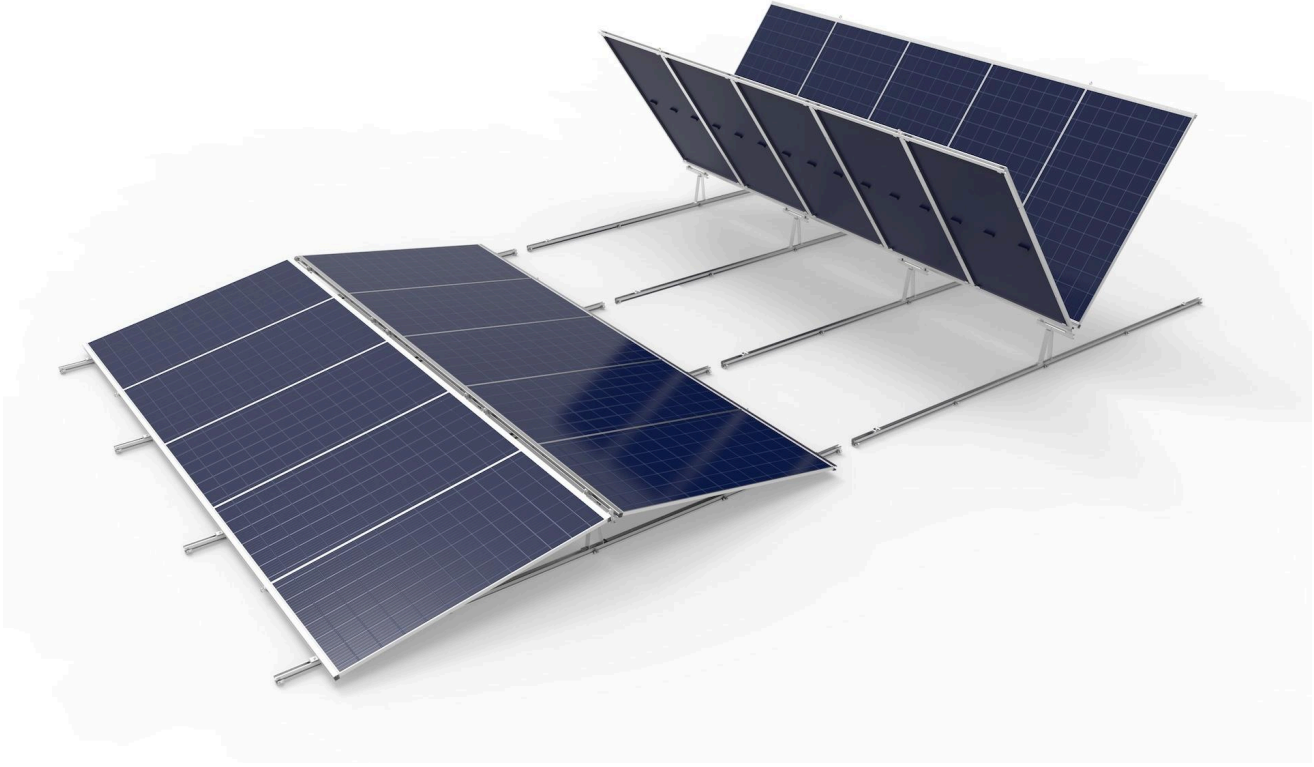
Installation Manual for Solpod Roof



Solpod Roof (patent pending)

SOLPOD

Solpod Pty Ltd, ABN 47 623 269 947

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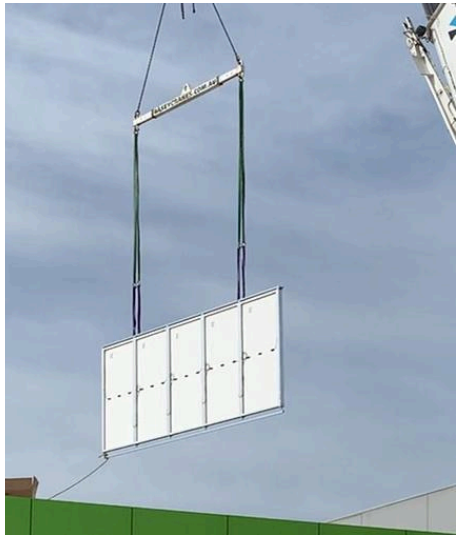
Introduction

Thank you for choosing the Solpod Roof solar frame from Solpod Pty Ltd. Made from custom-designed coated steel beams and brackets, Solpod's streamlined design and improved frame strength greatly simplifies solar panel installation. Solpod Roof is backed by a 10-year warranty and is compliant with the AS/NZS 1170.2:2021 on wind actions, AS 4100 Steel Structures, and AS/NZS 4600 Cold-formed Steel Structures.

Overview

Solpod Roof solar PV arrays are built using pre-assembled frames (solar pods or Solpods) of solar PV modules. Each Solpod is lifted to the roof using a crane. The spine of the Solpod is fixed to the roof, then the wings of the Solpod unfold into place. Solpods are transported to site on pallets, which are placed onto the ground using a tilt-tray truck.

Stack of Solpods being placed on the ground



Solpod being lifted to roof

Solpod being unfolded on roof

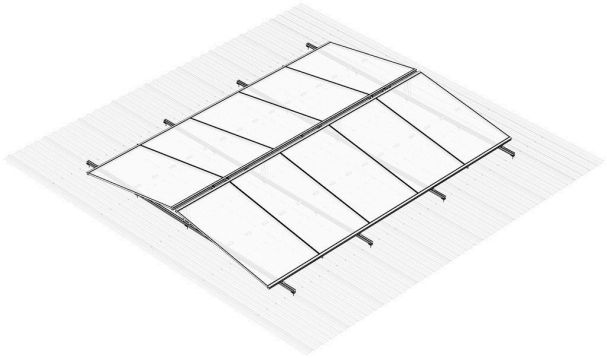
Compliance and certification

Solpod Roof is supplied with a certification that suits most buildings, covering wind regions A & B, terrain category 2 & 3. Custom certification is also available for sites that aren't covered by the generic certification, including an assessment of the site wind speed and the as-built conditions of the roof sheet and roof frame. Certification is provided by Tensys Engineering. If the roof is exposed to higher wind loads, such as near open water, please contact Solpod for guidance.

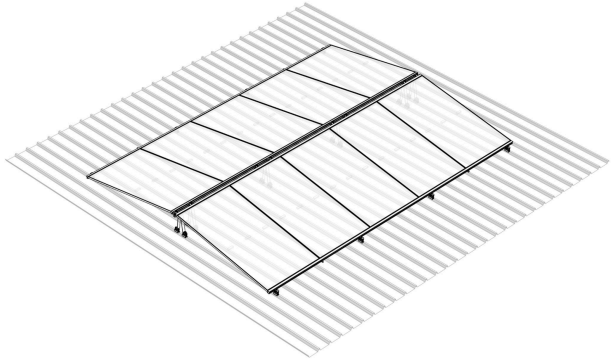
Types of roofs and roof fixings

Solpods can be fixed to a variety of roof types:

- Screw-fixed roofs: using long or short lengths of rail,
- Klip-Lok roofs: using roof clamps with EPDM rubber sheets,
- Concrete roofs: using longer lengths of rail on concrete anchors.



Solpod on screw-fixed rails



Solpod on roof clamps

Solpod on rails on concrete anchors

Site preparation

Prior to installation, the site needs to be inspected and prepared, including a weather assessment, roof access plan, cranage plan, material handling plan and traffic plan.

Weather assessment

Solpod installation is sensitive to wind, rain and debris, particularly high winds which can affect the crane. Installation should occur when the weather is forecast to be still and dry.

Roof access plan and cranage plan

Each site requires access to the roof for people and materials, independent of the crane. A typical 100 kW solar array consists of 18 Solpods covering a roof area of approximately 500 m^2. Depending on the maximum extension crane, one or more crane locations may be required.

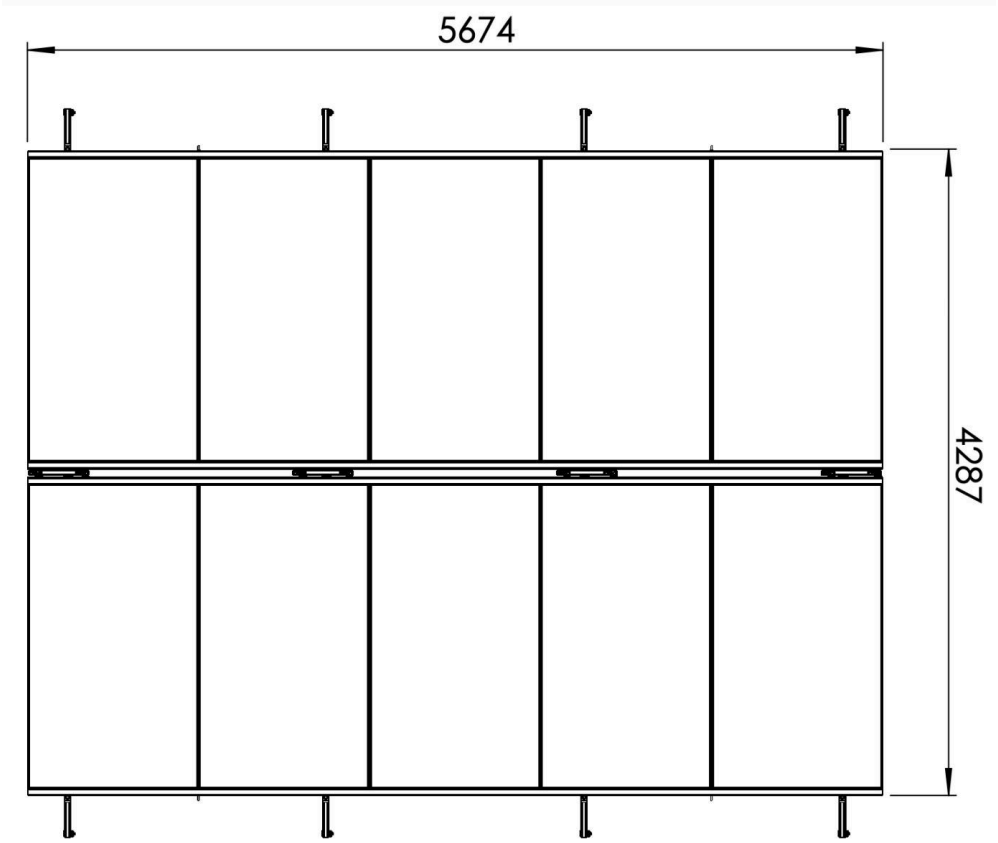
Traffic plan and material handling plan

Depending upon the roof access plan, cranage plan and material handling plan; an overall traffic plan may be required. Traffic plans are usually generated by a traffic management subcontractor. Depending upon the number of crane locations required, material handling may need to be considered.

- Where will the Solpod delivery (truck, trailer or container) be located?
- Where will ancillary components (inverters, cabling, trunking) be located?
- Where will waste be stored prior to removal?

Array mark out

Each array consists of multiple Solpods, and space needs to be allocated for access walkways, inverters and cable trays. The location of each Solpod needs to be marked on the roof, including the location of roof fixings. Each Solpod comprises two wings of each five modules, pre-assembled into strings of five. Typically, Solpods are laid out sets of three, to enable DC strings of fifteen modules, which suit the DC input range of solar PV inverters. Lengthways, Solpods can be installed with a 10 mm gap between them (-5 / +20 mm) to minimise the need for extra hardware for DC cable protection. For further guidance refer to *SP-008 Solpod Roof Layout Guide*.



Solpod Roof is 5674 mm long and 4287 mm wide (using 2063 x 1134 mm modules), in this image the rails are 4850 mm long.

Lifting to the roof

Taking delivery of a stack of Solpods

Solpods are delivered to site on pallets carried by a tilt-tray truck, which lowers the pallet to the ground.

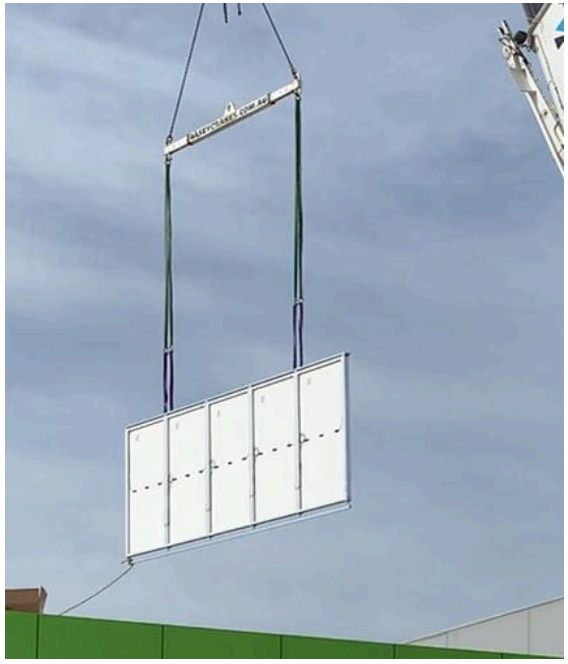
Pallet of Solpods on tilt-tray truck

Pallet being placed on the ground

Lifting from the ground to the roof

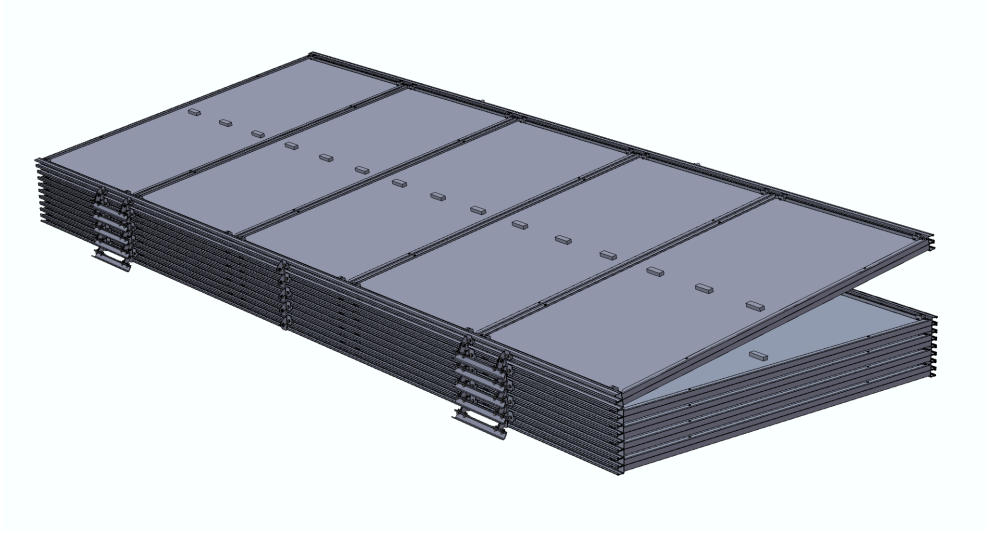
Solpods are lifted to the roof using a crane and four chains. Optionally, a 3 metre spreader bar can be used to better spread the chains. During craning, workers do not stand under the Solpod; they stand to the sides, and guide the Solpod using the attached guide-lines. This allows the Solpod to be rotated and translated into the desired position.

Solpod being lifted and unfolded without a spreader bar

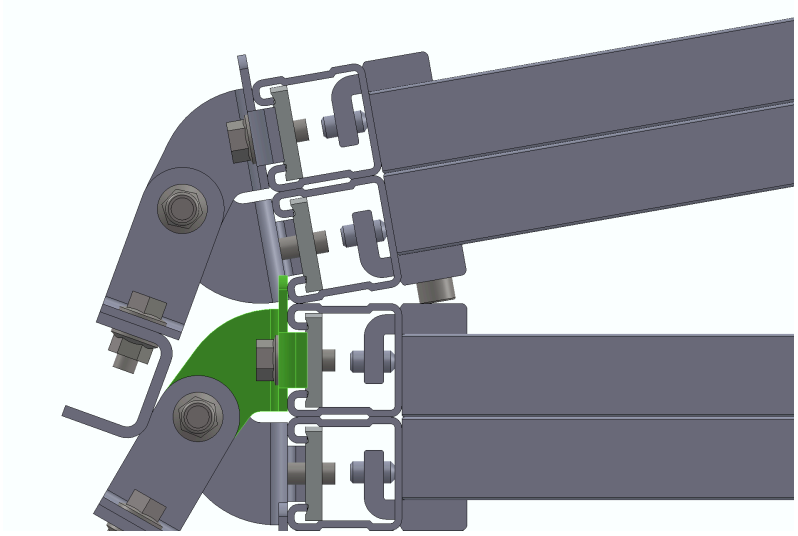


With a spreader bar

When a Solpod is lifted up off the stack, it rotates around tabs on the hinge brackets of the next Solpod in the stack, which prevents the Solpod from sliding back off the stack, and helps it rotate smoothly up into a vertical orientation.

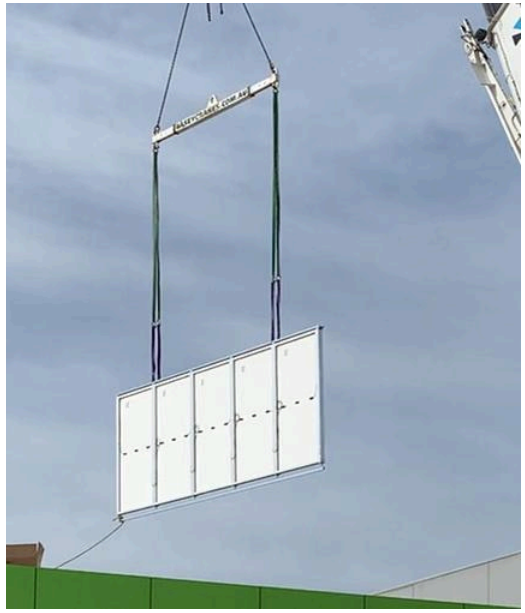


Solpod being lifted off a stack



Upper Solpod rotates around tabs on the lower Solpod

Optionally, Solpods can be lifted to the roof in a horizontal (not vertical) orientation, which may be safer if wind speeds have increased. For further detail refer to *SP-051 Lifting horizontally*.

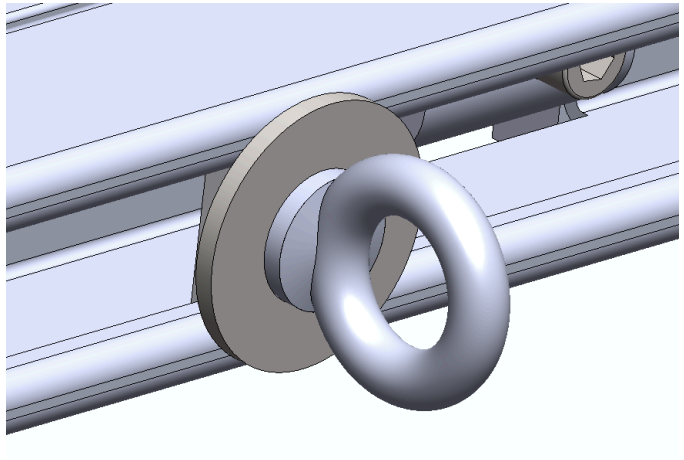


Solpod in a vertical orientation

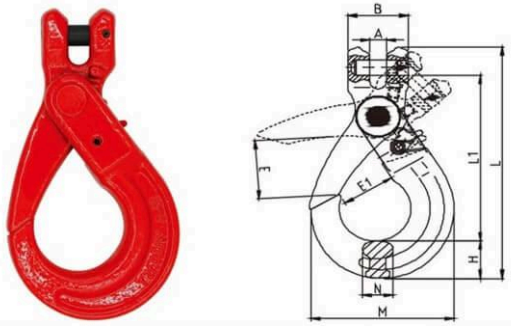
Solpod being lifted in a horizontal orientation

Connecting chains to each Solpod

Each Solpod is supplied pre-assembled with four lifting points, two on each edge beam. Each lifting point is an eyelet bolt (with an internal diameter of 19 mm) fixed to the edge beam. The crane chains can be fixed to the eyelets using a D-shackle, or a small self locking clevis (e.g. with a depth of 15 mm).



Eyelet bolt as lifting point



Model	W.L.L.	B.L	A (mm)	B (mm)	E (mm)	E1 (mm)	L1 (mm)	L (mm)	H (mm)	N (mm)	M (mm)	Weight (kg/pc)
8-TP808-06	1.12T	4.48T	8±0.5	32±1	32±2	28±1	99±3	134±3	20±1	15±0.5	73±2	0.44

A small clevis can connect directly to the eyelet bolts

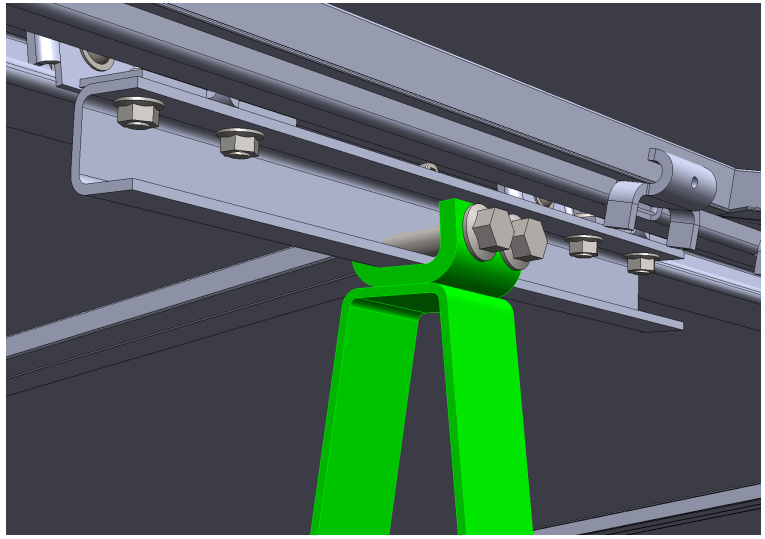
Unfolding on the roof

The Solpod is held by the crane and guided into position, then the central spine is lowered onto the pre-installed centre row of spine support brackets (which are fixed to rails or roof clamps). Workers fix the central spine to the spine support brackets, before the crane lowers the Solpod slightly, allowing the two wings to unfold. To ensure both wings unfold symmetrically, fix a tag line to each wing, and use the tag lines to pull the two wings away from each other. Once the Solpod has opened up (see photo below) the two wings can unfold the rest of the way by lowering the crane. When the Solpod is fully unfolded the edge beams of each wing rest on the rails. Workers fix the edge beams to the rails using edge beam clamp brackets. Workers detach the chains and the crane can start to slew back to the container base.

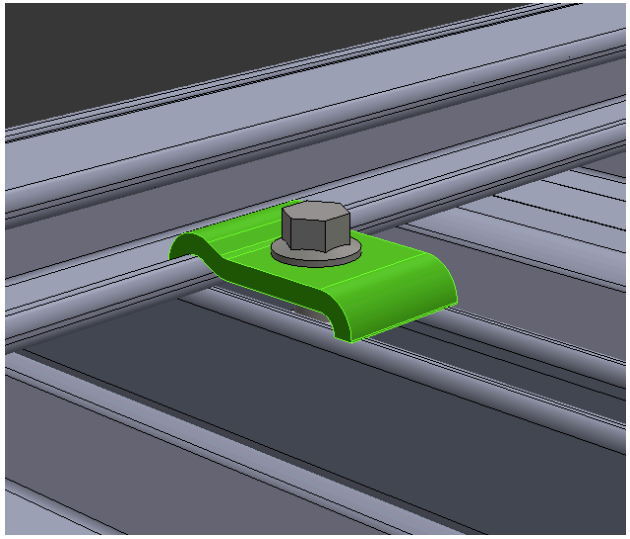
Solpod being unfolded

Fixing to brackets

Each Solpod has short spine beams which are fixed into spine support brackets, by tightening the two horizontal bolts. Solpod edge beams are fixed down using edge beam clamp brackets.



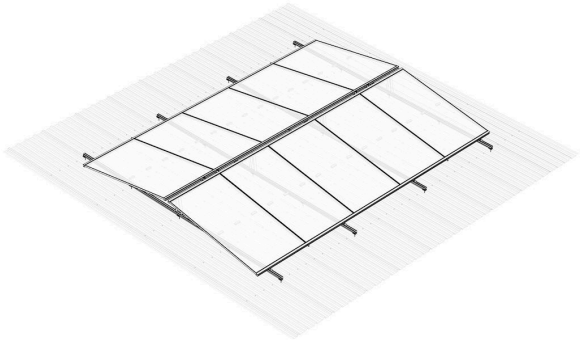
Spine support bracket



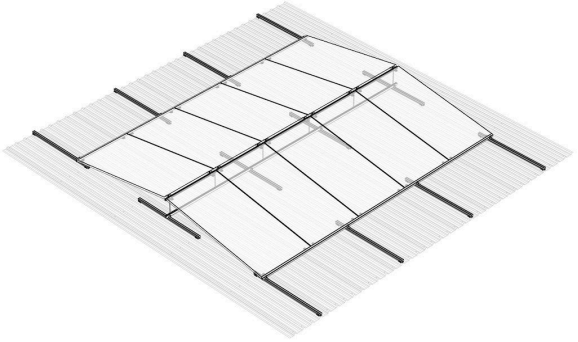
Edge beam clamp

Installing Solpod using roof screws

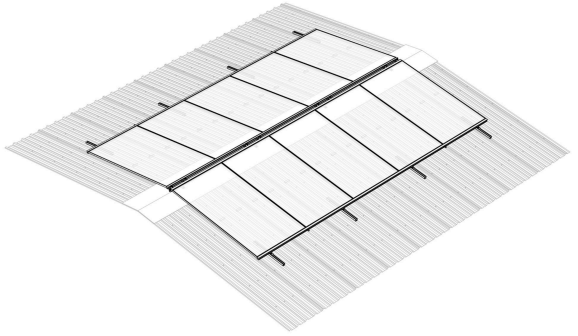
Solpods can be installed on a screw-fixed roof. Rails, which are ZAM coated steel struts, are used to bridge between purlins. Rails can be three separate sections, or a single continuous piece, as preferred by the installer (depending on how they prefer to install DC cabling). For Wind Region A up to 20 m, use four rails. For Wind Region A up to 30 m, or Wind Region B up to 10 m, use six rails, and contact Solpod to review based on purlin spacings. Site specific certification is also available.



Solpod installed on long rails



Solpod installed on short rails



Solpod installed over a roof ridge

Solpod installed on long rails:

- Total number of roof screws is a function of purlin spacing, typically 5 roof screws per rail, total of 20 roof screws per Solpod

Solpod installed on short rails:

- Typically 2 roof screws per short rail, total of 24 roof screws per Solpod

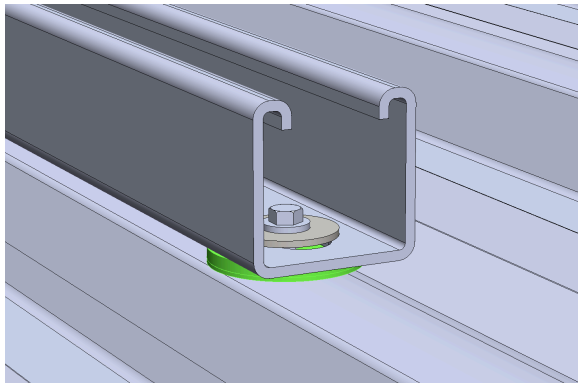
Solpod installed on a roof ridge:

- Two roof screws under each spine support bracket, total of 24 roof screws per Solpod

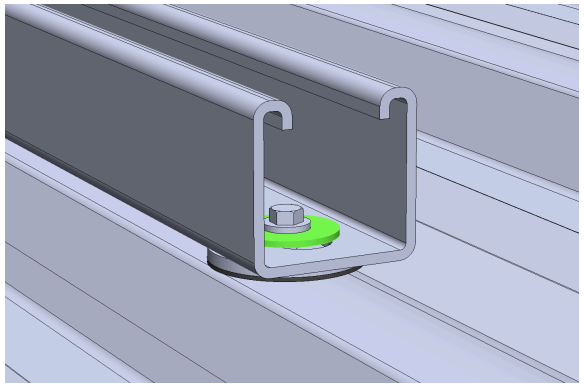
The rails are fixed to the frame of the building using two types of washer:

- Stainless steel / EPDM washer located under the strut, with EPDM pressing against the roof sheet
- Stainless steel washer located inside the strut, under the head of the roof screw

Stainless / EPDM washer



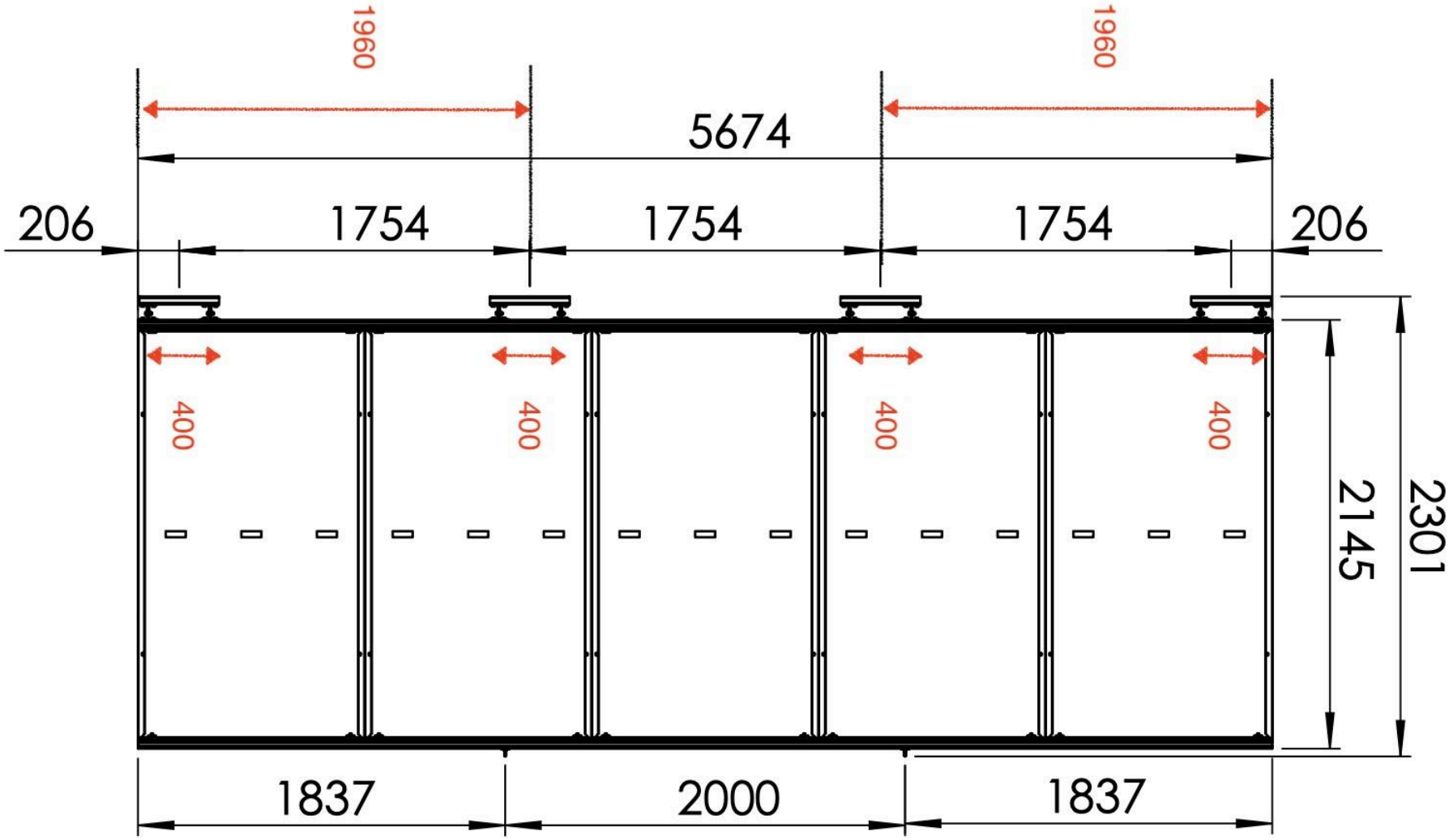
Location of stainless/EPDM washer



Location of stainless washer

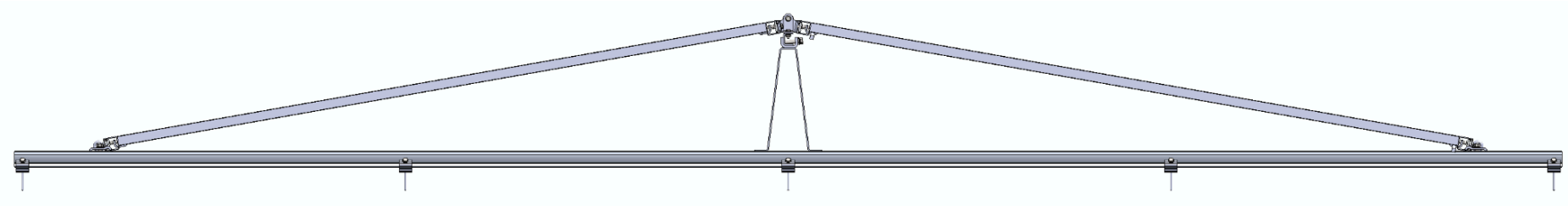
Both the roof sheet and strut are fabricated from coated steel, so there is no risk of corrosion owing to dissimilar metals. The coating is either ZAM (for the strut) or Zinc or Zincalume (for the roof sheet). ZAM and Zincalume are different brand names for the same type of coating, i.e. Zinc-Aluminium-Magnesium.

The four rails are located on the roof ribs that most closely align with the centre of each of the four short (400 mm long) spine beams.

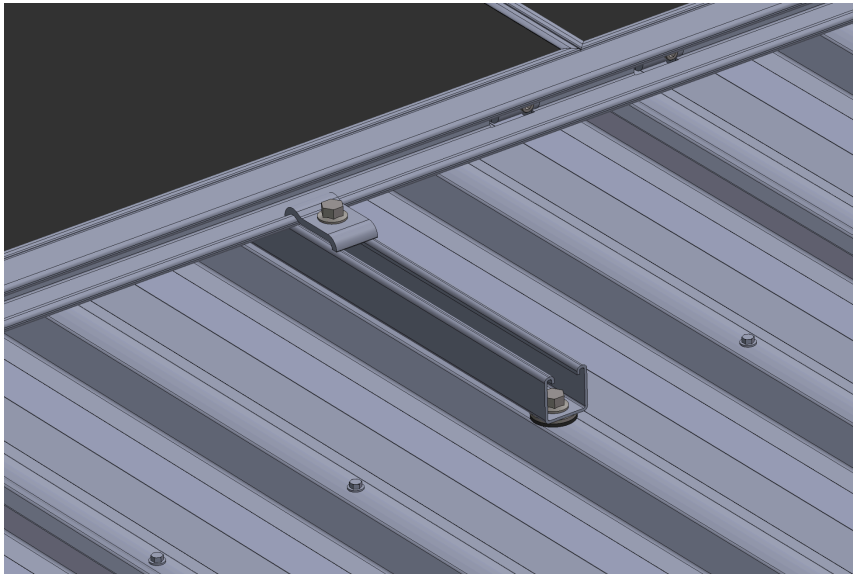


Location of each of the four short spine beams

Ensure that a roof screw (on each side) is located outside the edge beam, so that edge beam doesn't cantilever past a roof screw.

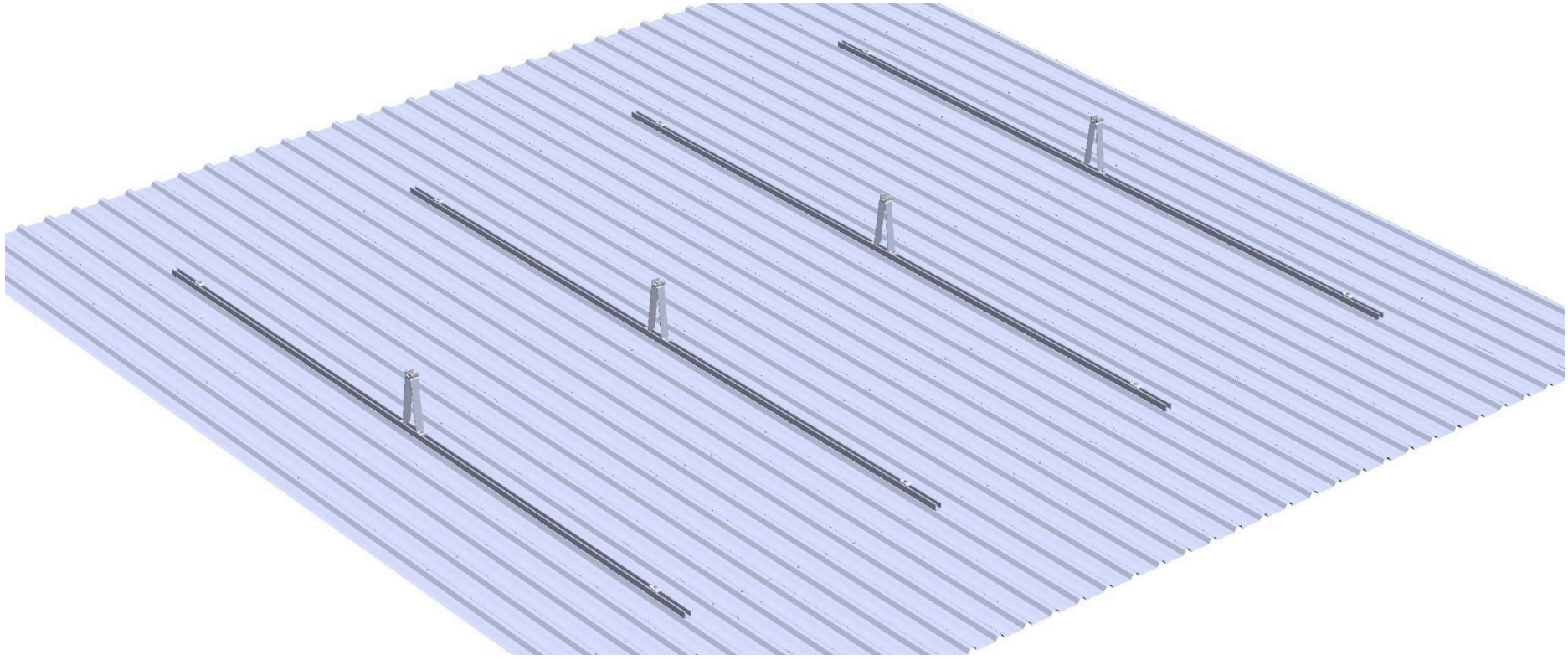


Locate a roof screw outside of each edge beam, to prevent a cantilever



Locate a roof screw outside of each edge beam, to prevent a cantilever

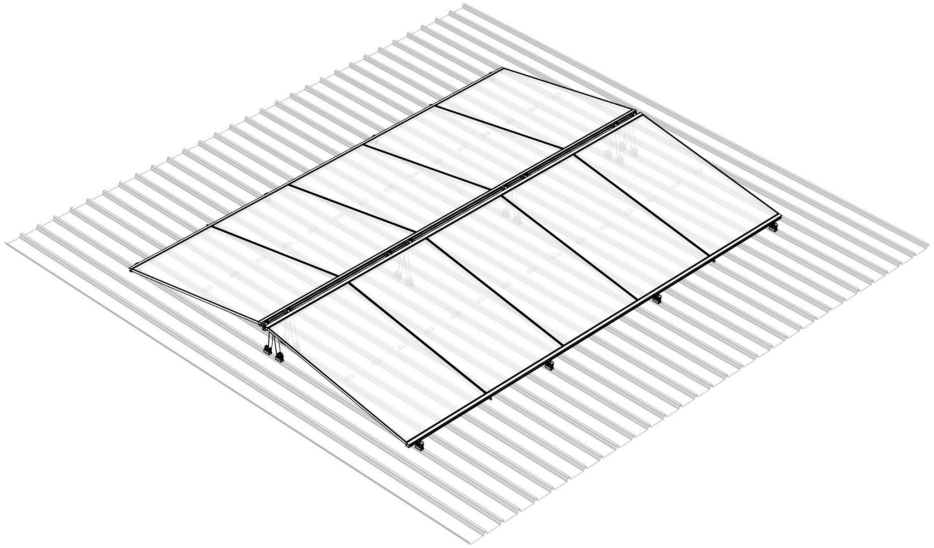
A spine support bracket is fixed to each rail.



Solpod Roof is typically supported on four rails, each with a spine support bracket

Installing Solpods using roof clamps

Solpods can be installed onto Klip-Lok roofs using roof clamps. The table shows the number of roof clamps required.



Solpod installed using roof clamps - this arrangement can support up to 8 roof clamps along the spine, and up to 24 along each edge beam

Wind Region	Roof height	Number of roof clamps along spine	Number of roof clamps along edge beam
Wind Region A	Up to 10 m	6	4
Wind Region A	Up to 20 m	10	4
Wind Region A	Up to 30 m	10	6
Wind Region B	Up to 10 m	10	6

Quantity of roof clamps required

Installing Solpod using concrete anchors

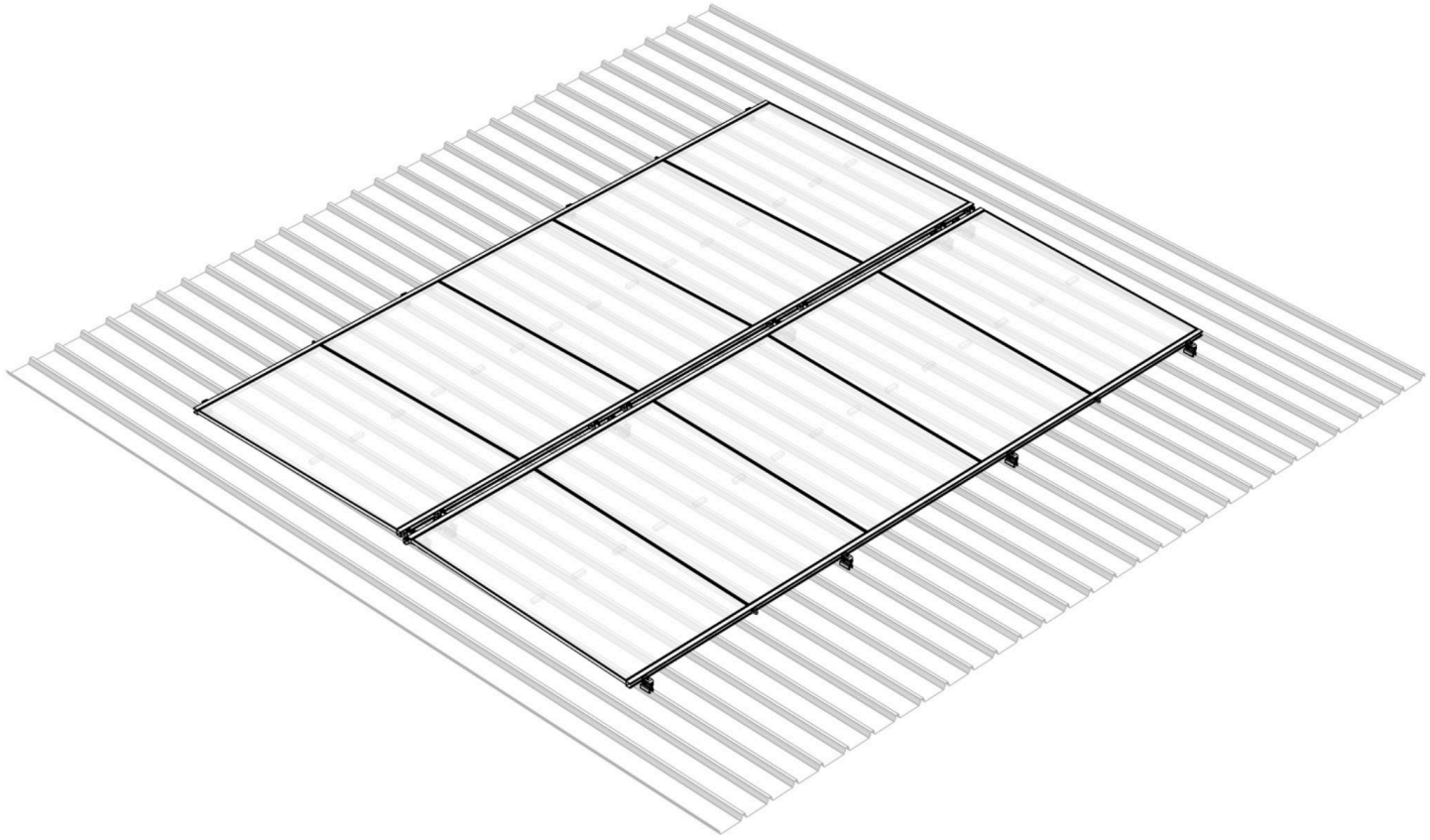
Solpods can be installed on rails that are fixed to the roof using M12 concrete anchors. Site specific certification is also available.

Solpod Roof in ‘tilt’ configuration, on a concrete roof, using four cross-beams and twelve concrete anchors

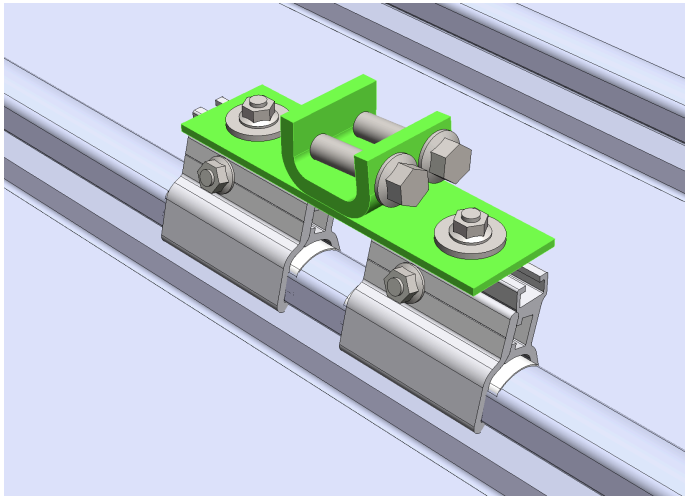
Roof slope

If the roof has a low slope, i.e. up to approximately 6 degrees, Solpod is best installed in the default ‘dual-tilt’ configuration with the solar panels tilted at 10 degrees on each side.

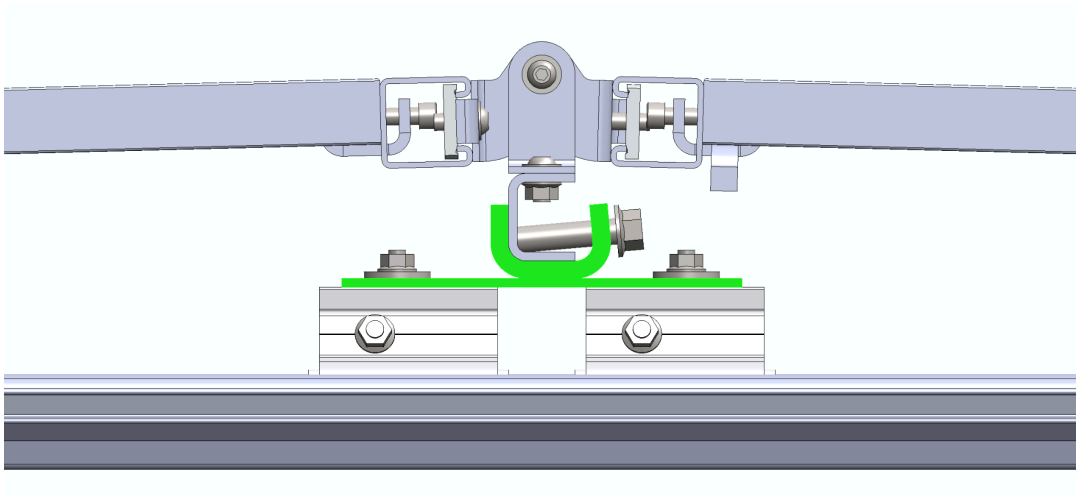
If the roof is more steeply sloped, i.e. above 6 degrees, Solpod is best installed in the optional ‘flush’ configuration, with the solar panels titled almost flat on each side. To achieve the ‘flush’ configuration, alternate ‘low profile’ spine support brackets are used.



Solpod in ‘flush’ configuration, on roof clamps, with ‘flush’ version of spine support brackets



Flush version of spine support bracket, on roof clamps

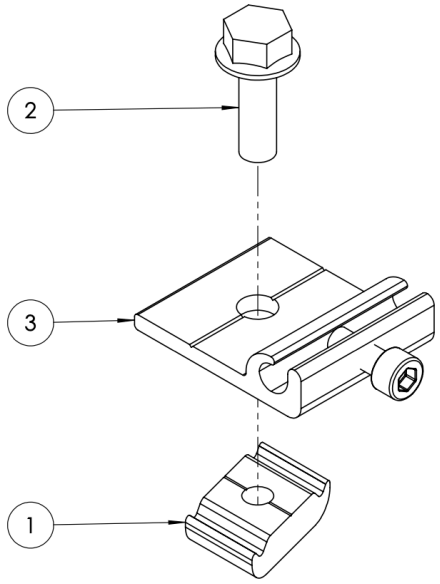


Flush version of spine support bracket - side view

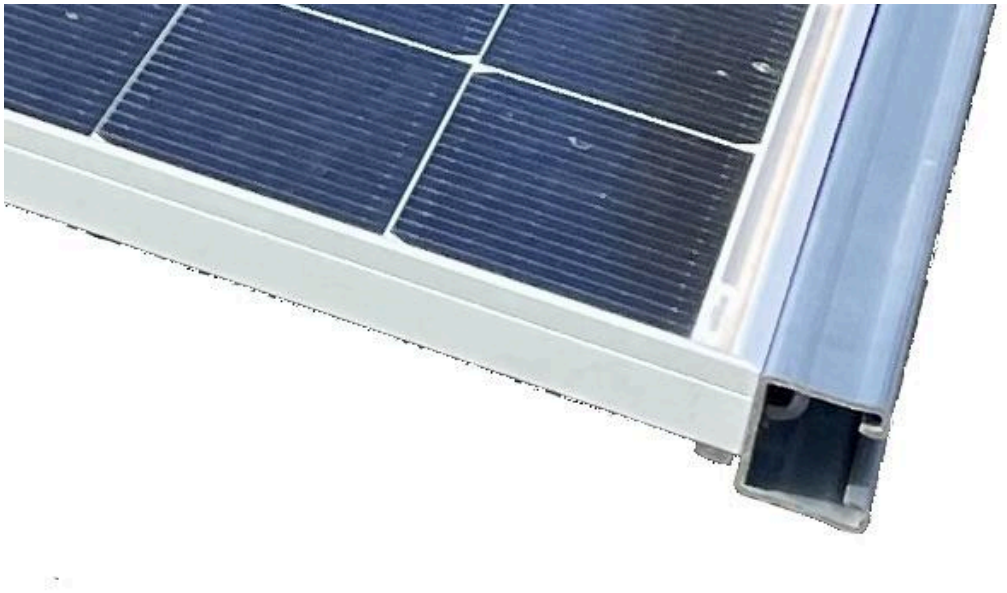
Electrical installation

Each Solpod consists of 10 solar PV modules. The modules are electrically connected to form two separate strings of 5 modules, owing to the different orientation (and solar insolation) of each Solpod wing. Three groups of 5 modules (that all have the same orientation) are electrically connected to form strings of 15 modules, suitable for connection to the solar inverter.

The remaining electrical installation, including DC cabling, DC isolators, inverter and AC cabling; is conducted using standard solar PV installation methods and procedures. The Solpod frame is fabricated from ZAM coated steel, requiring only a single earthing attachment per Solpod wing.

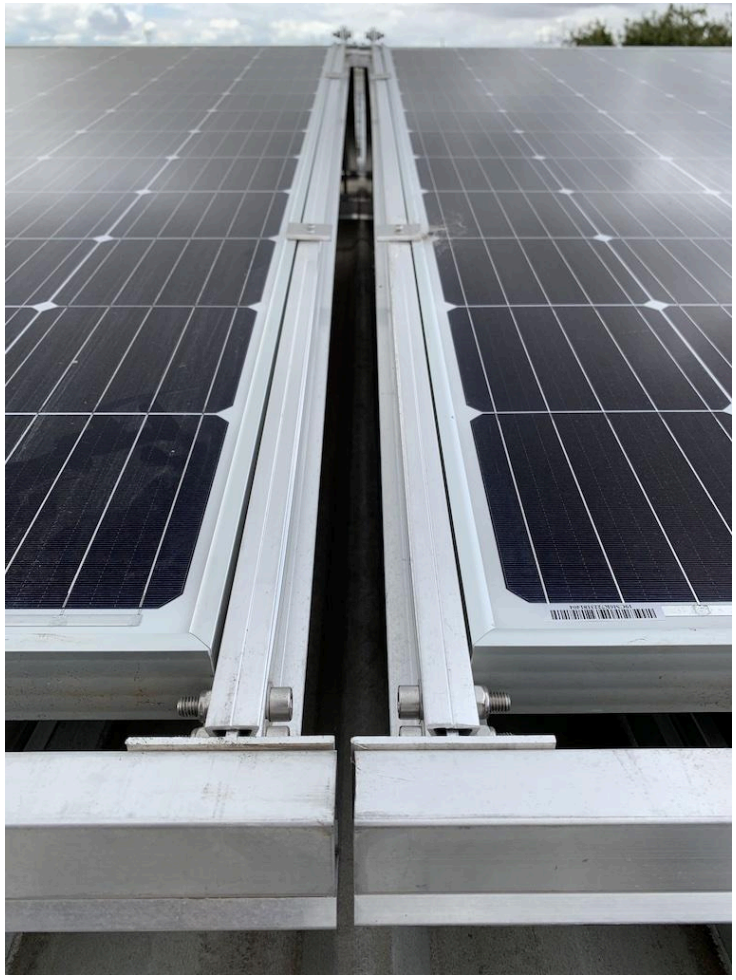


Solpod Earth Lug 02 (SPEL02)



Solpod Earth Lug can be fixed to a Solpod edge beam strut using a strut nut

Solpods can be located on the roof, with a gap of 10 mm (-5 mm, +20 mm) between the ends to minimise the cable protection requirements for the DC cables between wings.



Small gap between Solpods to simplify DC cable connections between Solpods

Maintenance

The ZAM coated steel beams, and hot dip galvanised steel brackets, used in Solpod are largely maintenance free. Only in highly polluted or marine conditions is rinsing with clean water required, during scheduled panel cleaning.

Both the roof sheet and Solpod rail (or strut) are fabricated from zinc coated steel, so there is no risk of corrosion owing to dissimilar metals. The coating is either ZAM (for the strut) or Zinc or Zincalume (for the roof sheet). ZAM and Zincalume are different brand names for the same type of coating, i.e. Zinc-Aluminium-Magnesium.