LUMASOL

INSTALLATION GUIDE



TILE HOOK MOUNTING

Contents

1.) Product Introduction 3

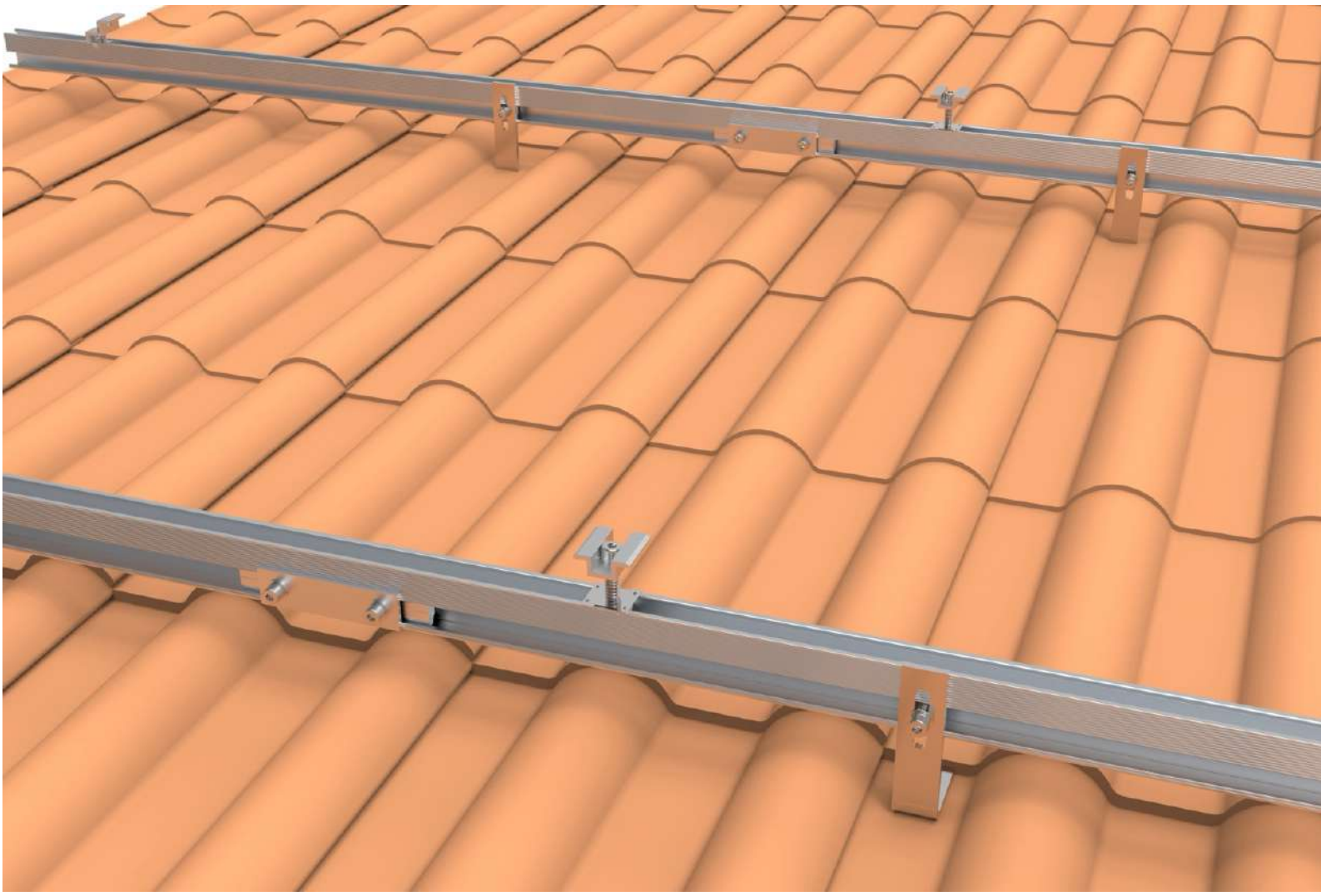
2.) Installation tools and components 4

3.) Installation guide 6

4.) Planning 9

5.) Installation Instructions 12

6.) Grounding lug installation 20



1. Product Introduction

The Lumasol tile hook mounting system securely attaches a rail system above roof tiles to the underlying structure, ensuring a safe and stable installation while minimizing impact on the roof tiles.
Please read this Installation Guide carefully before beginning installation. It is recommended to hire a reputable installer with sufficient experience in solar panel mounting. The Lumasol Tile Roof Flush-mount Racking System is certified to AS/NZS1170.2:2021, so ensure you follow this guide for compliance. Additionally, adhere to all applicable occupational health and safety regulations, as well as any other relevant local guidelines.
To verify you have the latest version of the Installation Manual, contact Lumasol at sales@lumasol.co.za.
Safety is paramount—ensure all local safety regulations are followed during the installation of this product.

The installer is solely responsible for:

1. Complying with all applicable local or national building codes, which may supersede this manual.
2. Ensuring that all products and components are suitable for the specific installation, environment, and conditions.
3. Verifying that the roof sheeting, rafters, main beams, and all other supporting structures can adequately support the mounting structure and PV modules.
4. Using only Lumasol Tile Roof Flush-mount Racking System parts and the installation tools specified in this guide. Lumasol is not responsible for any damage caused by substituting parts, components, or installation methods, as this may void the product warranty.
5. Ensuring that the roof's waterproofing remains intact. Where roof sheeting penetration occurs, a product like Sika should be used around the penetration to maintain water-tight integrity.
6. Recycling the mounting system in accordance with relevant local regulations.
7. Uninstalling the mounting system following the specified installation steps.
8. Ensuring that no fewer than two professional workers are present during installation.
9. Ensuring that all electrical equipment installations are performed by a licensed professional electrician.
10. Verifying the atmospheric corrosivity zones of the installation site prior to installation.
11. Safely installing all electrical aspects of the PV array, including adequate earthing of the PV array and flush-mount components.
12. Ensuring that the roof, rafters/purlins, connections, and other structural support members can support the array under the building's live load conditions.
13. Verifying compatibility to prevent electrochemical corrosion between dissimilar metals, which may occur between the mounting structures and the building or between the structures, fasteners, and PV modules.

2. Installation Tools & Components

- Allen Keys.
- Nut setter / Screwdriver.
- Tape measure.
- Chalk Line / String.
- Power Tools.
- Personal Protective Equipment.
- Spirit Level.
- Marker pen.
- Torque spanner.

		
Screwdriver	Angle grinder	Torque spanner
		
5m Tape	String	Marker pen

 PV Mounting Rail - ProRail47	 Splice Kit - ProRail47	 End Clamp (30mm/35mm)
 Inter Clamp (30mm/35mm)	 Tile Hook (Portrait)	 Tile hook (Landscape)
 Tile Hook – Adjustable	 Tile Hook – Extender	 Ground Earthing Lug

3. Installation Guide







Precautions During Stainless Steel Fastener Installation

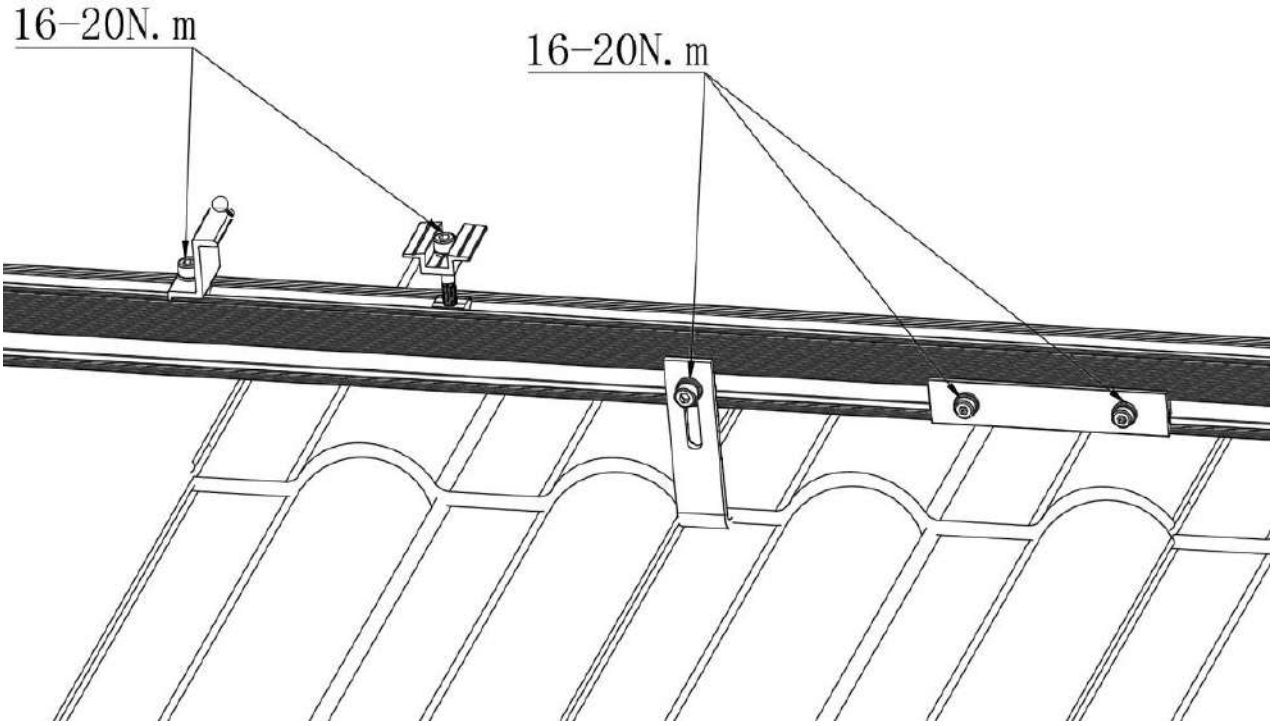
Improper installation can lead to the seizing (galling) of nuts and bolts. Follow the steps below to reduce the risk of thread galling when assembling stainless steel nuts and bolts.

General Installation Instructions

- Apply force to fasteners in the direction of the thread.
- Apply force evenly to achieve the required torque.
- Use professional tools for better control and accuracy.
- If desired, to prevent galling or seizing of threads, apply a lubricant (such as grease or oil).

Safe Torques

Refer to the safe torque values provided in this guide and the accompanying figures. If power tools are necessary, use them at low speeds. High-speed or impact drivers increase the likelihood of galling. If galling occurs and fasteners need to be cut, ensure there is no load on the fastener before cutting. Take care not to damage anodized or galvanized surfaces.



Note: For torque requirements on the Self-drilling Screw, please refer to the tile hook Installation.

	Panel Clamps	Rail Joiner	Grounding Lug	Connector
Safe torques (N.m)	16-20	16-20	16-20	16-20

Installation Dimensions

All drawings and dimensions in this Installation Guide are for general reference only. The Tile Roof Flush-mount Racking System should be optimized to meet the specific conditions of each project and documented in a construction drawing.

The installation process outlined in this guide remains the same, regardless of any variations in component sizes.

If on-site modifications or alterations to the system are necessary, please submit marked-up drawings or sketches to LUMASOL for review, feedback, and approval prior to making any changes.



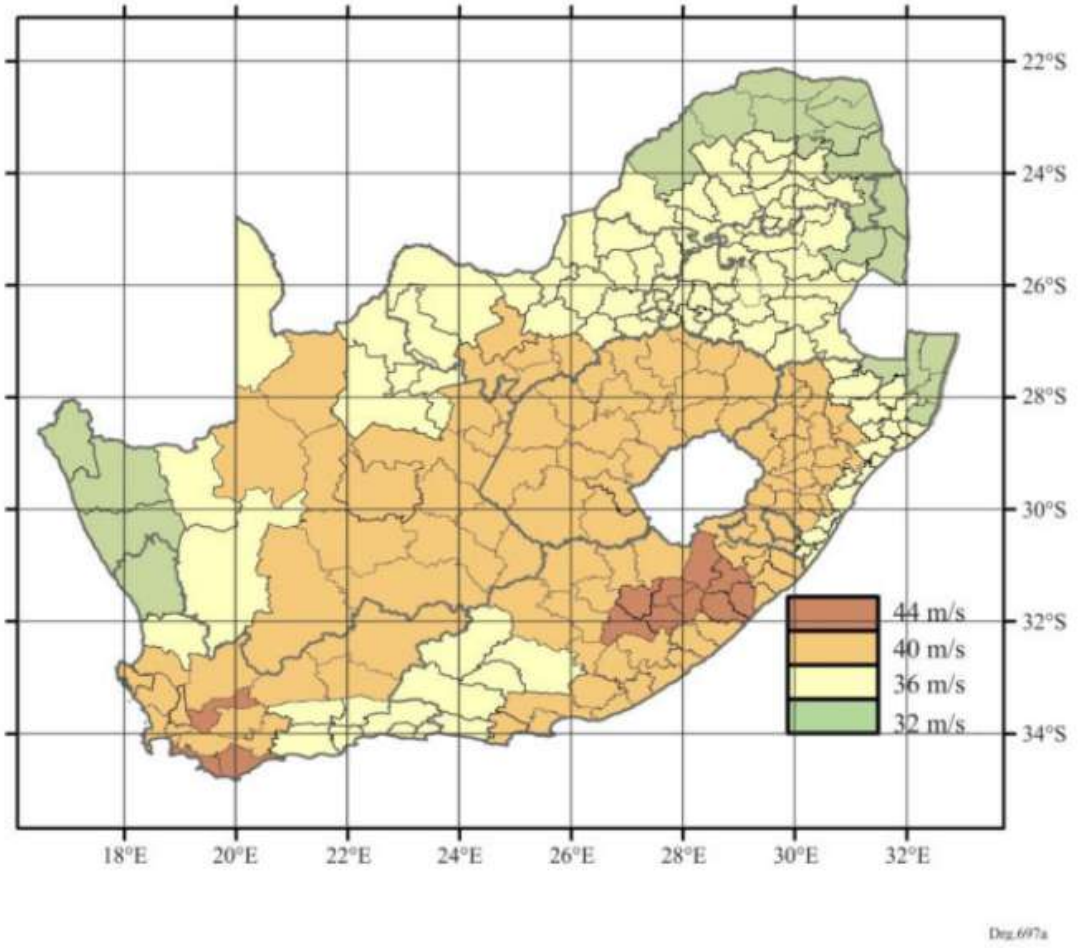




4. Planning

Identify the wind region and terrain category of the installation site.

SANS 10160-3:2019
Edition 2.1



Dng.697a

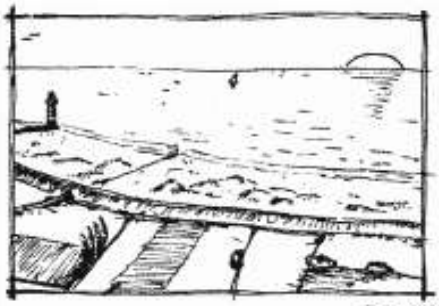
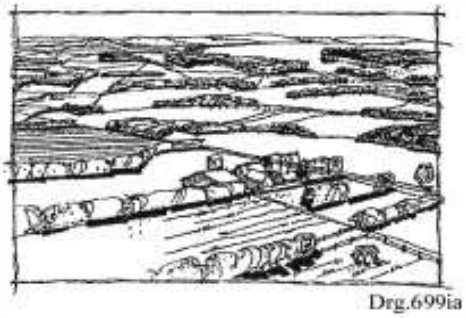
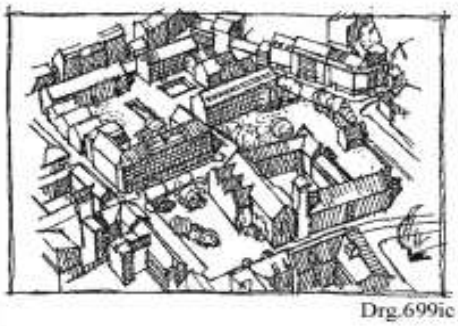
NOTE 1 This map results from comprehensive statistical research. (Strong winds in South Africa: Part 1 and Part 2) and is based on 3 second gust wind speed. Tabularised information, per municipality, is provided in table A.1 of annex A.

NOTE 2 This map should be used in combination with the partial factor for wind loading as stipulated in SANS 10160-1. For structures particularly sensitive to wind action, detailed investigation on an appropriate partial action factor may be required.

Figure 1 — Map of the fundamental value of the basic wind speed, $v_{b,0}$

- **Region A**: Indicates a regional wind velocity of 32 m/s with an average recurrence interval of 50 years.
- **Region B**: Indicates a regional wind velocity of 36 m/s with an average recurrence interval of 50 years.
- **Region C**: Indicates a regional wind velocity of 40 m/s with an average recurrence interval of 50 years.
- **Region D**: Indicates a regional wind velocity of 44 m/s with an average recurrence interval of 50 years.

Table 2 — Terrain categories

1	2	3
Category	**Description**	**Illustration**
A	Flat horizontal terrain with negligible vegetation and without any obstacles (for example coastal areas exposed to open sea or large lakes)	 Drg.699i
B	Area with low vegetation such as grass and isolated obstacles (for example trees and buildings) with separations of at least 20 obstacle heights	 Drg.699ia
C	Area with regular cover of vegetation or buildings or with isolated obstacles with separations of maximum 20 obstacle heights (such as villages, suburban terrain and permanent forest)	 Drg.699ib
D	Area in which at least 15 % of the surface is covered with buildings and their average height exceeds 15 m	 Drg.699ic

NOTE 1 A certain amount of a reduction in loading for category D can be obtained (see 7.3.5) by using a procedure described in A.5, which takes into account the vertical displacement of the peak wind pressure profile, within an environment with closely spaced obstructions.

The Lumasol Rooftop Solar Mounting Systems are designed for terrain category C. If your installation site falls outside of category C, adjust the interface spacing using the following factors:

- **Category A**: 90%
- **Category B**: 95%

Verify the Atmospheric Corrosivity Zone of the Installation Site

Refer to **ISO 9223:2012 - Corrosion of Metals and Alloys - Corrosivity of Atmospheres - Classification, Determination, and Estimation** to verify the corrosivity category of the installation site. This will help determine the appropriate products and interface spacing. When standard products are installed in high-corrosivity zones, such as C4/C5, apply a spacing reduction factor. For installations in ISO corrosivity category C4, reduce the interface spacing by 5%.

Table C.1 — Description of typical atmospheric environments related to the estimation of corrosivity categories

Corrosivity category[a]	Corrosivity	Typical environments — Examples[b]	
		Indoor	Outdoor
C1	Very low	Heated spaces with low relative humidity and insignificant pollution, e.g. offices, schools, museums	Dry or cold zone, atmospheric environment with very low pollution and time of wetness, e.g. certain deserts, Central Arctic/Antarctica
C2	Low	Unheated spaces with varying temperature and relative humidity. Low frequency of condensation and low pollution, e.g. storage, sport halls	Temperate zone, atmospheric environment with low pollution (SO_2 < 5 µg/m^3), e.g. rural areas, small towns Dry or cold zone, atmospheric environment with short time of wetness, e.g. deserts, subarctic areas
C3	Medium	Spaces with moderate frequency of condensation and moderate pollution from production process, e.g. food-processing plants, laundries, breweries, dairies	Temperate zone, atmospheric environment with medium pollution (SO_2: 5 µg/m^3 to 30 µg/m^3) or some effect of chlorides, e.g. urban areas, coastal areas with low deposition of chlorides Subtropical and tropical zone, atmosphere with low pollution
C4	High	Spaces with high frequency of condensation and high pollution from production process, e.g. industrial processing plants, swimming pools	Temperate zone, atmospheric environment with high pollution (SO_2: 30 µg/m^3 to 90 µg/m^3) or substantial effect of chlorides, e.g. polluted urban areas, industrial areas, coastal areas without spray of salt water or, exposure to strong effect of de-icing salts Subtropical and tropical zone, atmosphere with medium pollution
C5	Very high	Spaces with very high frequency of condensation and/or with high pollution from production process, e.g. mines, caverns for industrial purposes, unventilated sheds in subtropical and tropical zones	Temperate and subtropical zone, atmospheric environment with very high pollution (SO_2: 90 µg/m^3 to 250 µg/m^3) and/or significant effect of chlorides, e.g. industrial areas, coastal areas, sheltered positions on coastline

Determine the Height of the Installation Site

This document provides sufficient information for the installation of the Tile Roof Flush-Mount Racking System at heights up to 20 meters. If your installation site exceeds 20 meters in height, please obtain a project-specific engineering certificate to support your installation.

Determine Roof Slope

The Tile Roof Flush-Mount Racking System is suitable for roof slopes up to 30°. Please verify that the roof slope at the installation site is between 0° and 30°. If the slope is outside this range, a project-specific engineering certificate is required to support the installation.

Determine the Maximum Rail Support Spacing

The conditions for achieving a maximum installation interface spacing of 1.5m using the Lumasol Tile Roof Flush-Mount Racking System are:

1. Roof height is ≤ 10m
2. Roof tilt angle is ≤ 25°
3. The installation is located within roof zone H (as detailed later in this manual).

For installations that exceed these limits, reduce the installation interface spacing accordingly.

Verify Maximum Rail End Overhang

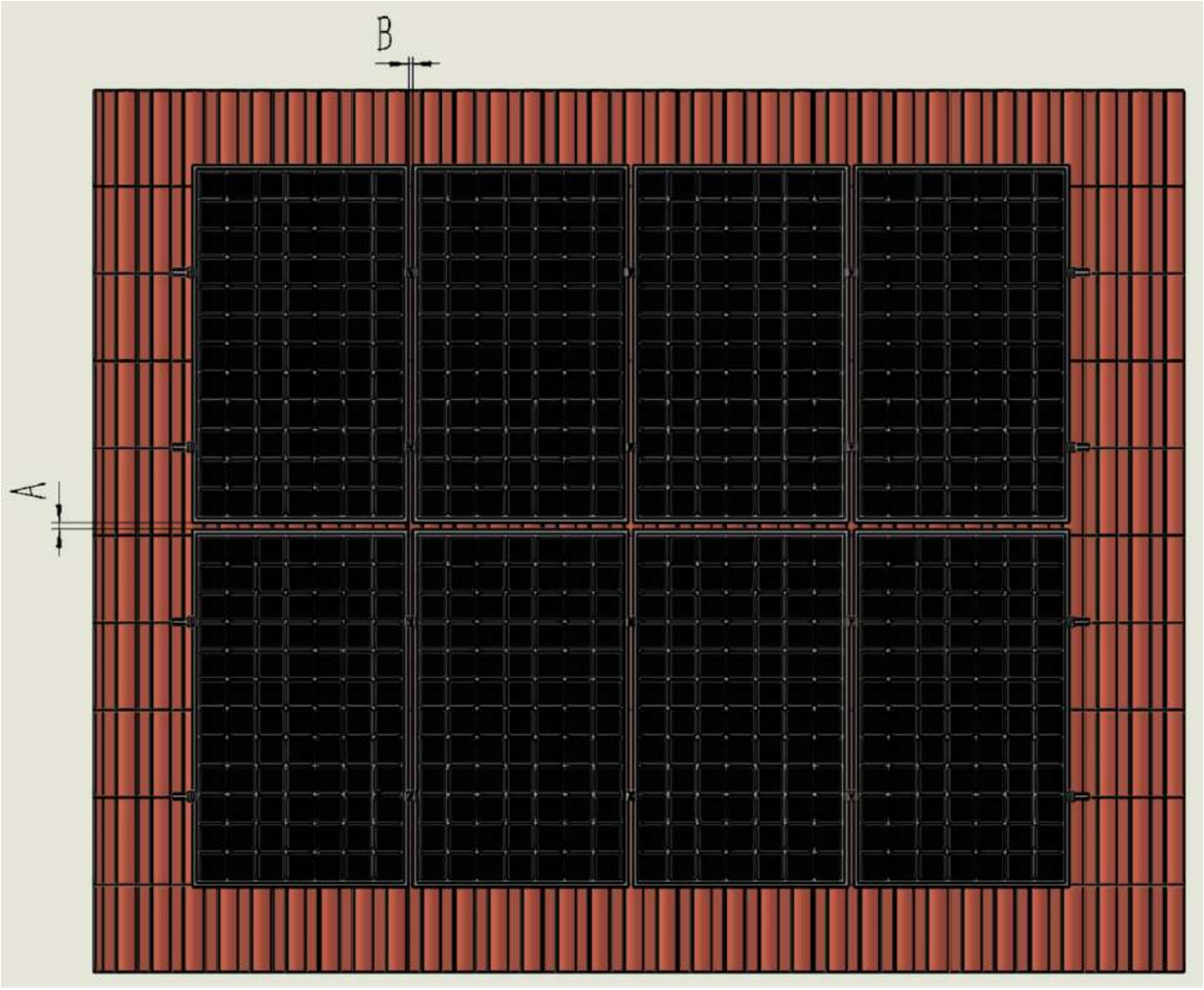
Rail end overhang refers to the distance from the last interface to the end of the panel. The maximum allowable rail end overhang is 40% of the last interface's installed spacing. For example, if the maximum interface spacing specified in the engineering certificate is 1800mm and the last installed spacing is 1500mm, the maximum rail end overhang is 600mm. Please refer to the diagram below.



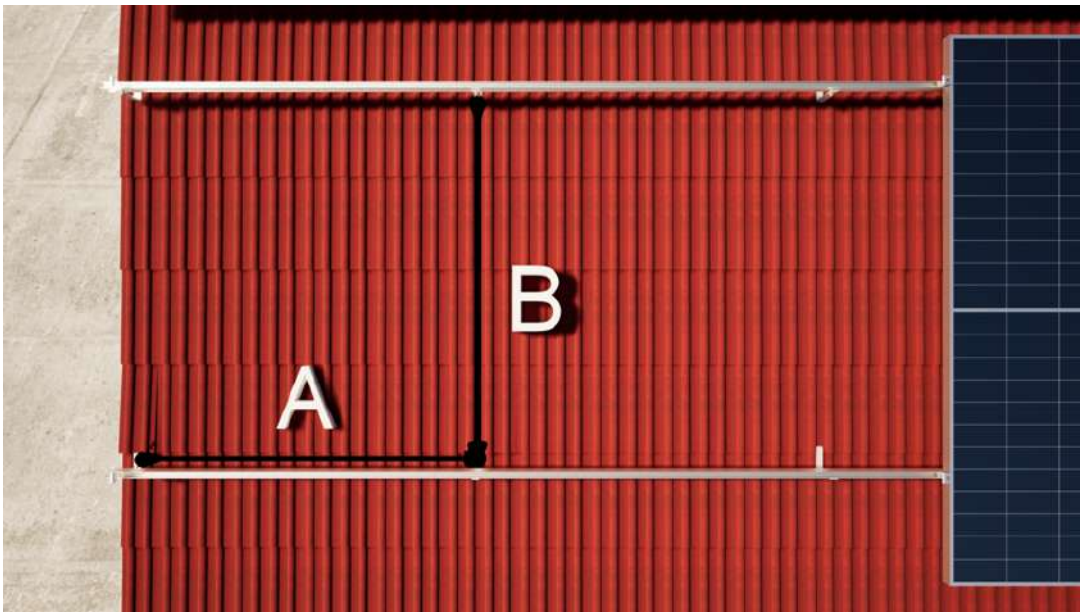
Determine the Clamping Zone of PV Modules

Please refer to the installation manual of the PV module manufacturer for the clamping zone information.

5. Installation instructions



1. Always refer to the installation manual provided by the solar module manufacturer.
2. Assess the number of modules in the vertical direction, considering the module height with at least an 18mm spacing between modules as shown by *"A".*
3. Assess the number of modules in the horizontal direction by considering the module width plus width "*B*". The width "*B"* depends on the mid clamps used, and the module frames should be positioned close up against the mid clamps.
4. Determine the horizontal spacing for tile hooks based on rafter spacing and the sites design considerations.
5. Determine the vertical spacing for tile hooks by referring to the installation manual of the PV module being used. Consider the approved fixing points on the module frame, as listed by the solar panel manufacturer.



Distance - A

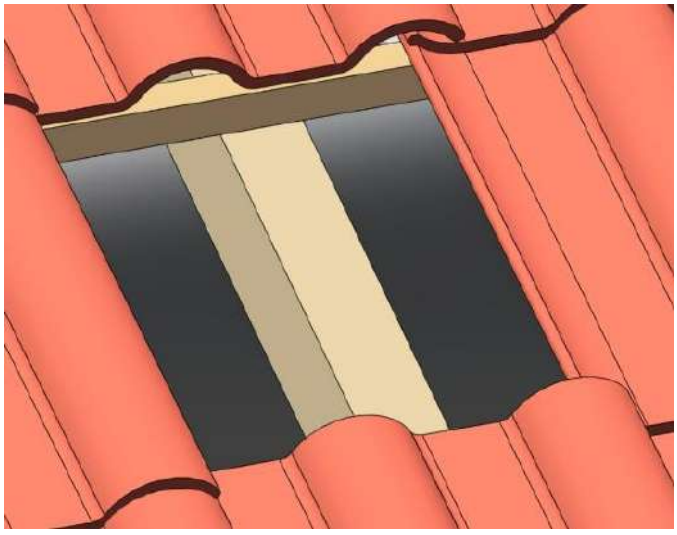
- This distance depends on the spacing between the roof trusses (wooden sub-structure), and should not exceed a maximum of 1500mm (if the site factors allow for 1500mm).

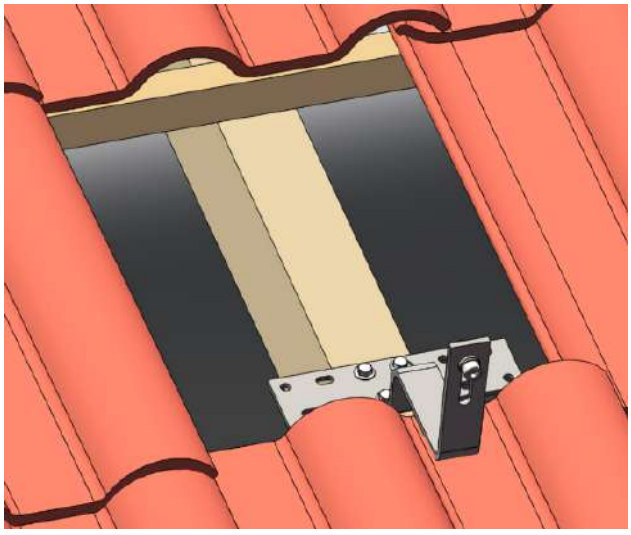
Distance - B

- This distance will vary. Please ensure that the distance between rails fall within the panel clamp zones as per the solar panel installation manual.

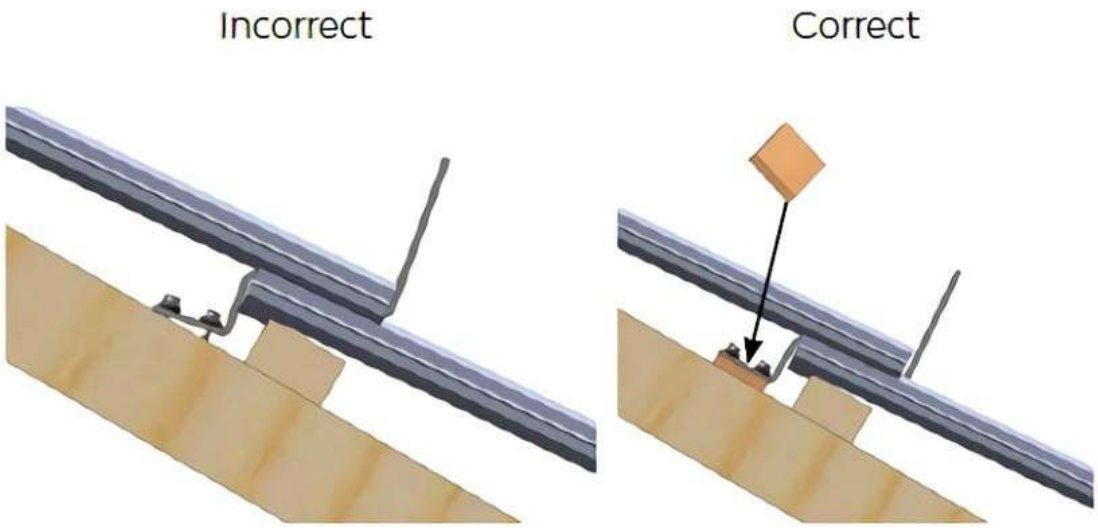
Tile hook installation

- Determine the positions of the Roof Hooks according to your plans. Remove the roof tiles at the marked positions or, if possible, simply push them up slightly as shown in the figures below.





- Fix the Roof Hooks to the rafters using timber screws with minimum of 25 mm embedment and following the screws installation instructions below:
- Use a 3/8" Hex Socket.
- Use a mains powered or cordless screwdriver with a maximum drive speed of 3,000 RPM.
- Fit the screw head into the driver bit and place at the fastening position.
- Apply consistently firm pressure (end load) to the screwdriver until the screw is fastened.
- The roof hook must not press against the roof tile. If the hook is not high enough, use a wooden block to raise it, as seen in the image below;



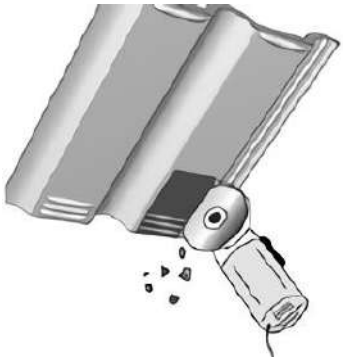
Notes:

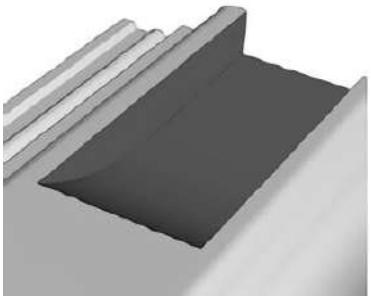
When installing the Adjustable Tile roof hook (LMS-TH4KIT), the height can be adjusted from 56mm to 83mm.

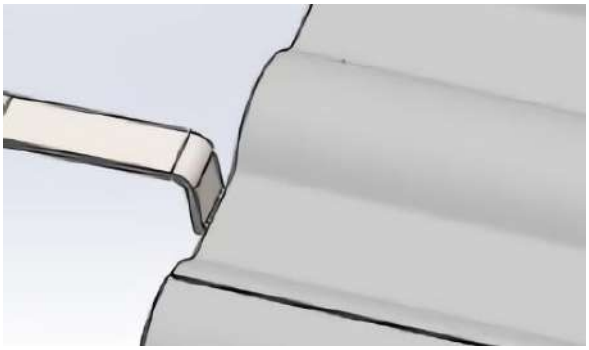
The recommended torque of the height adjustment bolt is 33-40N.m.



If necessary, use an angle grinder to cut a recess in the tile which sits on top of the Roof Hook. This is so that the tile lies flat on the surface. If grooved tiles are used, it will also be necessary to cut a recess in the lower tile.



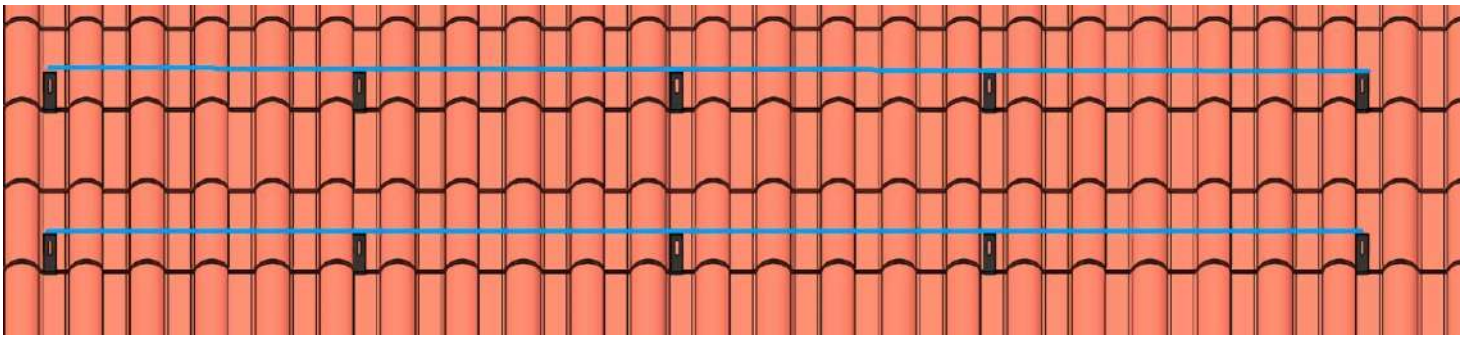




Caution! Never use fitted roof hooks as a step.

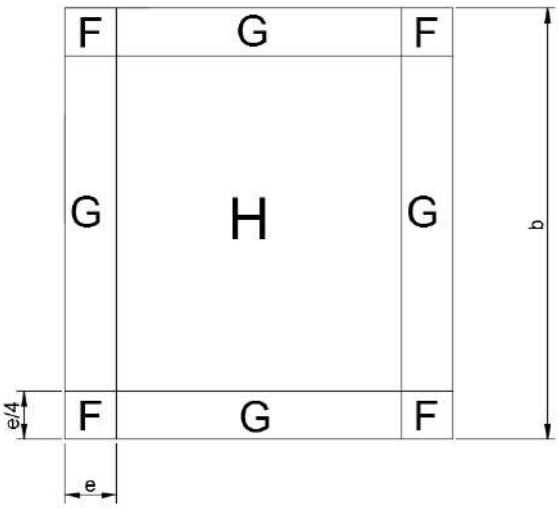


Fix the tile hook on the roof in a straight line, as seen below.



The conditions required to achieve a 1.5m interface spacing are:

1. A maximum roof height of 10m
2. A maximum roof tilt angle of 25°
3. The installation is located in Roof Zone H (as see below)





* e is the minimum value of 2x roof height h, roof width b and roof length l

Rail Installation

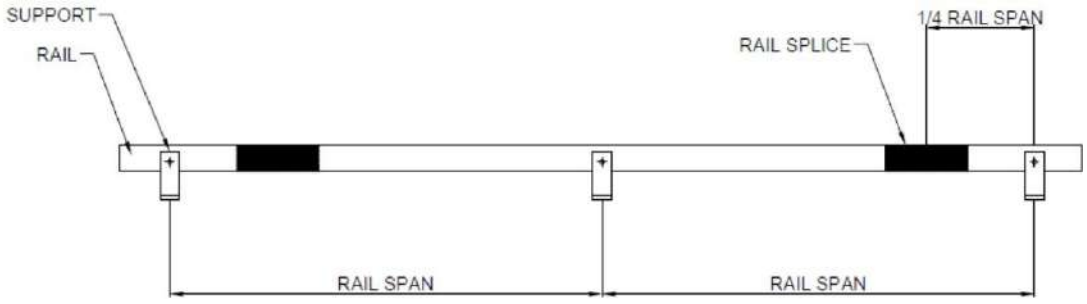
Based on the installation plan, determine the mounting position of the rail.

To connect multiple rails, use the rail joiner / splice kit as seen in the image above. Tighten the M8 bolts using an Allen key.

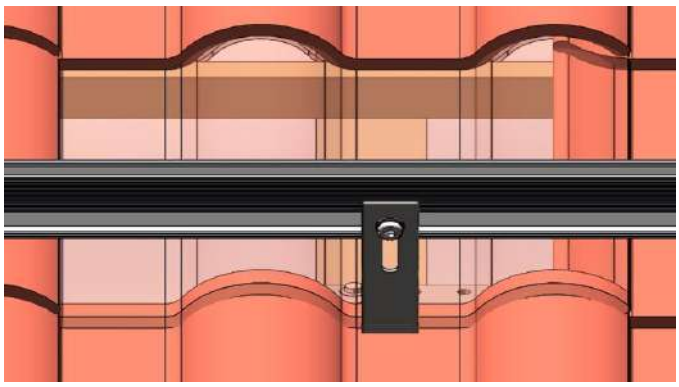
The splice provides an electrical connection between the two rails via the star washers, which penetrate the rails anodising layer.

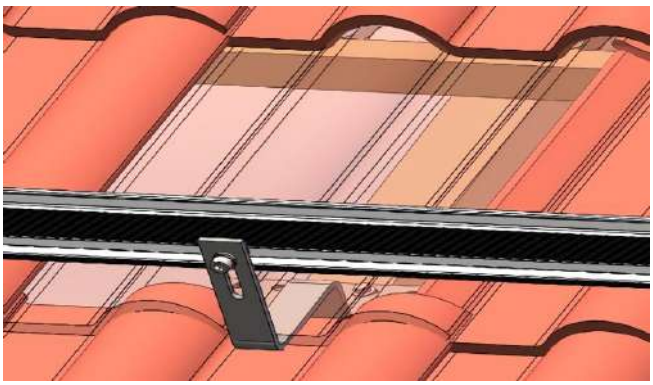
Rail splice connectors should not be installed directly above support points or at the midpoint between two adjacent supports. It is recommended to install the connector at a distance within 1/4 of the rail span from a support.

The recommended torque is 16-20 N·m.



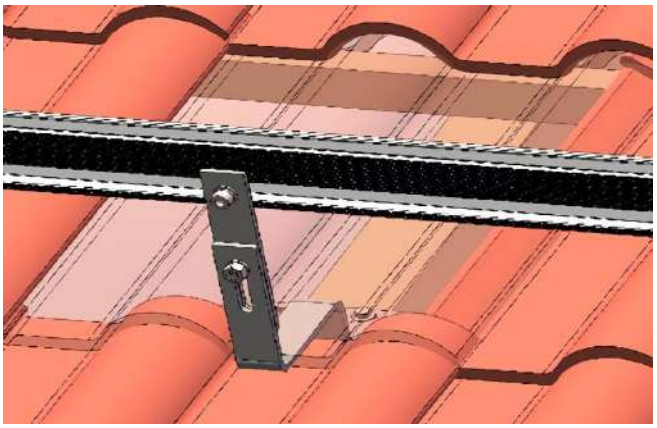
Connect the Rail and Tile roof hook as shown in the figures below. After positioning the rail correctly, fasten within 16-20 N.m.



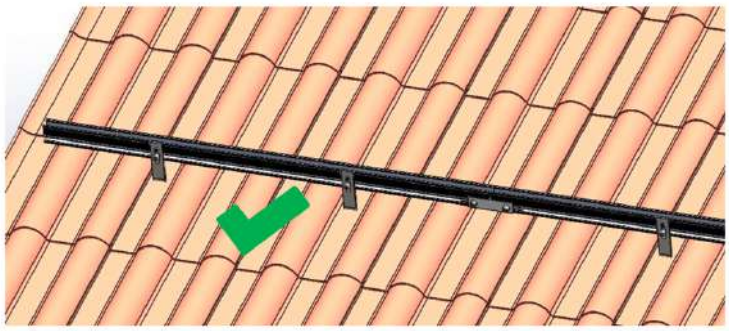


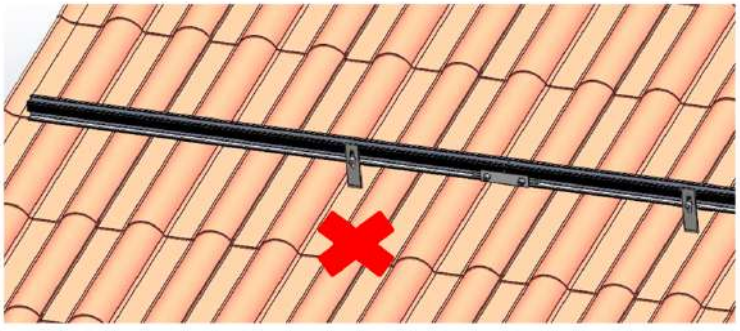
When using the tile roof hook and Tile Hook Height Extender, first secure the tile roof hook and height extender with a torque of 16-20 N·m. After positioning the rail properly, fasten the rail to the Tile Hook Height Extender, as shown in the figure, using a torque of 16-20 N·m.





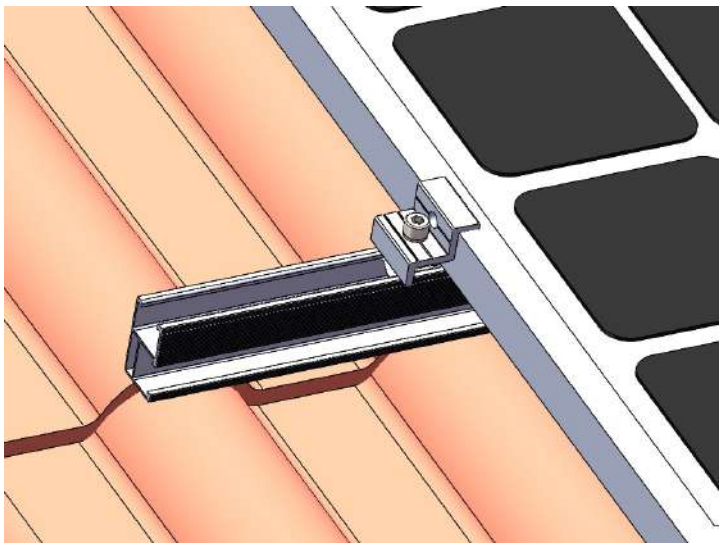
To ensure the strength of the rail and splice, each rail must be secured by at least two interfaces, as shown below.



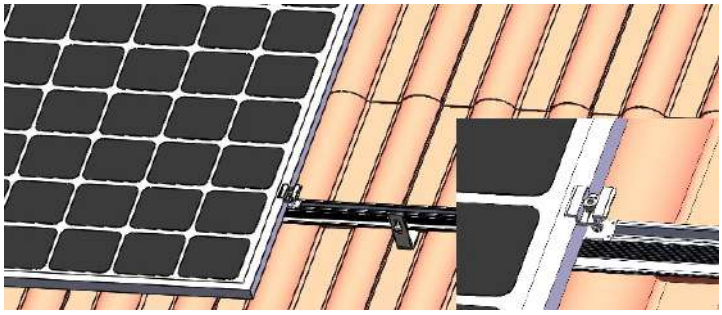


Mid and End Clamp Installation

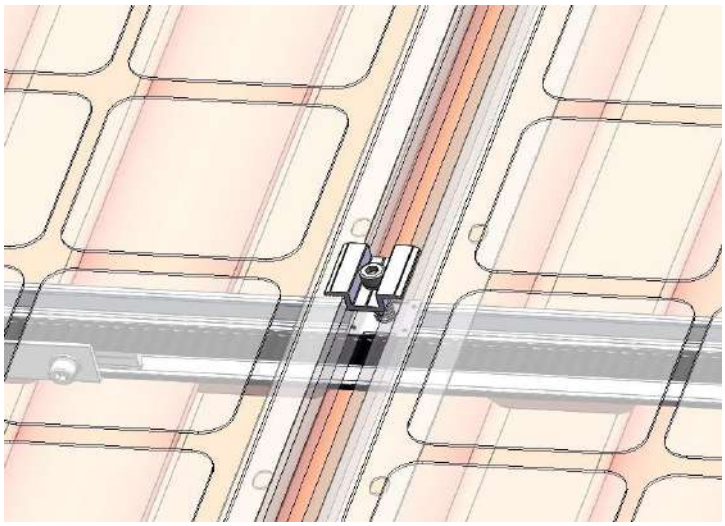
Step 1: Place the first PV Module on the rail according to your plan and fix it in place using an End Clamp.
Fasten lightly as shown in the image.



Step 2: Slightly lift the PV Module and slide Mid Clamps and Earthing Clips into position. The teeth on Earthing Clip will automatically align when the Mid Clamp is properly installed as seen in the image.

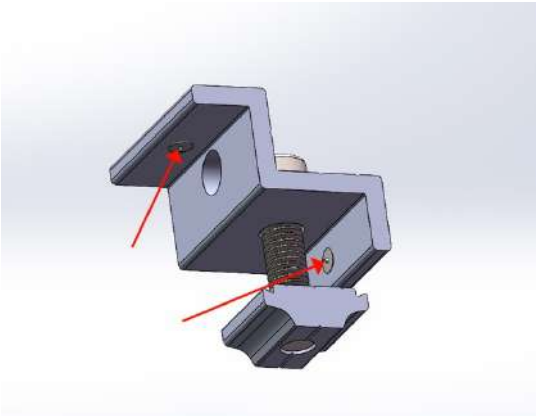


Step 3: Place the next PV Module into the other side of the Mid Clamp and Earthing Clip as shown in the image.



Notes:

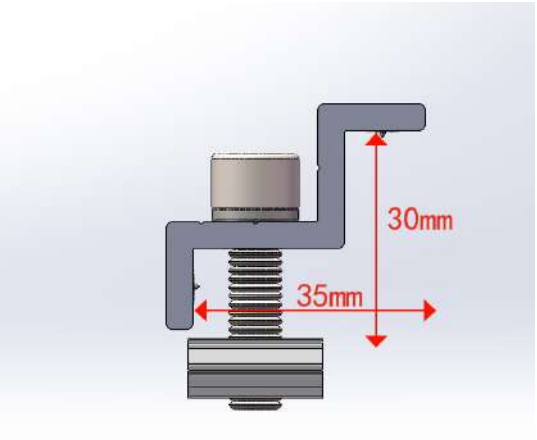
- When fastening the bolts, the bonding pins on the mid and end clamps pierce the anodized layer of the PV module, enabling electrical conductivity, as shown in the image.



- During mid clamp installation, ensure that the earthing clip is positioned between the panel and the rail. This ensures that, once the bolts are fastened, the earthing clip pierces the anodized layer of both the rail and the panel simultaneously, achieving proper conductivity.



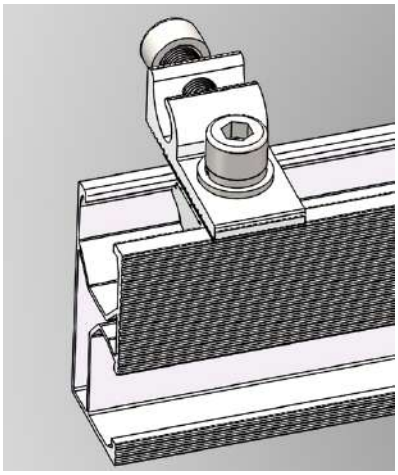
- The two holes on the end clamp allow for switching between two panel thicknesses—30mm and 35mm, as shown in the image.



Important Notes:

- Ensure PV module frames are fully pressed against end and mid clamps, as well as earthing clips. Visually check that earthing clips are correctly positioned. **Earthing clips are for single use only**.
- Fasten bolts with a torque of 16-20 N·m only once the PV module position is finalized. (Slightly tighten bolts to hold modules in place before final adjustment).
- Replace earthing clips when replacing defective PV modules.
- When removing defective PV modules, ensure enough earthing clips remain to maintain continuity with the rail. Install earthing clips under end clamps if needed.
- For arrays with more than two rows of rails, use the same layout and quantity of earthing clips as for two rows.

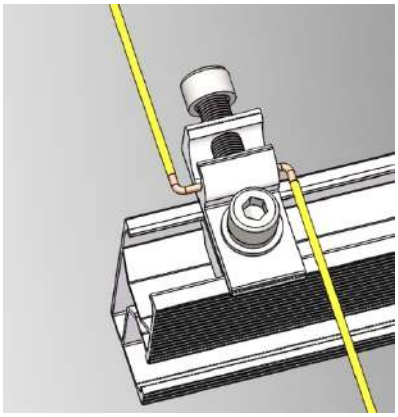
6. Grounding Lug Installation



Installation Requirement:

Install one grounding lug per rail row.

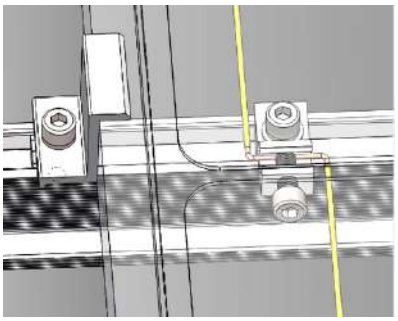
Use a recommended fastening torque of
16-20 N·m for M8x25 bolts.



Cable Connection: After fixing the grounding lug to the rails, strip the earthing cable (max size: 35 mm²). Insert the conductor into the channel and tighten the M8*20 bolt to 8-12 N·m to secure the cable.

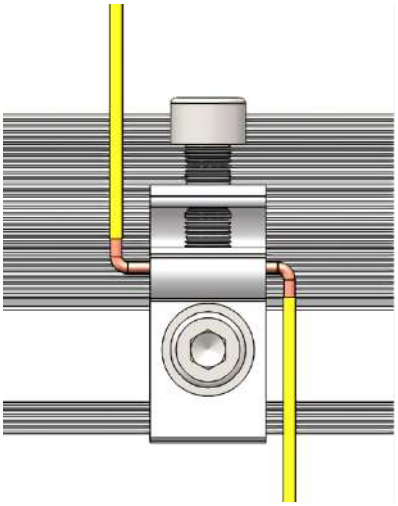
Note: Check the electrical resistance between the rail and earthing cable conductor to ensure proper bonding.

Grounding Lug Installation Options:



Option 1:
Mount the grounding lug in the top channel of the rail.

Option 2:
Mount the grounding lug in the top channel of the rail, just below the PV module. This option accommodates PV modules up to 30 mm in height.



Option 3:
Mount the grounding lug in the side channel of the rail.











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