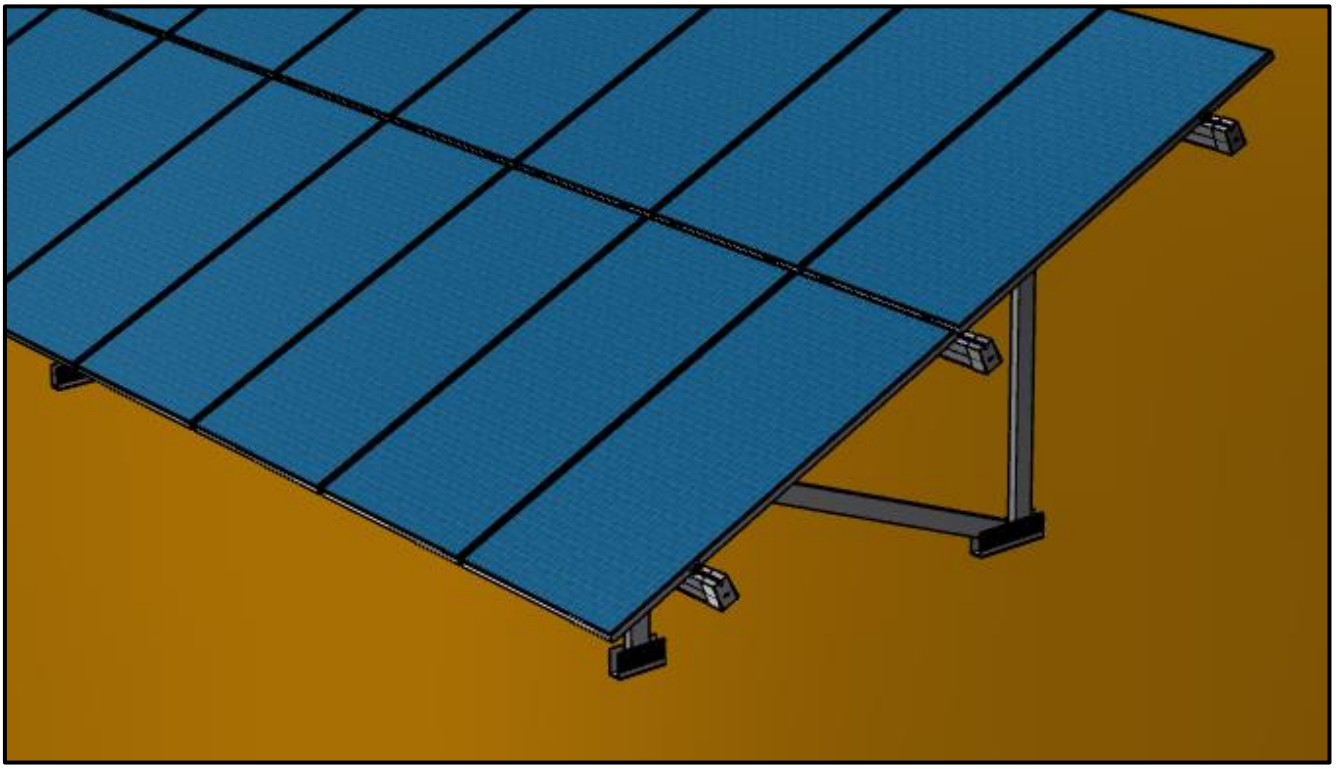
www.axestruct.com VAT no.: 4470284136 Reg. no.: 2018/528173/07

Installation Manual

IM_AXE_GM_EL

Elite Tilted Ground Mounting System

For framed PV modules in portrait orientation



Declaration

- Only the highest quality components are used in the mounting system in order to ensure trouble-free operation of your solar power system. The following information explains the proper setup of the Axe Struct ground mounting system tilted in open fields.
- Any unique structural features must be documented so that the unique features of the terrain can be taken into account when planning the layout.
- Always fasten the bolted connection by turning the bolt head. Do not turn the nut, just hold it.

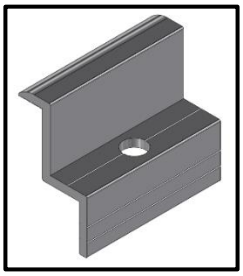
Contents

① Components

End Clamp

AXE_AL_CE_AP

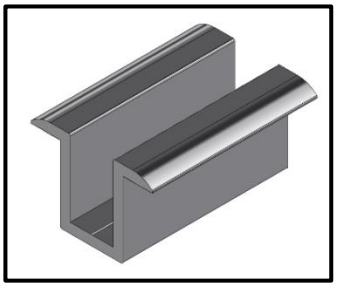
For PV modules with 30mm, 35mm and 40mm frame heights



Mid Clamp

AXE_AL_CM_AP

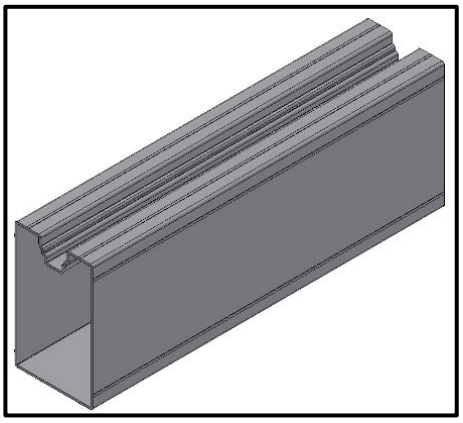
Clamping down any framed PV modules



Rail Splice

AXE_AL_EX_120_76

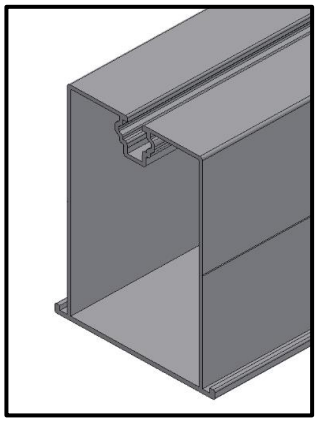
Extending Rails



Rail

AXE_AL_L_R_120_76

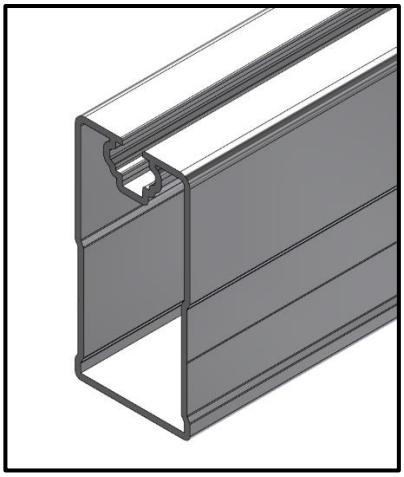
6 to 10m lengths



Rafter

AXE_AL_L_RF_120_60

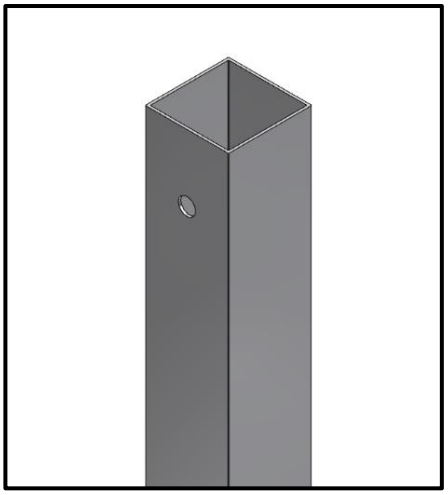
Support for Rails, connection to Piles



Pile

AXE_AL_L_SQR

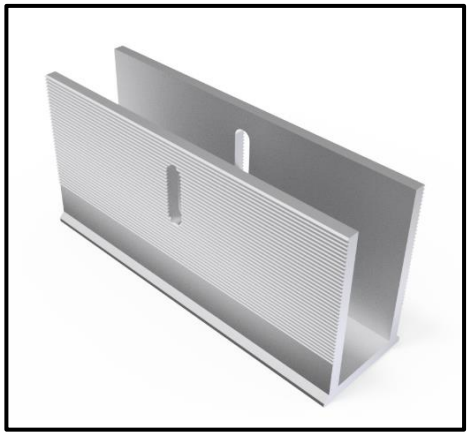
Profile for ground uprignt support



Base Slot Bracket

AXE_AL_BR_BS_S_50

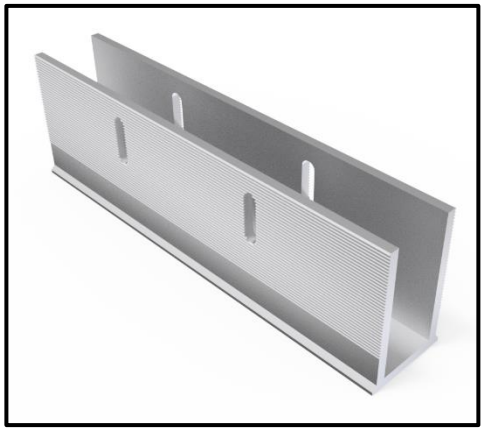
Front pile base connection



Base Slot Bracket

AXE_AL_BR_BS_D_50

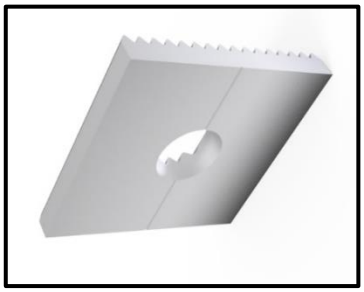
Middle and Back pile base connection



Chock Washer

AXE_AL_CW_12

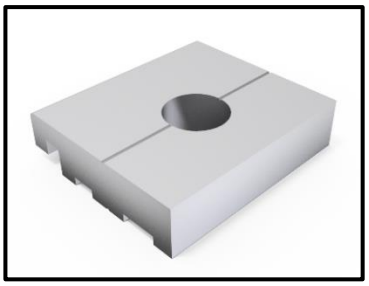
Base connection washer



Rail Clip

AXE_AL_CP_GM

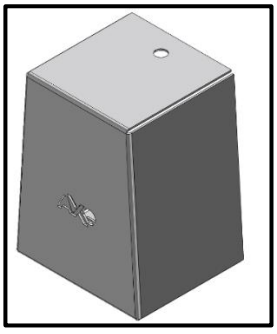
Holding Rail to Rafter



End Cap

AXE_AL_EC_120_76

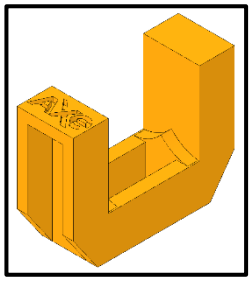
Rounding of Rail ends



Nut Stopper

AXE_PP_NST_8

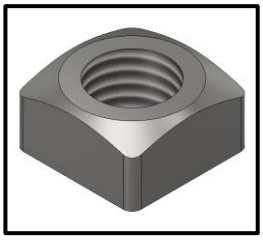
Guiding M8 Square nut into position



M8/10 Square Nut

AXE_SS_NSQ_8/10

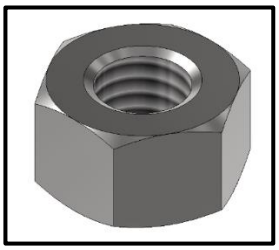
PV Module connection to Rails & Rail connection to Rafter



M12 Hex Nut

AXE_SS_NH_12

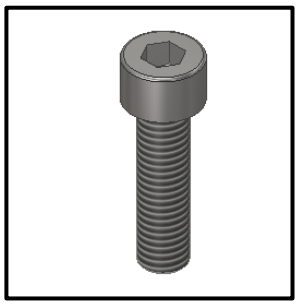
Pile-Rafter connection



M8 Hex-cap Screw

AXE_SS_CS_8

PV module connection



Self Drilling Tek Screw

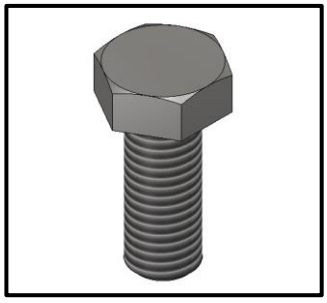
AXE_GS_ST_6.3

Splice connection

M10 Hex Bolt

AXE_GS_BH_10

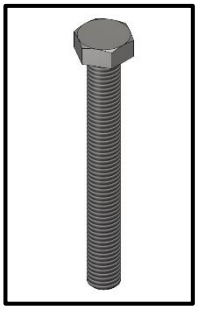
Rafter-Rail connection



M12 Hex Bolt

AXE_GS_BH_12

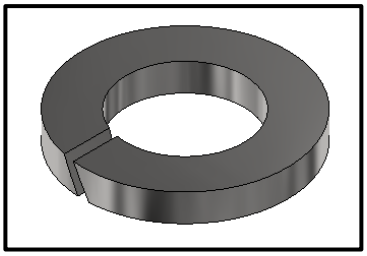
Pile-Rafter and Base connection



M8, M10 or M12 Spring Washer

AXE_GS_WS_8/10/12

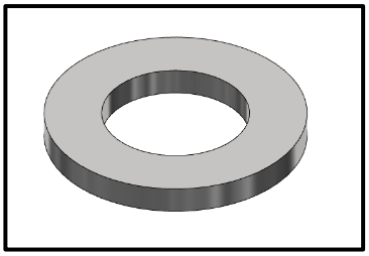
PV module, Bracket or Pile-Rafter connection



M12 Large Flat Washer

AXE_SS_WF_12

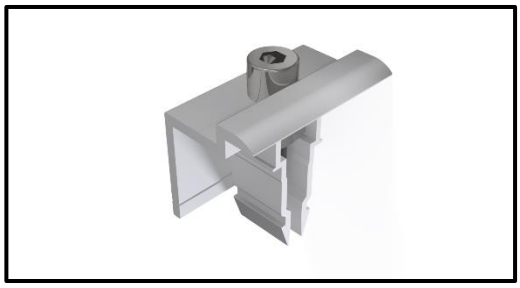
Pile-Rafter connection



End Clamp

AXE_AL_CE_CF

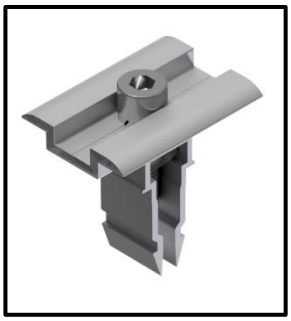
For PV modules with 35mm and 40mm frame heights



Mid Clamp

AXE_AL_CM_CF

Clamping down any framed PV modules



Seizing (Galling) Prevention

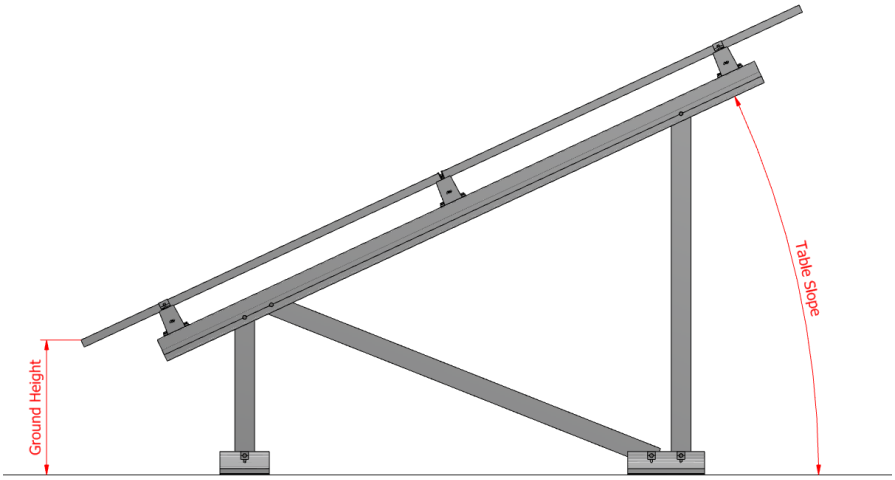
It is recommended that Copper Slip paste is applied in all threaded connections, specifically Stainless-Steel fasteners. This will prevent fasteners for seizing and promotes good practice. A further step to prevent seizing is to tighten fasteners at low rpm's, without interruptions and apply steady pressure.

② Layout positioning

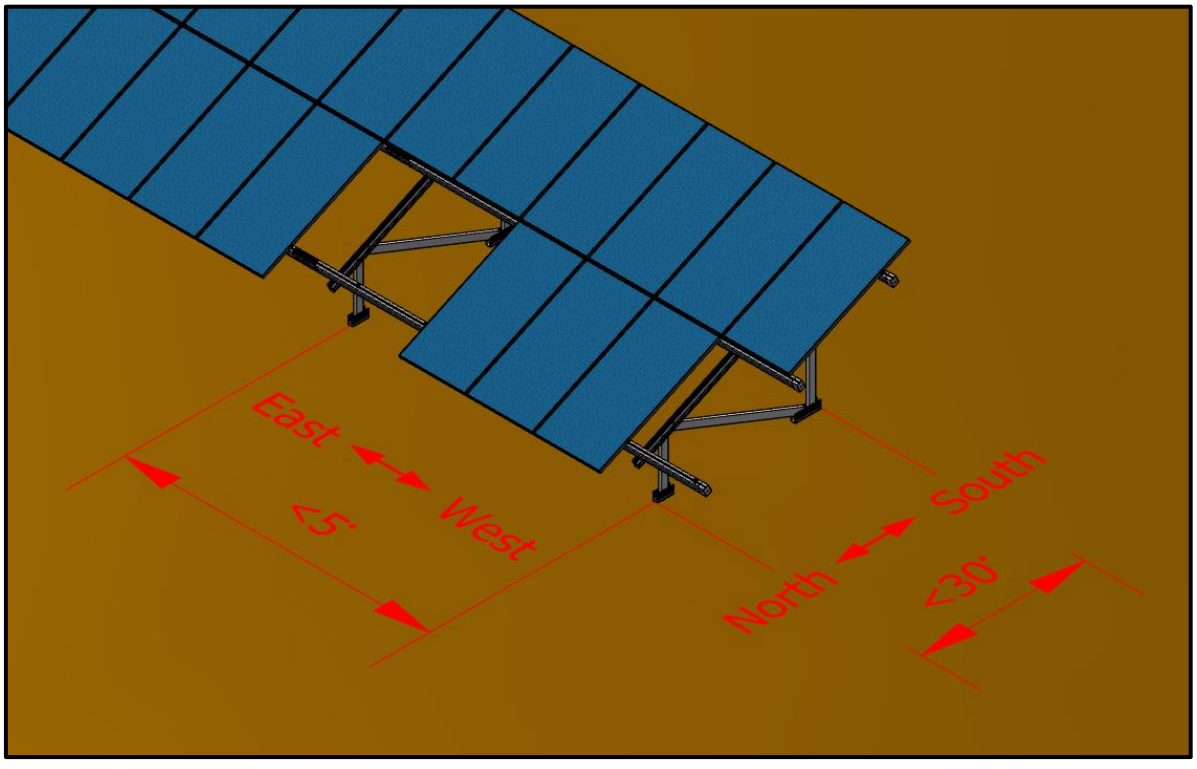
Profile cross sections and the span between Piles varies per selected PV module and site conditions. This must be determined by structural analysis. A geotechnical report is required to determine and regulate the pile driving (ramming) depth.

A minimum distance of 19 mm must be kept between PV modules. Mid Clamps can be used as spacing to maintain this distance.

The ground mount system is designed according to the selected table slope, number of PV modules per table and table height from ground level.



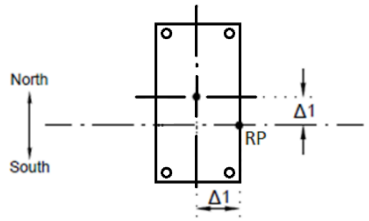
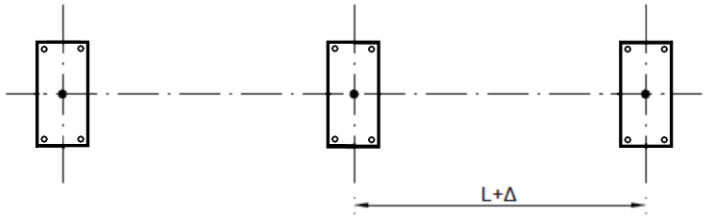
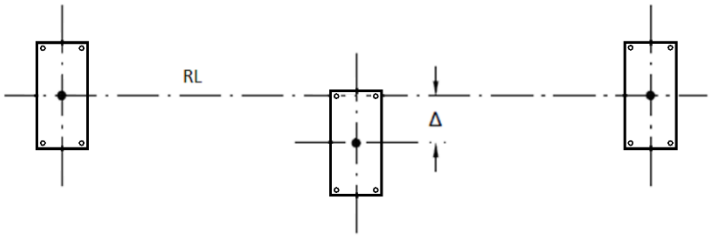
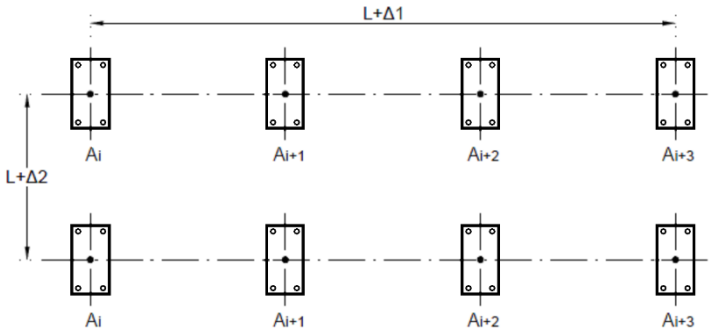
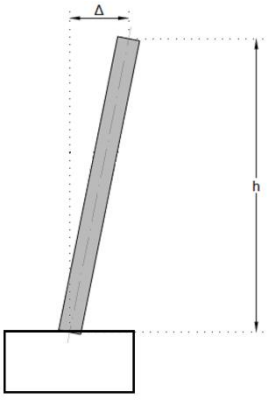
Terrain geography must be conveyed to the designer in order to maintain the requested table slope and PV module ground clearance height. The East – West terrain slope must be within 5° tolerance and for the North – South terrain slope it must be lower than 30°.

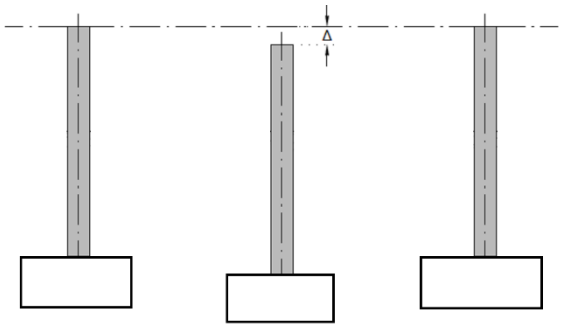


③ Foundation fixings

Mark out positions of foundation locations. Prepare designated areas for concrete bases, including compaction if needed. Place/cast reinforced concrete bases. Use guide plate and dowel in four threaded rods per concrete base.

Tolerances to consider when lining up threaded rods in concrete bases (measured at ground level):

Description	Depiction	Tolerance
Individual 4 rod grouping position relative to the refence point (RP)		Δ1 = ±10mm
Individual 4 rod grouping spacing relative to adjacent 4 rod grouping		Δ = ±10mm
General 4 rod grouping alignment relative to refence line (RL)		Δ = ±10mm
Overall table length and North – South spacing		Δ1 = ±20mm Δ2 = ±10mm
Individual post inclination		Δ = h/300

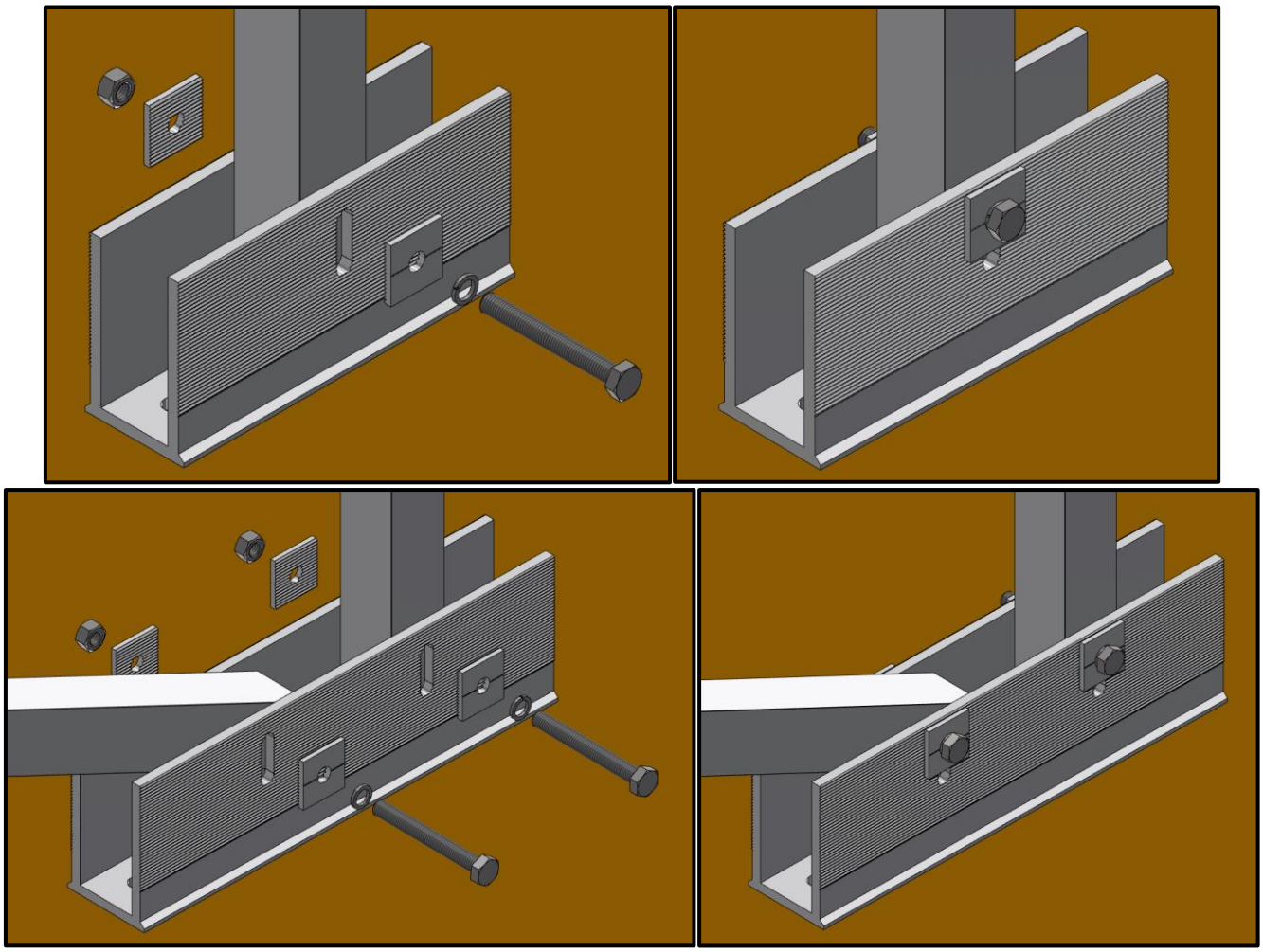
Individual base level relevant to adjacent base		Δ = ±10mm

④ Mounting Piles

Rafters are connected to the Front short Pile and corresponding Back long Pile. Use M12x90 Hex Bolts, M12 Spring Washers, M12 Flat Washers and M12 Hex Nuts to line up the connection.

Recommendation

- Use the middle holes on the rafter and pile to connect the first rafter and last rafter on each table. Once each table's outer rafters are assembled, a gut line must be stretched between these rafters. Rafters in the middle of the table between the outer rafter assemblies can then be aligned with the gut line as a reference using the adjustment holes on the piles and rafters.



Foundation connection

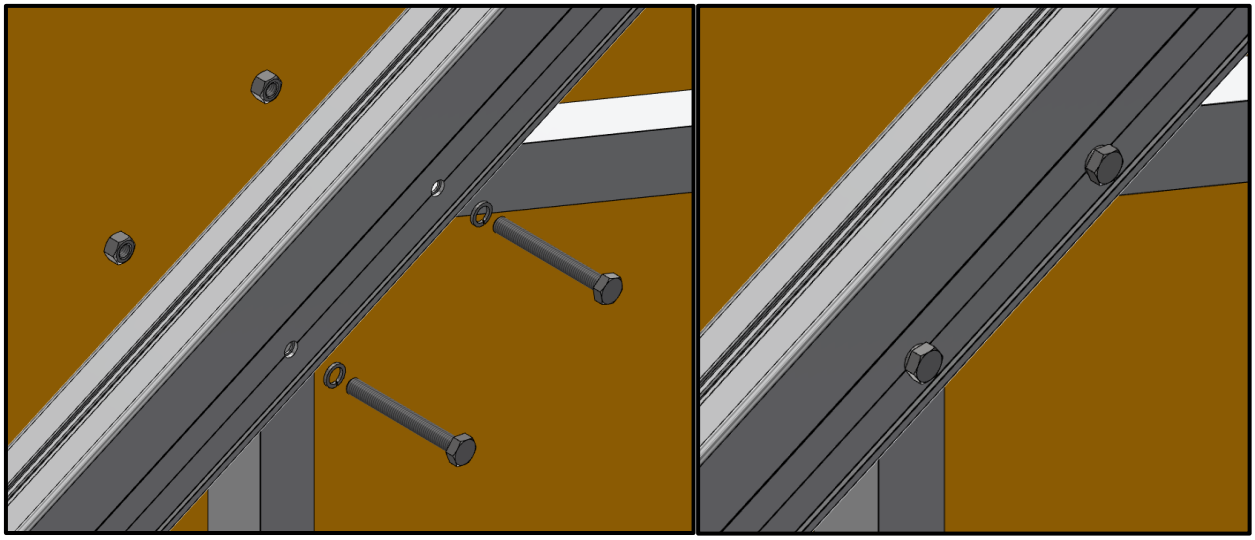
We strongly advise to pre-cast the M12 Threaded rods in the concrete base with a bolted washer that has an OD of 80mm and a thickness of 4mm. This washer should sit lower than the midpoint of the base depth. At own risk, an alternative method can be pursued by utilizing chemical anchors. The specifications and installation methods of suppliers should be strictly adhered to.

④ Mounting Rafters

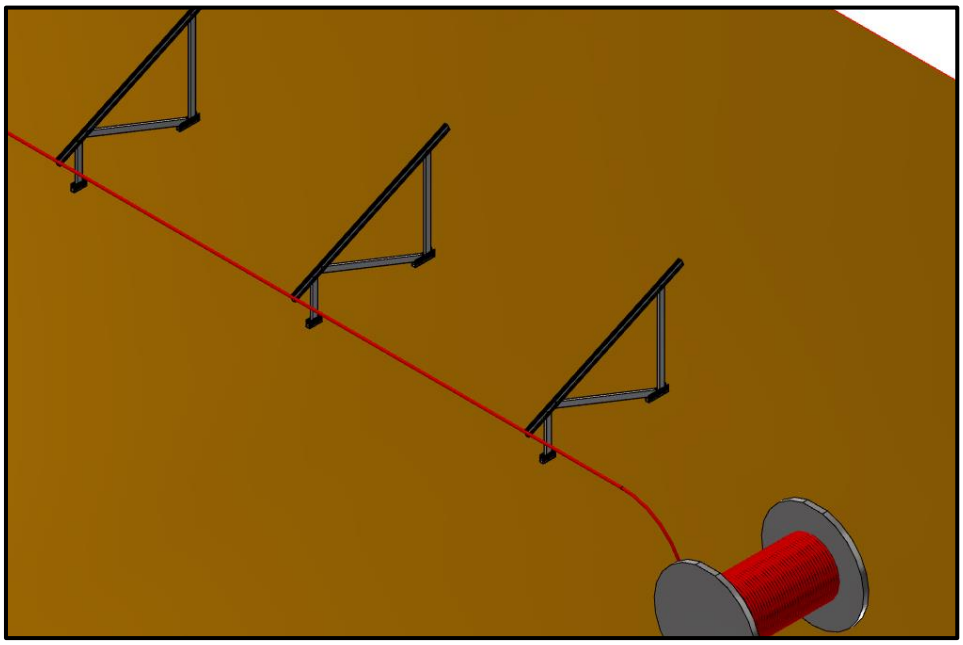
Rafters are connected to the Front short Pile and corresponding Back long Pile. Use M12x90 Hex Bolts, M12 Spring Washers, M12 Flat Washers and M12 Hex Nuts to line up the connection.

Recommendation

- Use the middle holes on the rafter and pile to connect the first rafter and last rafter on each table. Once each table's outer rafters are assembled, a gut line must be stretched between these rafters. Rafters in the middle of the table between the outer rafter assemblies can then be aligned with the gut line as a reference using the adjustment holes on the piles and rafters.



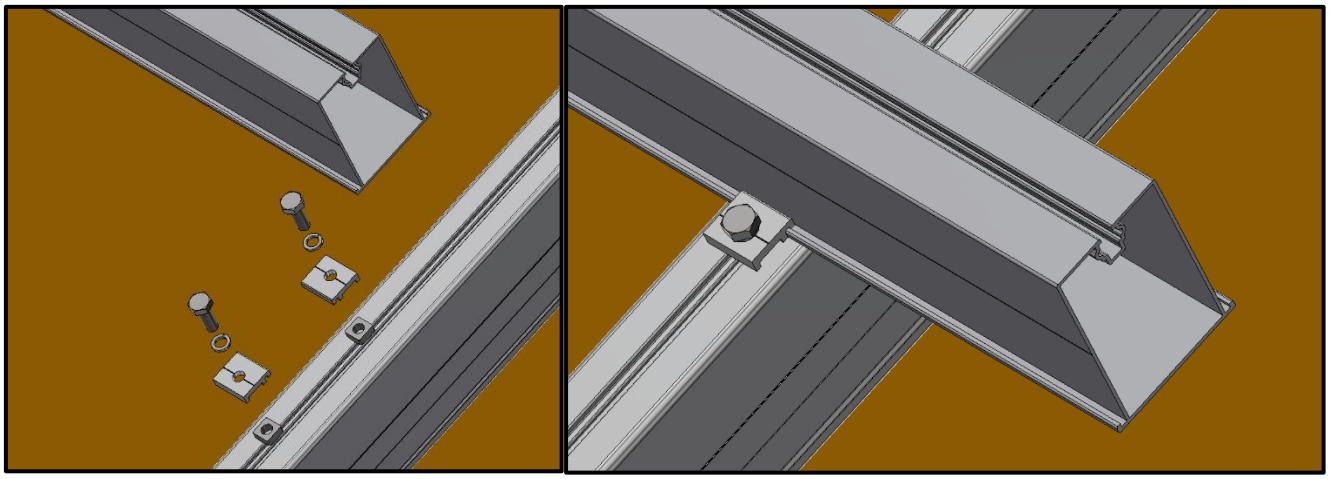
The M12 bolt and nut connections are torqued to 100 N.m. once all the Rafters have been aligned on a single table. This alignment must be done for both the bottom and top end of the Rafters in a vertical and horizontal plane.



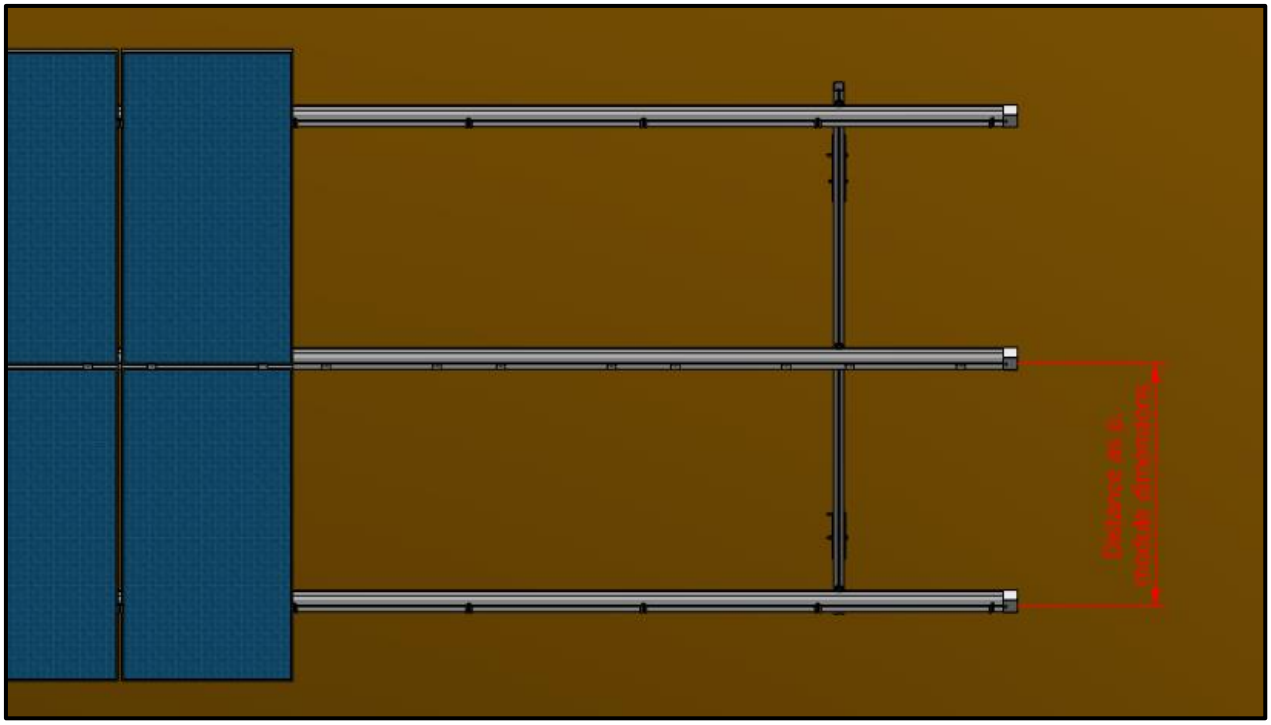
The Rafters must be aligned so that there will be no stresses in the PV module upon installation.

⑤ Mounting Rails

Position Rails on top of the Raftersl. Connect Rail Clips to rail by inserting M10 Square Nuts into Rafters cavity. Use M10x30 Hex Bolts, M10 Spring washers and M10 Square Nuts to tighten connection at 38 N.m. Spring washers are added to each connection configuration to ensure connection will not loosen over time.

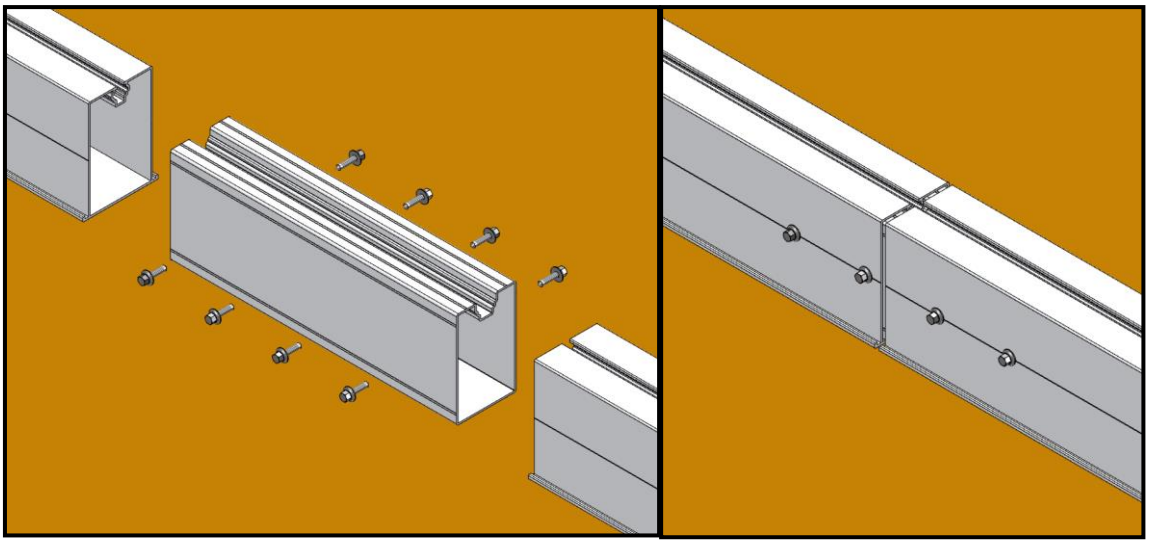


The rail spacings are dependent on the dimensions of the PV module used. PV module installation manuals indicate supporting requirements.



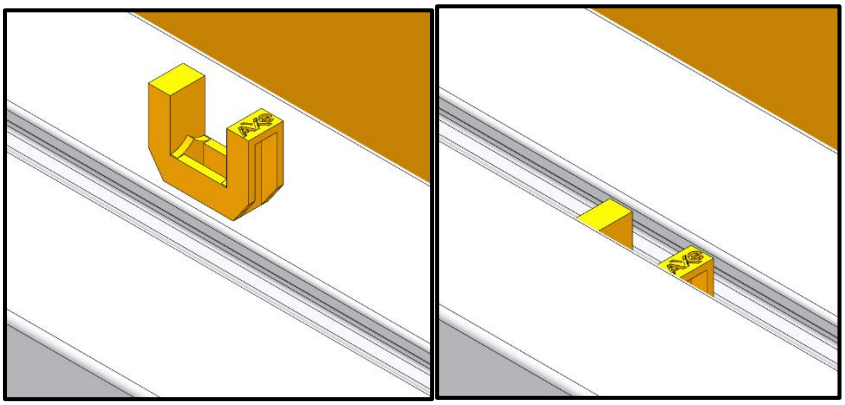
⑨ Joining Rails

Slide Rail Splice halfway, indicated on Rail Splice with a marker, into each adjoining Rail. Use 8 x M5.5 Self Drilling Tek Screws to tighten the connection.

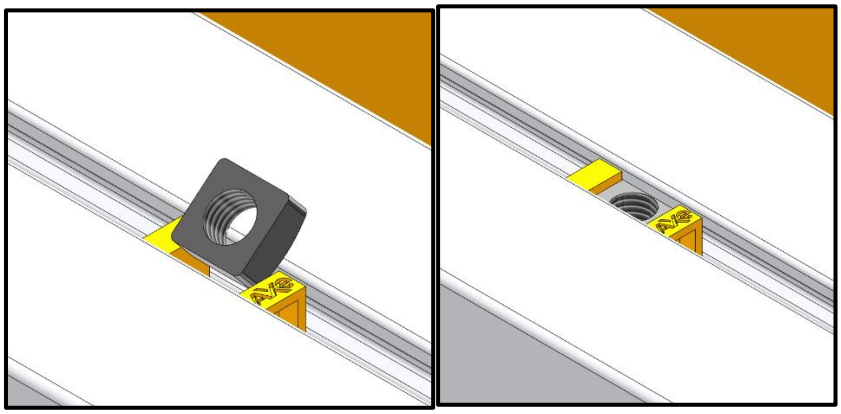


⑩ PV module installation

Insert Nut Stoppers into rail gap where the installation of PV module Clamps will be.

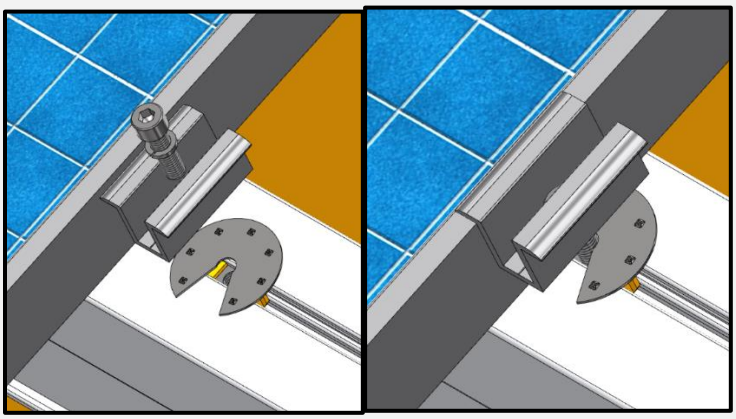


Position a M8 Square Nut at each Nut Stopper. Slide M8 Square Nut at an angle into Rail cavity so that it falls vertically with flat side facing upwards.

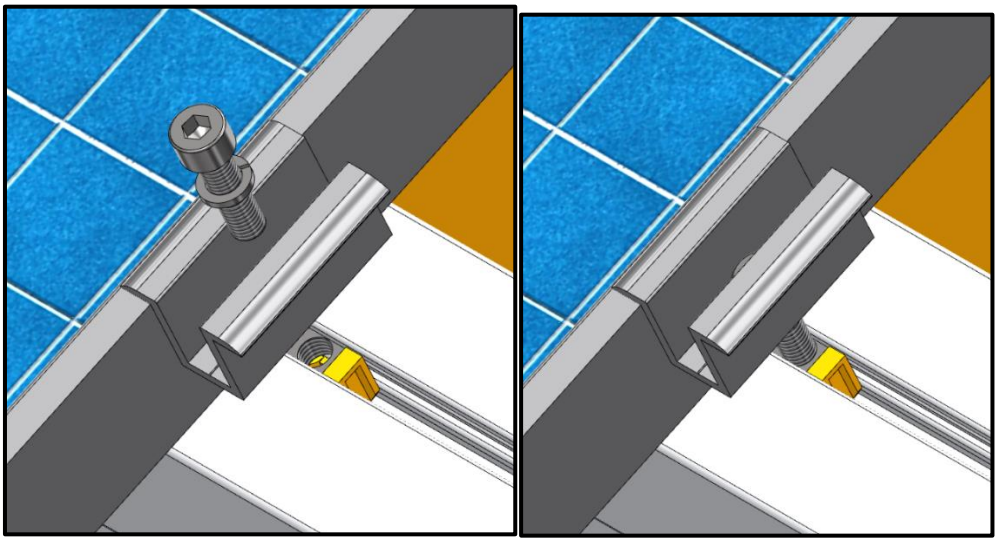


Earthing insurance

In order to ensure continuity for conduction of the earth system the anodizing layer on the PV module frames must be broken by installing Earth Plates. The Nut Stopper and Square Nut configuration must first be in position ready for the PV module's clamping configuration. An Earth Plate is then placed on the Rail with the long lip in the rail cavity and behind the Nut Stopper. The PV module is slightly lifted and the Earth Plate is then slid along the rail cavity up to the PV module until the short lip of the Earth Plate touches the side of the PV module. The PV module is then dropped on top of the spikes of the Earth Plate. This will align the Square Nut with the centre hole in the Earth Plate.

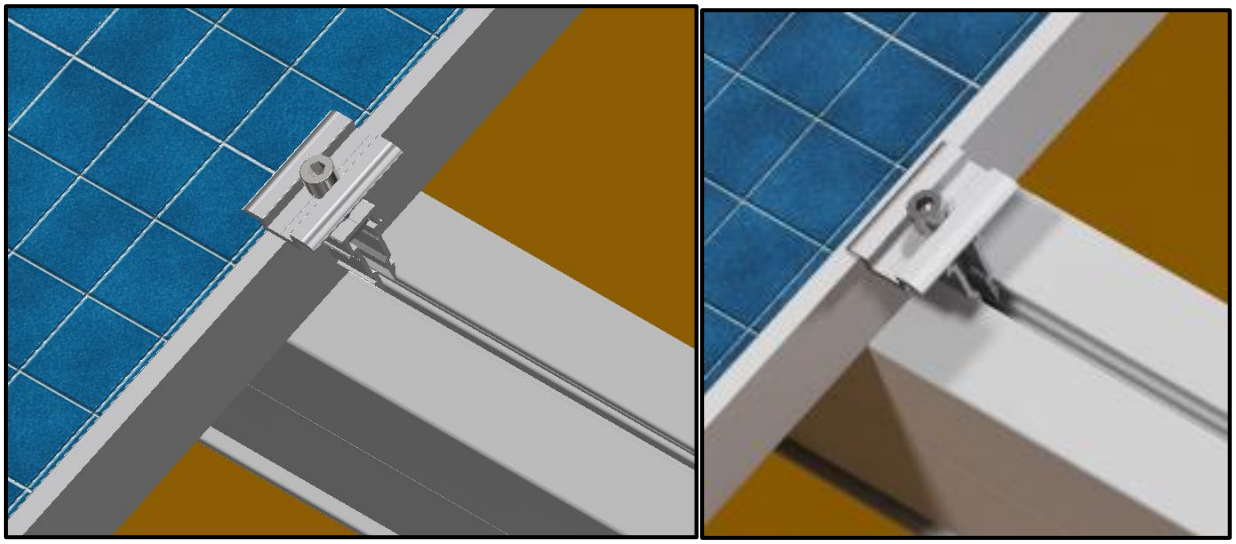


PV modules are laid onto Rails in portrait view so that each PV module is supported by 2x rail lengths. Install PV module Clamps on the sides of the PV module so that each PV module is fixed on 4x locations. 1x clamp per opposing long side and 2x clamps on short side will hold each PV module down to the Rails. Torque M8 Hex-Cap Screws at 18 N.m.

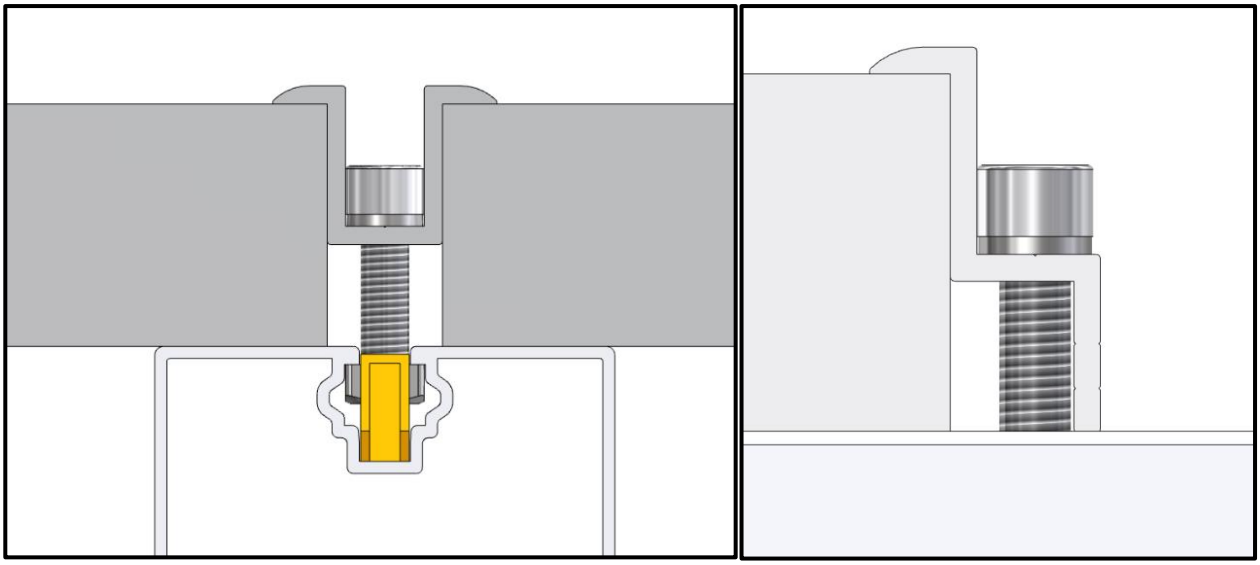


Click Fix

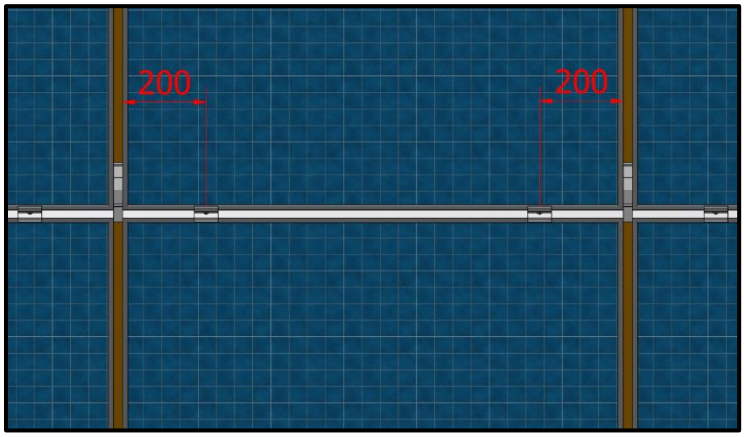
With the **M8 Hex Cap Screw** protruding, Insert **Mid Clamp Click Fix** between panels by simply pushing the pegs in to the slot in the rail. With the **Click Fix Clamp** firmly in the rail, position the panels flush with the clamp and **Torque** the **M8 Hex Screw** to **18N.m**. Do not repeatedly insert and remove the **Click Fix Parts**



Mid Clamps are used in between 2x PV modules and End Clamps are used at the end of a row of PV Modules. Make sure to mount Clamps flash against PV module sides.

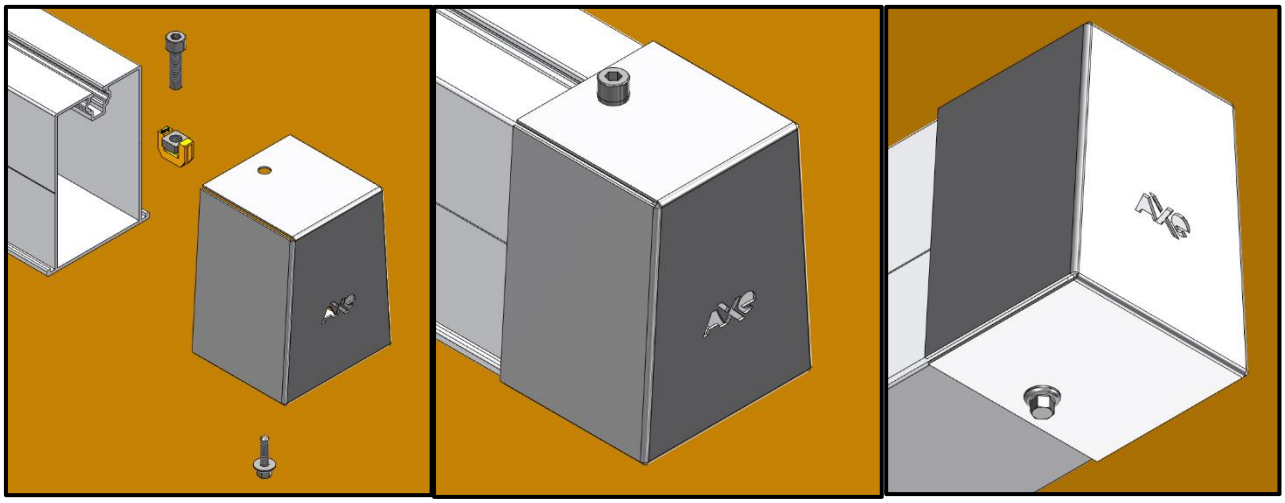


The centre of Mid Clamps used on the PV modules' short sides must be installed ±200mm from the PV module's side edges.



⑧ End Caps

Slide End Caps over the end of Rails for neat aesthetics. Position Nut Stopper and Square Nut configuration close to the end of a Rail. Slide End Cap over and tighten with M8x20 Hex Cap Screw. An M6.3 Self Drilling Tek Screw can be installed at the bottom of the End Cap for additional security.



⑨ Maintenance

The products are to be inspected annually in the form of a visual inspection of the whole installation. Axe Struct must be notified of any first appearances of rust and abnormal deformations.

Annual spot checks are to be done on fasteners to ensure that the minimum required torque moment specified in this Manual is met.

Zinc paint touch-ups must be done where galvanising layers have been damaged.

Cleaning of the product must be done with water with a pH between 6 and 10, and without chemicals.

⑩ Liability

Axe Struct can accept no liability for damage arising due to improper use, installation, operation or maintenance. Liability is further excluded if Axe Struct is not at fault due to gross negligence or intent.

The text and images in this Installation Manual correspond to the state of the art upon printing. Subject to change.