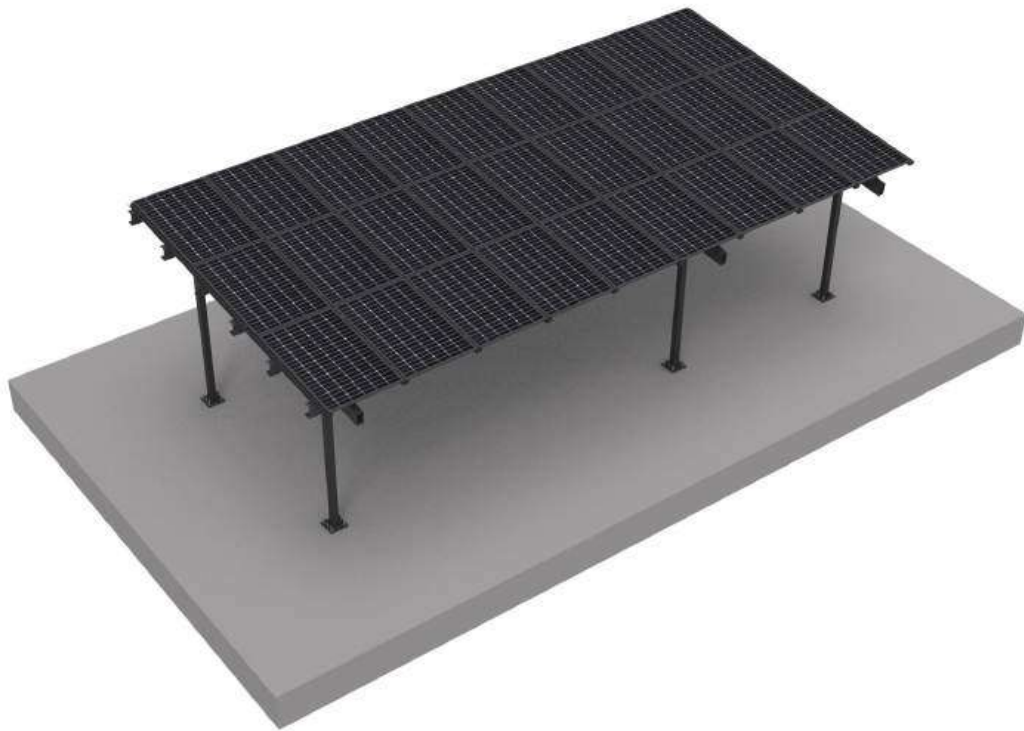




INSTALLATION MANUAL

SOLAR CARPORT STRUCTURE



Please read this manual before using the product and follow the instructions contained therein!

PARTS LIST

A-1 Welded pile 1S



B-1 Welded pile 2S



A-2 Welded pile 1M



B-2 Mount rail 2M



C Welded beam



D Mount rail 1



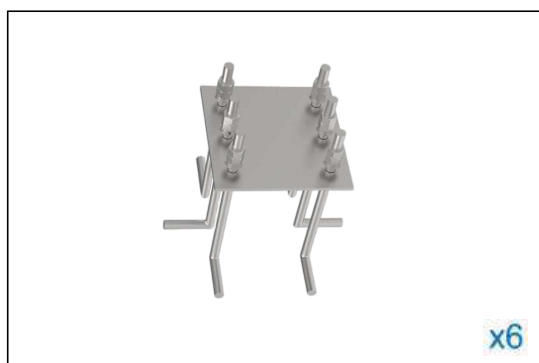
E Mount rail 2



F Rail splice



G Anchor base set



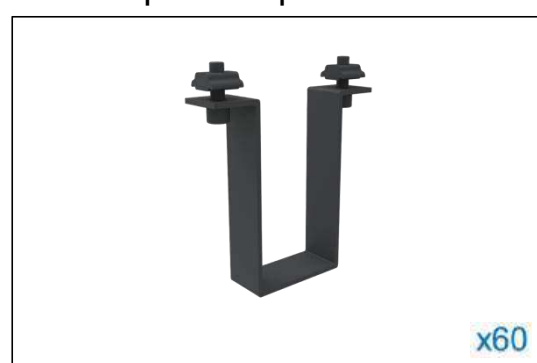
H BIPV rail



I BIPV gutter



J U-shaped hoop



K Steel rod



L Mid clamp



M End clamp



N Solar panel



OVERVIEW

Safety First: Required PPE

Before beginning installation, ensure all personnel are equipped with the following Personal Protective Equipment (PPE):

- **Hard Hat:** Protects against head injuries especially during the installation of overhead **Welded Beams, Mount Rails, BIPV rails, Solar Panels**, etc.
 - **Safety Glasses:** Protects eyes from debris during **Excavation** and **Concrete Pouring**.
 - **Heavy-Duty Gloves:** Prevents cuts when handling metal components like **BIPV Rails** or **Steel Rods**.
 - **Steel-Toed Boots:** Protects feet while positioning heavy **Welded Piles** and **Base sets**.
 - **Safety Harness:** Mandatory if working at heights to install **Solar Panels** or **Clamps**.
-

Required Tools

Ensure the following tools are available on-site to maintain the precision required for the carport structure:

- **Marking & Measurement:** Surveyor's level, string lines, and a high-visibility tape measure.
 - **Excavation:** Shovels or mechanical excavator and a soil compactor.
 - **Foundation:** Concrete vibrator and a wooden or steel float.
 - **Alignment:** Laser level and a plum bob to ensure piles are perfectly vertical.
 - **Assembly:** Torque wrench and a socket set for **M8, M10, M16**, and **M20** hardware.
-

General Safety Notes

- **Site Awareness:** Keep the site clear of unauthorized personnel during heavy lifting.
- **Weather Conditions:** Do not attempt to install **Solar Panels** or **Rails** during high winds or rain.
- **Electrical Safety:** All electrical wiring and grounding should be performed by a licensed electrician after the structural installation is complete.

FOUNDATIONS

1. Site Preparation

- **Action:** Clear all debris, vegetation, and rocks.
- **Requirement:** Level ground to site plan tolerances to ensure consistent pile height.

2. Marking and Positioning

- **Action:** Mark center points of each foundation pit using a surveyor's level or string lines.
- **Critical Check:** Verify diagonal measurements between markings to ensure a perfectly square layout.

3. Excavation

- **Action:** Dig pits to design specifications 1.0 x 1.0 x 1.5 meters.
- **Requirement:** Compact the pit bottom. Add 100mm of crushed stone if soil is loose.

4. Reinforcement and Anchor Base Set Installation

- **Action:** Place steel reinforcement cages into pits. Position the anchor base sets and cover exposed threads to protect them from concrete.
- **Requirement:** Ensure bolts are perfectly vertical and suggested thread projection height is above 85mm from the base plate.

5. Concrete Pouring

- **Action:** Pour structural-grade concrete, minimum C30.
- **Requirement:** Use a concrete vibrator to eliminate air pockets and ensure full bonding.

6. Surface Finishing

- **Action:** Smooth the top surface with a float.
- **Verification:** Use a laser level to ensure all foundation surfaces are at the same elevation.

7. Curing

- **Process:** Allow concrete to cure for 7 to 14 days.
- **Maintenance:** Keep surface moist with water or wet burlap to prevent cracking.

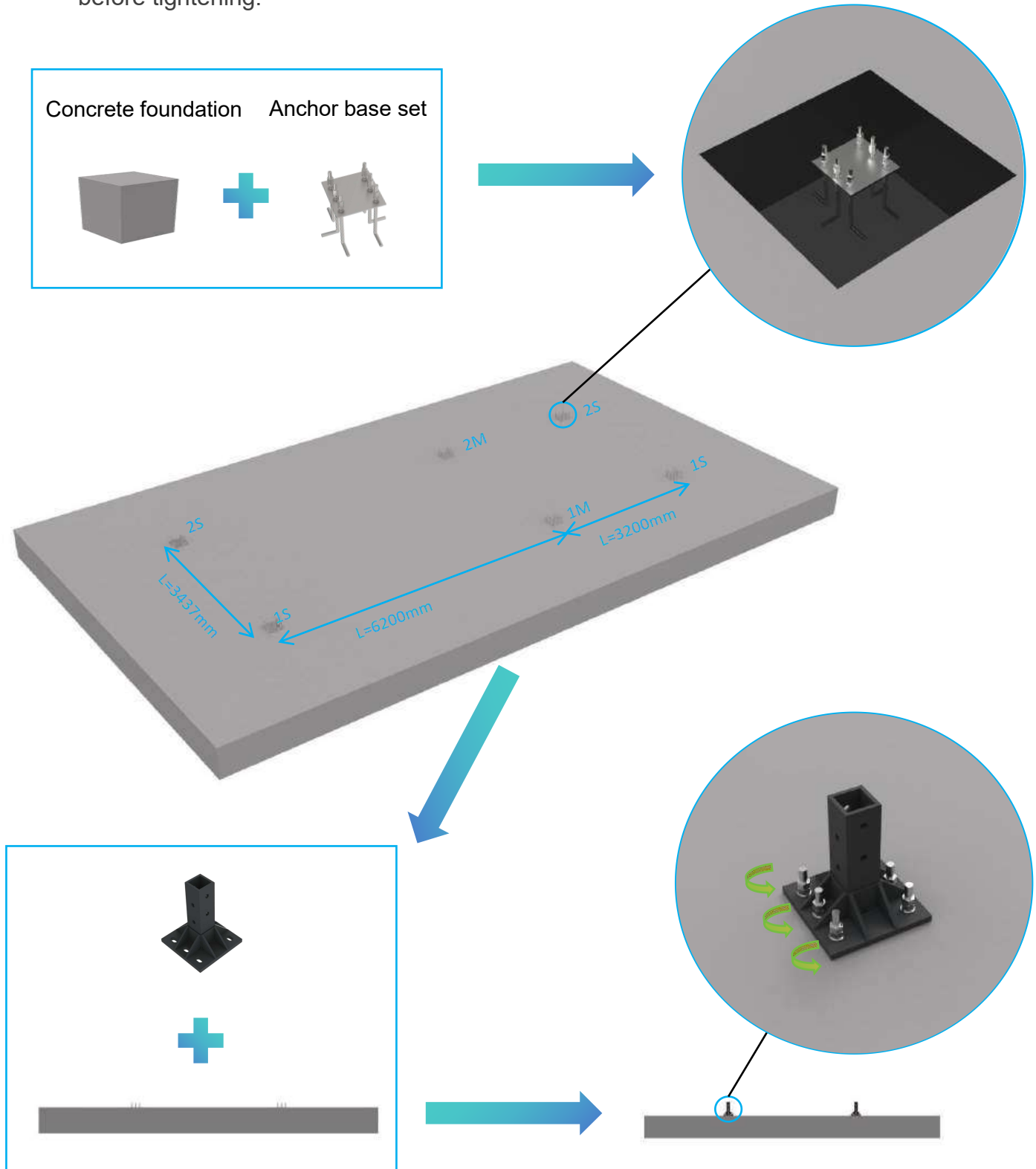
8. Completion

- **Final Check:** Clean concrete splatter from anchor bolt threads.
- **Requirement:** Confirm concrete reached full compressive strength before erecting the carport.

INSTALLATION

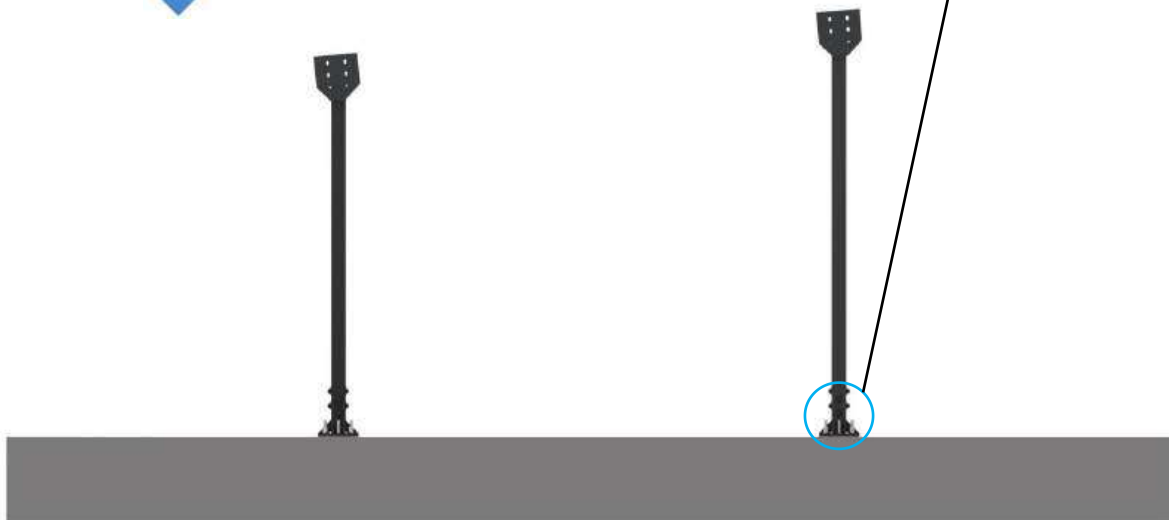
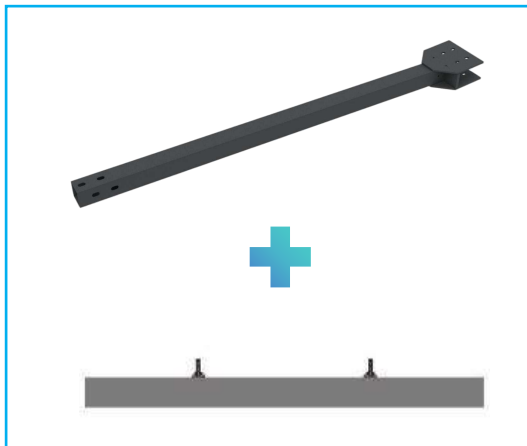
Step 1: Base Installation

- **Action:** Mount the **Base** onto the embedded **Anchor Base Set**. Secure the Base using 6 sets of M20*400 anchors with 2* hex nuts, spring washers and flat washers.
- **Requirement:** Ensure the Base is correctly oriented according to the structural tilt before tightening.



Step 2: Pile Installation

- **Action:** Position the **Welded Pile** onto the **Base**. Secure the connection using 8 sets of M20*50 hex bolts with spring washers, and large flat washers.
- **Requirement:** Ensure the pile is plumb and all bolts are tightened to the specified torque.

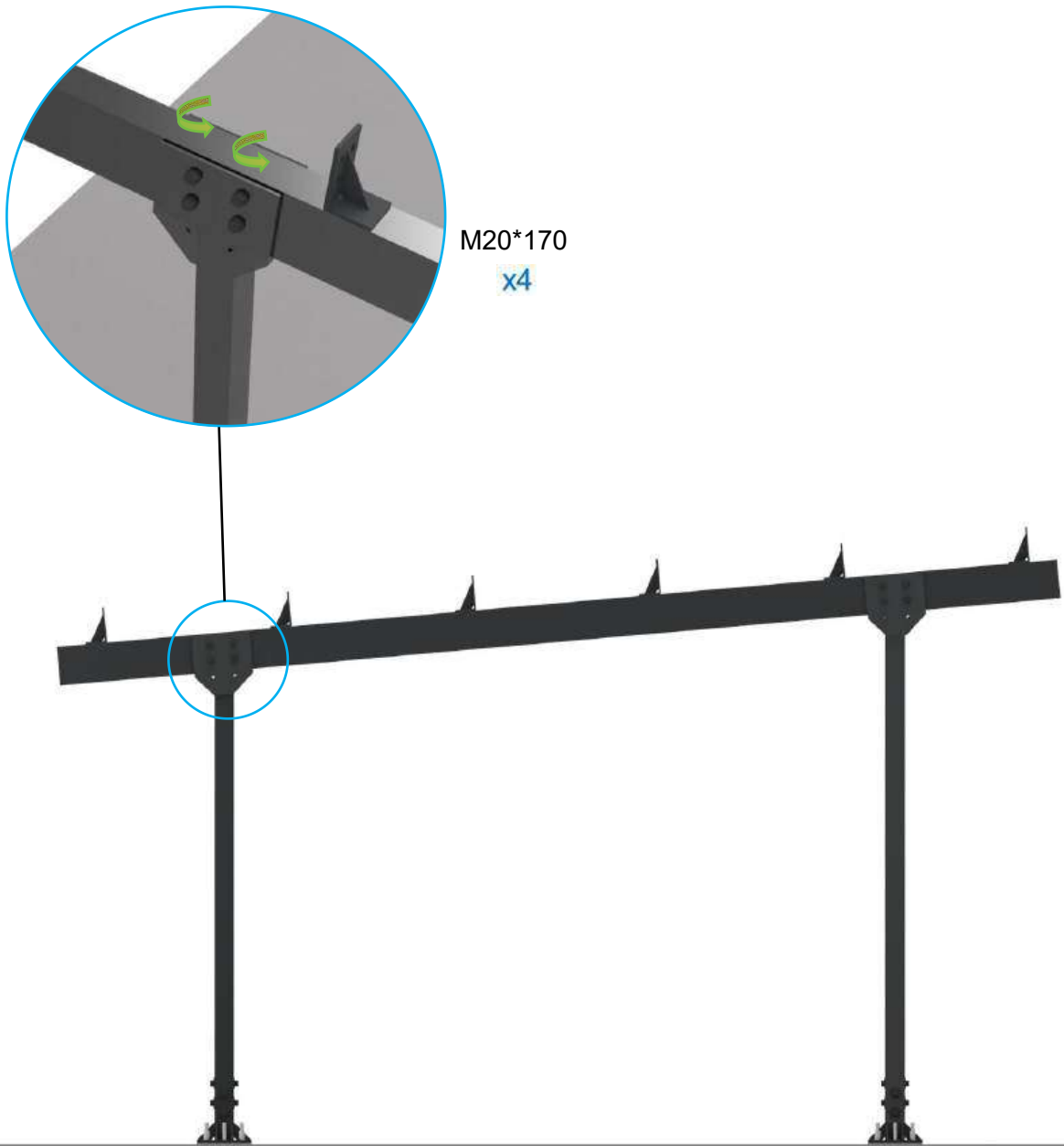


Note: Pile Identification

- **1 & 2:** Indicates row position (**1** for Front, **2** for Back).
- **M & S:** Indicates layout position (**M** for Middle, **S** for Side).
- **Identification:** Middle piles (**1M/2M**) are identified by **color bands**. Side piles (**1S/2S**) have no color bands.

Step 3: Beam Installation

- **Action:** Position the **Welded Beam** onto the **Pile**. Secure the connection using 4 sets of M20*170 hex bolts with 2* large flat washers, spring washer and hex nut.
- **Requirement:** Ensure the beam is correctly aligned with the pile mounting holes before tightening.

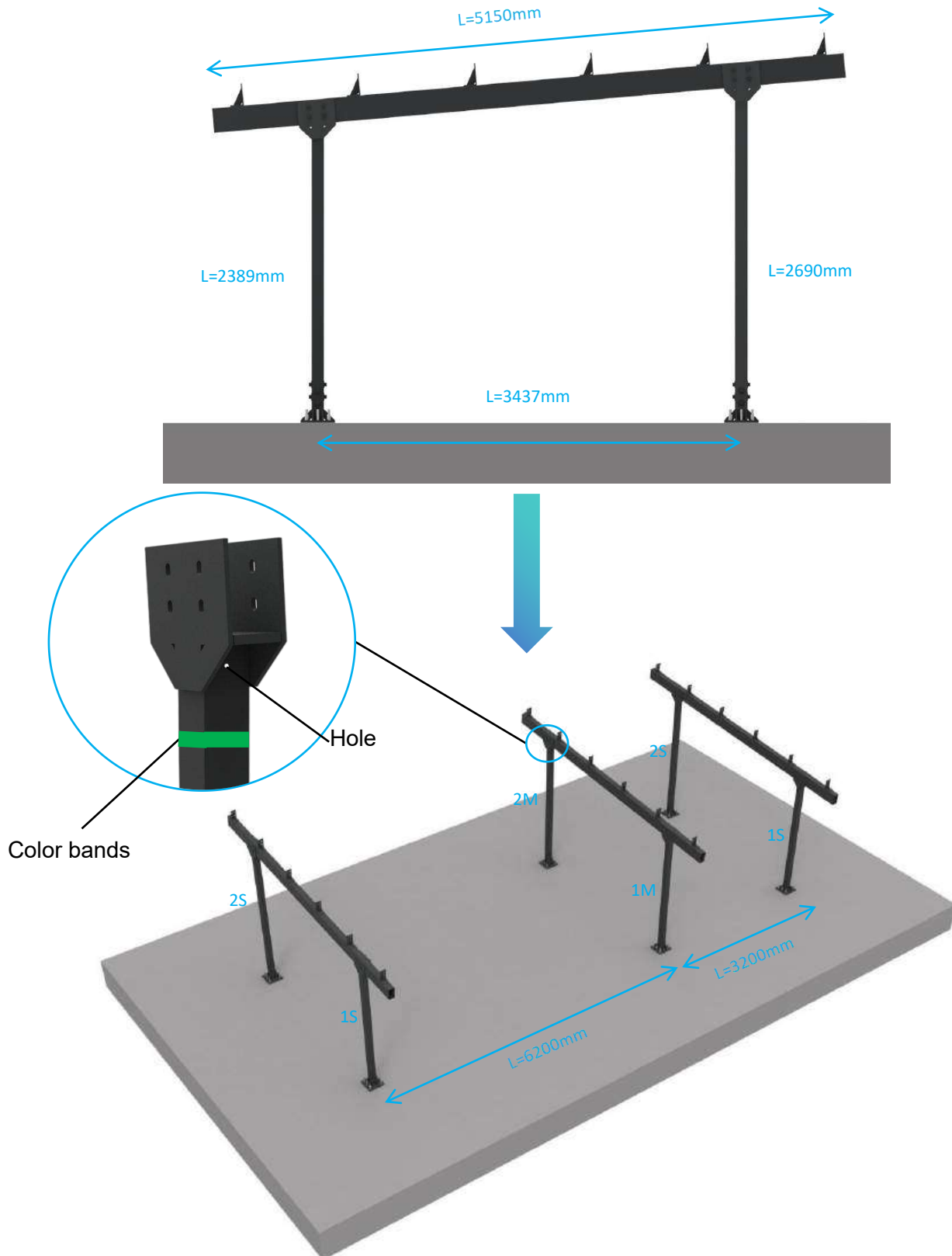


Note: Beam Orientation

- **Alignment:** Insert the **Welded Beam** into the upper groove of the **Pile** at the angle specified in the design drawings.
- **Direction:** Ensure the L-shaped **support beam splice** faces **upward** to allow for proper component mounting.

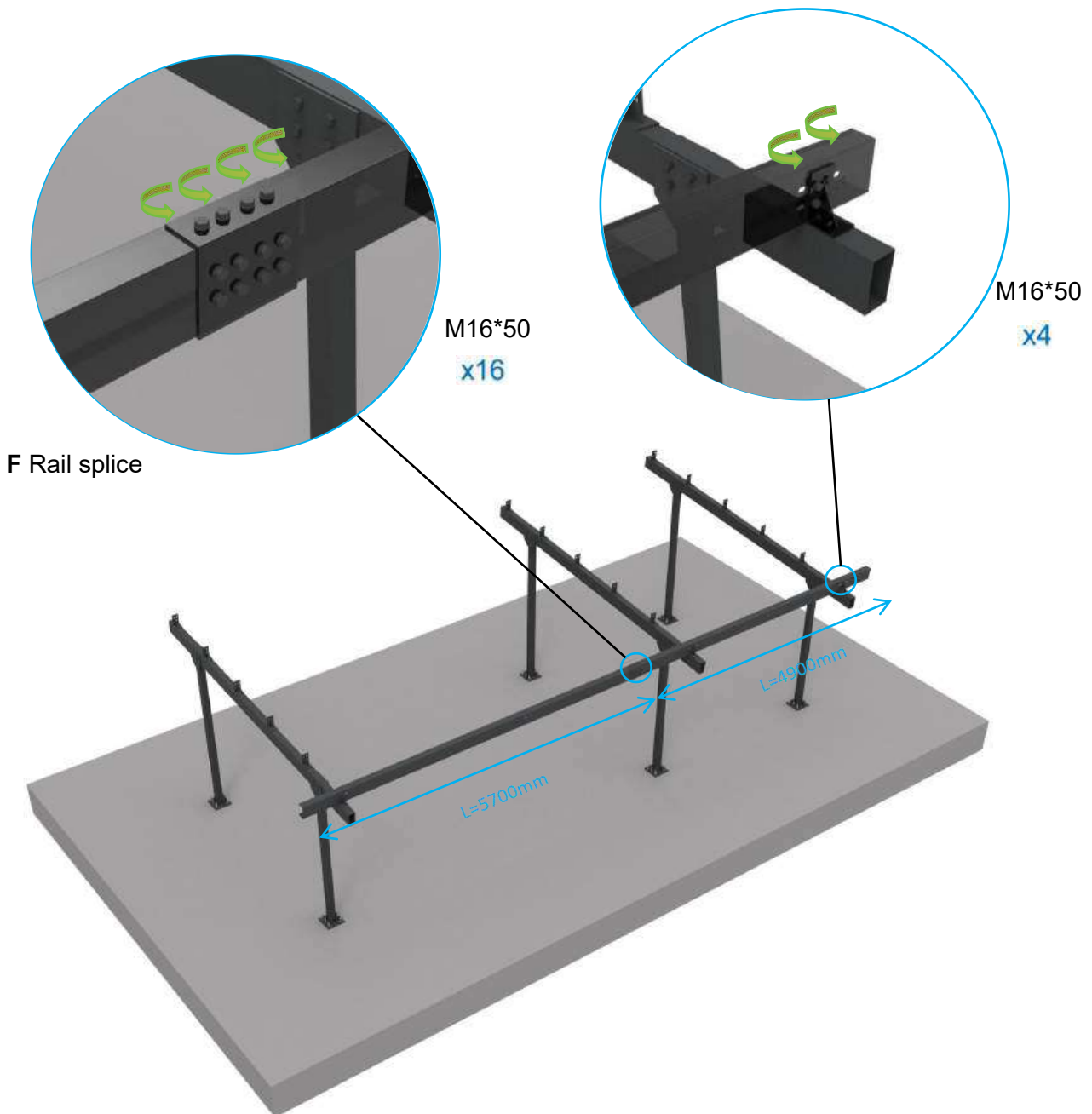
Step 4: Frame Completion

- **Action:** Repeat **Steps 1, 2, and 3** to install all remaining **Welded Piles** and **Welded Beams**.
- **Final Check:** Ensure all piles are aligned in a straight line and all beams are parallel before proceeding to the rail installation.



Step 5: Mount Rail Installation

- **Rail Splicing:** Connect **Rail 1** and **Rail 2** using a rail splice. Secure them using 16 sets of M16*50 hex bolts with 2* large flat washers, spring washer and hex nut.
- **Beam Mounting:** Fix the assembled **Rail** onto the **Welded Beam**. Secure the rail onto the support beam splice using 4 sets of M16*50 hex bolts with 2* large flat washers, spring washer and hex nut.
- **Requirement:** Ensure all parts are fully seated and bolts are tightened to prevent sagging.

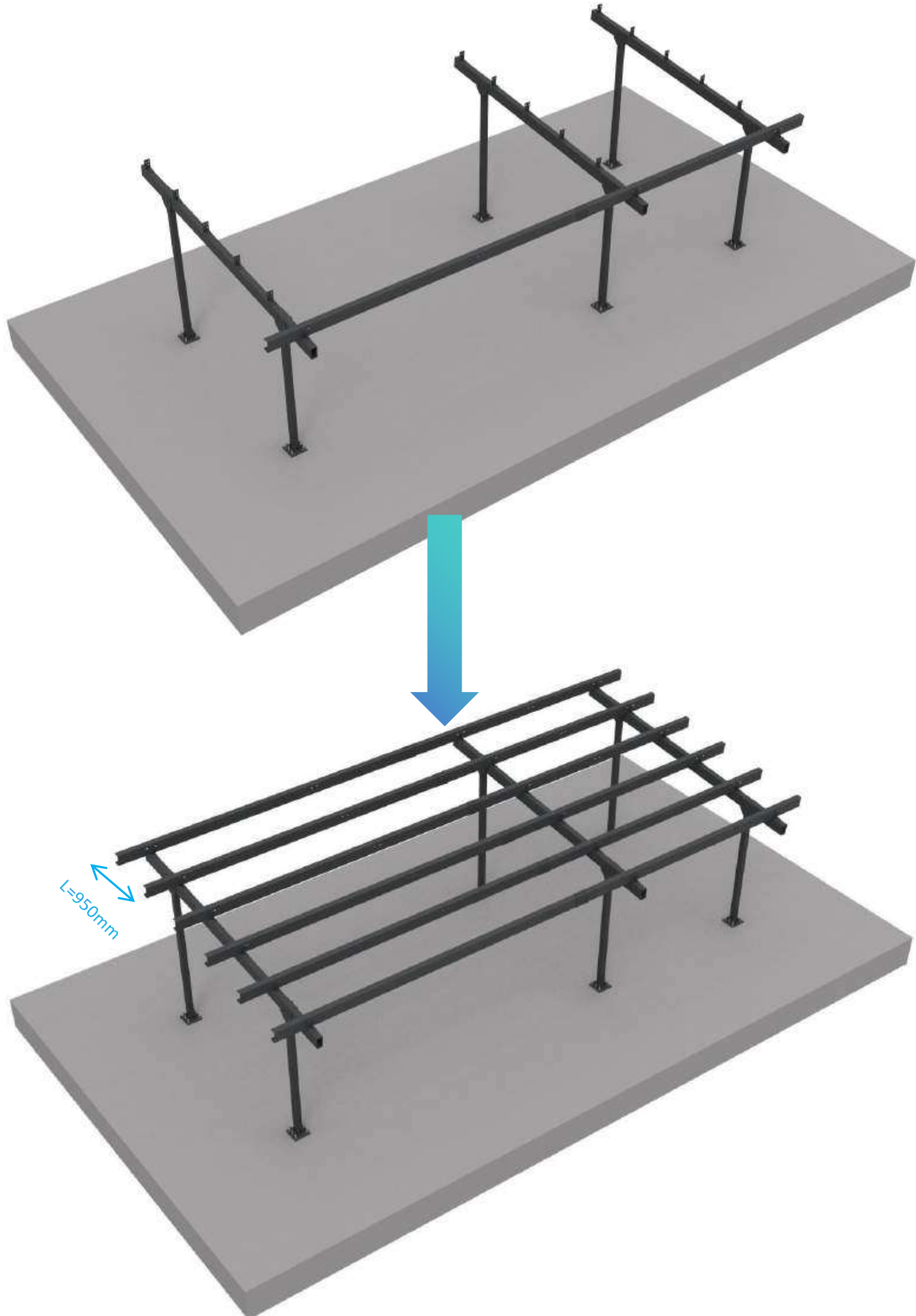


Note: Rail Positioning

- **Layout:** Install rails at the specific locations and intervals marked on the drawing.
- **Length:** Ensure rails of different lengths are matched to their corresponding positions as indicated in the site plan.

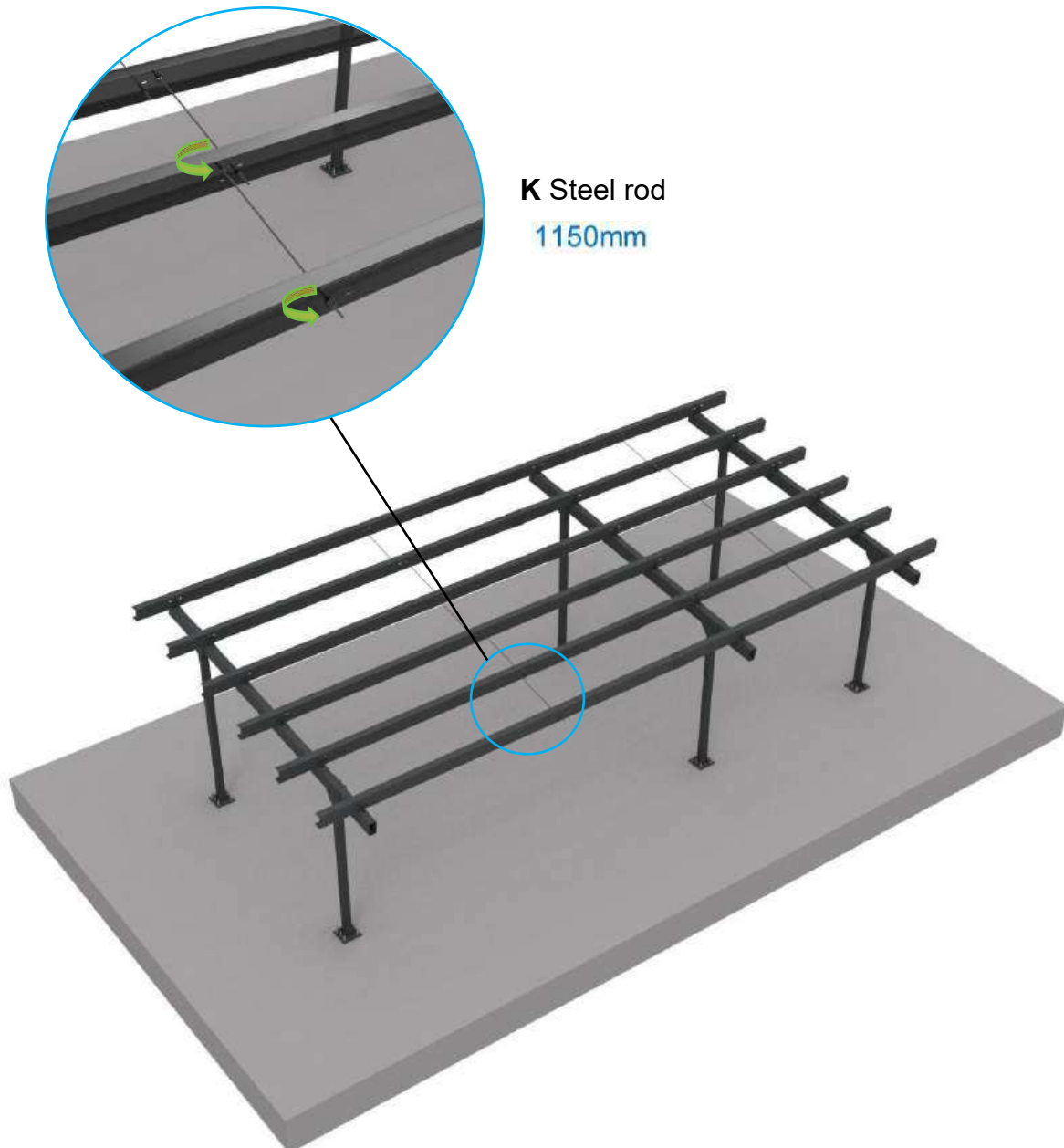
Step 6: Mount Rail Completion

- **Action:** Repeat **Step 5** to install and secure all remaining **Rails**.
- **Requirement:** Verify that all rails are parallel and the spacing between them matches the design drawings to ensure the solar panels fit correctly.



Step 7: Steel Rod Installation

- **Action:** Install the **Steel Rods** between the two **Rails** through the pre-drilled holes. The **semicircular gaskets** will allow you to adjust and set the rod direction.
- **Fixing:** Secure each rod using M10 large flat washers, spring washers, and hex nuts.
- **Requirement:** Ensure all rods are tensioned according to the design to provide lateral stability to the structure.

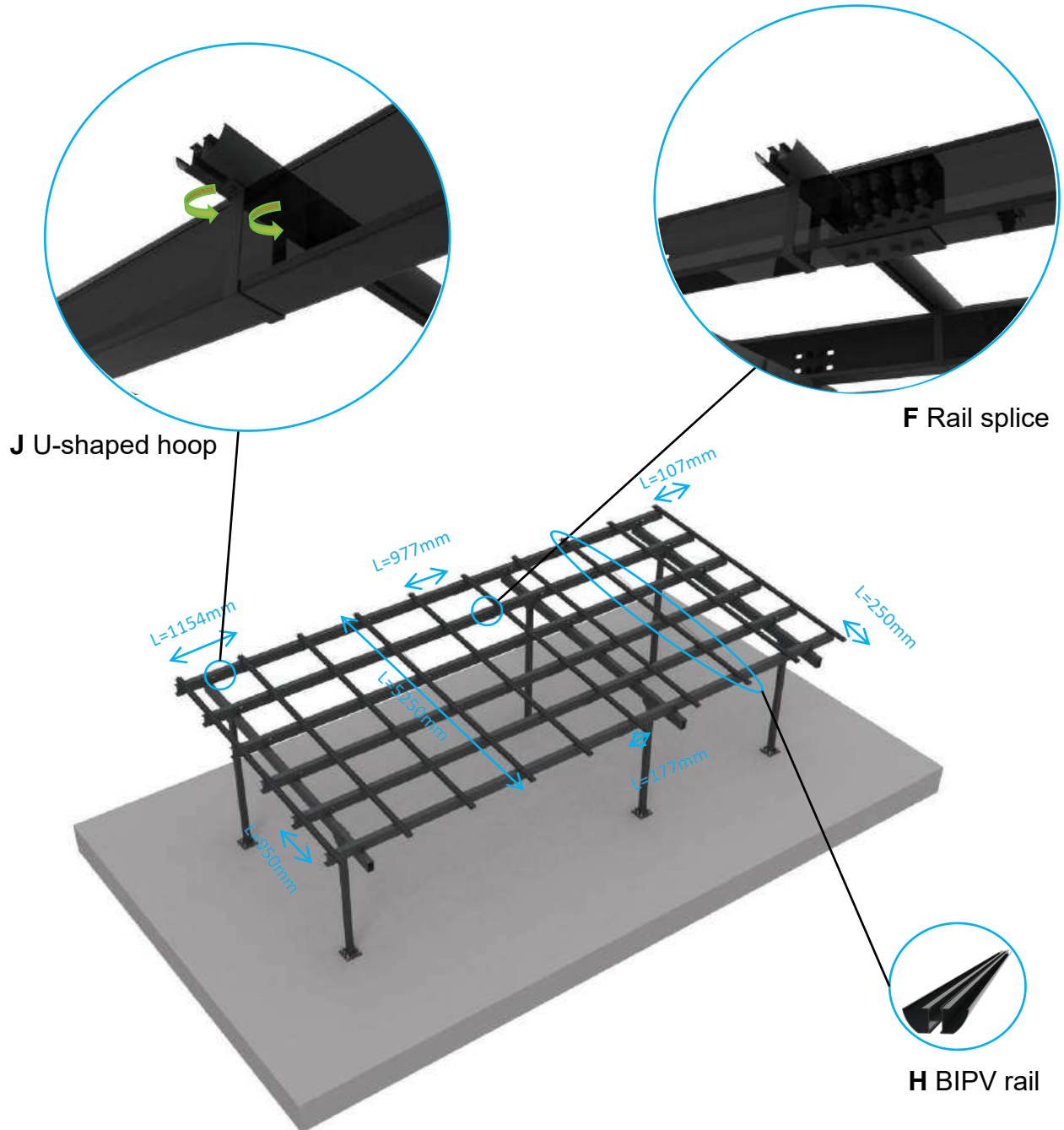


Note: Rod Alignment

- **Staggering:** Follow the design drawings to ensure rods are correctly misaligned.
- **Pattern:** Align the same rod vertically (**up/down**) and different rods horizontally (**left/right**) to achieve the required structural tension.

Step 8: BIPV Rail Installation

- **Action:** Mount the **BIPV Rails** onto the **Mount Rails**. Secure each BIPV rail with 6 sets of **U-shaped hoops**.
- **Hardware:** Each hoop is fixed with 2 sets of M8*25 hex screws, 2* flat washers, 2* spring washers, and 2* alu nuts.
- **Requirement:** Ensure the U-shaped hoops are centered on the mount rails before tightening.

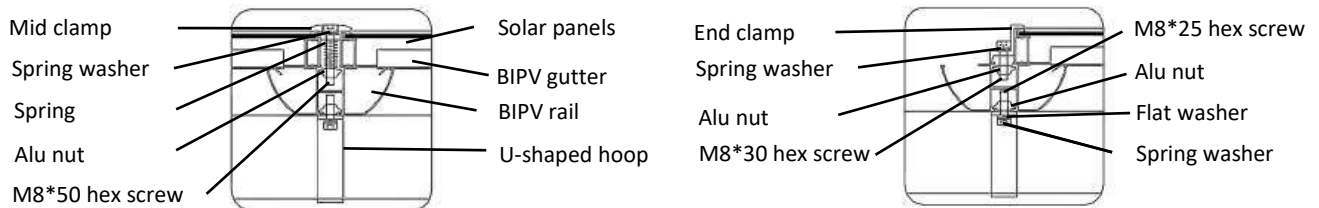
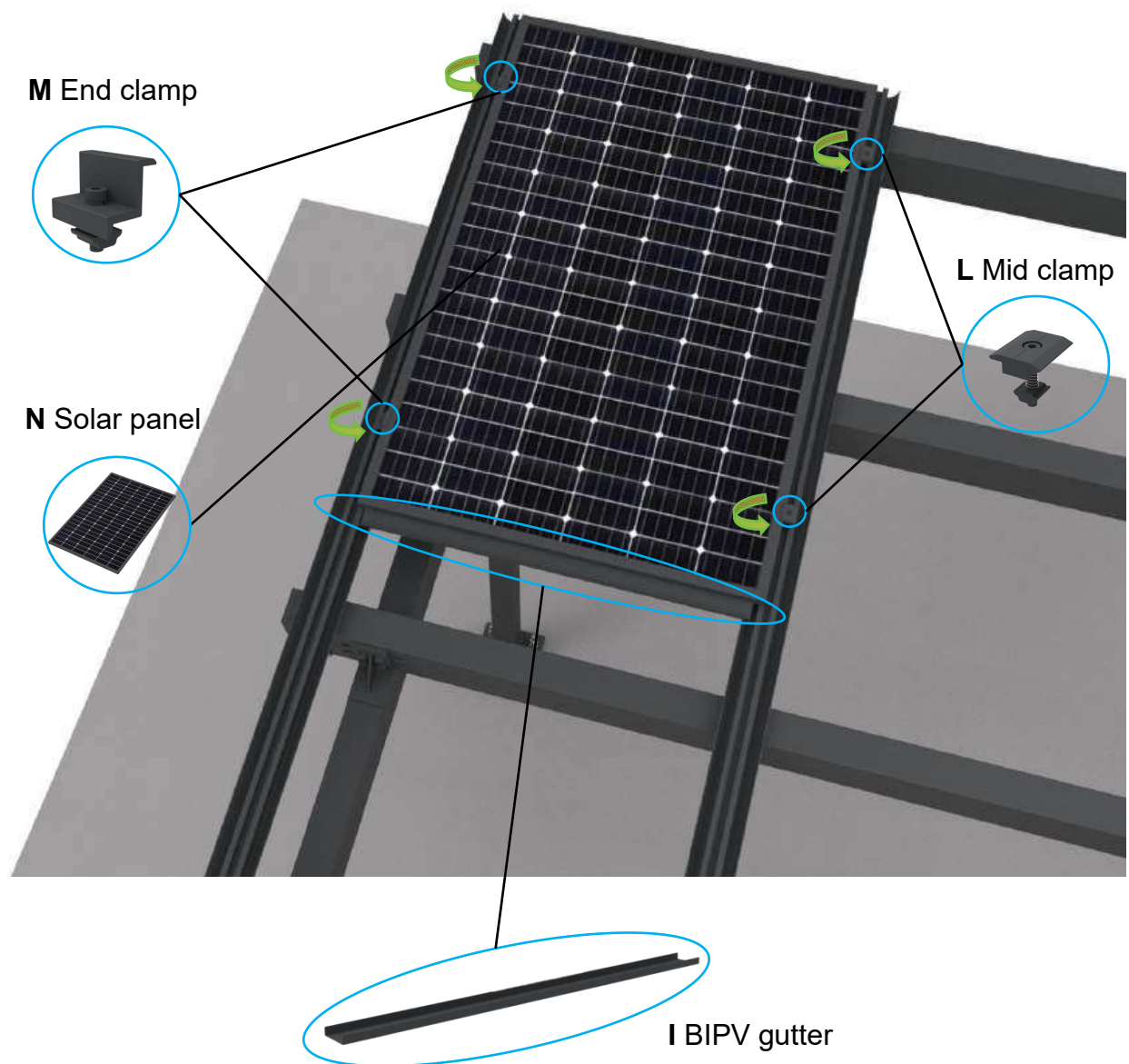


Note: BIPV Rail Positioning

- **Alignment:** Install the **BIPV Rails** according to the specific distance dimensions and layout marked in the design drawings.

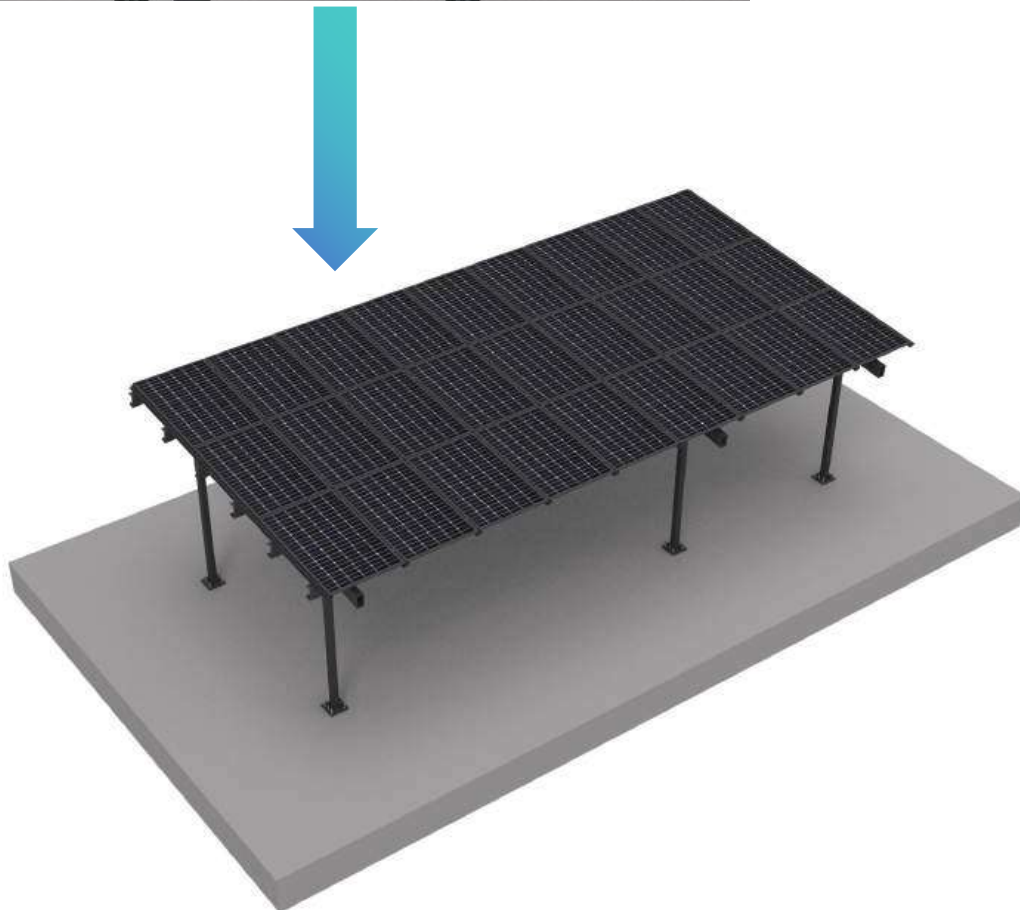
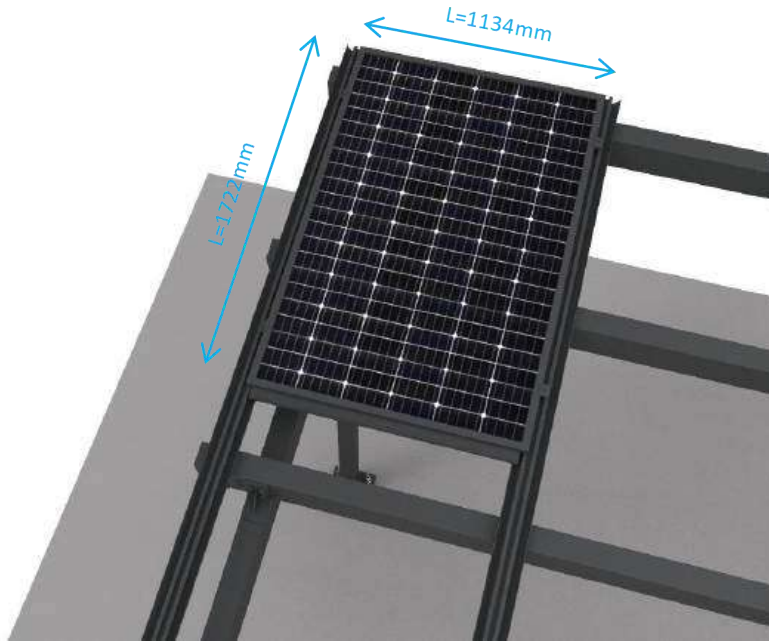
Step 9: BIPV Gutter and Solar Panel Installation

- **Action:** Position the **BIPV gutter** across two BIPV rails before installing **panels**. Ensure that the gutter is centered directly under the gap where two panels meet.
- **Fixing:** Secure the panels using Mid or End **Clamps**, which are specifically sized for the thickness of the panels to ensure a secure, waterproof fit.



Step 10: Final Assembly Completion

- **Action:** Repeat **Step 9** to install all remaining **BIPV Gutters** and **Solar Panels**.
- **Critical Check:** Ensure all gutters are properly overlapped or aligned to maintain the drainage path before the final tightening of clamps.
- **Requirement:** Verify that the solar panel array is straight and all clamps are torqued to the specified values.



FINALIZATION

Congratulations!

You have successfully completed the installation of the Carport Structure. By following these steps, you have built a durable, waterproof BIPV system designed to provide clean energy and vehicle protection for years to come. Please perform the following final checks to ensure your warranty and structural safety remain valid.

Final Inspection Checklist

- **Structural Alignment:** Verify all **Welded Piles** (1S, 1M, 2S, 2M) are plumb and the frame is perfectly square.
 - **Hardware Torque:** Confirm all bolt sets, specifically the **M20 Base anchors**, **M20 Pile bolts**, **M20 Beam bolts**, and **M16 Rail hardware**, are tightened to specified values.
 - **Rod Tension:** Check that all **Steel Rods** are properly tensioned and follow the staggered alignment pattern (up/down and left/right).
 - **BIPV Waterproofing:** Ensure every **BIPV Gutter** is centered under panel gaps and properly overlapped to maintain a clear drainage path.
 - **Clamp Security:** Inspect all **Mid Clamps** and **End Clamps** to ensure they are flush against the solar panels and securely fastened to the **BIPV Rails**.
 - **Debris Removal:** Clear any leftover installation debris from the gutters and panel surfaces to prevent drainage blockages or shading.
-

Maintenance Guidelines

- **Annual Inspection:** Conduct a full structural check once a year to ensure no bolts have loosened due to wind vibration or thermal expansion.
- **Gutter Cleaning:** Regularly clear the **BIPV Gutters** of leaves, dust, or snow to ensure the waterproof drainage system functions correctly.
- **Panel Cleaning:** Clean the **Solar Panels** with water and a soft brush as needed to maintain maximum energy efficiency.
- **Concrete Check:** Periodically inspect the **Concrete Foundation** for signs of cracking or shifting.