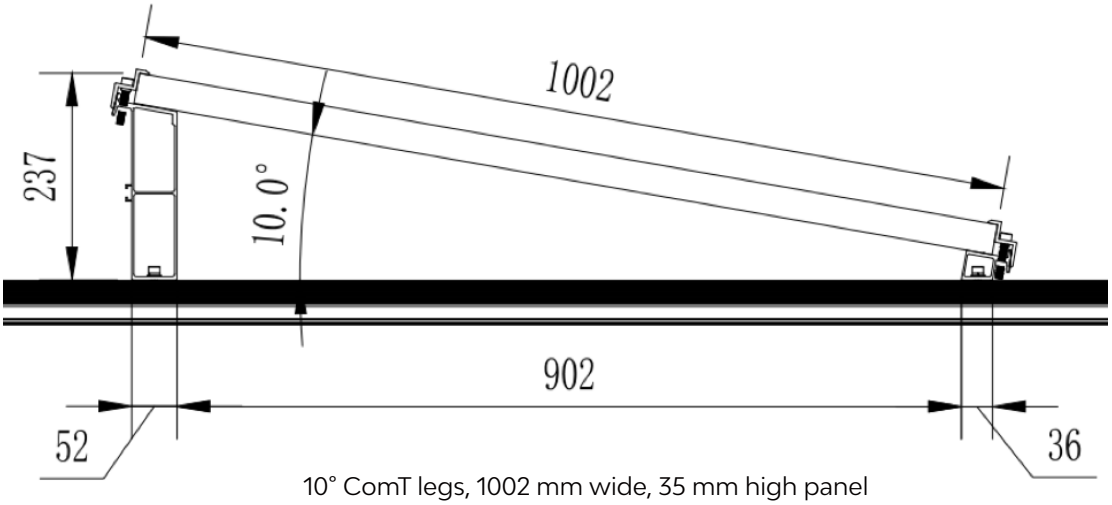
Side View Drawing



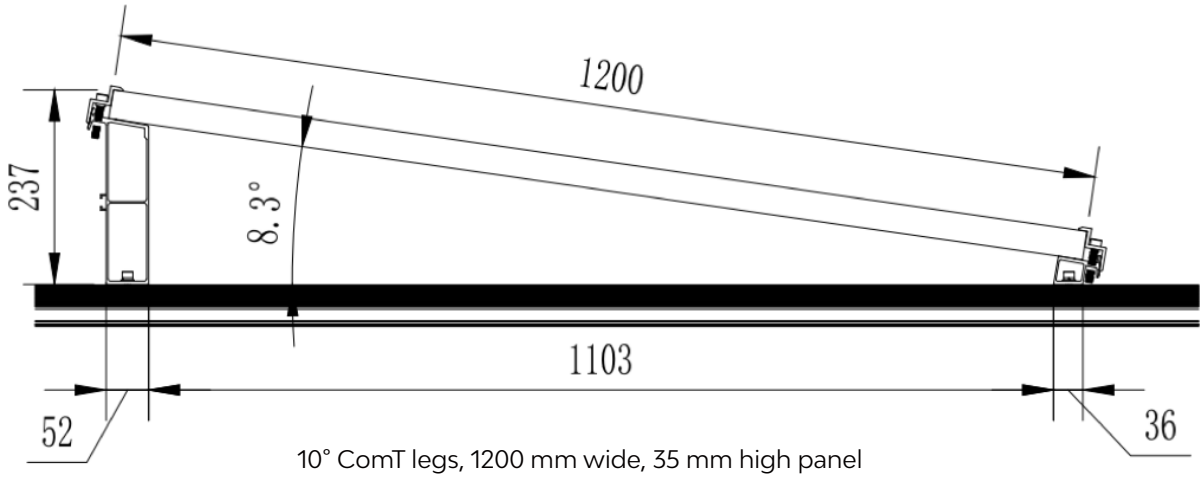
5° ComT legs, 1002 mm wide, 35 mm high panel
Note: 5° tilt angle is designed based on 1002 mm wide panel



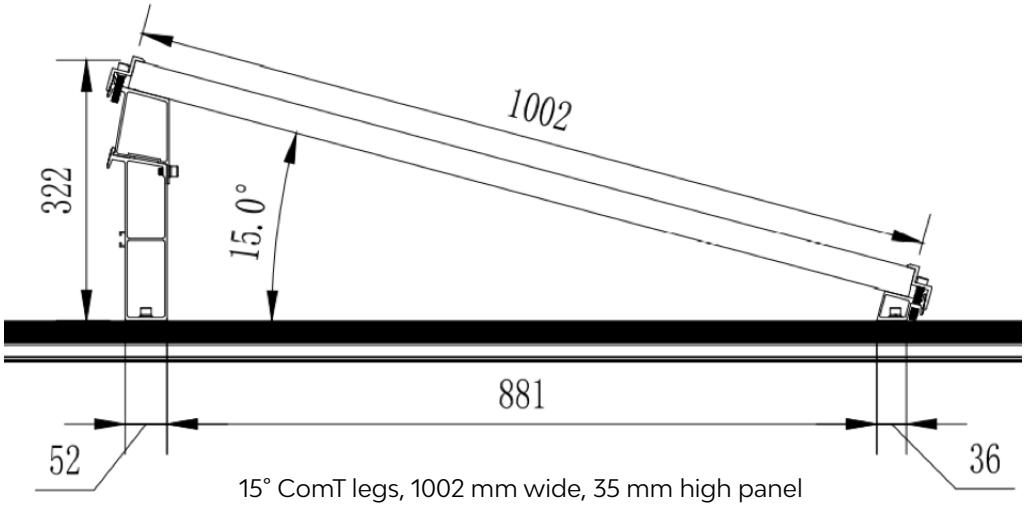
5° ComT legs, 1200 mm wide, 35 mm high panel
Note: 1200 mm wide panel is max panel width considering earthing pins on top of legs plates can provide effective panels earthing



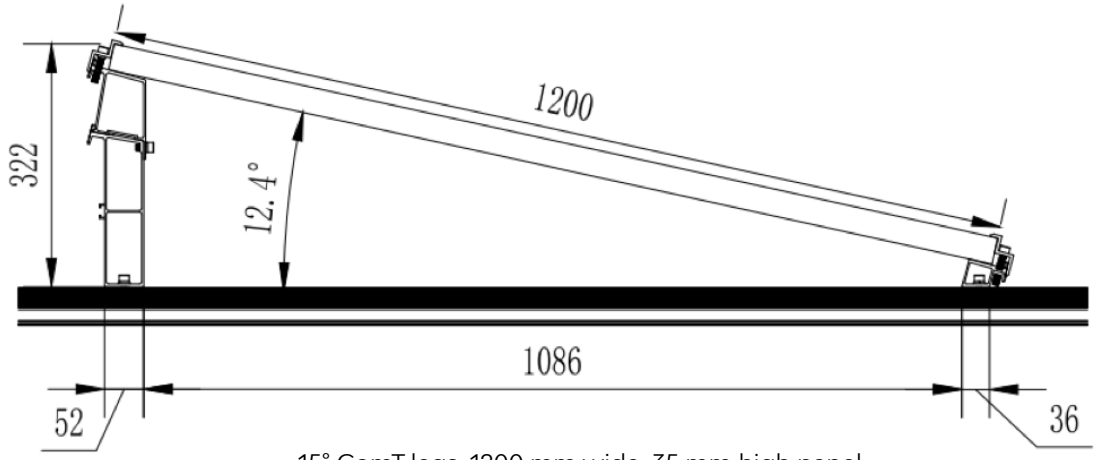
10° ComT legs, 1002 mm wide, 35 mm high panel
Note: 10° tilt angle is designed based on 1002 mm wide panel



10° ComT legs, 1200 mm wide, 35 mm high panel
Note: 1200 mm wide panel is max panel width considering earthing pins on top of legs plates can provide effective panels earthing

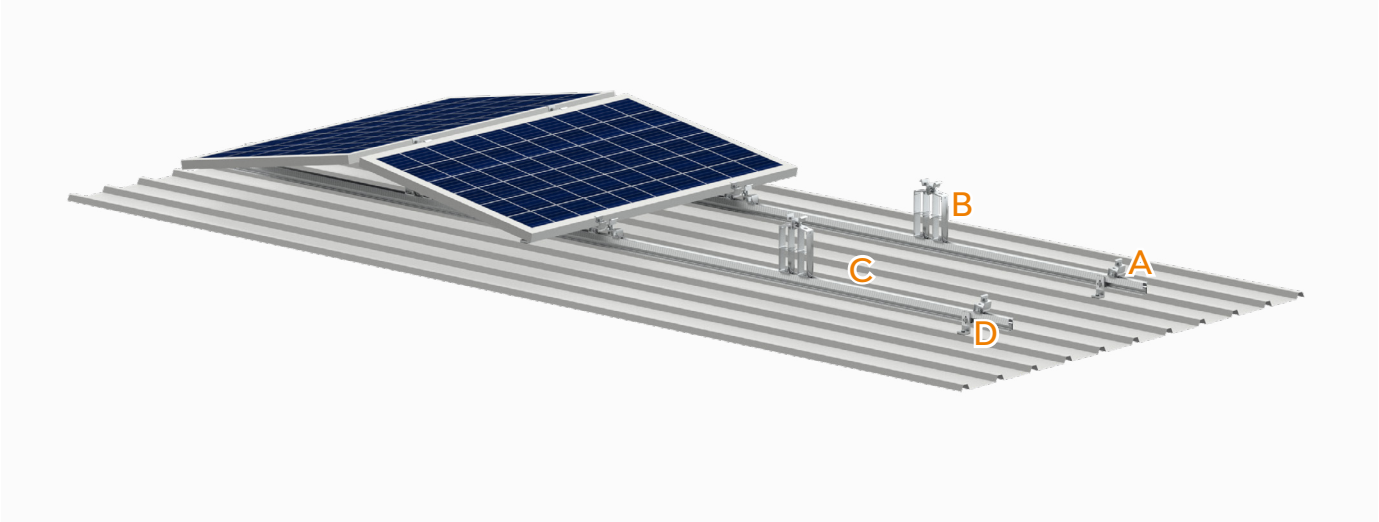


15° ComT legs, 1002 mm wide, 35 mm high panel
Note: 15° tilt angle is designed based on 1002 mm wide panel



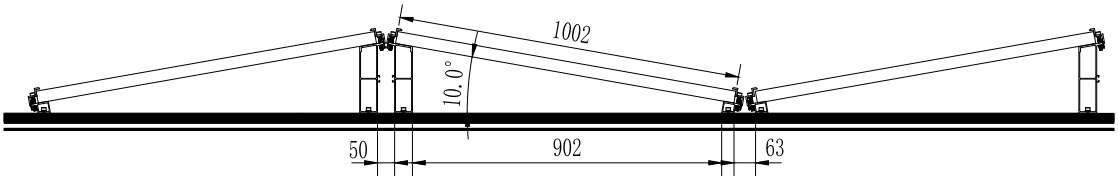
15° ComT legs, 1200 mm wide, 35 mm high panel
Note: 1200 mm wide panel is max panel width considering earthing pins on top of legs plates can provide effective panels earthing

Overview of PVezRack® ComT East-West



A. Front Leg Assembly B. Rear Leg Assembly C. ECO Rail D. Tin Interface

Side View Drawing (10° legs, 1002 mm wide panel as an example)



Note: Minimum distance between two rear legs is 50 mm, between two front legs is 63 mm as well for 5° and 15° tilt legs, and for other panel width.

Precautions during Stainless Steel Fastener Installation

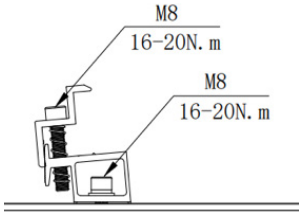
Improper operation may lead to deadlock of Nuts and Bolts. The steps below should be applied to stainless steel nut and bolt assembly to reduce this risk.

General Installation Instructions:

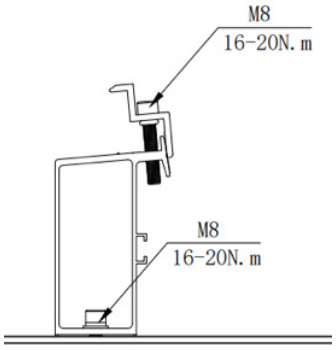
(1) Apply force to fasteners in the direction of the thread
(2) Apply force uniformly, to maintain the required torque
(3) Professional tools and tool belts are recommended
(4) In some cases, fasteners could be seized over time. To avoid galling or seizing of thread, apply lubricant (grease or 40# engine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

Safe Torques

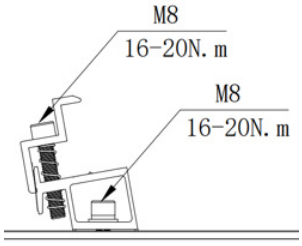
Please refer to safe torques defined in this guide. When fixing mid and end clamps, if the torques range specified by the panel manufacturer is different, it should be used instead. In case power tools are required, Clenergy recommends the use of low speed only. High speed and impact drivers increase 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 cutting it. Avoid damaging the anodized or galvanized surfaces.



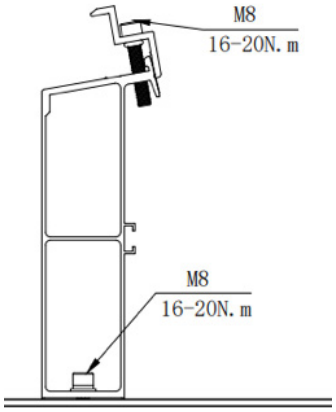
5° Front Leg



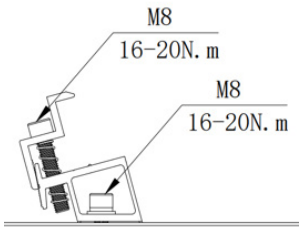
5° Rear Leg



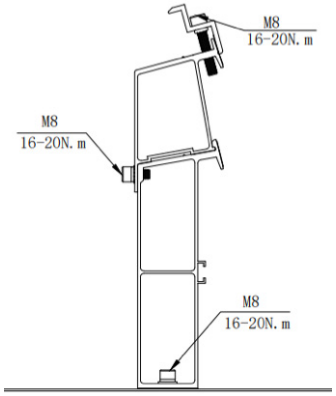
10° Front Leg



10° Rear Leg



15° Front Leg



15° Rear Leg

Installation Instructions

1. Tin Interface with ECO Rail Installation

When using the Tin Interface (ER-I-05 as an example) with the ECO Rail solution, please follow the steps below.

Fix the Tin Interface on the metal purlin with a self-tapping screw according to the installation plan (Clenergy Tin interface is supplied with one Buildex 14- 11 x 70 Hex Head Zips screw). Ensure that the Tin Interface in the front and rear or left and right directions are aligned using string as shown in Figure 1.

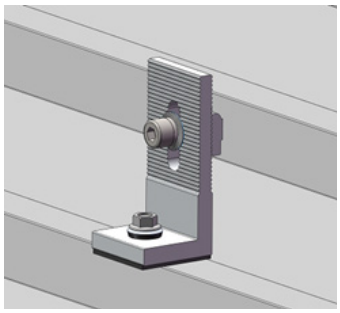


Figure 1

Fix the Rail on the Tin Interface as shown in Figures 2 and 3.
Recommended torques of M8 Bolt:16-20N•m

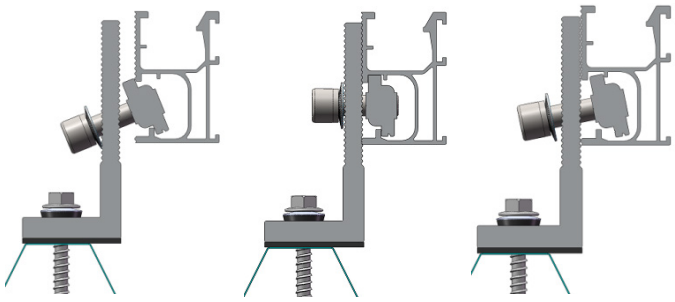


Figure 2

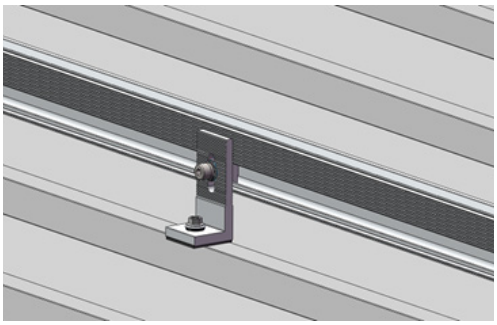


Figure 3

To connect several rails, 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 4. Tighten the second M8 Bolt using an Allen key. The total rail length is recommended not to be over 30 meters considering the rail's thermal expansion problem.

M8 Bolt Recommended torque is 10 ~12 N•m.
Splice provides an electrical connection between the 2 rails through the pressure bolts. This eliminates the need of using 2 earthing lugs.

Note: It is important to run visual inspection to make sure installations above were properly done. It is important to check and correct fasteners torques with torque wrench or similar tool if using tools without torque setting during installations.

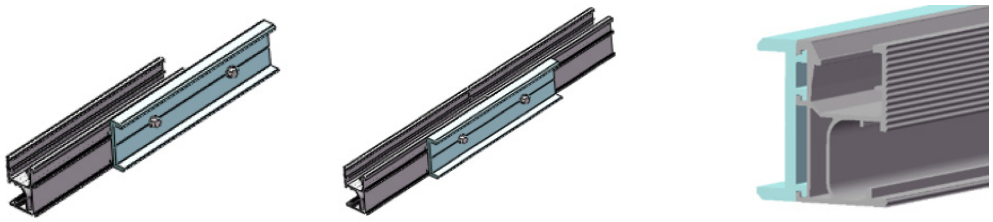


Figure 4

2. MT-Rail Support with T50/T110 Rail Installation (optional)

In case of large purlin spacing, MT-Rail Support with T50 or T110 Rail will be an option. Please follow the steps below.

Based on the rib spacing of the metal roof sheet, mark out the positions of self-tapping screws on the MT-Rail Support and then attach the glued EPDM rubber pad under the MT–Rail Support as shown in Figure 5 (Clenergy 240 mm long MT rail section is supplied with two Buildex 14-11 x 70 Hex Head Zips screws).

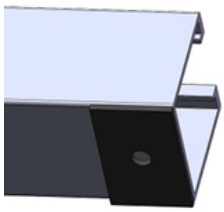


Figure 5

Confirm the position of the purlin for the MT-Rail Support installation, then fix the MT Rail Support by screwing through two ribs on the purlin as shown in Figure 6.

Figure 6

Fix the Rail onto the MT-Rail Support with T-Rail Clamps as shown in Figures 7 and 8.

Recommended torques of M8 Bolt:16-20N•m

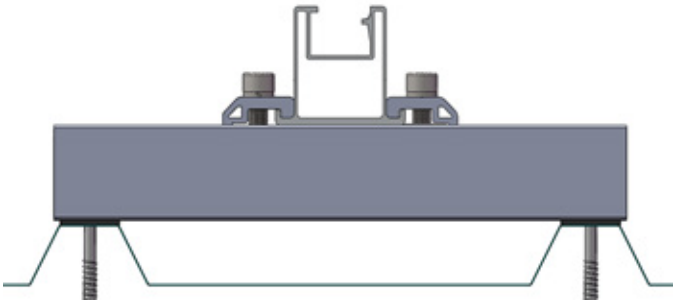


Figure 7

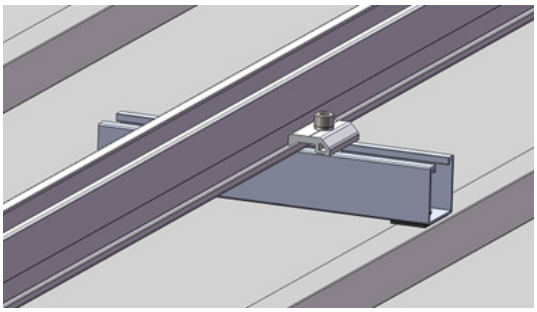
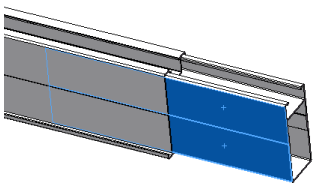
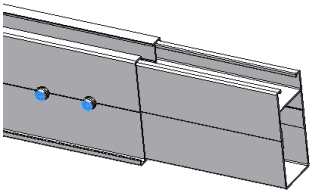


Figure 8

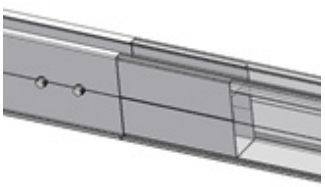
If the T Rail is not long enough, please use Splice for T Rail to connect two T Rails together. Insert half of the Splice into T Rail and fasten with two sets of Self-tapping screws in each side of the T Rail, and then insert the other half of the Splice into T Rail and fasten with Self-tapping screws as shown in Figure 9.



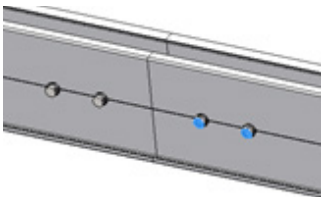
Insert half of Splice into T Rail



Two sets of Self-tapping screws in each side of T Rail



Insert the other half of the Splice into T Rail



Two sets of Self-tapping screws in each side of T Rail

Figure 9

3. Front and Rear Leg Installation

In this step, the Tin Interface with ECO Rail is used as an example.

Fix a 5° Front Leg into the top channel of ECO Rail, then fasten the Front Leg after the position is adjusted properly as shown in Figures 10 and 11.

Recommended torques of M8 Bolt: 16-20N•m.

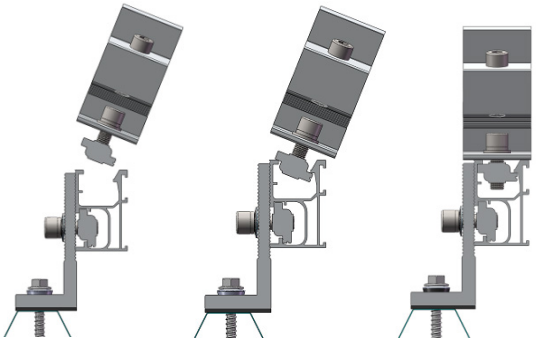


Figure 10

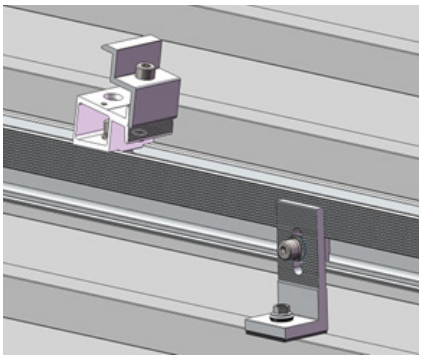


Figure 11

Fix a 5° Rear Leg into the top channel of ECO Rail, then fasten the Rear Leg after the position is adjusted properly as shown in Figure 12. Recommended torques of M8 Bolt:16-20N•m.

The same steps above applies for 10° front and rear legs installations as shown in Figures 10, 11 and 13.

Please follow steps below for 15° front and rear legs installations.

Follow Figure 10 to install a 15° front leg on top of the ECO rail.

There are two ways to install a 15° Rear Leg.

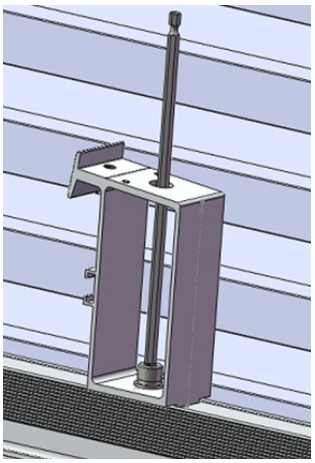


Figure 12 5° Rear Leg

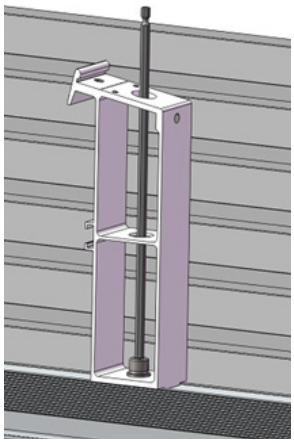


Figure 13 10° Rear Leg

Option 1:
Install 10° Rear Leg on top of the ECO rail as shown in Figure 13. Add a 15° rear leg extender on the 10° Rear Leg as shown in Figures 14-15. Don't forget to use the teeth lock washer when fastening the bolt as shown in Figure 15.

Note: The teeth lock washer must be placed next to a 15° rear leg extender to achieve earthing continuity between from 15° rear leg extender to the 10° rear leg.

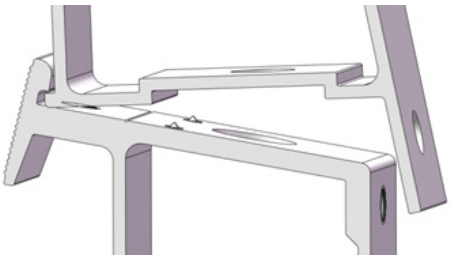


Figure 14

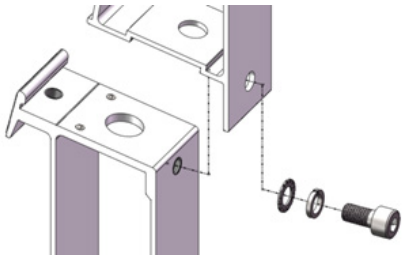


Figure 15

Option 2:

Assemble a 15° rear leg extender on a 10° rear leg before installing it on ECO rail as shown in Figure 16. The teeth lock washer must be placed for earthing continuity purpose. Then, fix the assembled 15° rear leg on ECO rail as shown in Figure 17.

Note: It is important to run visual inspection to make sure the installations above were properly done. It is important to check and correct fasteners torques with torque wrench or similar tool if using tools without torque setting during installations.

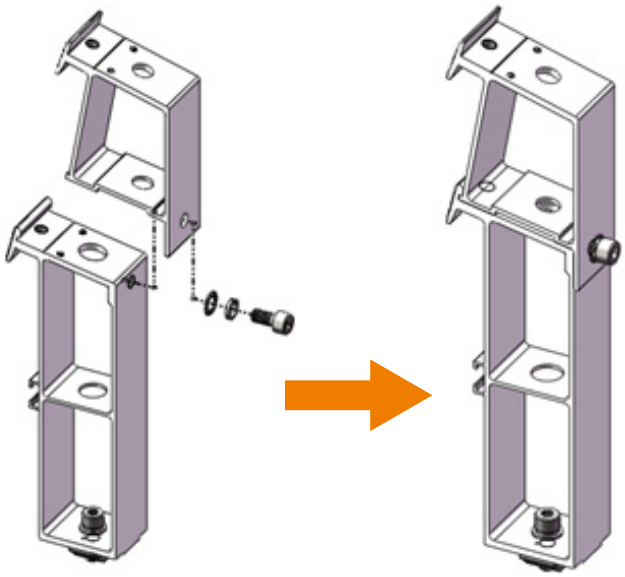


Figure 16

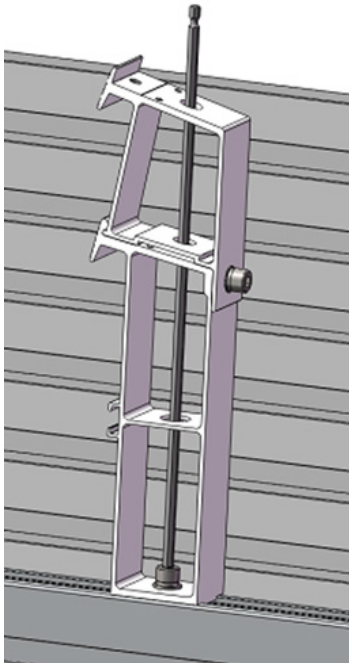


Figure 17

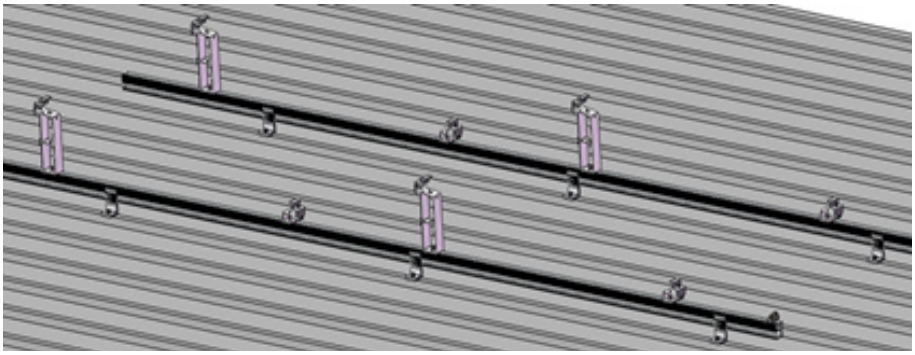


Figure 18

4. PV Module Installation

Place the PV Modules on the Front and Rear Leg as shown in Figure 19. 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 20. The pins of the Front and Rear legs are used for creating earthing continuity from PV modules to both legs.

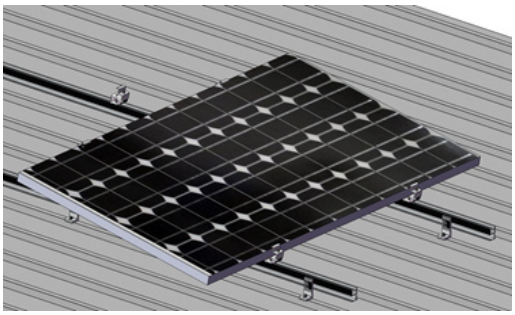


Figure 19

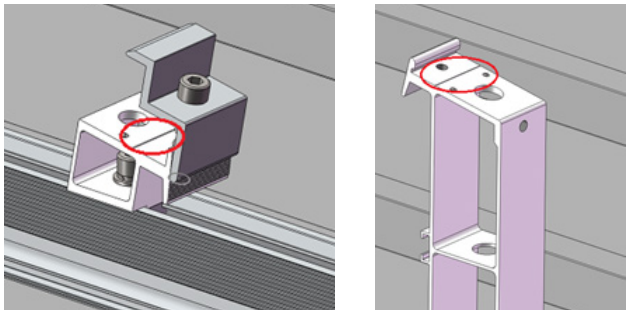


Figure 20

Fix the clamp on the Rear Leg as shown in Figure 21. Fasten the clamps of the Front and Rear legs till the PV Modules are properly installed as shown in Figure 22. Recommended torques of M8 Bolt:16-20N•m

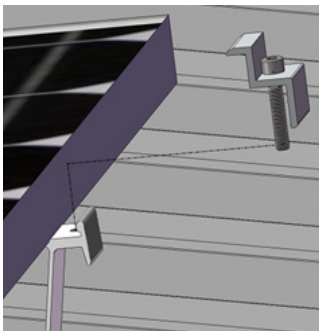


Figure 21

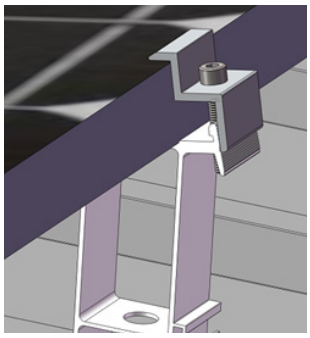


Figure 22

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

The installers must ensure panel clamps are installed flush mounted to the panel frame and apply correct torque value of clamp fastener.

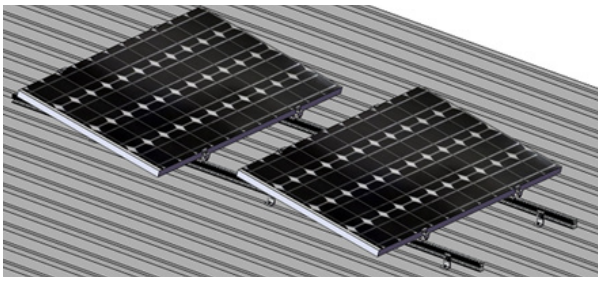


Figure 23

5. Grounding Lug Installation

It is required to install one Grounding Lug per row of rail. The recommended fasten torque of the bolt M8*25 is 16~20 N•m.

Once the grounding lug is attached to the rail, insert U-Shape Copper Channel into the grounding lug as shown in Figure 24. 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 the rail and earthing cable conductor to ensure the bonding is made.

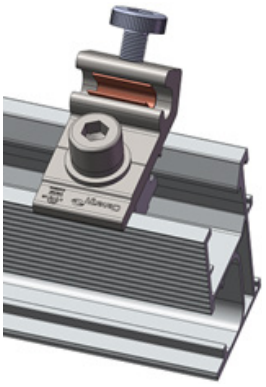


Figure 24

There are two options for Grounding Lug installation.

Option 1
Fix the Grounding Lug into the top channel of the Rail as shown in Figure 25.

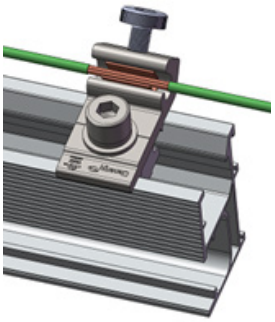


Figure 25

Option 2
Fix the Grounding Lug at the side channel of Rail as shown in Figure 26.

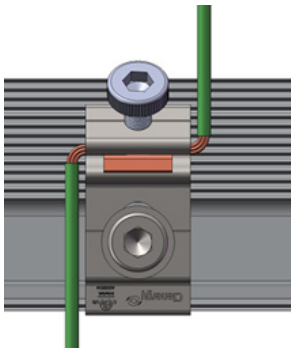


Figure 26

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

18 August 2023

Clenergy Australia
1/10 Duerdin Street
Clayton, VIC 3168

CERTIFICATION LETTER

Clenergy PV ez-Rack Commercial Tilt 5,10 and 15 degrees spacing tables V2.0 TC2, 2.5, 3 – Wind Region A, B1,B2 C and D. Project No.: **CL-619-S-REV 3**. Internal REF: **00628.**

MW Engineering Melbourne, being Structural Engineers within the meaning of Australian regulations, have calculated the maximum spacings for the PV ez-Rack rail system for the following conditions:

- **Wind Loads to AS 1170.2-2021**
  - **Wind Terrain Category 2, 2.5 and 3**
  - **Wind average recurrence of 500 years**
  - **Wind Region A, B1,B2, C and D**
- **Solar panel dimensions length up to 2.4 m and width up to 1.2 m**

Attached are the tables showing the spacings according to Wind Region, roof pitch, and building height.

The values shown on these tables 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,

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August 2023

STRUCTURAL DESIGN CERTIFICATION

PV-ezRACK®

SOLAR ROOF

Commercial tilt interface spacing tables

Standard: AS/NZS 1170.2:2021

Terrain Category: 2, 2.5 & 3

Client: Clenergy Australia

REF: 00628

Date: AUGUST 2023

Limitation: This report has been prepared for the exclusive use of Clenergy Australia, and is subject to and issued in connection with the provisions of the agreement between MW Engineering Melbourne and Clenergy Australia. MW Engineering Melbourne accepts no liability or responsibility whatsoever for any use of or reliance upon this report by any third party other than Clenergy's clients.

March 2023

Clenergy Reference: CL-619-S-REV3

Project: PV ez-Rack Commercial Tilt 5,10 and 15 degrees spacing tables

Australian Standards

AS/NZS 1170.0:2002 (R2016)	**General Principles**
AS/NZS 1170.1:2002 (R2016)	**Imposed Loadings**
AS/NZS 1170.2:2021	**Wind Loadings**
AS/NZS 1664.1:1997-Amdt 1:1999	**Aluminium**

Rail Type: ECO-RAIL

Wind Terrain Category: 2, 2.5 & 3

Wind average recurrence interval: 500 years

This engineering document was designed to cater for most common installation scenarios defined with an importance level 3 (500 years wind average recurrence) such as buildings and facilities where a large group of people can congregate in one area, commercial buildings, schools, aged cares, large office buildings, large commercial warehouses, multi-storey dwelling and churches. If the project conditions do not fit on the above criteria, please contact Clenergy for an assessment.

From 1 May 2023 installers must follow AS/NZS1170.2:2021 only.

Designed: AE

Date: AUGUST 2023

Disclaimer: From the date of publication onwards, any amendment made to any of the above mentioned Standards will make this report outdated and a new one will have to be released, unless the amendment has no implications on this certificate.

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-ECO (ECO Rail) and all other ECO rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	0° ≤ α < 10°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	2069	1376	990	660	2069	1376	990	660	1911	1210	910	609	1710	1136	833	543	1553	993	730	478
WRB1	1388	891	657	431	1388	891	657	431	1190	769	567	373	1056	685	506	333	924	601	445	293
WRB2	1246	803	593	389	1246	803	593	389	1070	693	512	337	950	617	458	301	832	543	402	266
WRC	906	589	437	288	906	589	437	288	780	509	378	249	638	410	305	209	560	370	280	190
WRD	603	395	294	194	603	395	294	194	510	340	250	168	464	306	228	151	408	269	201	133

ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1331	880	660	420	1331	880	660	420	1208	770	580	380	1110	735	543	357	993	645	478	314
WRB1	891	581	431	284	891	581	431	284	769	502	373	246	685	447	333	219	601	394	293	193
WRB2	803	524	389	256	803	524	389	256	693	454	337	223	617	404	301	198	543	356	266	175
WRC	589	386	288	190	589	386	288	190	509	335	249	165	396	264	198	132	374	242	179	121
WRD	395	260	194	128	395	260	194	128	286	198	143	99	264	176	132	88	231	154	110	77

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-ECO (ECO Rail) and all other ECO rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	789	515	382	252	789	515	382	252	680	445	331	218	606	398	296	195	532	350	260	172
WRB1	480	316	235	155	480	316	235	155	415	274	204	135	371	245	183	121	327	215	161	107
WRB2	434	286	213	141	434	286	213	141	376	248	185	122	335	222	165	109	295	195	146	97
WRC	320	212	158	105	320	212	158	105	277	184	138	91	248	164	123	81	218	145	108	71
WRD	216	143	107	70	216	143	107	70	188	124	92	62	168	111	83	165	148	330	242	165

ANGLE TO THE HORIZONTAL	**10° ≤ α < 20°**																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	789	515	382	252	789	515	382	252	680	445	331	218	606	398	296	195	532	350	260	172
WRB1	480	316	235	155	480	316	235	155	415	274	204	135	371	245	183	121	327	215	161	107
WRB2	434	286	213	141	434	286	213	141	376	248	185	122	335	222	165	109	295	195	146	97
WRC	320	212	158	105	320	212	158	105	277	184	138	91	248	164	123	81	218	145	108	71
WRD	216	143	107	70	216	143	107	70	188	124	92	62	168	111	83	77	148	132	99	66

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-ECO (ECO Rail) and all other ECO rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	846	551	410	270	760	497	369	244	672	440	327	216	617	404	300	198	558	366	272	181
WRB1	515	338	252	166	463	305	227	150	411	270	202	133	377	249	186	123	341	226	168	111
WRB2	464	306	228	151	418	276	206	137	371	245	183	121	341	225	168	111	309	204	152	101
WRC	343	227	169	112	310	205	152	101	274	182	135	89	253	167	125	83	229	151	113	75
WRD	231	153	114	76	209	139	103	68	185	123	91	165	171	113	84	165	154	319	231	154

ANGLE TO THE HORIZONTAL	**10° ≤ α < 20°**																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	846	551	410	270	760	497	369	244	672	440	327	216	617	404	300	198	558	366	272	181
WRB1	515	338	252	166	463	305	227	150	411	270	202	133	377	249	186	123	341	226	168	111
WRB2	464	306	228	151	418	276	206	137	371	245	183	121	341	225	168	111	309	204	152	101
WRC	343	227	169	112	310	205	152	101	274	182	135	89	253	167	125	83	229	151	113	75
WRD	231	153	114	76	209	139	103	68	185	123	90	66	171	113	84	66	154	121	88	55

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-ECO (ECO Rail) and all other ECO rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	0° ≤ α < 10°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1152	744	550	361	1152	744	550	361	990	643	476	313	880	573	424	279	771	503	374	247
WRB1	693	454	337	223	693	454	337	223	599	393	292	193	534	351	261	172	469	309	230	152
WRB2	626	411	305	202	626	411	305	202	541	355	265	174	482	317	236	156	424	279	208	138
WRC	461	303	226	149	461	303	226	149	399	263	196	130	264	176	132	88	253	165	121	88
WRD	310	205	152	101	310	205	152	101	231	154	121	77	221	147	110	74	200	130	100	69
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	937	609	450	297	937	609	450	297	806	526	391	257	718	469	349	230	630	413	307	203
WRB1	567	373	277	183	567	373	277	183	490	322	240	159	438	289	215	142	385	254	189	125
WRB2	512	337	251	166	512	337	251	166	443	292	217	144	396	260	194	129	349	230	171	113
WRC	378	249	186	123	378	249	186	123	328	216	162	107	198	132	99	66	198	132	99	66
WRD	254	168	126	83	254	168	126	83	187	121	88	66	179	121	88	60	154	99	77	55
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	910	600	450	297	910	600	450	297	806	526	391	257	718	469	349	230	630	413	307	203
WRB1	567	373	277	183	567	373	277	183	490	322	240	159	438	289	215	142	385	254	189	125
WRB2	512	337	251	166	512	337	251	166	443	292	217	144	396	260	194	129	349	230	171	113
WRC	378	249	186	123	378	249	186	123	328	216	162	107	165	110	88	55	154	99	77	55
WRD	254	168	126	83	254	168	126	83	121	77	55	44	121	77	55	44	99	66	55	33

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-ECO (ECO Rail) and all other ECO rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1452	968	726	484	1386	924	693	462	1320	880	660	440	1320	880	660	440	1265	798	599	399
WRB1	1150	760	570	380	1119	725	536	352	987	641	475	312	904	588	436	287	816	531	395	260
WRB2	1033	685	515	343	1007	653	484	318	888	579	428	282	815	531	394	259	735	481	357	235
WRC	819	534	396	261	616	418	308	209	588	399	294	190	253	165	121	88	253	165	121	88
WRD	515	330	250	160	490	323	240	160	220	143	110	77	220	143	110	77	220	143	110	77
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1199	792	594	378	1133	714	536	357	970	640	480	320	970	631	467	308	877	570	423	278
WRB1	806	526	391	257	725	474	352	232	641	420	312	206	588	386	287	190	531	350	260	172
WRB2	727	476	353	233	653	428	318	210	579	379	282	187	531	349	259	172	481	316	235	155
WRC	534	351	261	173	460	310	230	150	420	280	209	139	198	132	99	66	187	121	88	66
WRD	358	236	176	117	323	213	160	105	165	110	88	55	154	99	77	55	154	99	77	55
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	956	630	473	300	850	560	420	280	823	537	398	263	755	494	366	242	681	446	332	218
WRB1	628	412	306	203	565	371	276	183	500	329	245	162	460	302	226	149	416	274	205	135
WRB2	567	372	277	183	510	335	250	165	452	297	222	147	416	274	204	135	376	248	185	123
WRC	418	275	205	135	350	240	180	120	320	210	160	109	154	99	77	55	132	88	66	44
WRD	280	186	139	90	250	168	120	80	99	66	55	33	99	66	55	33	99	66	55	33

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-ECO (ECO Rail) and all other ECO rails
Type of Interface	ER-I-05 (Tin Interface)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	714	466	347	229	642	420	313	207	568	373	277	184	522	342	255	169	471	311	231	153
WRB1	435	287	213	142	392	258	193	128	348	229	171	113	320	211	158	104	290	191	143	95
WRB2	394	259	193	128	355	234	174	116	314	208	155	103	290	191	143	95	263	173	129	86
WRC	291	192	144	96	263	173	129	86	233	154	116	77	214	142	106	70	194	129	97	64
WRD	196	130	98	64	177	118	88	165	158	143	110	77	145	143	110	77	131	132	99	66
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	714	466	347	229	642	420	313	207	568	373	277	184	522	342	255	169	471	311	231	153
WRB1	435	287	213	142	392	258	193	128	348	229	171	113	320	211	158	104	290	191	143	95
WRB2	394	259	193	128	355	234	174	116	314	208	155	103	290	191	143	95	263	173	129	86
WRC	291	192	144	96	263	173	129	86	233	154	116	77	187	121	88	66	179	121	88	60
WRD	196	130	98	64	177	118	88	121	147	99	77	55	132	88	66	44	120	88	66	44
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	935	616	462	308	869	572	429	286	869	572	429	286	869	572	429	286	869	572	429	286
WRB1	803	528	396	264	737	484	363	242	737	484	363	242	737	462	347	231	670	440	330	220
WRB2	723	477	358	238	663	437	328	219	664	437	328	219	665	417	314	210	604	397	298	199
WRC	671	440	330	220	352	231	176	121	308	209	154	99	132	88	66	44	121	77	55	44
WRD	275	187	132	88	231	154	121	77	99	66	55	33	88	55	44	33	88	55	44	33

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-T50
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	0° ≤ α < 10°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	2167	1441	1089	726	2167	1441	1089	726	2002	1331	1001	671	1881	1254	946	627	1782	1188	891	594
WRB1	1782	1188	891	594	1782	1188	891	594	1672	1111	836	561	1595	1067	803	528	1518	1012	759	506
WRB2	1719	1071	804	537	1719	1071	804	537	1614	1002	755	507	1536	963	726	478	1367	914	687	458
WRC	1507	1001	748	506	1067	704	528	352	1001	671	506	330	638	429	319	209	616	407	308	209
WRD	880	583	440	297	880	583	440	297	561	374	275	187	539	363	264	176	506	341	253	165

ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1331	880	660	440	1331	880	660	440	1265	847	638	418	1221	814	605	407	1155	770	583	385
WRB1	1122	748	561	374	1122	748	561	374	1056	704	528	352	1023	682	506	341	979	649	495	330
WRB2	1011	676	507	339	1011	676	507	339	952	636	477	319	923	616	458	308	884	587	448	299
WRC	979	649	495	330	649	440	330	220	616	418	308	209	396	264	198	132	374	253	187	121
WRD	506	330	253	165	506	330	253	165	286	198	143	99	264	176	132	88	231	154	110	77

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-T50
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	0° ≤ α < 10°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1578	1030	764	504	1578	1030	764	504	1361	890	663	437	1213	796	592	392	1066	700	522	345
WRB1	961	632	470	312	961	632	470	312	831	548	408	271	742	489	365	243	653	432	322	214
WRB2	868	571	426	282	868	571	426	282	752	496	370	245	671	443	331	219	591	391	292	193
WRC	642	424	316	210	642	424	316	210	555	368	275	183	497	329	246	163	438	290	217	144
WRD	433	287	214	142	433	287	214	142	376	249	186	124	336	223	167	110	296	196	147	98

ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1287	858	649	429	1243	825	616	418	1188	792	594	396	1092	735	546	368	1010	670	500	340
WRB1	961	632	470	312	950	630	470	312	831	548	408	271	742	489	365	243	653	432	322	214
WRB2	868	571	426	282	859	569	426	282	752	496	370	245	671	443	331	219	591	391	292	193
WRC	642	424	316	210	578	389	294	189	530	350	260	180	374	242	187	121	330	220	165	110
WRD	410	280	210	140	407	263	200	132	242	165	121	77	220	154	110	77	198	132	99	66

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-T50
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	0° ≤ α < 10°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1694	1104	819	540	1520	993	737	487	1344	880	654	433	1235	810	602	398	1116	733	545	361
WRB1	1029	676	504	333	926	610	455	301	821	541	403	268	755	498	372	247	684	452	337	224
WRB2	929	612	456	302	837	552	412	273	742	489	365	243	683	450	337	224	618	408	306	203
WRC	687	454	338	225	620	410	306	203	549	363	271	180	506	335	250	166	458	303	227	150
WRD	463	307	229	152	418	277	207	138	371	246	184	122	342	227	169	112	310	206	153	102

ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1243	825	616	418	1155	770	583	385	1122	748	561	374	1100	737	550	363	1019	683	515	336
WRB1	950	640	480	320	890	590	450	300	821	541	403	268	755	498	372	247	684	452	337	224
WRB2	858	579	434	291	804	534	407	272	742	489	365	243	683	450	337	224	618	408	306	203
WRC	687	454	338	225	572	374	286	187	517	341	253	168	319	209	165	110	297	198	154	99
WRD	418	275	209	143	341	231	176	110	209	143	99	66	198	132	99	66	176	121	88	55

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-T50
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1507	1012	759	506	1507	1012	759	506	1452	968	726	484	1386	924	693	462	1320	880	660	440
WRB1	1271	840	630	420	1271	840	630	420	1150	760	570	380	1069	702	523	345	940	618	461	306
WRB2	1146	759	570	380	1146	759	570	380	1038	688	516	344	965	635	474	313	849	560	417	276
WRC	922	607	453	299	660	440	330	220	616	418	308	209	264	176	132	88	253	165	121	88
WRD	583	385	286	189	583	385	286	189	231	154	121	77	231	154	121	77	220	143	110	77
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1199	792	594	396	1199	792	594	396	1133	748	561	374	1133	748	561	374	1067	704	528	352
WRB1	1001	660	495	330	1001	660	495	330	910	600	450	300	850	560	420	280	771	508	379	251
WRB2	904	597	448	299	904	597	448	299	821	542	408	272	768	506	380	254	697	460	343	228
WRC	756	499	373	247	506	341	253	165	506	341	253	165	198	132	99	66	198	132	99	66
WRD	462	308	231	154	462	308	231	154	187	121	88	66	187	121	88	66	154	99	77	55
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1001	660	495	330	1001	660	495	330	935	616	462	308	935	616	462	308	869	572	429	286
WRB1	869	572	429	286	869	572	429	286	803	528	396	264	803	528	396	264	704	462	347	231
WRB2	785	517	388	259	785	517	388	259	725	477	359	240	726	477	358	240	636	418	314	210
WRC	704	462	347	231	429	286	209	143	429	286	209	143	165	110	88	55	154	99	77	55
WRD	308	209	154	99	308	209	154	99	121	77	55	44	121	77	55	44	99	66	55	33

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-T50
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1452	968	726	484	1386	924	693	462	1320	880	660	440	1320	880	660	440	1265	836	627	418
WRB1	1265	836	627	418	1265	836	627	418	1199	792	594	396	1133	748	561	374	1133	748	561	374
WRB2	1220	753	566	378	1221	754	567	378	1104	715	537	358	1021	675	507	338	1021	676	507	339
WRC	1133	748	561	374	616	418	308	209	616	418	308	209	253	165	121	88	253	165	121	88
WRD	539	363	275	176	539	363	275	176	220	143	110	77	220	143	110	77	220	143	110	77
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1199	792	594	396	1133	748	561	374	1067	704	528	352	1067	704	528	352	1001	660	495	330
WRB1	1001	660	495	330	935	616	462	308	935	616	462	308	869	572	429	286	869	572	429	286
WRB2	902	596	448	298	843	557	418	279	845	557	418	279	785	517	388	259	786	517	388	259
WRC	869	572	429	286	506	341	253	165	462	308	231	154	198	132	99	66	187	121	88	66
WRD	429	286	209	143	429	286	209	143	165	110	88	55	154	99	77	55	154	99	77	55
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1001	660	495	330	935	616	462	308	935	616	462	308	869	572	429	286	869	572	429	286
WRB1	803	528	396	264	803	528	396	264	803	528	396	264	737	484	363	242	737	484	363	242
WRB2	725	477	359	239	725	477	358	239	725	477	359	239	666	438	328	219	666	438	329	219
WRC	737	484	363	242	385	264	198	132	352	231	176	121	154	99	77	55	132	88	66	44
WRD	308	209	154	99	275	187	132	88	99	66	55	33	99	66	55	33	99	66	55	33

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-T50
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1323	882	630	420	1200	800	600	400	1136	746	555	368	1044	686	511	338	944	622	463	307
WRB1	870	573	427	284	784	518	386	256	696	459	342	227	641	423	316	209	580	383	287	190
WRB2	788	519	387	256	710	468	350	232	629	416	311	206	580	383	286	190	525	348	259	172
WRC	583	385	288	191	525	348	259	172	466	309	231	153	253	165	121	88	231	154	121	77
WRD	394	260	195	129	355	235	176	117	220	143	110	77	220	143	110	77	198	132	99	66
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1133	748	561	374	1067	704	528	352	1067	672	504	336	956	630	473	315	910	600	450	300
WRB1	850	560	420	280	784	518	386	256	696	459	342	227	641	423	316	209	580	383	287	190
WRB2	769	507	381	253	710	468	350	232	629	416	311	206	580	383	286	190	525	348	259	172
WRC	583	385	288	191	462	308	231	154	441	280	210	140	187	121	88	66	187	121	88	66
WRD	390	260	190	129	336	221	160	110	154	99	77	55	132	88	66	44	132	88	66	44
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	935	616	462	308	869	572	429	286	869	572	429	286	869	572	429	286	869	572	429	286
WRB1	803	528	396	264	737	484	363	242	737	484	363	242	737	484	363	242	737	484	363	242
WRB2	775	476	358	239	664	437	328	219	664	437	328	219	664	437	328	219	665	437	328	219
WRC	671	440	330	220	352	231	176	121	308	209	154	99	132	88	66	44	121	77	55	44
WRD	275	187	132	88	231	154	121	77	99	66	55	33	88	55	44	33	88	55	44	33

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-T110
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	0° ≤ α < 10°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	2167	1441	1089	726	2167	1441	1089	726	2002	1331	1001	671	1881	1254	946	627	1782	1188	891	594
WRB1	1782	1188	891	594	1782	1188	891	594	1672	1111	836	561	1595	1067	803	528	1518	1012	759	506
WRB2	1600	1071	804	537	1600	1071	804	537	1503	1002	755	507	1435	963	726	478	1367	914	687	458
WRC	1507	1001	748	506	1067	704	528	352	1001	671	506	330	638	429	319	209	616	407	308	209
WRD	880	583	440	297	880	583	440	297	561	374	275	187	539	363	264	176	506	341	253	165

ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1331	880	660	440	1331	880	660	440	1265	847	638	418	1221	814	605	407	1155	770	583	385
WRB1	1122	748	561	374	1122	748	561	374	1056	704	528	352	1023	682	506	341	979	649	495	330
WRB2	1011	676	507	339	1011	676	507	339	952	636	477	319	923	616	458	308	884	587	448	299
WRC	979	649	495	330	649	440	330	220	616	418	308	209	396	264	198	132	374	253	187	121
WRD	506	330	253	165	506	330	253	165	286	198	143	99	264	176	132	88	231	154	110	77

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-T110
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	0° ≤ α < 10°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1578	1030	764	504	1578	1030	764	504	1361	890	663	437	1213	796	592	392	1066	700	522	345
WRB1	961	632	470	312	961	632	470	312	831	548	408	271	742	489	365	243	653	432	322	214
WRB2	868	571	426	282	868	571	426	282	752	496	370	245	671	443	331	219	591	391	292	193
WRC	642	424	316	210	642	424	316	210	555	368	275	183	497	329	246	163	438	290	217	144
WRD	433	287	214	142	433	287	214	142	376	249	186	124	336	223	167	110	296	196	147	98

ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1287	858	649	429	1243	825	616	418	1188	792	594	396	1092	735	546	368	1010	670	500	340
WRB1	961	632	470	312	950	630	470	312	831	548	408	271	742	489	365	243	653	432	322	214
WRB2	868	571	426	282	859	569	426	282	752	496	370	245	671	443	331	219	591	391	292	193
WRC	642	424	316	210	578	389	294	189	530	350	260	180	374	242	187	121	330	220	165	110
WRD	410	280	210	140	407	263	200	132	242	165	121	77	220	154	110	77	198	132	99	66

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 5 and 10 degrees COMT

Type of Rail	ER-R-T110
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	0° ≤ α < 10°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1694	1104	819	540	1520	993	737	487	1344	880	654	433	1235	810	602	398	1116	733	545	361
WRB1	1029	676	504	333	926	610	455	301	821	541	403	268	755	498	372	247	684	452	337	224
WRB2	929	612	456	302	837	552	412	273	742	489	365	243	683	450	337	224	618	408	306	203
WRC	687	454	338	225	620	410	306	203	549	363	271	180	506	335	250	166	458	303	227	150
WRD	463	307	229	152	418	277	207	138	371	246	184	122	342	227	169	112	310	206	153	102

ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1243	825	616	418	1155	770	583	385	1122	748	561	374	1100	737	550	363	1019	683	515	336
WRB1	950	640	480	320	890	590	450	300	821	541	403	268	755	498	372	247	684	452	337	224
WRB2	858	579	434	291	804	534	407	272	742	489	365	243	683	450	337	224	618	408	306	203
WRC	687	454	338	225	572	374	286	187	517	341	253	168	319	209	165	110	297	198	154	99
WRD	418	275	209	143	341	231	176	110	209	143	99	66	198	132	99	66	176	121	88	55

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-T110
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1507	1012	759	506	1507	1012	759	506	1452	968	726	484	1386	924	693	462	1320	880	660	440
WRB1	1271	840	630	420	1271	840	630	420	1150	760	570	380	1069	702	523	345	940	618	461	306
WRB2	1146	759	570	380	1146	759	570	380	1038	688	516	344	965	635	474	313	849	560	417	276
WRC	922	607	453	299	660	440	330	220	616	418	308	209	264	176	132	88	253	165	121	88
WRD	583	385	286	189	583	385	286	189	231	154	121	77	231	154	121	77	220	143	110	77
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1199	792	594	396	1199	792	594	396	1133	748	561	374	1133	748	561	374	1067	704	528	352
WRB1	1001	660	495	330	1001	660	495	330	910	600	450	300	850	560	420	280	771	508	379	251
WRB2	904	597	448	299	904	597	448	299	821	542	408	272	768	506	380	254	697	460	343	228
WRC	756	499	373	247	506	341	253	165	506	341	253	165	198	132	99	66	198	132	99	66
WRD	462	308	231	154	462	308	231	154	187	121	88	66	187	121	88	66	154	99	77	55
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	3																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1001	660	495	330	1001	660	495	330	935	616	462	308	935	616	462	308	869	572	429	286
WRB1	869	572	429	286	869	572	429	286	803	528	396	264	803	528	396	264	704	462	347	231
WRB2	785	517	388	259	785	517	388	259	725	477	359	240	726	477	358	240	636	418	314	210
WRC	704	462	347	231	429	286	209	143	429	286	209	143	165	110	88	55	154	99	77	55
WRD	308	209	154	99	308	209	154	99	121	77	55	44	121	77	55	44	99	66	55	33

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-T110
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1452	968	726	484	1386	924	693	462	1320	880	660	440	1320	880	660	440	1265	836	627	418
WRB1	1265	836	627	418	1265	836	627	418	1199	792	594	396	1133	748	561	374	1133	748	561	374
WRB2	1137	753	566	378	1138	754	567	378	1079	715	537	358	1021	675	507	338	1021	676	507	339
WRC	1133	748	561	374	616	418	308	209	616	418	308	209	253	165	121	88	253	165	121	88
WRD	539	363	275	176	539	363	275	176	220	143	110	77	220	143	110	77	220	143	110	77
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1199	792	594	396	1133	748	561	374	1067	704	528	352	1067	704	528	352	1001	660	495	330
WRB1	1001	660	495	330	935	616	462	308	935	616	462	308	869	572	429	286	869	572	429	286
WRB2	902	596	448	298	843	557	418	279	845	557	418	279	785	517	388	259	786	517	388	259
WRC	869	572	429	286	506	341	253	165	462	308	231	154	198	132	99	66	187	121	88	66
WRD	429	286	209	143	429	286	209	143	165	110	88	55	154	99	77	55	154	99	77	55
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	2.5																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1001	660	495	330	935	616	462	308	935	616	462	308	869	572	429	286	869	572	429	286
WRB1	803	528	396	264	803	528	396	264	803	528	396	264	737	484	363	242	737	484	363	242
WRB2	725	477	359	239	725	477	358	239	725	477	359	239	666	438	328	219	666	438	329	219
WRC	737	484	363	242	385	264	198	132	352	231	176	121	154	99	77	55	132	88	66	44
WRD	308	209	154	99	275	187	132	88	99	66	55	33	99	66	55	33	99	66	55	33

PV ez-Rack Commercial Tilt Spacing Tables – Only for the use of 15 degrees COMT

Type of Rail	ER-R-T110
Type of Interface	S-MT/240 (MT – Rail support)
Solar Panel Dimension	2 m x 1 m
Purlin Thickness	1.9 mm

ANGLE TO THE HORIZONTAL	**0° ≤ α < 10°**																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1323	882	630	420	1200	800	600	400	1136	746	555	368	1044	686	511	338	944	622	463	307
WRB1	870	573	427	284	784	518	386	256	696	459	342	227	641	423	316	209	580	383	287	190
WRB2	788	519	387	256	710	468	350	232	629	416	311	206	580	383	286	190	525	348	259	172
WRC	583	385	288	191	525	348	259	172	466	309	231	153	253	165	121	88	231	154	121	77
WRD	394	260	195	129	355	235	176	117	220	143	110	77	220	143	110	77	198	132	99	66
ANGLE TO THE HORIZONTAL	10° ≤ α < 20°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	1133	748	561	374	1067	704	528	352	1067	672	504	336	956	630	473	315	910	600	450	300
WRB1	850	560	420	280	784	518	386	256	696	459	342	227	641	423	316	209	580	383	287	190
WRB2	769	507	381	253	710	468	350	232	629	416	311	206	580	383	286	190	525	348	259	172
WRC	583	385	288	191	462	308	231	154	441	280	210	140	187	121	88	66	187	121	88	66
WRD	390	260	190	129	336	221	160	110	154	99	77	55	132	88	66	44	132	88	66	44
ANGLE TO THE HORIZONTAL	20° ≤ α < 25°																			
TC	2																			
BUILDING HEIGHT (m)	≤ 5				5<H≤10				10<H≤15				15<H≤20				20<H≤30			
	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner	Internal	Intermediate	Edge	Corner
WRA	935	616	462	308	869	572	429	286	869	572	429	286	869	572	429	286	869	572	429	286
WRB1	803	528	396	264	737	484	363	242	737	484	363	242	737	484	363	242	737	484	363	242
WRB2	722	476	358	239	664	437	328	219	664	437	328	219	664	437	328	219	665	437	328	219
WRC	671	440	330	220	352	231	176	121	308	209	154	99	132	88	66	44	121	77	55	44
WRD	275	187	132	88	231	154	121	77	99	66	55	33	88	55	44	33	88	55	44	33

General Notes

Note 1. This engineering document was designed to cater for most common installation scenarios however, it does not cater for all of them. Contact Clenergy if you are unable to comply with any of the installation specifications listed on this document.

Note 2. Maximum roof pitch of 10°.

Note 3. Panels to be installed only as per figure 1.

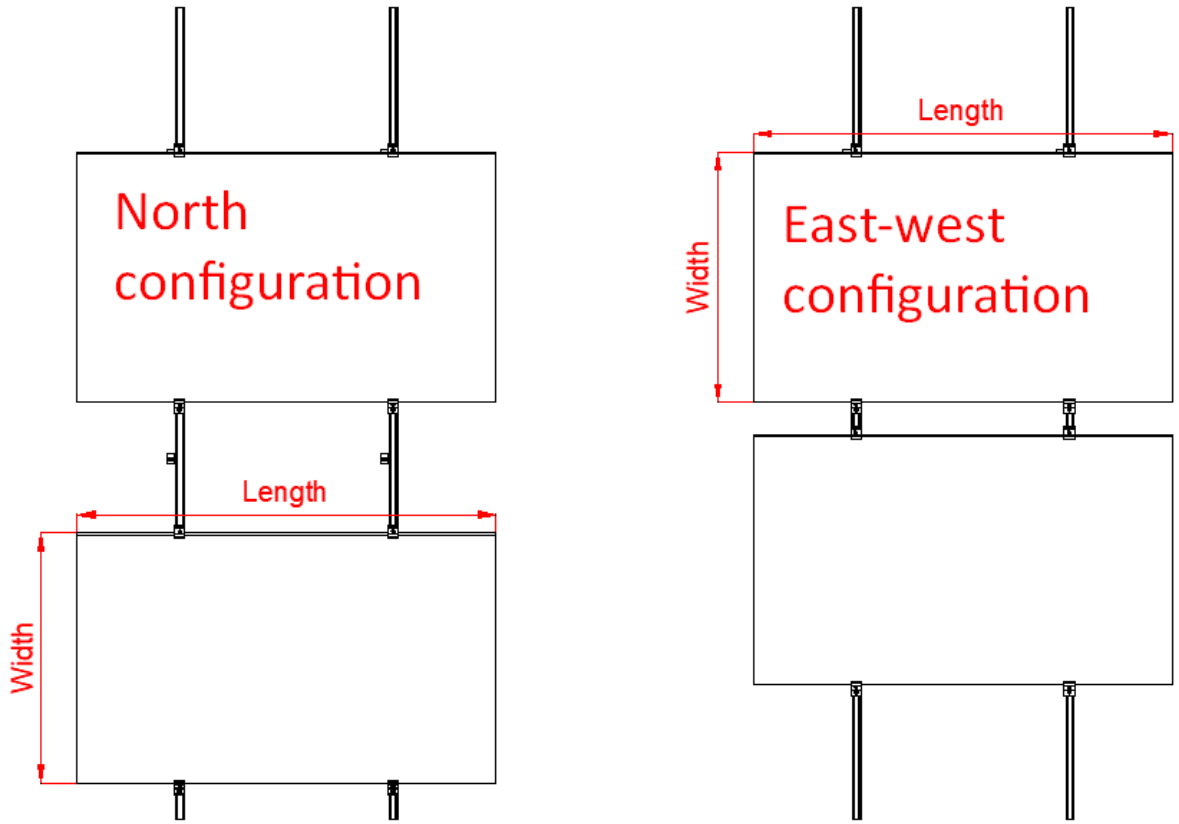


Figure 1. Panel configuration

Note 4. Standard screws shipped for Tin Roof Interfaces

Metal Purlins/Battens	**Fasteners to be used**
1.2 mm - 2.4 mm	Buildex- 14 - 11 x 70 Hex Head Zips with 16 mm Aluminium Bonded Washer or a screw that has an equal or a higher pullout capacity.
Wood Purlins and Rafters	**Fasteners to be used**
Timber F7 (Pine) and Timber 17 (Hardwood). 25 mm, 30 mm and 35 mm embedment into the timber	Buildex- 14 - 11 x 70 Hex Head Zips with 16 mm Aluminium Bonded Washer or a screw that has an equal or a higher pullout capacity.

Note 5. Fixing spacing to be reduced according to the purlin thickness as per below:

Purlin Thickness		
From 1.2mm to 1.49mm	From 1.5 mm to 1.89 mm	From 1.9 to 2.4 mm
Reduction of 60%	Reduction of 30%	Spacings remain the same

Tophats from 0.42 mm to 0.75 mm are not included in this certificate. Contact Clenergy if your project has the aforementioned parameters.

Note 6. Fixing spacing to be reduced to timber purlins as per below:

Batten type			
	25 mm	**30 mm**	**35 mm**
Timber F7	Reduction of 55%	Reduction of 45%	Reduction of 40%
Timber F17	Spacings remain the same	Spacings remain the same	Spacings remain the same

Note 7. This certificate only covers the assessment of the Clenergy PV-ezRack mounting system, including the components listed on note 4 and 8. The assessment of the roof structure, PV panels and other fixings are to be checked by the installer/contractor, if necessary.

Note 8. The following components are satisfied for use according to AS/NZS 1664.1:1997-Amdt 1:1999 and AS/NZS 1170.2:2021.

Components	Part No.	Description
ECO-Rail	All ECO rails	All ECO rails
Splice	ER-SP-ECO	PV-ezRack Splice for ECO rail
ST-Rail	ER-R-STXXXX	Standard Rail
Splice	ER-SP-ST	PV-ezRack Splice for Standard Rail 200mm
T50 Rail	ER-R-T50/XXXX	T50 Rail
Splice	ER-SP-T50	PV-ezRack Splice for T50 rail
T110 Rail	ER-R-T110/XXXX	T110 Rail
Slice	ER-SP-T110	PV-ezRack Splice for T110 rail
MT Rail Section	S-MT/XXXX	MT support
Rail Clamp	ER-RC-T/DM	Rail clamp for T-rail with diamond module
Rail Clamp	ER-RC-T/G	Rail clamp for T-rail with Z module
Diamond Module	ER-DM-MT8	Diamond module
Front Leg	FL-COMT/Z/G/5	Front leg, commercial tilt 5 degree
Back Leg	RL-COMT/Z/G/5	Back leg, commercial tilt 5 degree
Front Leg	FL-COMTZ/G/10V2	Front leg, commercial tilt 10 degrees, version 2

Back Leg	RL-COMT/Z/G/10V2	Back leg, commercial tilt 10 degrees, version 2
Front Leg	FL-COMTZ/G/15	Front leg, commercial tilt 15 degrees
Back Leg	RL-E-COMT/G/15	Back leg, commercial tilt 15 degrees
Interface	ER-I-05	Tin Interface
Interface Interface	ER-I-05 ER-I-05/BA	Tin Interface Tin Interface Black
Interface Interface	ER-I-05/BA ER-I-05/CM	Tin Interface Black Tin Interface with Click Module
Interface Interface	ER-I-05/CM ER-I-05A/EZC/ECO	Tin Interface with Click Module ezClick connection for ECO-Rail
Interface Interface	ER-I-05A/EZC/ECO ER-I-25	ezClick connection for ECO-Rail Tin Interface with curved Base for corrugated Roof
Interface	ER-I-25	Tin Interface with curved Base for corrugated Roof
Adapter for Corrugated Roof	EZ-AD-C43	Adapted for Corrugated Iron Roof for Tin interface ER-I-05
Adapter for Corrugated Roof Corrugated Adapter	EZ-AD-C43 EZ-AD-C110	Adapted for Corrugated Iron Roof for Tin interface ER-I-05 PV-ezRack Adapter for Corrugated Iron Roof.
Corrugated Adapter Connector Clamp	EZ-AD-C110 CRC-R/ECO	PV-ezRack Adapter for Corrugated Iron Roof. Cross Connector Clamp for ECO-Rail
Splice ECO Rail Black	ER-SP-ECO/BA	MT rail support (black anodized)
MT rail section	S-MT/XXXX/BA	MT rail support (black anodized)

		Rail clamp for T-rail with diamond module (black anodized)
MT rail section Rail Clamp	S-MT/XXXX/BA ER-RC-T/DM/BA	MT rail support (black anodized) Rail clamp for T-rail with diamond module (black anodized)

Note 9. For Terrain Category (TC) definition. Refer to clause 4.2.1 of AS/NZS 1170.2:2021 for more information.

Note 10. Topographic Multiplier (Mt) taken as 1.0. Refer to clause 4.4 of AS/NZS 1170.2:2021 for more information.

For topographic Multiplier (Mt) more than 1.0 (installations on a mountain, hilly or sloped terrain) please refer to clause 4.4 of AS/NZS 1170.2:2021 to define appropriate Topographic multiplier value.

The below table provides a reduction factor applied for topographic multipliers greater than 1 (installation on a slope, hill on mountain). To achieve a more accurate and cost-effective design, please contact Clenergy Engineering department.

Mt	**A, B1, B2**			
	Internal	**Intermediate**	**Edge**	**Corner**
1	1	1	1	1
1.01	0.93	1	0.86	1
1.02	0.93	1	0.86	1
1.03	0.93	0.89	0.86	1
1.04	0.93	0.89	0.86	1
1.06	0.86	0.89	0.86	1
1.08	0.86	0.89	0.86	1
1.09	0.79	0.78	0.71	0.75
1.1	0.79	0.78	0.71	0.75
1.2	0.64	0.67	0.57	0.75
1.3	0.57	0.56	0.57	0.50
1.4	0.50	0.44	0.43	0.50
1.5	0.43	0.44	0.43	0.50

Note 11. Shielding Multiplier (Ms) taken as 1.0. Refer to clause 4.3 of AS/NZS 1170.2:2021 for more information.

Note 12. Wind Direction Multiplier (Md) taken as 1.0. Refer to clause 3.3 of AS/NZS 1170.2:2021 for more information.

Note 13. Clamping zone of the PV panels should be according to the manufacturer's specifications.

Note 14. Capacities checked and compared against testing data from Clenergy Australia and MTS (NATA certified).

Note 15. Maximum permitted rail overhang for fixing spacings equal or over 700 mm to be 150 mm. For fixing spacings less than 700 mm, rail overhang should be 50 mm. This applies to standard and East-West installations. Refer to figure 2 and 3 for more information.

Note 16. Excess rail shall be cut accordingly. Refer to installation manual for more information.

Note 17. Fixing spacings are based on a row spacing of 400 mm (Figure 2 and 3)**.** Reduction and increase factors to be applied for other row spacings as per the below table.

Row spacing	Spacing +/- (North facing)	Spacing +/- (East-West)
0 mm to ≤ 200 mm	- 20 %	- 20 %
< 200 to < 400 mm	-10%	-10%
≤ 400 mm to ≤ 650 mm	Apply the same table spacings	Apply the same table spacings
> 650 mm	+20%	+ 10 %

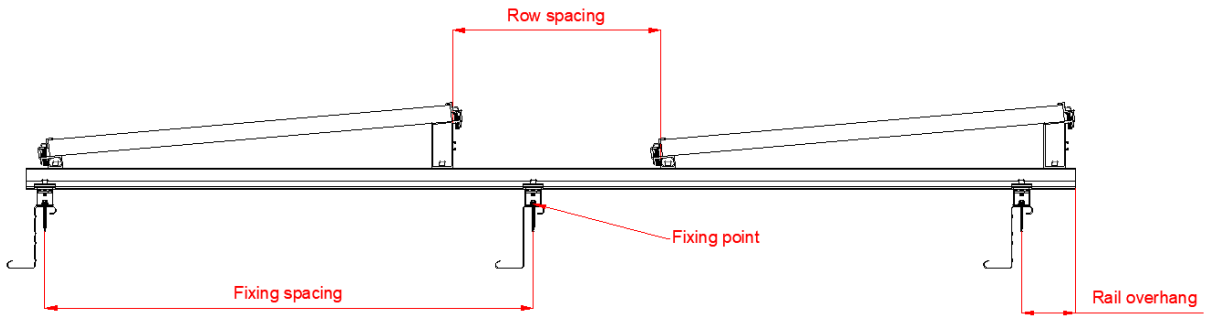


Figure 2. COMT installation configuration (reference only)

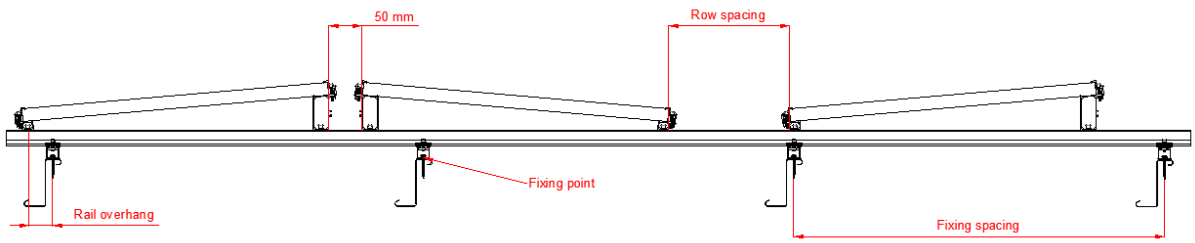


Figure 3. E-W COMT installation configuration (reference only)

Note 18. From the date of publication onwards, any amendment made to any of the above-mentioned Standards will make this report outdated and a new one will have to be released, unless the amendment has no implications on this certificate.

Note 19. All components from Clenergy must be installed according to manufacturer's specification and the instructions shown in the relevant installation manual. Please contact Clenergy Australia or check the website for the latest installation guides.

Note 20. No consideration has been taken on the effect of snow loads. In case the roof is located in a snow prone area, a special design must be made.

Note 21. No considerations have been taken on the effect of earthquake loads.

Note 22. Minimum grade for steel purlins/battens of 450 Mpa.

Note 23. If any of the screws of the interfaces go into pre-existing holes, they will have to be one size up compared to the screws that were previously installed. This is to ensure that the pullout capacity remains the same or higher.

Note 24. Minimum of two (2) screws per fixing point when using ER-R-MT rail and one (1) for ER-R-ECO.

Note 25. Please refer to AS 4312 to find out about corrosion categories.

Note 26. This Engineering report is based on 2 m x 1 m panels and two rails per panel. However, a percentage increase or decrease can be applied on all interface spacings as shown on the following table.

Number of rails per panel	Panel length (mm)	Spacing +/- W.R – A & B1	Spacing +/- W.R – B2, C & D
2 rails	≤ 1700	+ 6 %	+ 10 %
3 rails	≤ 1700	+ 12 %	+ 18 %
2 rails	≤ 1800	+ 4 %	+ 7 %
3 rails	≤ 1800	+ 12 %	+ 15 %
2 rails	≤ 1900	0 %	+ 5 %
3 rails	≤ 1900	+ 10 %	+ 15 %
2 rails	≤ 2000	0 %	0 %
3 rails	≤ 2000	+ 10 %	+ 15 %
2 rails	≤ 2100	- 10 %	- 6 %
3 rails	≤ 2100	+ 7 %	+ 12 %
2 rails	≤ 2200	- 18 %	- 12 %
3 rails	≤ 2200	+ 5 %	+ 10 %
2 rails	≤ 2300	- 20 %	- 12 %
3 rails	≤ 2300	+ 5 %	+ 10 %
2 rails	≤ 2400	- 25 %	- 15 %
3 rails	≤ 2400	+ 5 %	+ 10 %

Note 27. Panel width cannot exceed 1.20 m for any of the above panel length dimensions and panel weight cannot exceed 15 kg/m^2.

Note 28. Same fixing tables on this document can be used for East-West systems.

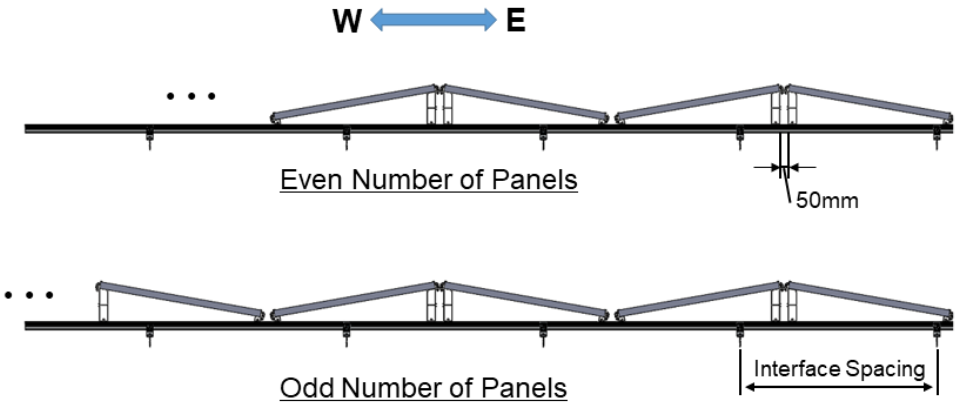


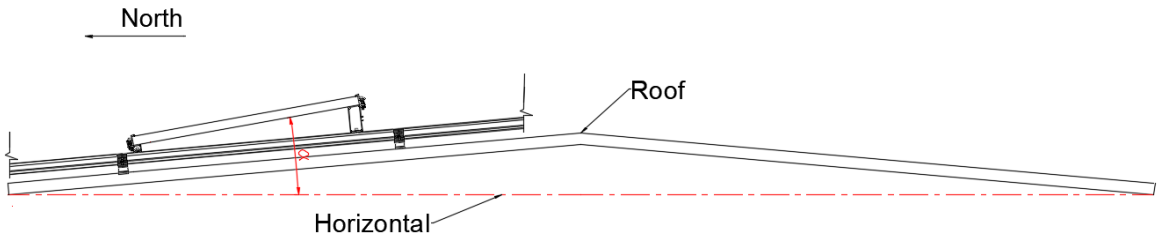
Figure 4. East-West configuration (reference only)

Note 29. Base rail between panel rows should run continuous from the first panel row to the last.

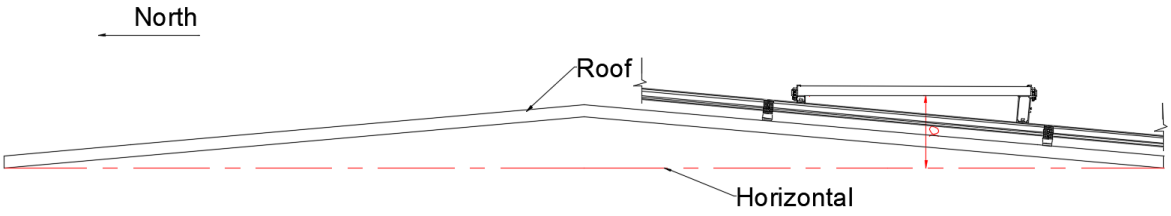
Note 30. Contact Clenergy if you are planning to install on a different roof type such as curved, multi-span (pitched and saw-tooth), mansard, circular bin, silo, tank, pitched free, troughed free, hypar free, canopy, awning and cantilivered roof.

Note 31. Final tilt "α" identification as per below

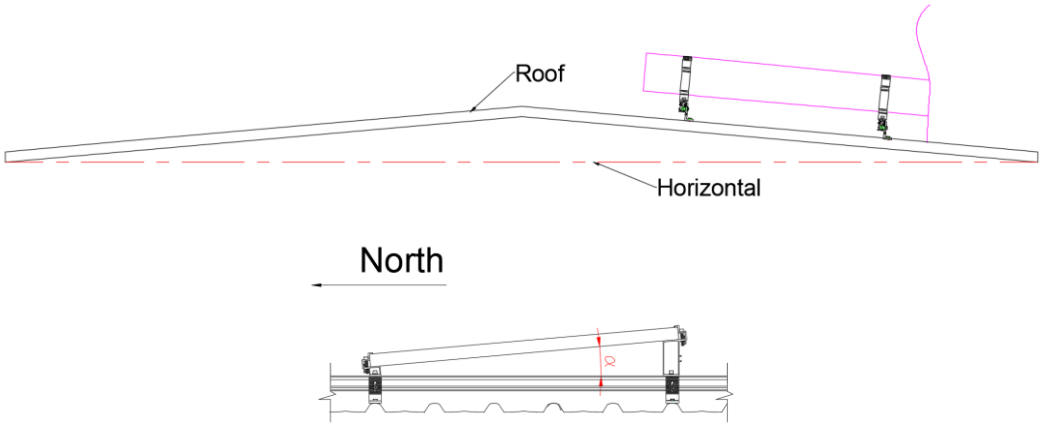
Standard tilt



Reverse tilt



ECO – Rail perpendicular to ribs

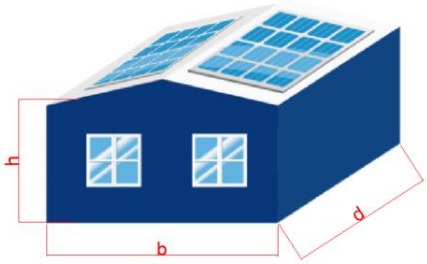


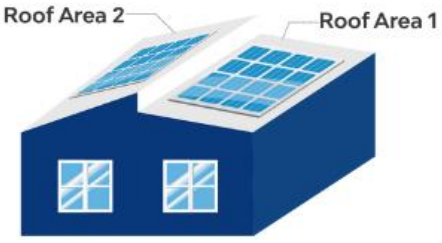
Note 32. Clamping zone of the PV panels should be according to the manufacturer's specifications.

Note 33. The most conservative spacing has to be used if one panel or panel row fall between two roof zones.

Note 34. Roof Zone definition to be calculated as per below:

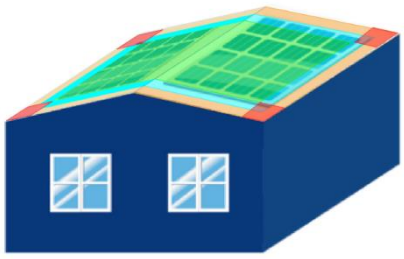
Step 1. Determine building height (h), width (b) and length (d).
Step 2. Check ratio of height to length/width (h/b and h/d)
If both h/b and h/d < 0.2, then a = 2h
Step 3. If any of h/b or h/d ≥ 0.2 then a = the lowest value between 0.2b, 0.2d and h.

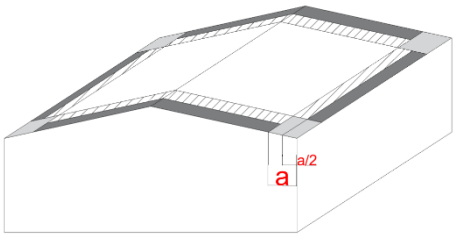




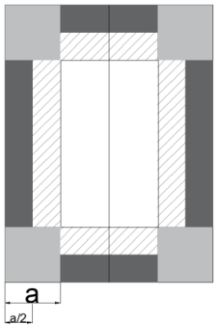
Roof zone definition

Roof Pitch < 10°

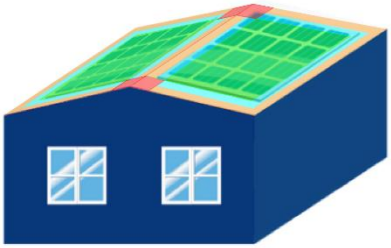


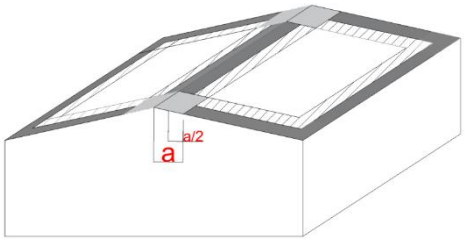


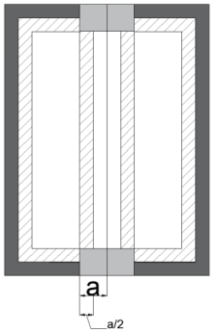
Top view



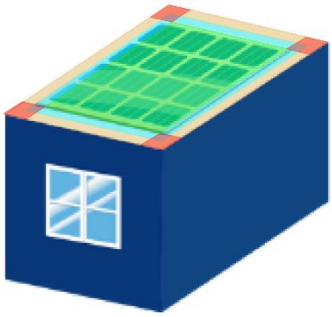
Roof Pitch > 10°

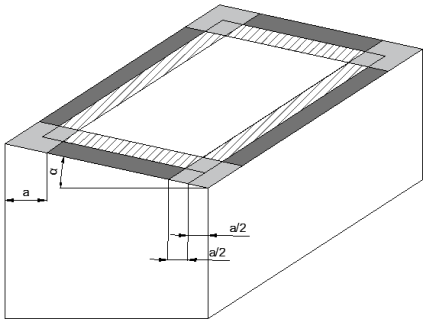


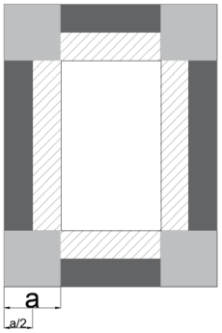




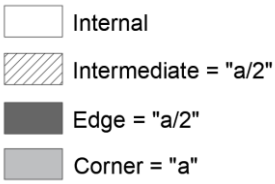
Flat/Mono – Slope Roof







Legend:



Example:

- Wind Region: A
- Terrain Category: 3
- Corrosivity Level: C4 (Spacing -5%, see Note 25)
- Building Height: 12 m
- Building Dimension (breadth x depth): 8 m x 8 m
- Roof Pitch: 5°
- Panel Tilt Angle: 10°
- Tilt Condition (Normal or Reverse): Normal
- Type of Rail: ER-R-ECO
- No. of Rails: 3
- Rail Orientation (Perpendicular or Parallel): Perpendicular
- Purlin Spacing: 900 mm
- Purlin Thickness: 1.9 mm (Spacing remains no change, see Note 5)
- Panel Dimension: 1750 mm x 1000 mm (Spacing +12%, see Note 26)
- Row Spacing: 300 mm (Spacing -10%, see Note 17)

Fixing Spacing as per below (α=5°+10°= 15°, see Note 31):

- Internal: 1156 mm
- Intermediate: 737 mm
- Edge: 555 mm
- Corner: 363 mm

Installation Feasibility:

- Internal: 900 mm
- Intermediate: Not feasible
- Edge: Not feasible
- Corner: Not feasible

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