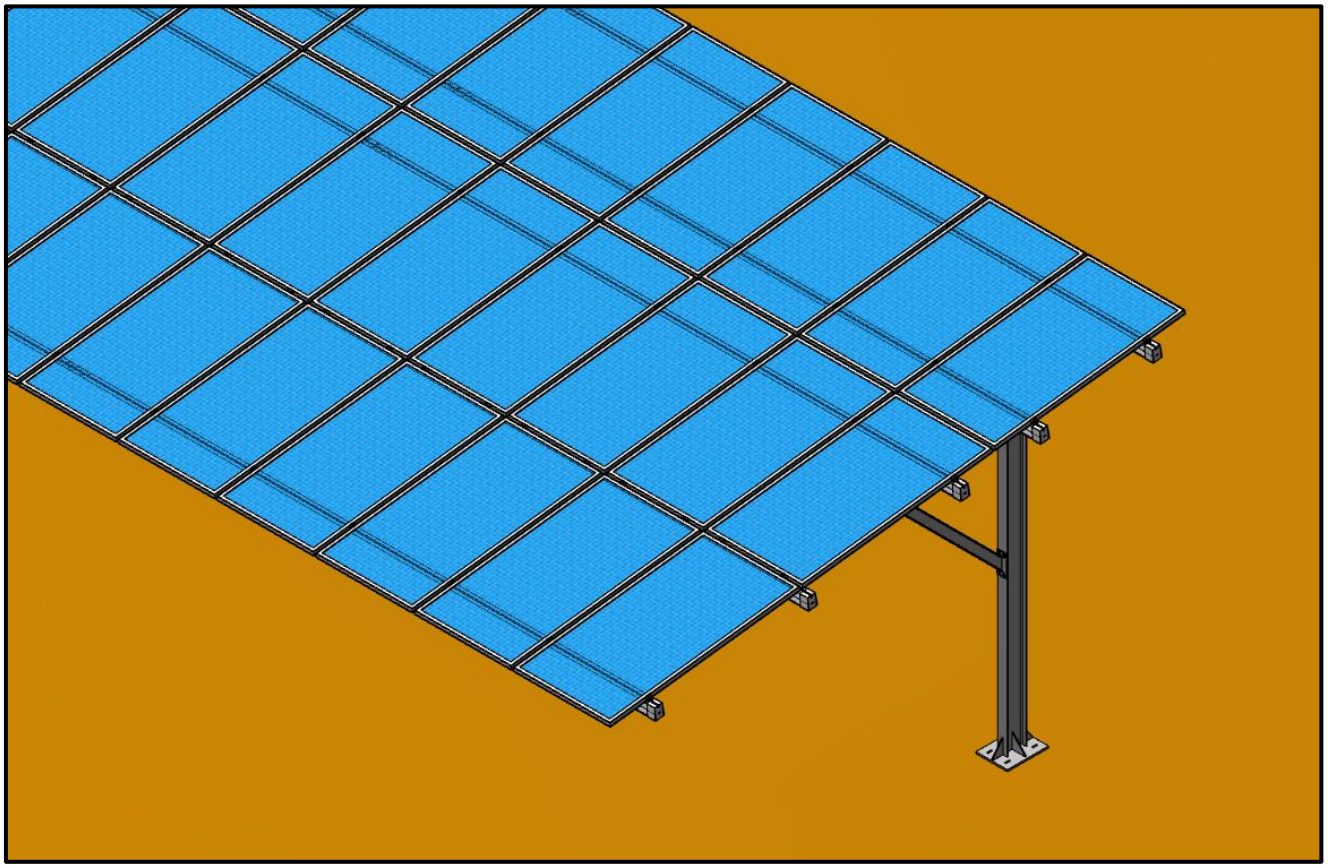
www.axestruct.com VAT no.: 4470284136 Reg. no.: 2018/528173/07

Installation Manual

IM_AXE_CP_EXC

Exclusive Tilted Car Port 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.

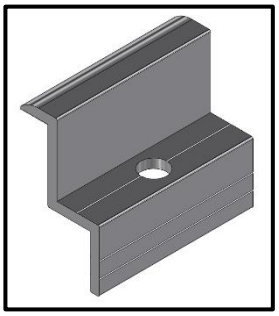
Contents

① Components

End Clamp

AXE_AL_CE_AP_40

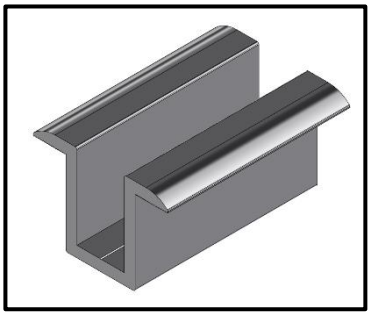
For PV modules with 30mm, 35mm and 40mm frame heights



Mid Clamp

AXE_AL_CM_AP

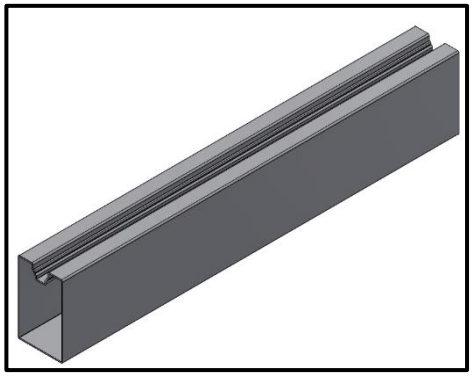
Clamping down any framed PV modules



Rail Splice

AXE_AL_RL_EX_120_76

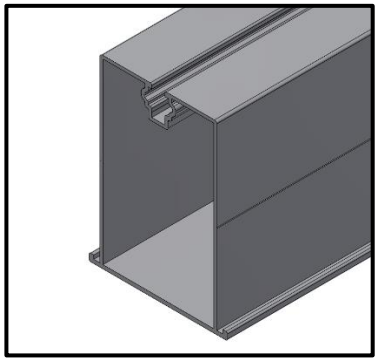
Extending Rails



Rail

AXE_AL_RL_120_76

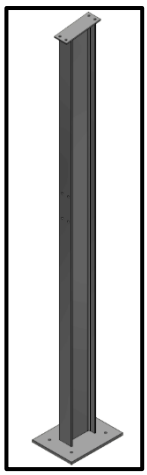
6 to 10m lengths



Pile

AXE_GS_LF

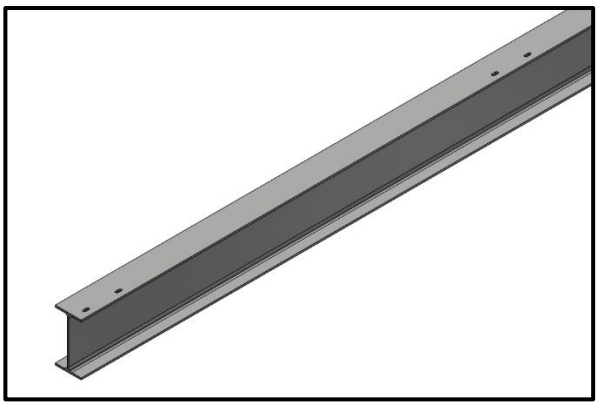
Ramming profile for ground uprignt support



Rafter

AXE_GS_L

Support for Rails, connection to Piles



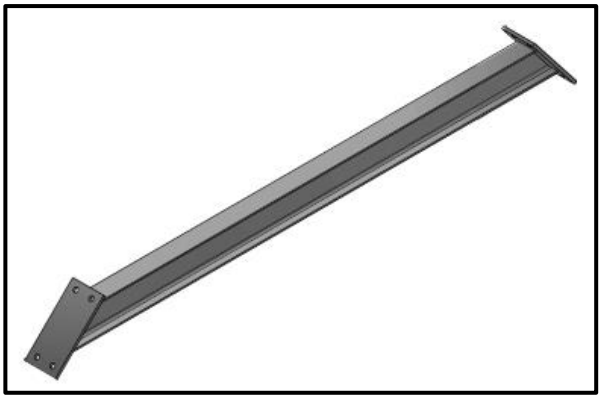
Bracing

AXE_GS_LF

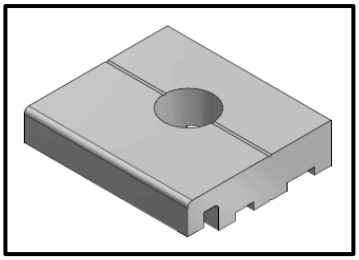
Rail Clip

AXE_AL_CP_GM

Support for Rafters, connection to Piles



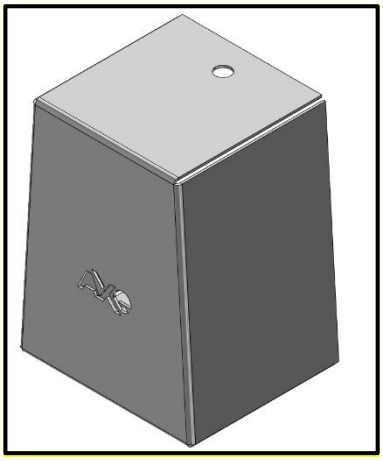
Holding Rail to Rafter



End Cap

AXE_AL_RL_EC_120

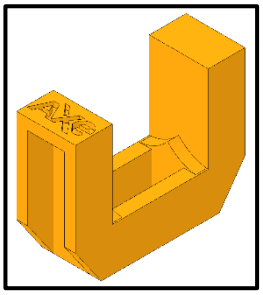
Rounding of Rail ends



Nut Stopper

AXE_PP_NST_8

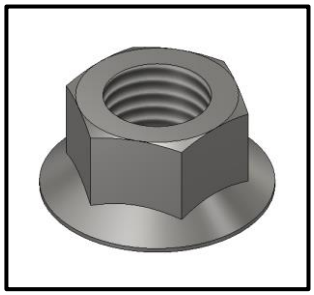
Guiding M8 Square nut into position



M8 or M12 Hex-flange Nut

AXE_SS_NHF_8/10

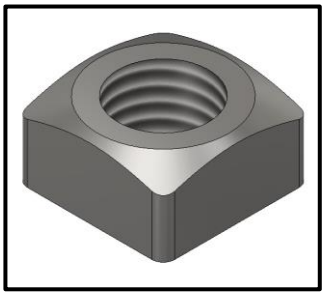
Rail Clip or Pile connection to Rafter



M8 or M10 Square Nut

AXE_SS_NSQ_8/10

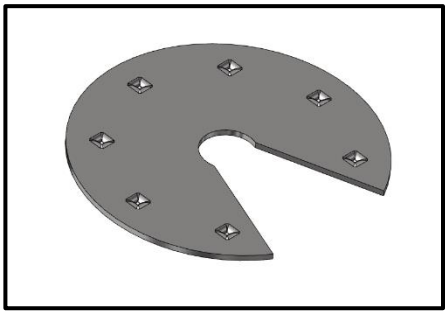
PV Module connection to Rails



Earthing Plate

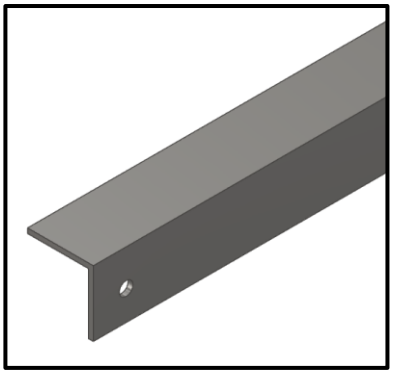
AXE_SS_EP

Breaking anodising layer on PV Module at Clamp connection



AXE_GS_L_A_45_45_3

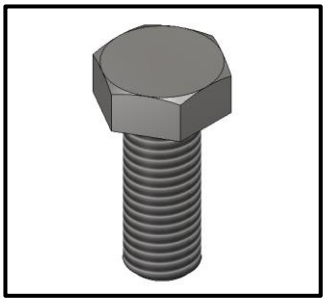
Stabilizing support between Posts



M12 and M16 Hex Bolt

AXE_GS_BH_12/16

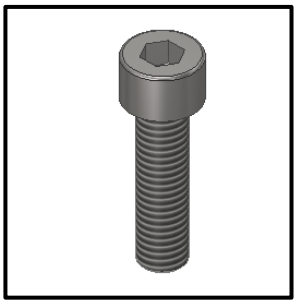
Pile-Rafter and Bracing connections



M8 and M10 Hex-cap Screw

AXE_SS_CS_8/10

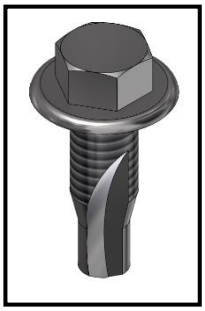
PV module, Rail connection



Self Drilling Tek Screw

AXE_GS_ST_6.3

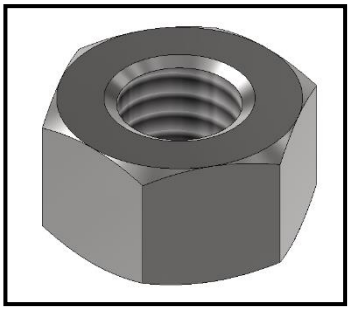
Splice connection



M12 and M16 Hex Nut

AXE_GS_NH_12/16

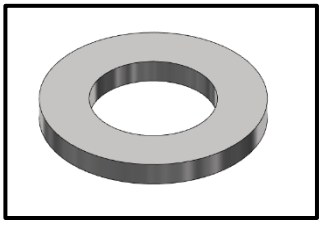
Pile-Rafter and Bracing connections



M12 and M16 Large Flat Washer

AXE_GS_WF_12/16

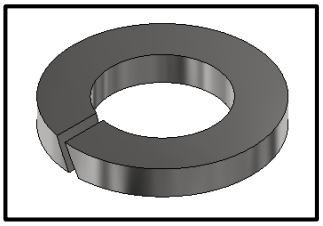
Pile-Rafter and Bracing connections



Spring Washer

AXE_SS/GS_WS

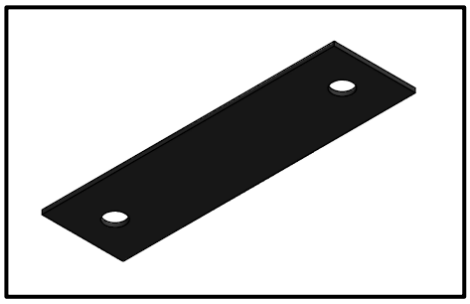
For all connections



Isolation Pad

AXE_PP_ISO_120

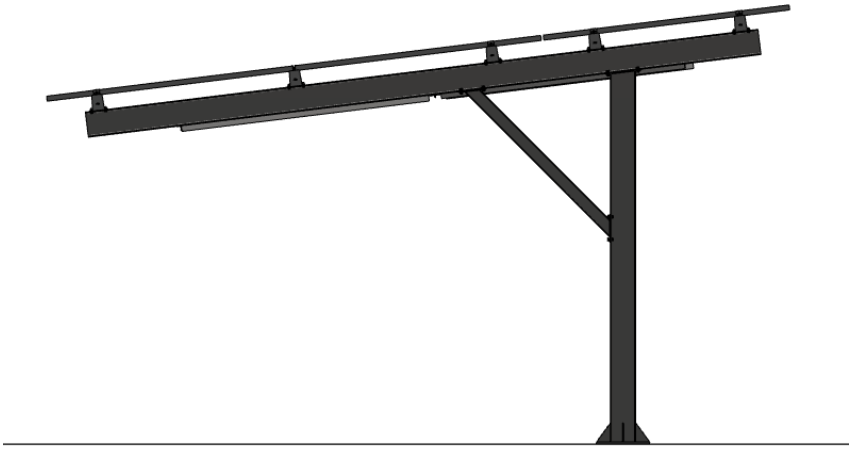
Isolation between Rail and Rafter



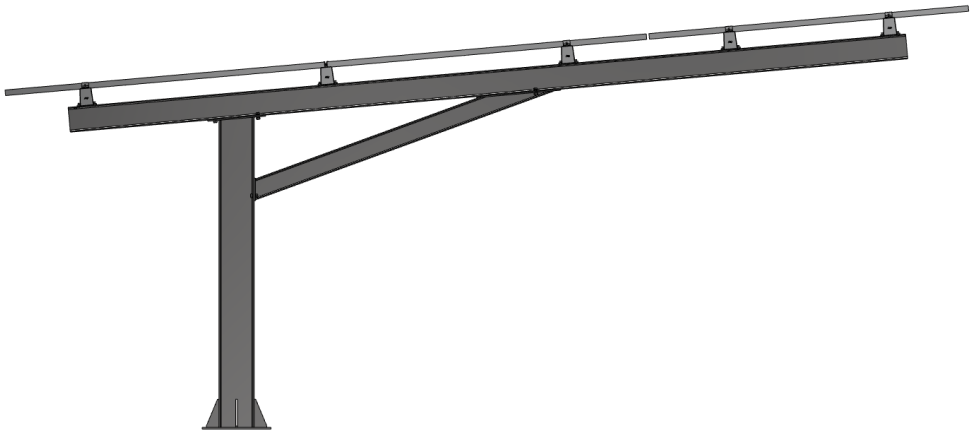
② Configuration options

Car Ports are either offered in a Single Park or a Double Park. Single Park is a configuration where vehicles only enter the car port from one side, with the option of a frontwards or a backwards slope. Double Park is a configuration where vehicles enter the car port from both sides.

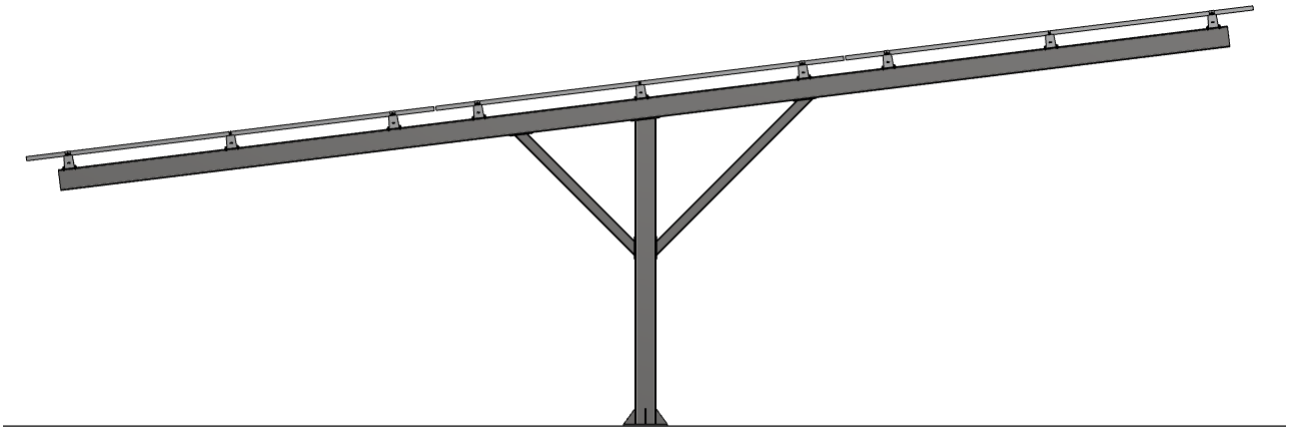
Side views of Single Park and Double Park



Towards entry side (Frontwards)



Away from entry side (Backwards)



Double

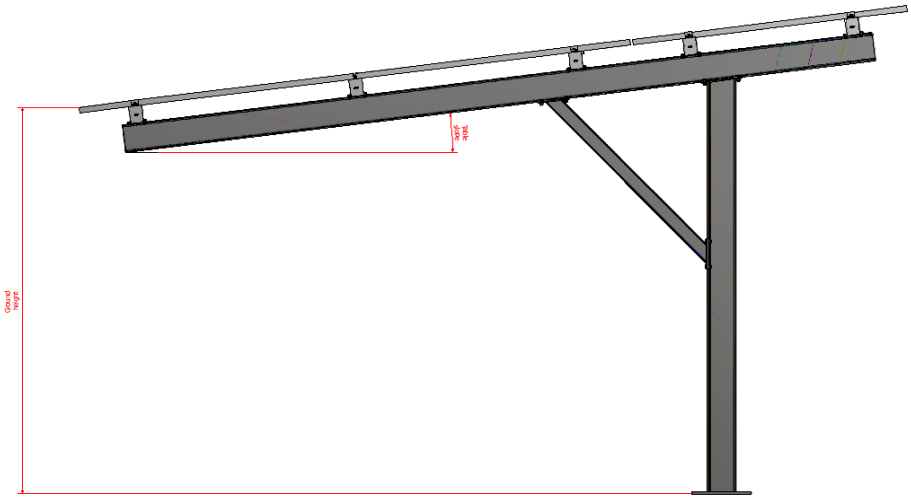
For the purpose of continuity in this document all images are based on the Single Park configuration sloping to the front.

③ Layout positioning

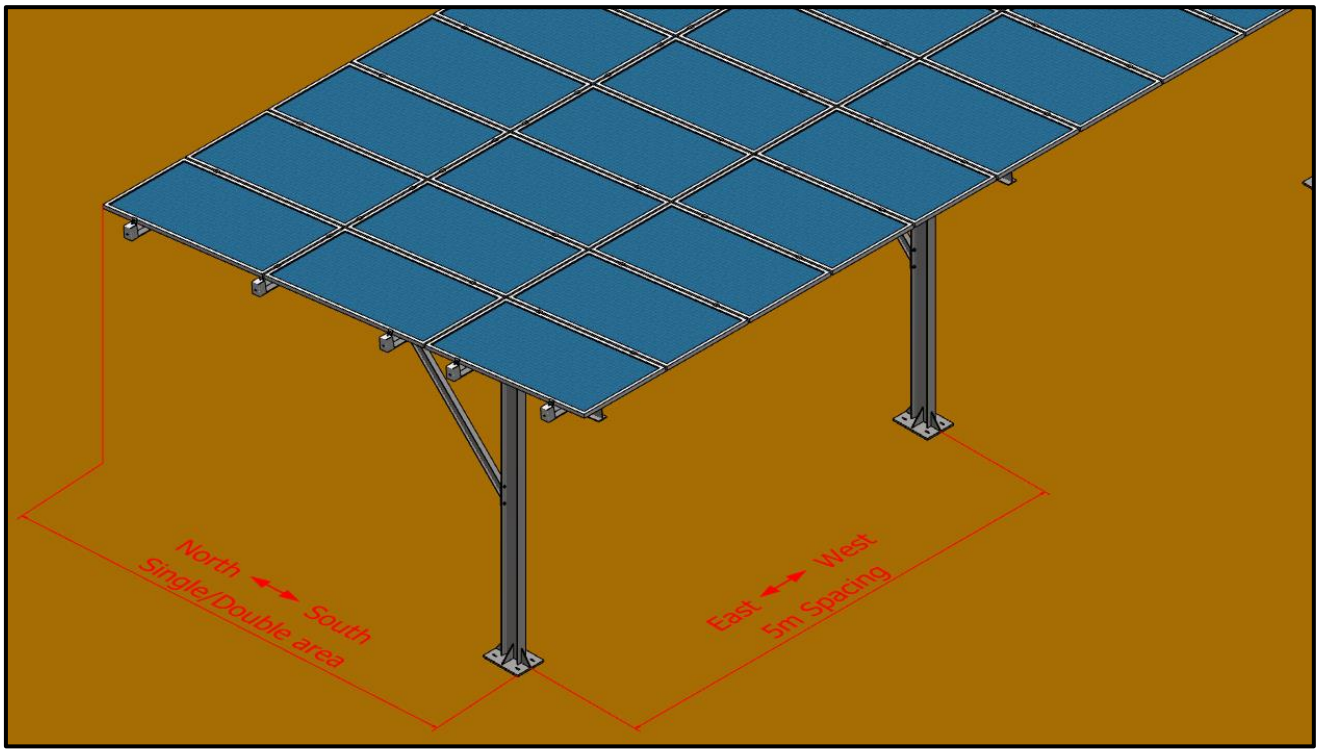
Profile cross sections and the span between Piles varies per selected PV module and site conditions. This must be determined by structural analysis. A geotechnical report is required to determine the concrete sizes for supporting the Posts.

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

The car port system is designed according to the selected table slope, double or single parking options, number of PV modules per table and table height from ground level.



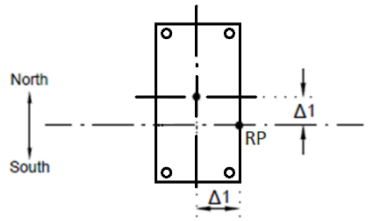
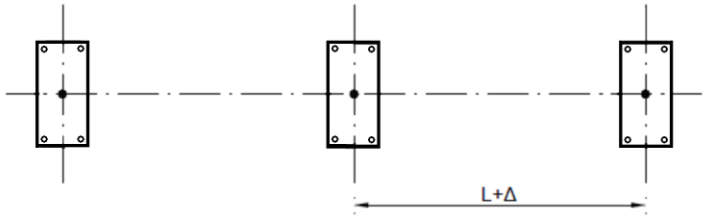
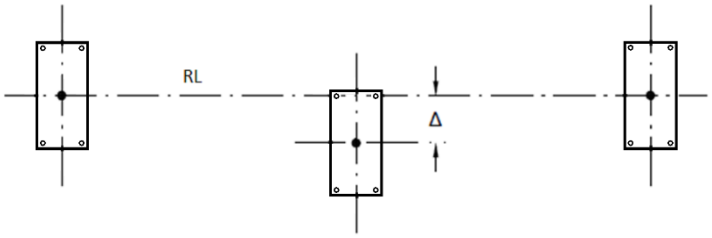
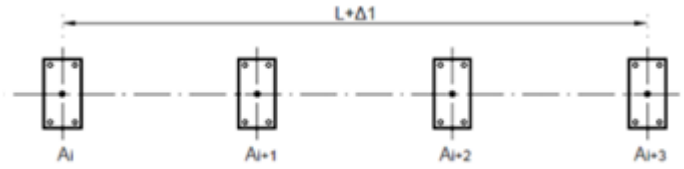
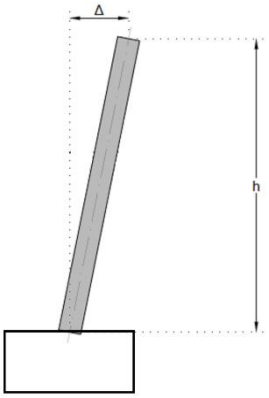
Spacing between posts in the East – West direction is a standardised 5 m for two cars to park next to one another. The double-parking option in the North South direction allows for additional symmetry parking space.

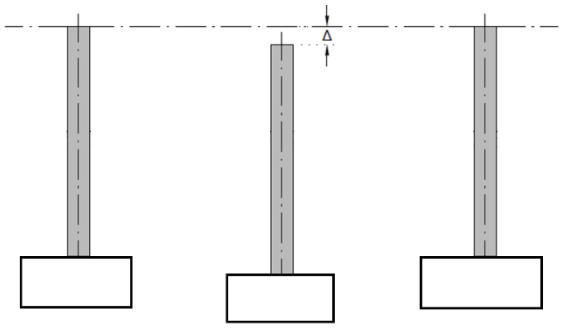


④ Foundation fixings

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 = ±5mm
Individual 4 rod grouping spacing relative to adjacent 4 rod grouping		Δ = ±5mm
General 4 rod grouping alignment relative to refence line (RL)		Δ = ±5mm
Overall table length and North – South spacing		Δ1 = ±20mm
Individual post inclination		Δ = h/300

Individual base level relevant to adjacent base		Δ = ±5mm

⑤ Foundation connection

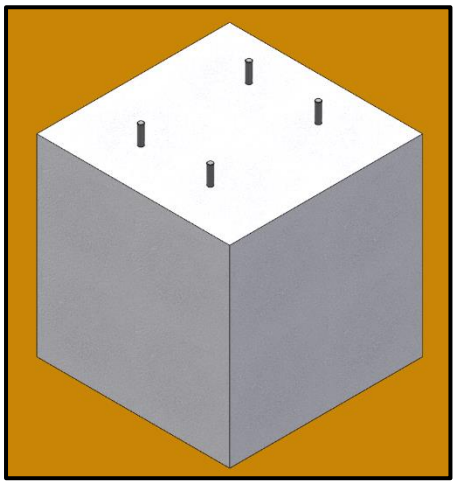
Treaded Rods must be pre-casted or doweled in the Concrete Bases to anchor Piles onto bases. Treaded Rods must be of size M24 and Hot Dip Galvanized Steel.

Foundation connection

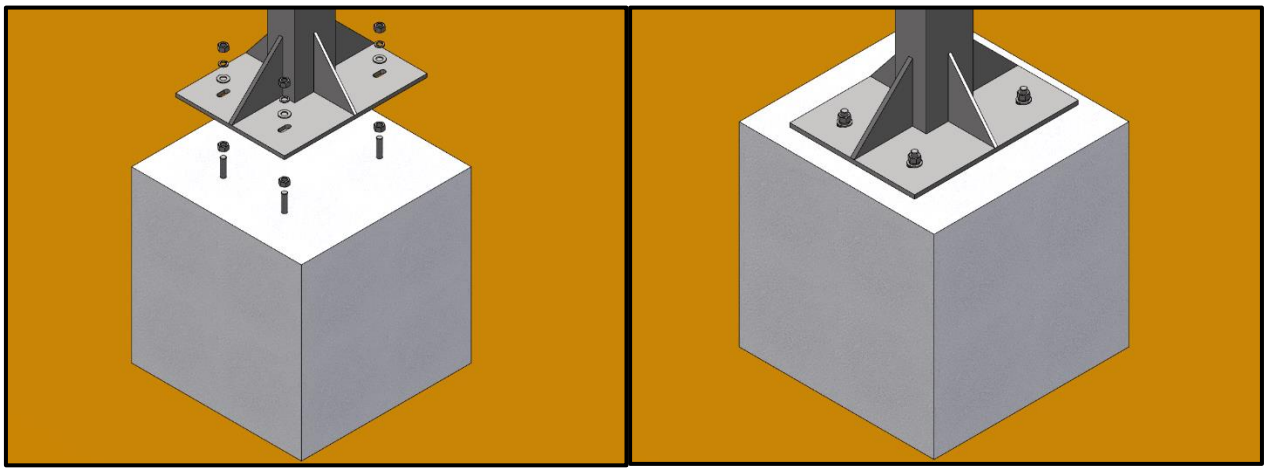
We strongly advise to pre-cast the M24 Threaded rods in the concrete base with a bolted washer that has an OD of 80mm and a thickness of 4mm. This washer should sit lower than the midpoint of the base depth. At own risk, an alternative method can be pursued by utilizing chemical anchors. The specifications and installation methods of suppliers should be strictly adhered to.

Recommendation

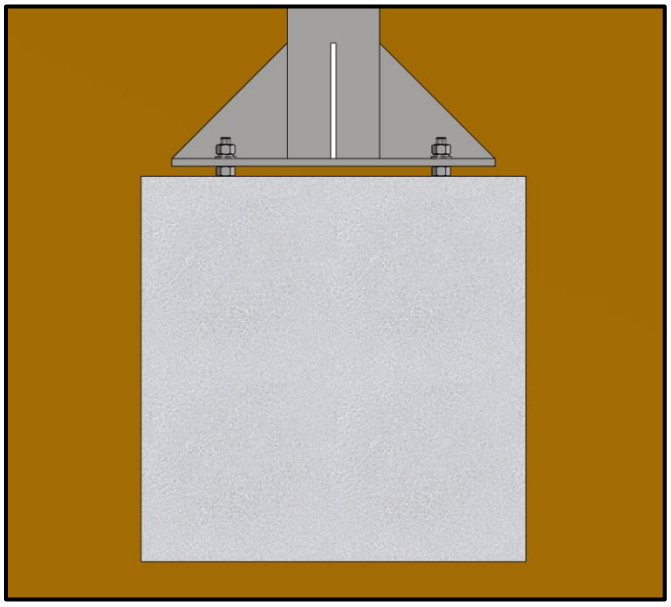
- If the anchor bolts are doweled in bases, it is extremely important to drill the proper size bore hole for the appropriate anchor bolt. Avoid “dog leg” or “rifled” holes, they will hinder anchor installation. It is also important to avoid letting the drill dwell at the bottom of the hole. This can cause an enlargement at the bottom of the hole and result in a loss of anchorage strength.



Piles are fixed on the Concrete Bases through the Treaded Rods. The Piles must be positioned so that the slots run parallel with the Rafters. The slots ensure lateral alignment. M24 Hex Nuts are placed underneath the baseplate to vertically align Piles. Piles are fixed with M24 Flat Washers and M24 Hex Nuts. Torque M24 Hex Nut to 900 N.m.



The Gap between the Concrete Base and the Baseplate of the Piles must be filled with Grout once the Pile is fixed into position.

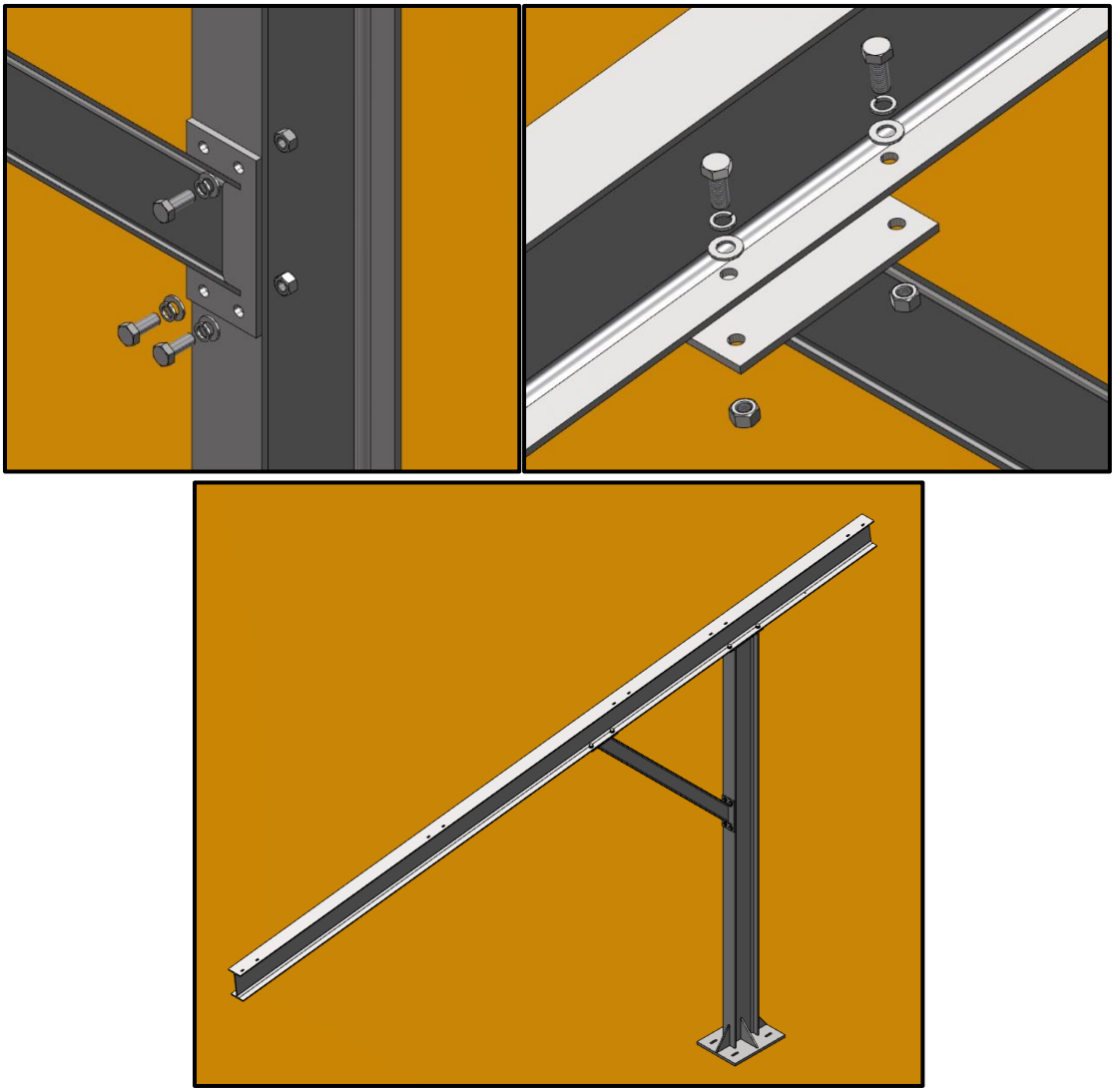


⑥ Mounting Rafters

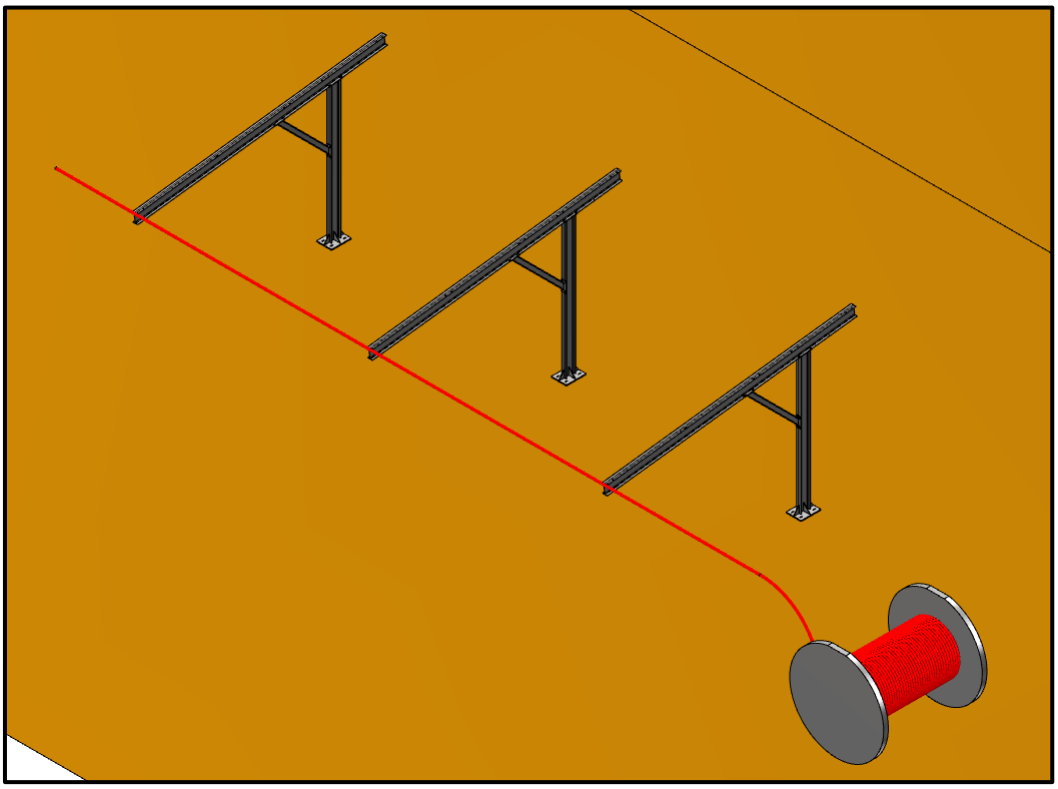
Rafters are connected to the Front short Pile and corresponding Back long Pile. Use M16x40 Hex Bolts, M16 Flat Washers, M16 Spring Washer and M16 Hex Nuts to line up the connection.

Recommendation

- Use the middle holes on the rafter and pile to connect the first rafter and last rafter on each table. Once the outer rafters of each table 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 reference by using the adjustment holes on the piles and rafters.



The M16 bolt and nut connections are torqued to 245 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.



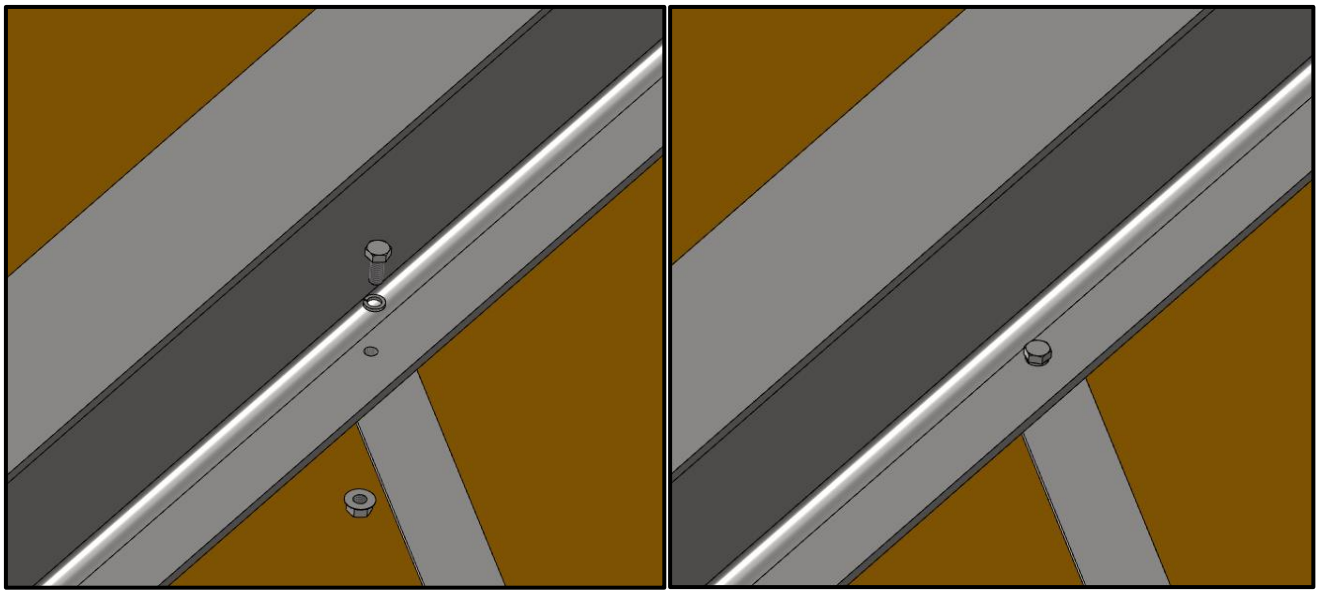
The Rafters must be aligned so that there will be no stresses in the PV module later.

Any on site cutting or drilling must be painted to protect against surface damage. The paint has to cover ±3cm around the damaged area.

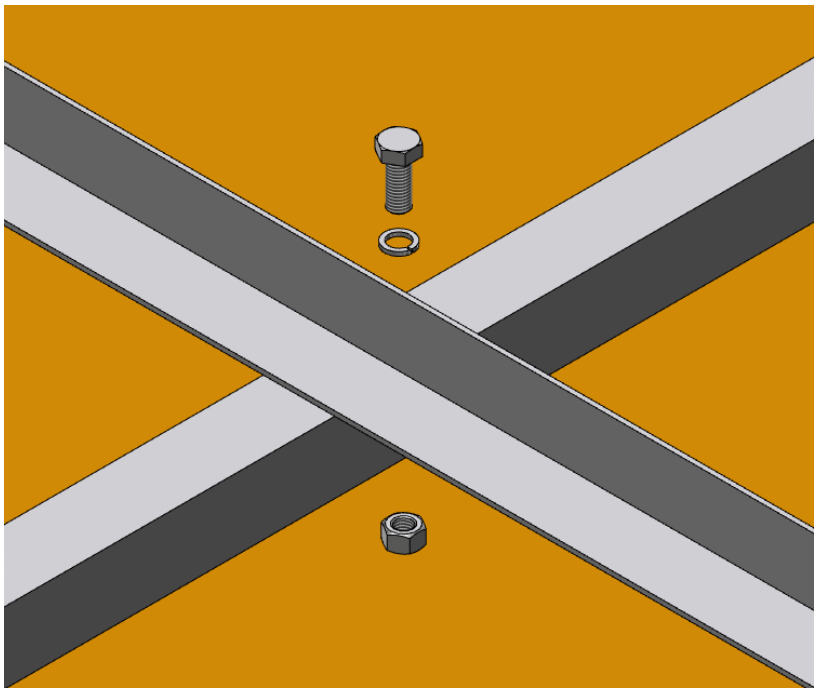
⑦ Mounting Bracings

Bracing must be placed in the first and last bay of the Car Port structure. If the Car Port table is longer than 30m, Bracing must be added in the middle bay as well.

Position Bracing Angles on the bottom of the Rafters. Connect Bracing Angles to Rafters with M12x30 Hex Bolts, M12 Spring Washers and M12 Hex Nuts to tighten connection at 100 N.m.

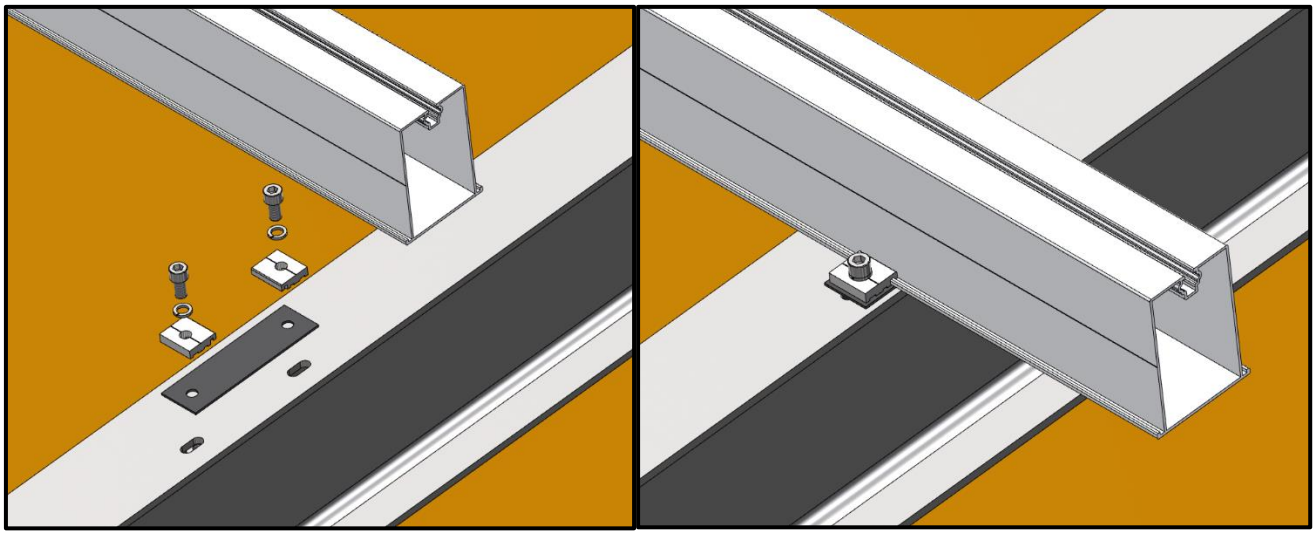


The Bracing Angles connect in the middle between Posts via a hole drilled on-site. Align Bracing Angles and connect with a M12x30 Hex Bolt, M12 Spring Washer and a M12 Hex Nut.

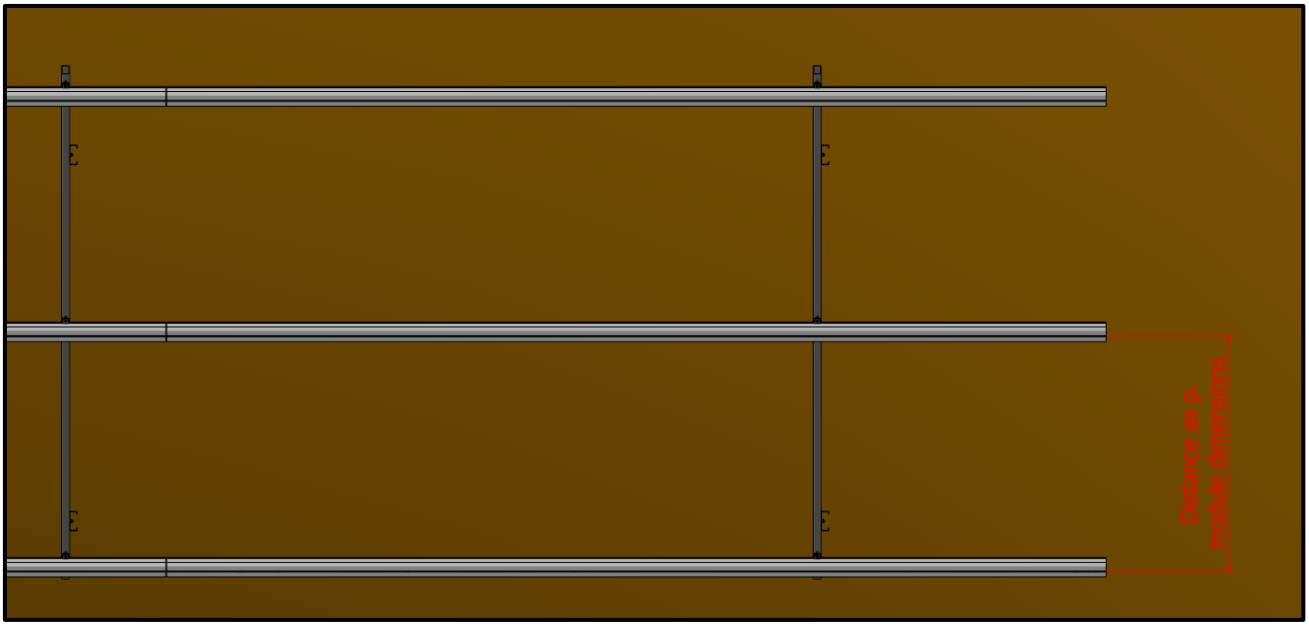


⑧ Mounting Rails

Position Rails on top of Rafters with slotted holes visible on each side of the rail. Connect Rail Clips to rail and line up with slots on Rafters. Place the Rubber between the Rail Clip and the Rafter. Use M10x35 Hex-Cap Screws, M10 Spring Washer and M10 Hex Flange Nuts to tighten connection at 38 N.m.

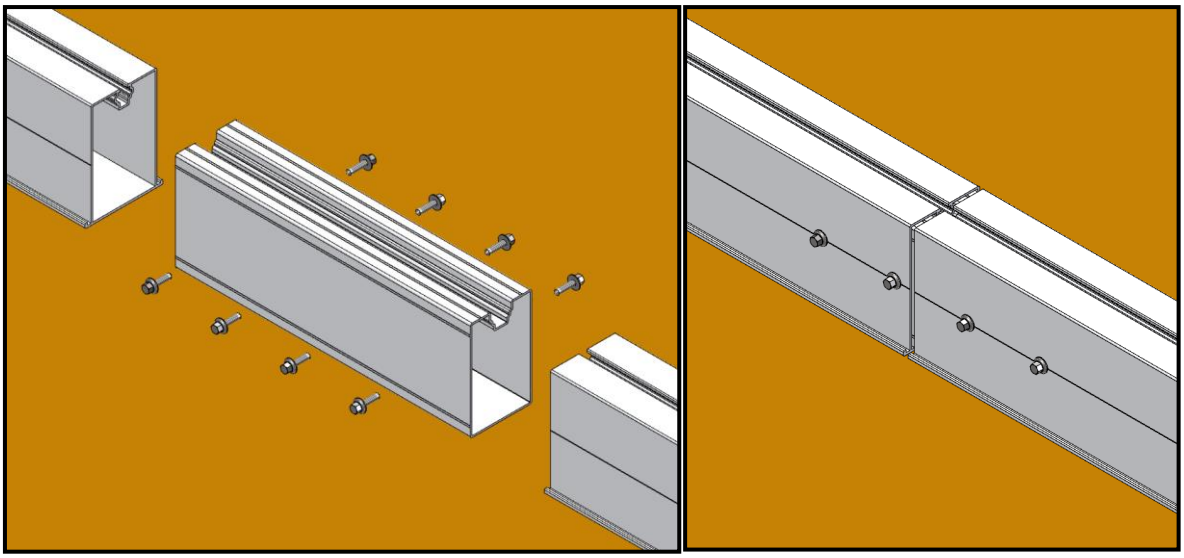


The rail spacing's are dependent on the dimensions of the PV module used. PV module installation manuals indicate supporting requirements.



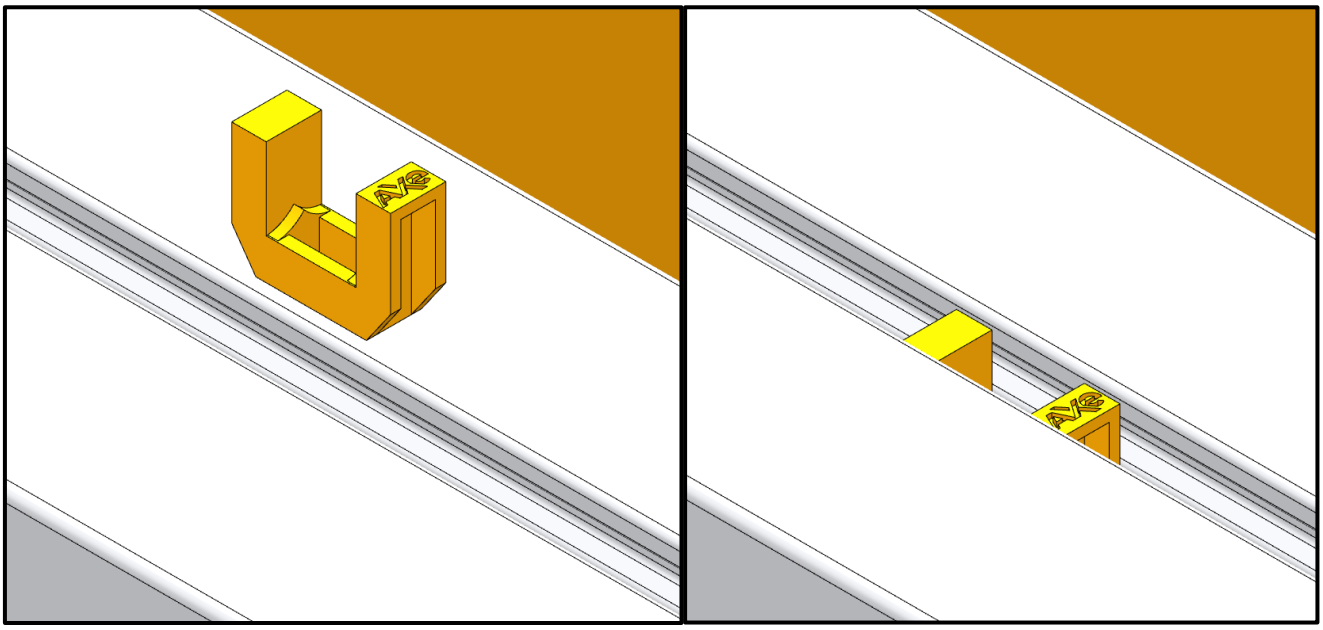
⑨ Joining Rails

Slide Rail Splice halfway, indicated on Rail Splice with a marker, into each adjoining Rail. Use 8 x M6.3 Self Drilling Tek Screws to tighten the connection.

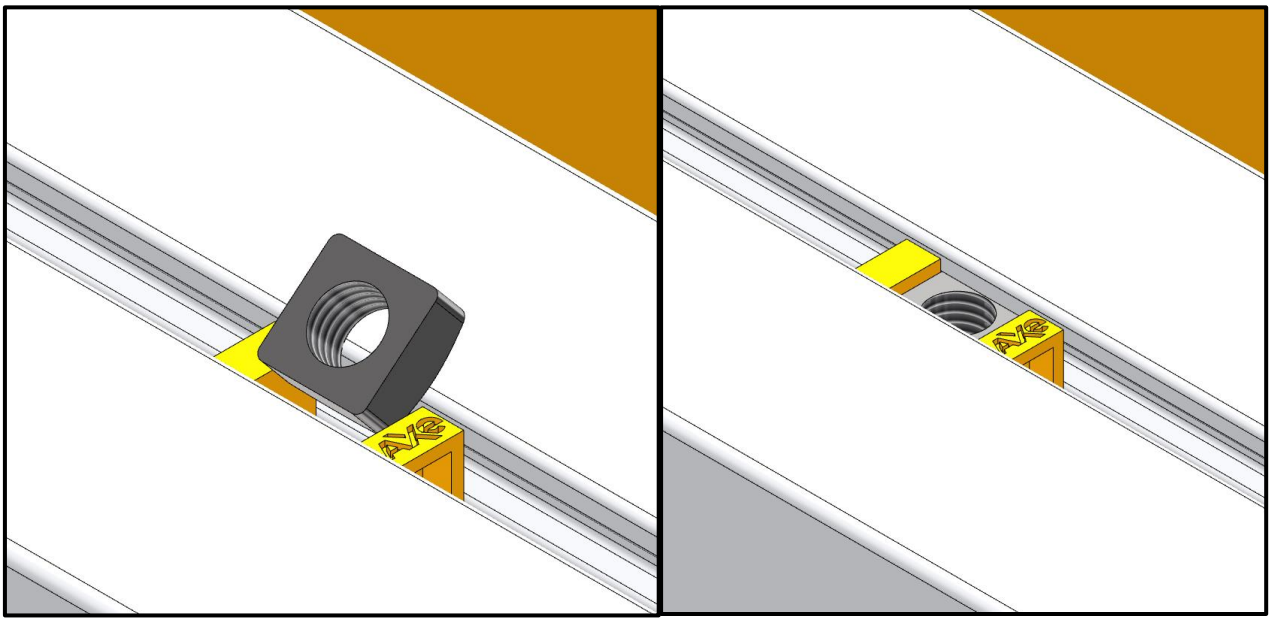


⑩ PV module installation

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

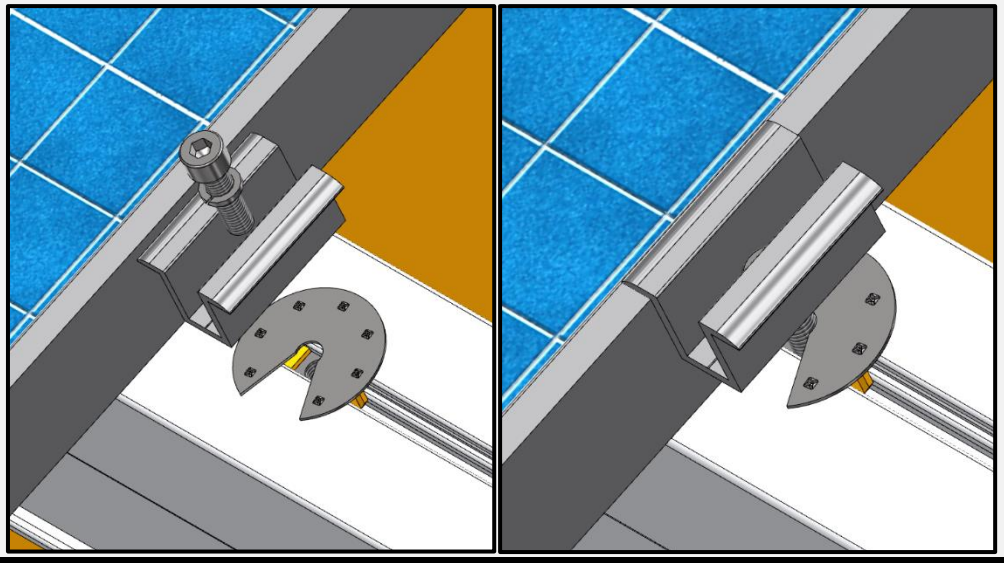


Position a M8 Square Nut at each Nut Stopper. Slide M8 Square Nut at an angle into Rail cavity so that it falls vertically with flat side facing upwards.

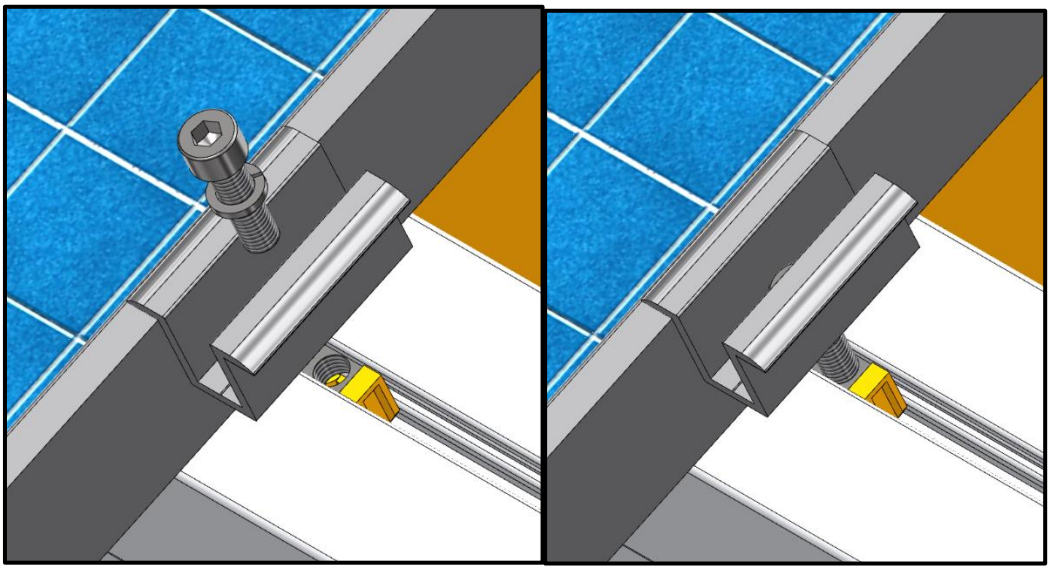


Earthing insurance

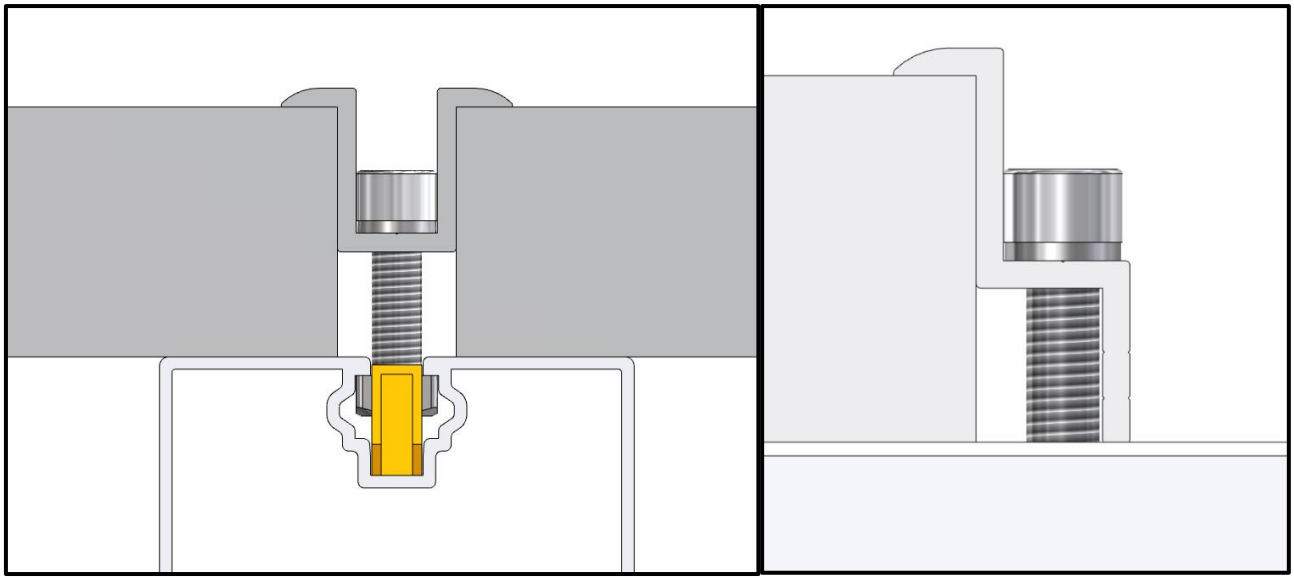
In order to ensure continuity for conduction of the earth system the anodizing layer on the PV module frames must be broken by installing Earth Plates. The Nut Stopper and Square Nut configuration must first be in position ready for the PV module's clamping configuration. An Earth Plate is then placed 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.



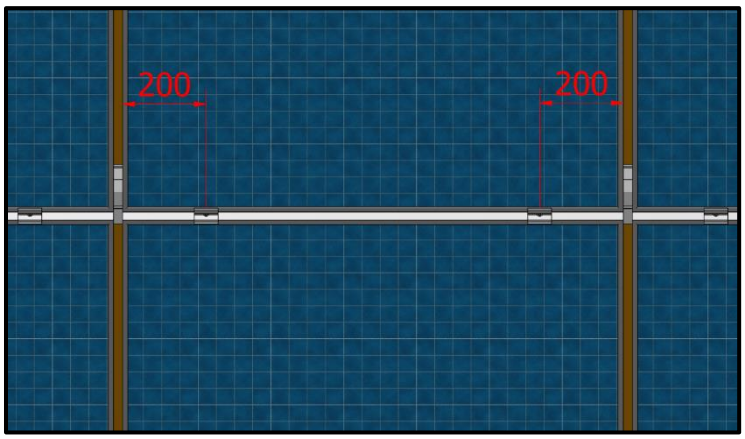
PV modules are laid onto Rails in portrait view so that each PV module is supported by 2x rail lengths. Install PV module Clamps on the sides of the PV module so that each PV module is fixed on 4x locations. 1x clamp per opposing long side and 2x clamps on short side will hold each PV module down to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



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.

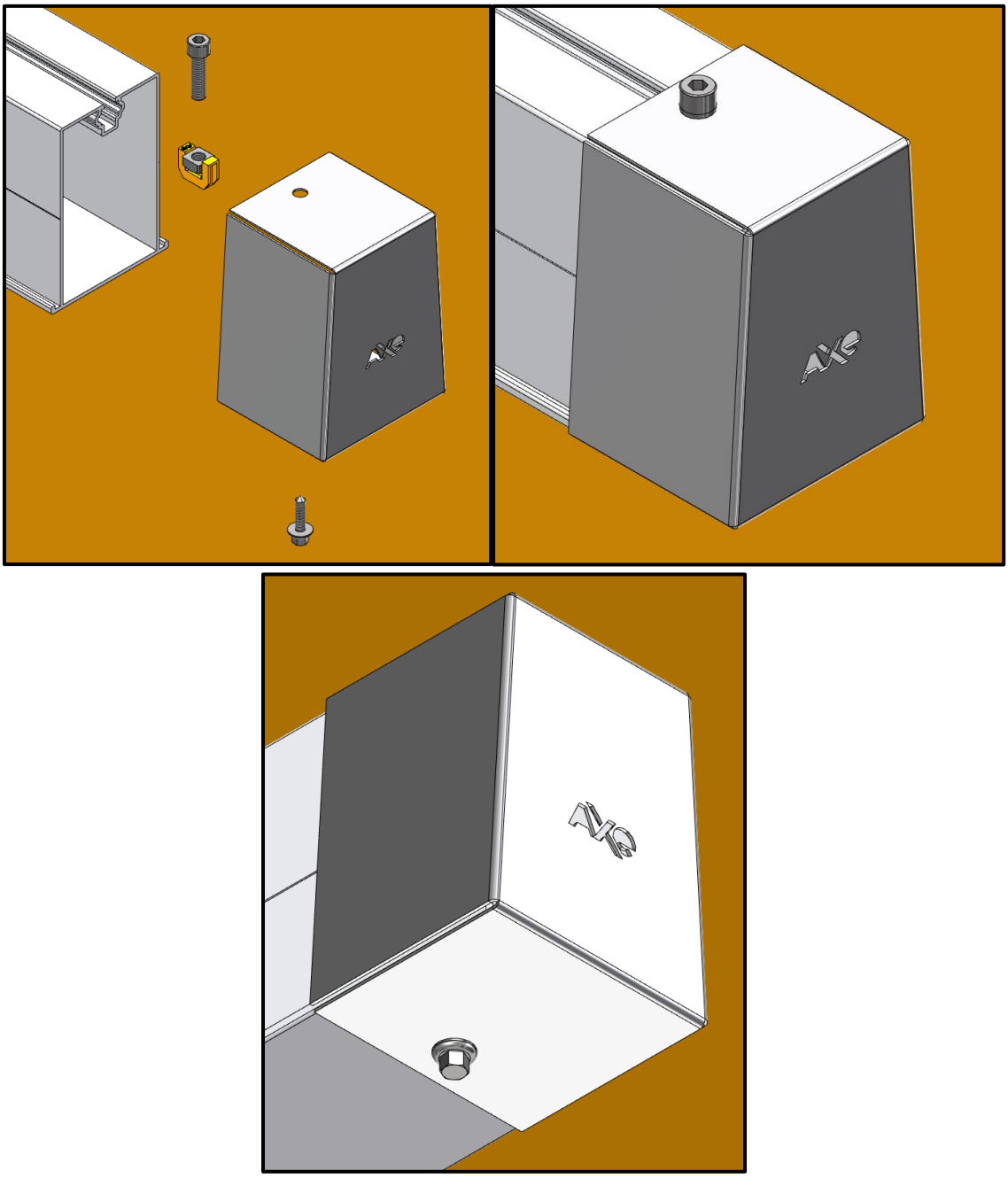


The centre of Mid Clamps used on the PV modules' short sides must be installed ±200mm from the PV module's side edges.



⑪ End Caps

Slide End Caps over 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. A M6 Self Drilling Tek Screw can be installed at the bottom of the End Cap for additional security.



⑫ 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.

A twin pack zinc fix along with gold galvanising paint touch-ups must be applied 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.

⑬ 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.