Installation Manual for Solpod v4 Ground

SP-033 Version 1.1, January 2023

Example installation of Solpod Ground (patent pending)

SOLPOD

Solpod Pty Ltd, ABN 47 623 269 947

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Introduction

Thank you for choosing the Solpod v4 Ground solar frame from Solpod Pty Ltd. Made from custom-designed aluminium extrusions and components, Solpod's streamlined design and improved frame strength greatly simplifies solar panel installation. Solpod is backed by a 10-year warranty and is compliant with the AS/NZS 1170.2:2021 on wind actions and AS/NZS 1664.1:1997 on aluminium structures.

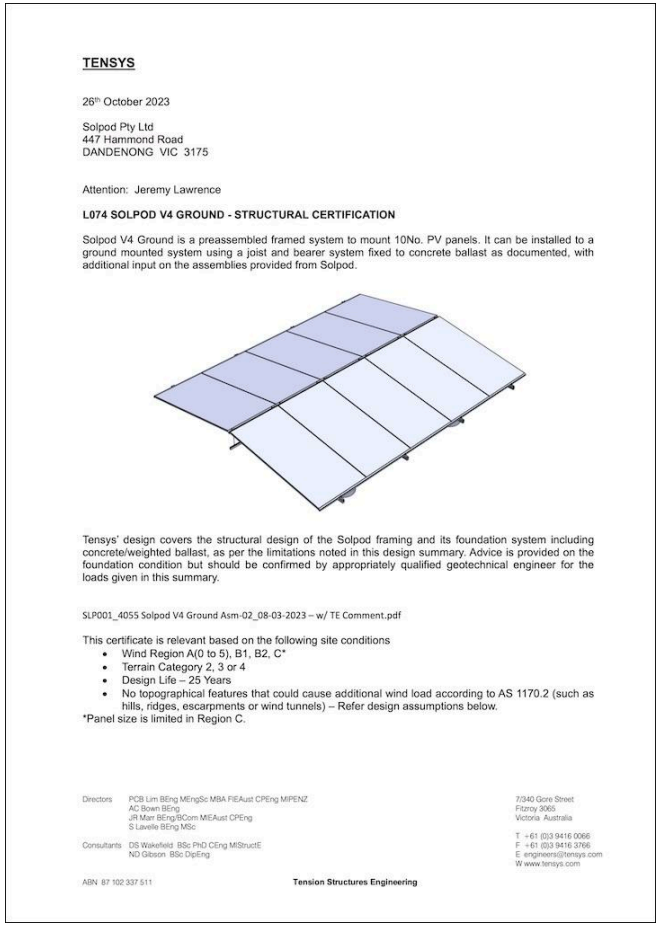
Overview

Solpod solar PV arrays are built using pre-assembled frames (or Solpods) of solar PV modules. Each Solpod is lifted into location using a crane. The spine is fixed to the ground frame, then the wings of the Solpod unfold into place.

Solpod being unfolded onto a ground frame

Compliance and certification

Solpod v4 Ground is supplied with certification that suits most sites, covering wind regions A & B, terrain category 2 & 3. Certification is provided by Tensys Engineers. Custom certification is also available for sites that aren't covered by the generic certification, e.g. for terrain category 1.5 or 1.0 (near open water). Contact Solpod for more information.



TENSYS

26th October 2023

Solpod Pty Ltd
447 Hammond Road
DANDENONG VIC 3175

Attention: Jeremy Lawrence

L074 SOLPOD V4 GROUND - STRUCTURAL CERTIFICATION

Solpod V4 Ground is a preassembled framed system to mount 10No. PV panels. It can be installed to a ground mounted system using a joist and bearer system fixed to concrete ballast as documented, with additional input on the assemblies provided from Solpod.

Tensys certificate L074b for Solpod v4 Ground

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.

Access plan and cranage plan

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

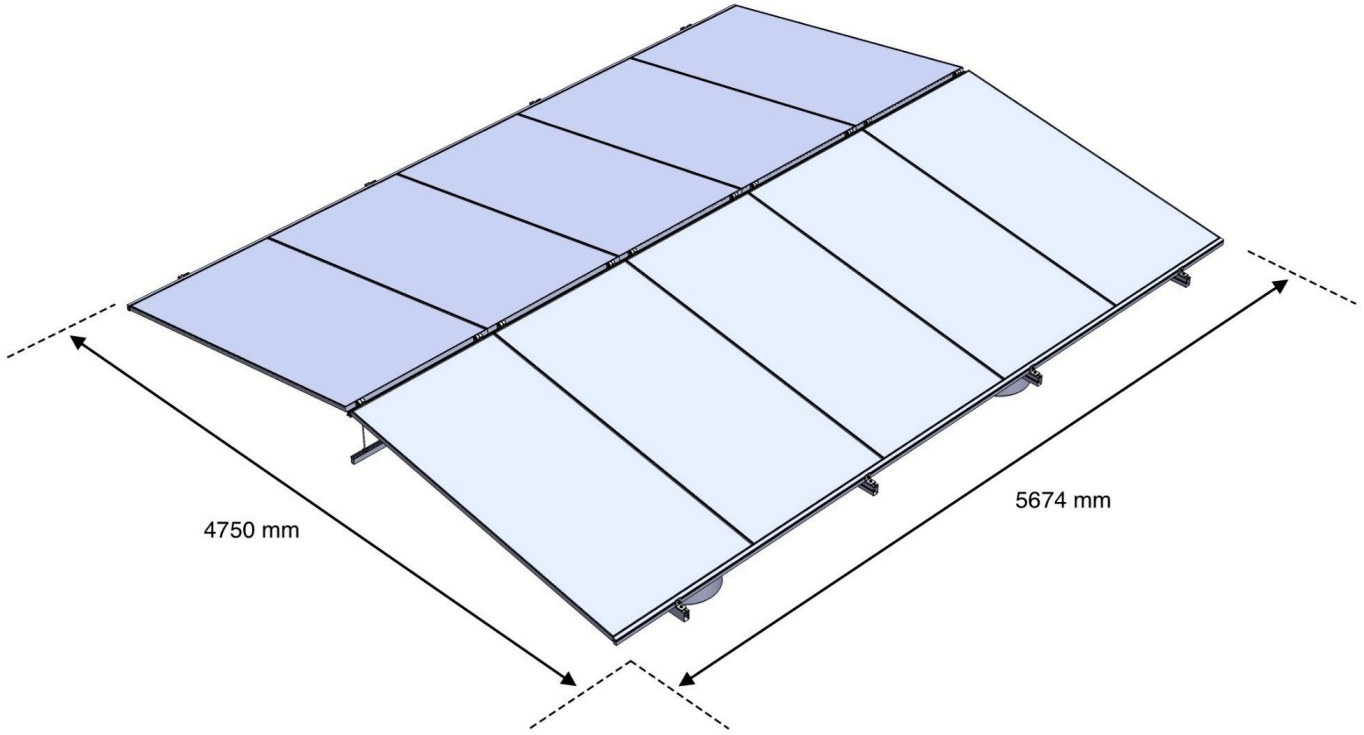
Traffic plan and material handling plan

Depending upon the 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 be located?
- Where will ancillary components (inverters, cabling, trunking) be located?
- Where will waste be stored prior to removal?

Area layout

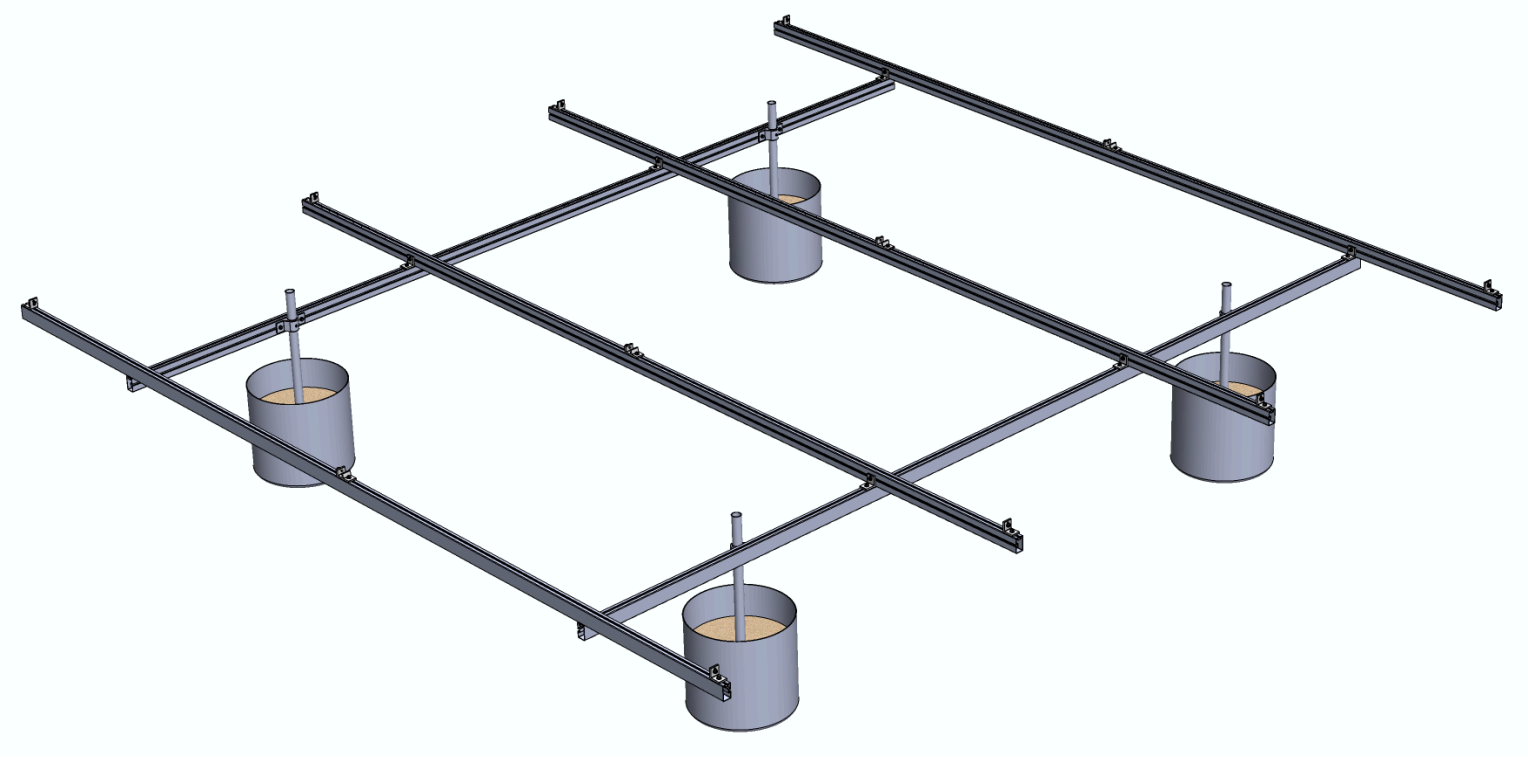
Each array consists of multiple Solpods, and space needs to be allocated for access walkways, inverters and cable trays. Each Solpod comprises two wings of each five modules, pre-assembled into strings of five. Typically, Solpods are laid out sets of three, to enable DC strings of fifteen modules, to suit the DC input range of inverters. Lengthways, Solpods can be installed with a 20-60 mm gap between them to minimise the need for extra hardware for DC cable protection. Sideways, Solpods should be installed with a 600 mm gap to allow access to the fixings along the edge beams.



Solpod v4 Ground dimensions, using ten modules each 2278 x 1134 mm

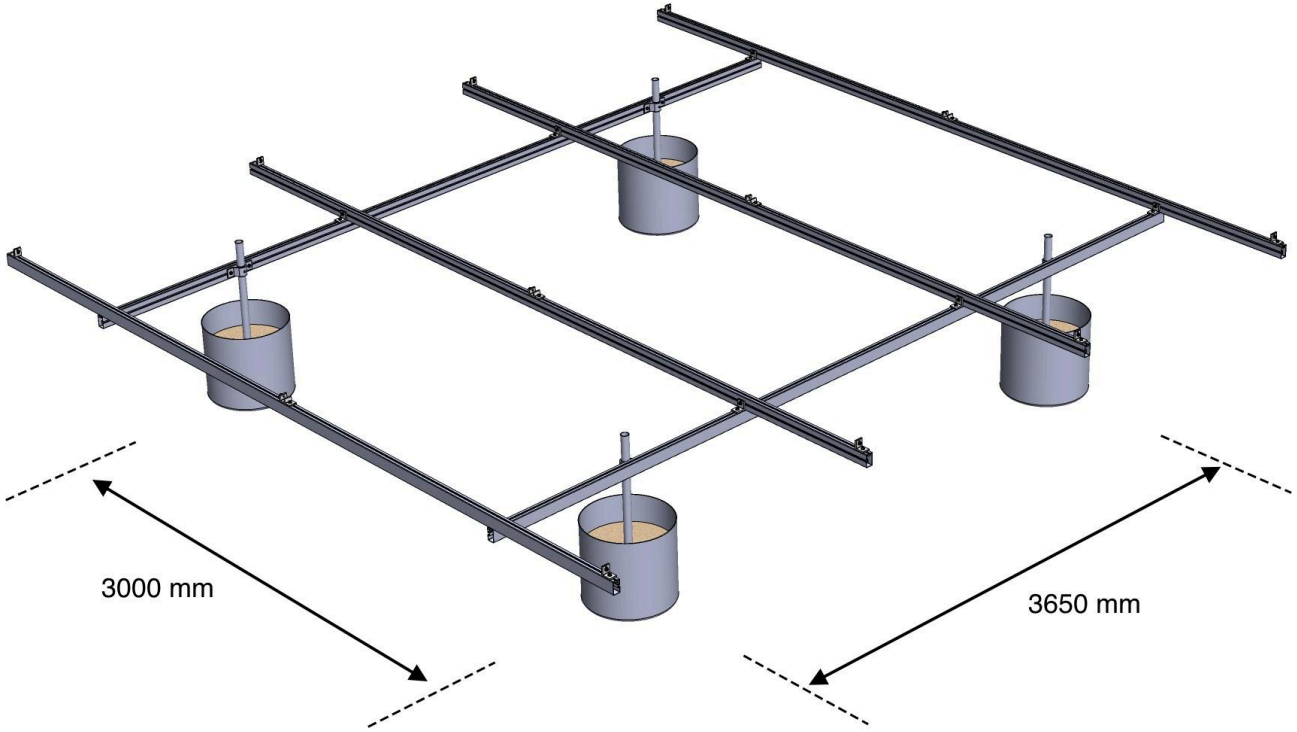
Ground frame

Each Solpod is supported on a ground frame, which is held down using four anchors. The anchors can either be non-penetrating, such as ballast blocks (shown below), or penetrating, such as Mega-Anchors. The ground frame is designed to be adjustable to cope with uneven ground, e.g. the ballast blocks can be moved up to 250 mm away from their default location, and the whole frame can be adjusted vertically on the risers. The two bearers do not have to be perfectly parallel.



Ground frame for Solpod v4, showing four ballast blocks, two bearers, four joists, F-brackets, and L-brackets.

The four anchors (or ballast blocks) are spaced at 3000 x 3650 mm, for Solpod v4 Ground using modules 2278 x 1134 mm.

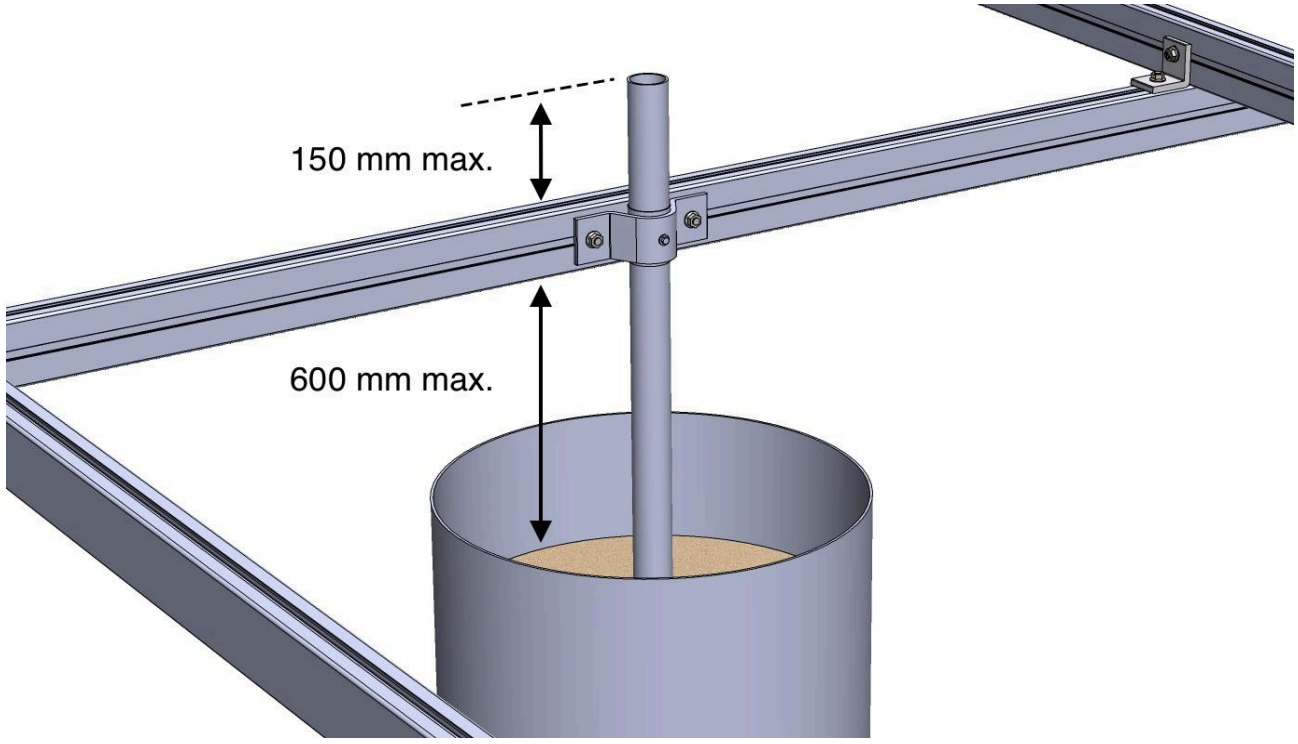


Solpod v4 Ground dimensions, showing spacing of ballast blocks

To mark out the location of the anchors, or ballast blocks:

1. Define one of the four anchors in each Solpod as the datum
2. Mark out the location of the datum anchor for each Solpod, e.g. 5700 mm apart lengthways (comprising 5674 mm for the Solpod and 26 mm for a gap) and 5350 mm apart sideways (comprising 4750 mm for the Solpod and 600 mm for a walkway)
3. Mark out the location of the other three anchors for each Solpod, referenced to the datum

The maximum distance between the top of the concrete and the underside of the bearer is 600 mm, and the maximum projection of the riser is 150 mm above the top of the bearer. Use a laser level to place marks on the riser, to ensure the whole array is level.

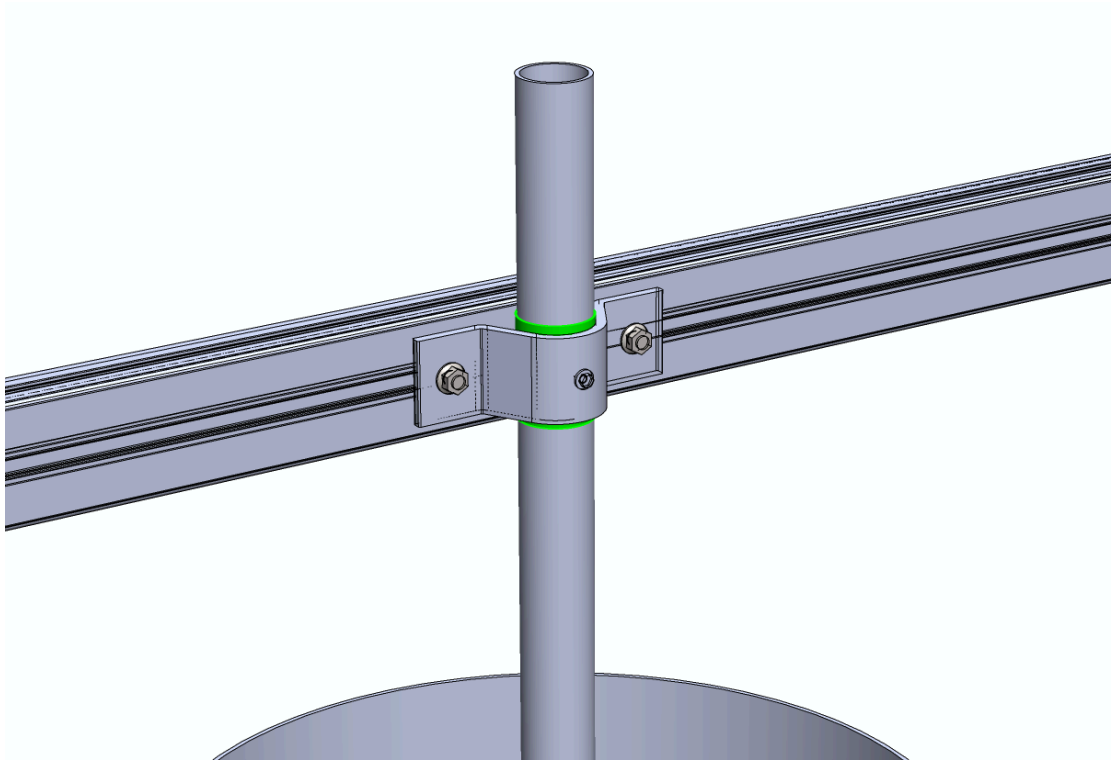


Limits on risers

After the bearers and joists are in-place and aligned, lock each riser brackets in position using a 12g Tek screw, pre-drill using 4.0 or 4.5 mm.

Riser bracket fixed using 12g Tek screw

If the array is located in a highly corrosive environment, e.g. within 200 metres of the sea, use an EPDM barrier between the riser (galvanised steel) and the bearer & riser bracket (aluminium).



EPDM wrapped around riser in highly corrosive environments

Lifting Solpods into location

Lifting the Solpod pallet from the truck to the ground

Solpods are delivered to site on a pallet (or container base). Two pallets can fit on a 14 metre long flat-bed truck. Pallets are lifted off the truck using the same crane that lifts the pods to the roof, using a 3 metre spreader bar and chains to the corner lifting lugs. For more details, refer to the Installation Manual for Solpod v4 Roof, or the Solpod channel on YouTube.

Lifting from the pallet to the array location

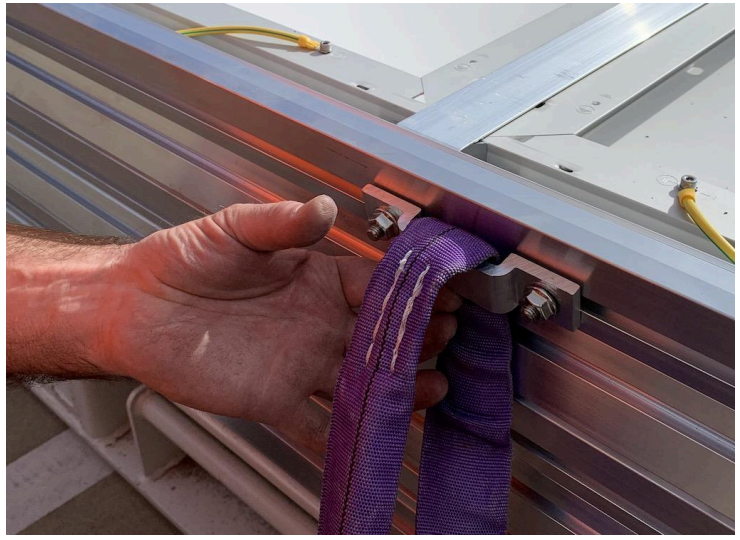
Solpods are lifted from the pallet to the array location using a crane and four chains. The following components are required, which can typically be hired with the crane:

- Two chain sets (four chains in total), each chain set to an equal length of between 3 and 4 metres, rated to 1 tonne
- Shackles and hooks to suit

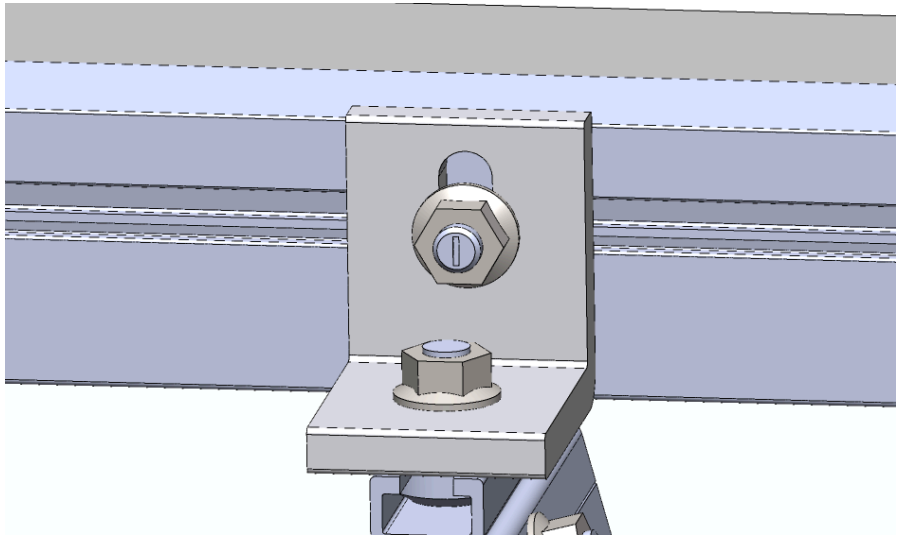
During craning, workers do not stand under the Solpod; they stand to the sides, and guide the Solpod using the attached guide-lines. This allows the Solpod to be rotated and translated into the desired position. For more details, refer to the Installation Manual for Solpod v4 Roof, or the Solpod channel on YouTube.

Connecting chains to each Solpod

Each delivery of Solpods is supplied with three sets of slings brackets. Each set consists of four sling brackets and four 1 metre slings. Each sling bracket has T-headed fasteners that allow the sling brackets to be attached to the slot on the edge beam of the Solpod. Each T-headed fastener has a marked line to indicate the angle of rotation. When fitted and rotated correctly into position, the marked line is vertical. The sling brackets are fitted at one metre in from the ends of the Solpods.



1 metre sling and sling bracket, fasteners about to be tightened



Example of marker line in the end of a T-headed fastener, used to fix both L-bracket and sling-brackets to the edge beams

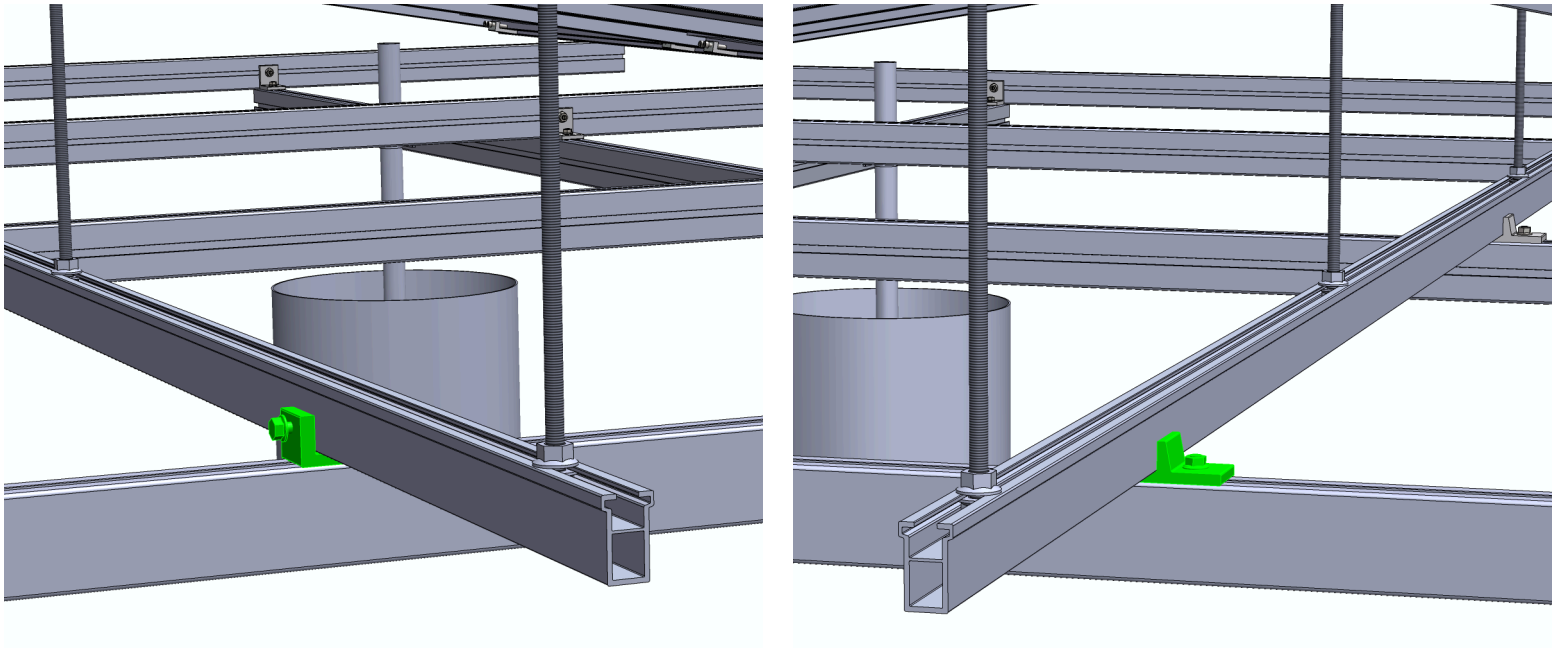
Unfolding

The crane lowers the Solpod down into the F-brackets, which are already fixed down onto the joists. After the horizontal fasteners in the F-brackets are tightened (onto the spine lower beam) the crane lowers the Solpod further, allowing the two wings to unfold, until the edge beams rest on the joists. Workers position and then tighten the L-brackets, before detaching the chains so the crane can begin the next cycle.

Solpod being unfolded.

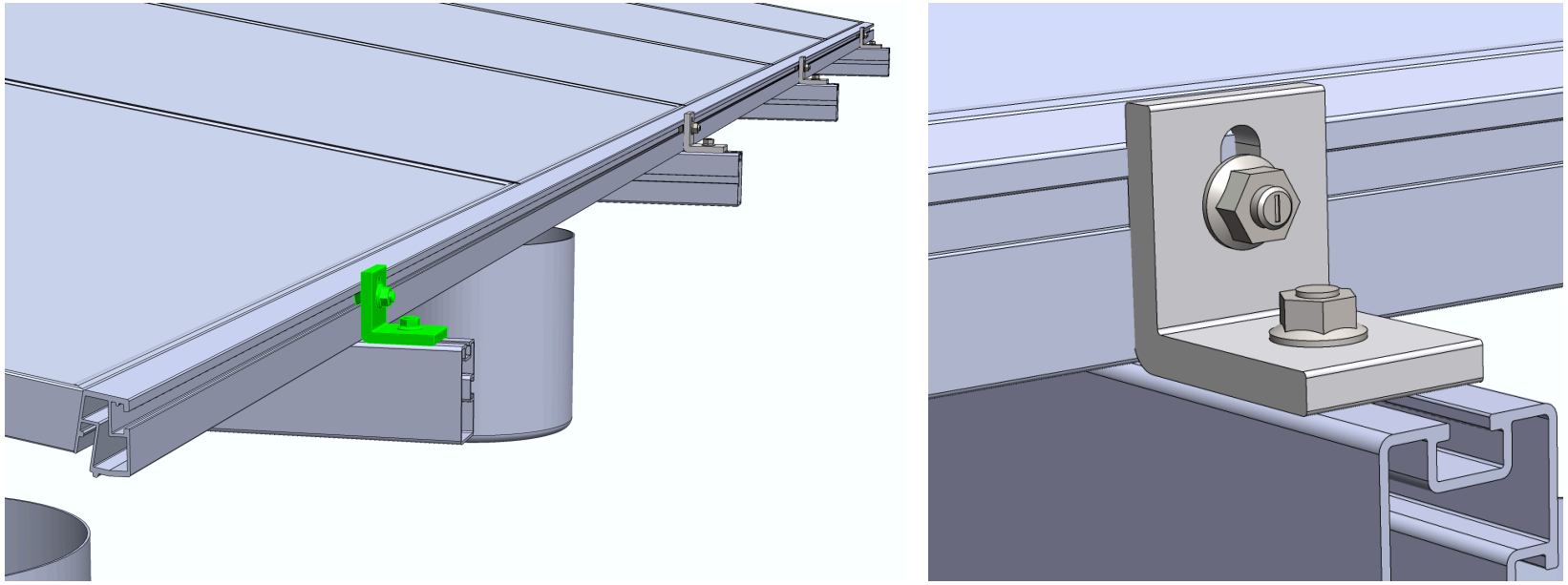
F-brackets and L-brackets

Each Solpod contacts the joists via three extruded aluminium beams - the spine lower beam and the two edge beams. F-brackets hold the spine lower beam, and L-brackets hold the edge beams. F-brackets use two fasteners, one down to the joist, tightened to 10 N.m, and one horizontal, tightened to 10-20 N.m, pressing against the side of the spine lower beam to create a 1 mm embedment.



F-brackets hold the spine lower beam to the joists.

L-brackets use two fasteners, one down to the joist, tightened to 10 N.m, and custom T-headed fastener that is inserted into the slot on the edge beam, then rotated into position before tightening, also to 10 N.m. The T-headed fastener has a marked line to indicate the degree of rotation. When properly inserted and rotated, the marker line is vertical.



L-brackets hold the edge beams to the joists. The marked line on the tip of the T-headed fastener should be vertical.

Ballast weight

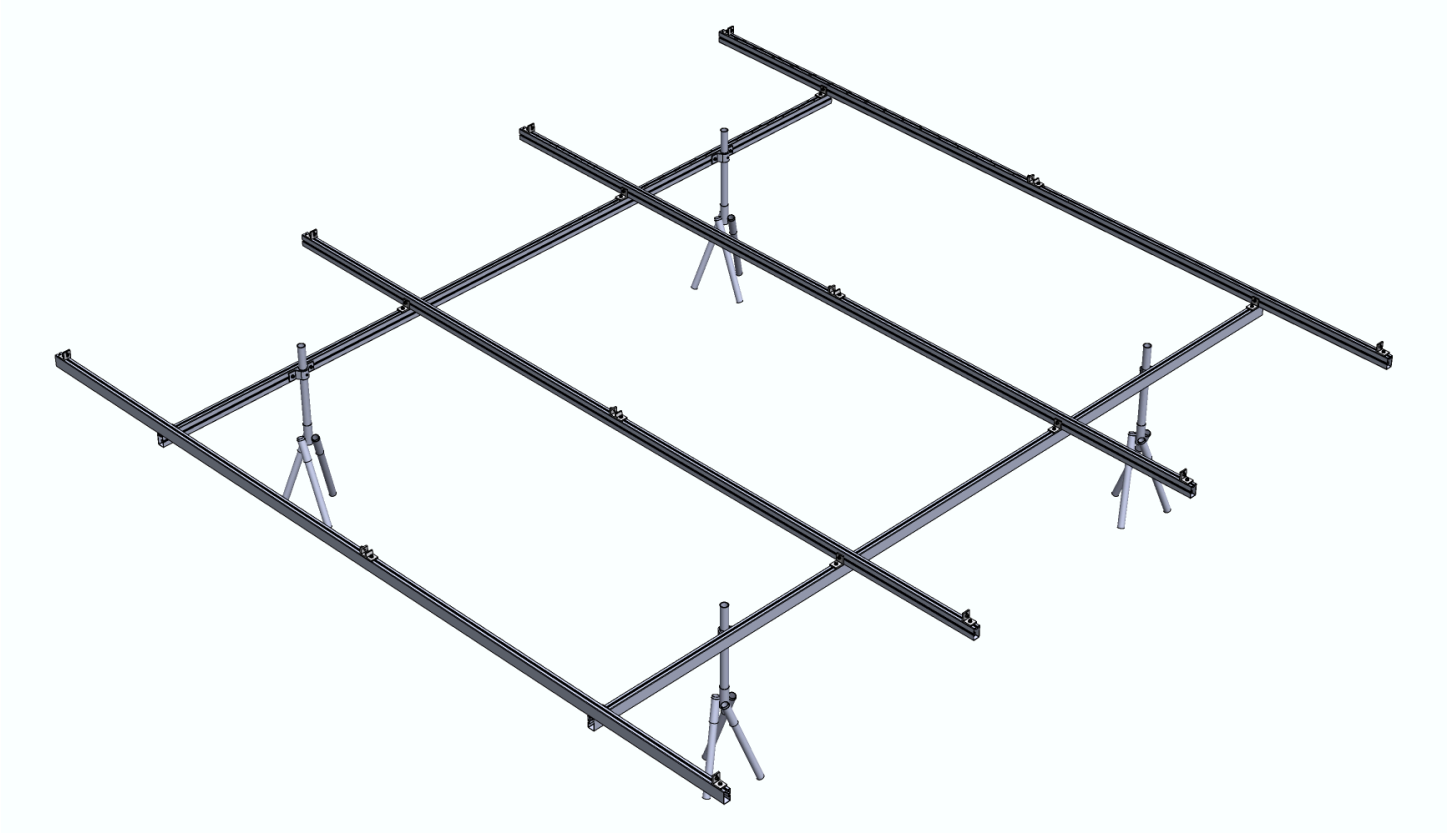
Ballast requirements are reproduced from certification letter L074b from Tensys Engineering:

S30	Wind Region			
TC	A	B1	B2	C*
TC2	675	1170	1330	2000
TC2.5	580	1030	1180	1800
TC3	500	900	1040	1600
TC4	330	665	775	1250

Minimum Total Concrete Ballast for Solpod v4 Ground using S30 Panels.
Ballast is to be equally distributed to 4No. Planters.
**Note for Region C, currently only S20 panels can be used, refer below.*

Mega-Anchor

Solpod v4 Ground can also be installed on Mega-Anchors, instead of ballast blocks. Each Mega-Anchor uses three piles, each 1 metre long, delivering adequate capacity for Wind Region A, B1 or B2.



Ground frame for Solpod v4, showing four Mega-Anchors, two bearers, four joists, F-brackets, and L-brackets.

Cable trays

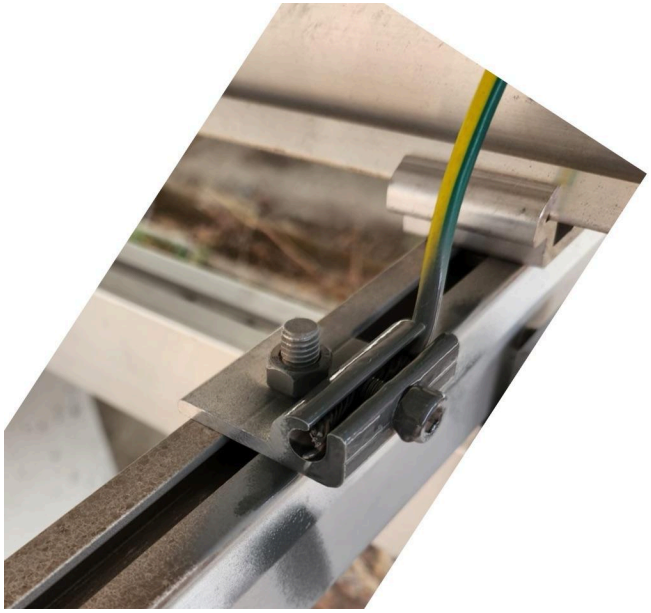
Solpod can offer aluminium channel, channel lid and channel feet as an alternative to galvanised steel cable tray. Solpod channel can be fixed to the joists on the ground frame, via Solpod Channel Feet.

Solpod Channel fixed under Solpods, used to carry DC cables to a termination point

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 pod 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 mill-finish aluminium, requiring only a single earthing attachment per pod wing.



Earth cable attached to earth lug (SPEL-GB37) that fixes to a joist, with zinc spray.

Maintenance

The mill-finish aluminium used in Solpod is largely maintenance free. Only in highly polluted or marine conditions is rinsing with clean water required, during scheduled panel cleaning.