PA219 Solar Module Installation Manual

CATALOGUE

1.0 Summarize

First of all, thank you very much for choosing SUNGOLD lightweight flexible modules. This manual provides important safety instructions for the installation, maintenance, and use of the PA219 series solar standard modules (hereinafter referred to as "modules") of Sungold solar Co., Ltd (hereinafter simply referred to as "SUNGOLD") on standing seam color steel tiles. It is the responsibility of users and installers to read and understand the installation methods. Users and installers must complete the on - site technical survey of the project to ensure that the provided installation method is applicable to the project. Failure to comply with these safety guidelines may result in personal injury, death, or property damage. Installing and operating solar modules requires professional skills, and only professionals are allowed to engage in this work. Please read the safety and installation instructions before using and operating the modules. The installer must accordingly inform the end - customers (or consumers) of the above - mentioned matters.

1.1 Scope of responsibility

Regardless of whether the component installation is carried out in accordance with the instructions in the installation manual (including the changes publicly announced on the official SUNGOLD website during installation), SUNGOLD shall not be legally responsible for any damage incurred during the installation process, including but not limited to personal and property losses caused by component operation and system installation.
In case of any inconsistent descriptions among different language versions of this manual, the Chinese version shall prevail. This manual is only for installation guidance. Whether explicitly stated or implied in the manual, it does not have the meaning of any warranty.

1.2 Warning message

If non-Sungold-approved hardware is connected to the PA219 component, the warranty will be invalid.

2.0 Safety precautions

2.1 Warning

Before installing, wiring, operating, or maintaining the components, carefully read and understand all safety instructions. Failure to do so may result in property damage or even the risk of injury or death. When the component is exposed to sunlight or other light sources, direct current will be generated. Whether or not the components are connected, direct contact with the live parts of the components, such as terminal blocks, etc., may lead to injury or death.

2.2 Handling safety

- When installing or troubleshooting, do not wear metal rings, watchbands, earrings, nose rings, lip rings or other metal objects. Only use insulated tools suitable for electrical installation work.
- Do not lift the module by grasping the module junction box or electrical wires.
- Do not stand or step on the PV module, or place heavy objects on it.
- Do not drop the PV module or let objects fall onto the PV module.
- Be careful when handling, transporting and installing PV modules.
- Follow the safety regulations for all other system components, including wires and cables, connectors, charge regulators, inverters, batteries, rechargeable batteries, etc.
- Do not attempt to disassemble the PV module. Do not remove any installed nameplates or components from the PV module.
- Do not paint or glue on the top surface of the photovoltaic module.
- Do not scratch or impact the back panel.
- Only use connectors that are compatible with the photovoltaic module connectors. Disassembling the connectors without prior authorization will void the warranty.
- Do not disassemble the installed components for use in other projects, as this may void the warranty.
- Do not install modules within 50 meters of the coastline.
- Do not handle components under wet conditions unless appropriate protective measures are in place.

2.3 Installation safety

Any installation accessories used must be materially compatible with each other to avoid electrochemical corrosion.

- It is not recommended to use components with different configurations in the same system.
- Excessively long cables must be effectively managed or fixed in an appropriate manner, such as using UV-resistant cable ties to secure the cables to the installation system.
- For high operating voltage applications: connect multiple components in series (component string), system voltage = sum of individual component voltages.
- The maximum system voltage is DC 1500V.
- The maximum number of components connected in series is determined by the system design, the type of inverter used, and environmental conditions.
- To prevent overheating, select cables/connectors suitable for the system's maximum short-circuit current. For single components: cable cross-section **≥2.5mm²,** connector rated current **>25A,** cable operating temp max **85℃,** connector **105℃.**

- Please refer to local regulations to determine the wiring size, type, and temperature of the system.
- The components are supplied with connectors for system electrical connection. The recommend-
- ed connectors are MC4, TC-Cable01 or other compatible connectors.
- To ensure the reliability of the electrical connection and avoid possible water vapor intrusion, MC4,
- TC-Cable01 or other compatible connectors must be snapped into place.
- Long-term exposure to a humid environment may reduce the interconnection of the connectors,
- causing leakage or reduced conductivity. It is recommended to use a suitable wire management system to prevent the cables and connectors from being eroded by water vapor, and regularly inspect them according to different humidity levels to achieve optimal performance.
- The direct current generated by the photovoltaic system can be converted into alternating current
- and used in the public power grid. Since the policies of different regional institutions regarding the connection of renewable energy systems to the grid vary, always consult a qualified system designer or integrator for relevant advice. Usually, an installation permit and inspection and approval by the local institution are required.
- The number of bypass diodes in the junction box varies depending on the component model.
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2.4 Other safety rules

- Before installation, do not expose the photovoltaic modules to sunlight to avoid unnecessary degradation.
- During transportation, ensure that the modules are free from severe vibration to prevent micro-cracks in the batteries or damage to the modules.
- Consult the local authorities for guidelines and requirements regarding fire safety of buildings or structures.
- Do not use photovoltaic modules near the equipment or in places where combustible gases may be generated.
- When installing the modules, local regulations and codes should be complied with.

3.0 Mechanical properties / Electrical properties

The rated electrical performance data of the components are measured under the standard test conditions (STC) of irradiance 1000W/m2, AM1.5, and nominal cell temperature of 25℃. The specific electrical and mechanical performance parameters of the solar modules are provided in Annex A of this installation manual. The main electrical performance parameters under STC are also marked on the nameplate of each component. The maximum system voltage for all component series is 1500V.

In some cases, the current or voltage generated by the components may be greater than the optimal operating current or voltage under their standard test conditions (STC). Therefore, when determining the component ratings and load values, the open-circuit voltage and short-circuit current of the components under STC should be multiplied by 1.25.

4.0 Storage and unpacking

Preventive measures and general safety rules

- Components should be stored in a dry and well - ventilated environment.
- Components must be transported in the packaging boxes provided by SUNGOLD and should be stored in the original packaging boxes before installation. Please protect the packaging and avoid any damage. Open the component packaging according to the recommended unpacking steps. Be careful during the processes of opening the packaging, transportation, and storage.
- Do not apply excessive loads on components or distort components.
- Do not carry the components by means of the wires or junction boxes of the components.



- Standing, climbing, walking, and placing items on the components are prohibited.
- Components are prohibited from coming into contact with sharp objects. Scratches can directly affect the safety of the components.
- Do not place the components in an environment without reliable support or fixation.
- Changing the wiring method of the bypass diode is prohibited.
- All electrical interfaces need to be kept clean and dry.

5.0 Component installation

Preventive measures and general safety rules

- Before installing the components, please complete the on-site technical survey of the project to ensure that the provided methods comply with local laws, regulations and building standards.
- Check the applicable building codes to ensure that the buildings of the project are suitable for the installation of Sungold components.
- When installing the components, ensure that the components are installed on a fireproof roof.

Environmental conditions

The components are applicable to general climatic conditions, referring to IEC60721-2-1 - Classification of environmental conditions - Part 2-1: Environmental conditions appearing in nature - Temperature and humidity.

- If the component is used in a special installation environment, it is necessary to consult the SUNGOLD Technical Support Department in advance.
- The installation surface should be flat, without pits or protrusions.
- The component shall not be installed near flames or flammable objects.
- The component shall not be exposed to artificial concentrated light sources.
- The component shall not be immersed in water (pure water or saltwater), and shall not be installed in an environment where it is in contact with water (pure water or saltwater) for a long time (such as fountains, waves, etc.) or in positions where water is likely to accumulate (such as depressions, drainage outlets, etc.).
- It is strictly prohibited to place the component in a salt spray (i.e., a marine environment) or a sulfur - containing (i.e., sulfur - source - containing, volcanic, etc.) environment.
- If the above precautions are not followed, the SUNGOLD warranty will be invalid.

Installation requirements

- Ensure that the components of other systems do not have a destructive mechanical or electrical performance impact on the component.
- Allow components to be connected in series to increase the voltage. When connected in series, the positive pole of one component is connected to the negative pole of the next component.
- The number of provided bypass diodes varies depending on the component model.
- It is strictly prohibited to use components in parallel.
- Connect an appropriate number of components according to the voltage specifications of the inverter used in the system. Even under the worst local temperature conditions, the voltage generated by the connected components shall not be higher than the voltage value allowed by the system.
- To avoid (or reduce) the mismatch effect of the array, it is recommended to connect components with similar electrical performance in the same string.
- In order to reduce the risk caused by indirect lightning strikes, grounding measures should be properly taken during the system design.
- Components should be firmly fixed to withstand all possible loads, including wind and snow loads (2400 Pa).

- When components are installed in rooftop application scenarios, overall maintenance in the later stage needs to be considered. The roof where the photovoltaic system is installed must be evaluated by construction experts or engineers, and there should be formal and complete structural analysis results to prove that it can bear the additional pressure of the system support, including the self - weight of the photovoltaic components.
- During installation, it is prohibited for a single component to span the joints where displacement may occur between directly contacting materials. Otherwise, there may be hidden cracks in the components.
- If the construction does not comply with the installation specifications in this manual, it may cause damage such as hidden cracks in the components and fires.

Optimal direction and inclination

- In order to achieve the maximum annual power generation, the optimal orientation and tilt angle of the components should be determined first. Generally, when sunlight shines perpendicularly on the components, the maximum electrical energy can be generated.

Avoid shadows

- Even a minimal amount of shading (such as dust) can cause a decrease in power generation. If all surfaces of a component remain unobstructed throughout the year, the component can be considered "shading - free". Ensure that sunlight can still reach the component even on the shortest day of sunshine in the year, and avoid any shading of the component, including from leaves, bird droppings, and other foreign objects.
- Shading of components can lead to material aging and long - term heating of diodes, which will affect the service life of the components, increase the risk of component fires, accelerate the aging of solar cells, and reduce the power generation efficiency of the shaded components. Therefore, please ensure that the installation location of the components is free from shading throughout the year.

5.1 Component wiring

Correct electrical wiring

- Before starting the system, check whether the wiring is correct. If the measured maximum power point voltage (Vmp) and maximum power point current (Imp) are inconsistent with the provided specifications, there may be a wiring fault.

The correct connection of the connector

- Ensure that the connectors are tightened and correctly connected. Use a special wrench to tighten the connector nuts, and the tightening torque must match the photovoltaic cables used. The typical value is between 3.4 Nm and 3.5 Nm (for specific connection steps, please refer to the connector supplier's information). Connectors shall not bear external pressure. Connectors can only be used for circuit connection functions and shall not be used to open and close circuits. Do not insert other metal objects into the connectors or make electrical connections in any other way.
- Ensure that the male and female connectors are inserted tightly without looseness.
- The connector connections should be kept dry and clean, and the connectors should be prevented from being immersed in water.
- It is prohibited for junction boxes and connectors to come into contact with organic solvents, oily substances, other corrosive materials, etc., which may cause functional failure, to avoid damage. If any damage occurs to the junction boxes and connectors, continued use is prohibited ;

Use appropriate materials

- If it is necessary to replace the connector or junction box, it must be approved by Shanggu or an authorized distributor. Use only the connectors or junction boxes permitted, and ensure that the electrical and mechanical properties of these components are in good condition.
- The permitted solar cables are single - wire cables. Select the cable grade that matches the system according to the actual situation of the system. At the same time, the cable should have appropriate insulation properties to withstand the maximum possible current. Choose an appropriate wire gauge to reduce resistance. The material of the wire is generally copper.

Cable protection

- Use cable ties with UV resistance to secure the cables to the installation system. Appropriate measures should be taken to protect the exposed cables from damage.

5.2 Grounding

- There is no metal conductor in the PA219 component part, so there is no need to set up a grounding system.

6.0 Construction Guide

6.1 Construction tools

Structural adhesive、Cleaning tools、measuring tape、Wire - laying tools, etc.


Structural adhesive


Electric caulking gun

6.2 Precautions for component unpacking, handling, and inspection

- In the process of transportation, to ensure the safety of the components, please open the component packaging box after arriving at the installation site.
- Before unpacking, please check whether the packaging box is damaged and notify SUNGOLD or the local distributor in a timely manner.
- It is recommended that the unpacking personnel wear anti-slip gloves in advance.
- Under no circumstances are components allowed to be lifted or carried by using the junction box or connecting cable as a handle.
- To avoid damaging the solar cells, two people should lift the four corners of the component (avoiding the position of the solar cells) simultaneously to carry the component.
- Be cautious during the handling of components to avoid the edges of the components hitting the ground or other sharp and hard objects.
- Check whether there is any damage on the surface of the components. If the surface material of the components is damaged or worn, do not use it.
- Please check whether the junction box, connectors, and cables are damaged, and whether the box cover is tightly closed. Do not use if there is any damage.
- Operations such as painting, applying adhesives, and sticking labels on the surface of the components are strictly prohibited.

6.3 Construction precautions

- Construction can be carried out normally within the temperature range of 5℃ - 40℃ and humidity below 80% (the specific construction temperature range shall be subject to the information of the special adhesive manufacturer);
- The surface of the base layer must be cleaned or wiped clean, kept dry, free of floating soil, oil stains, etc.
- The bonded area shall not be torn or peeled within 24 hours after construction;
- The bonding surface needs to be flat, without pits or protrusions;
- When storing the auxiliary materials used in construction, the storage specification requirements of the auxiliary materials shall be followed.

6.4 Construction specifications for structural adhesive

- The structural adhesive used shall be consulted with and confirmed by SUNGOLD, or the structural adhesive of the model recommended by SUNGOLD shall be used.
- After cleaning the construction surface, the surface must be free of water stains before applying the adhesive.
- After applying the adhesive, the width of the adhesive shall not be less than 10mm and the height shall not be less than 5mm. After pasting, the height of the structural adhesive shall reach 5 - 10mm. It shall not be too high or too flat. If it is too high, the curing time of the structural adhesive will be too long; if it is too flat, the adhesive force of the structural adhesive will fail. Do not use feet or other non - designated tools to compact the structural adhesive.
- The application must be uniform and continuous. Before pasting, do not scrape the adhesive strip flat. The spread of the adhesive should be achieved by the self - weight extrusion of the components.
- The time from applying the adhesive to assembly should be completed within the shortest time (not exceeding 5 minutes).
- Within 48 hours, the structural adhesive will cure to a depth of 2 - 3mm. Before it is completely cured, do not apply force, do not move the components, and do not conduct pull - out force tests, etc.

Specialgluecuringtableatdifferentambienttemperatures			
Ambient Temperature	-10≤Ta≤0	0 < Ta < 20	20≤Ta≤45
FullSolidificationTime	21	14	7
Standardsolidificationconditions:temperature(23±2)°C,humidity(50±5)%conditionscanbecompletelysolidifiedin7days			

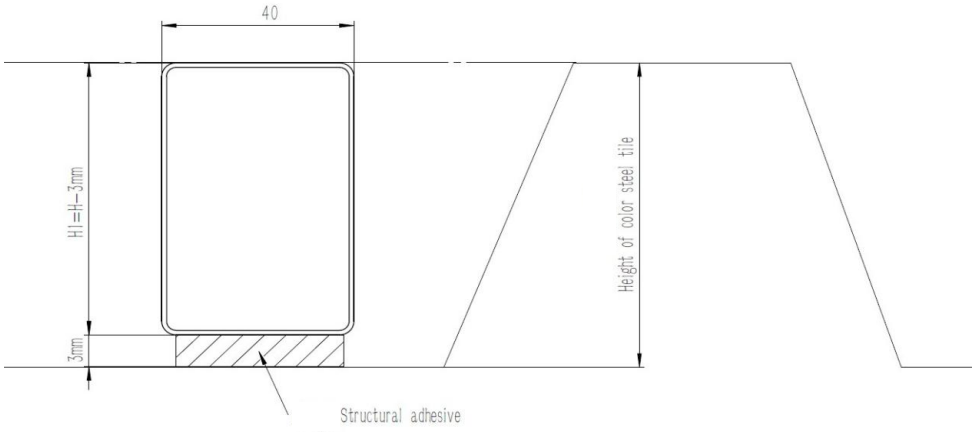
Table 1. Complete Curing Time of Special Glue

(This table is only used as a reference for the curing time of Tianshan 1527 structural adhesive. For special adhesives of different models from different manufacturers, the specific curing time shall be subject to the information provided by the special adhesive manufacturer.)

6.5 Construction plan for trapezoidal color steel tiles

6.5.1 Supporting parts

- Level the aluminum square tube



Material: Aluminum Profile 6063-T5/T6

Surface Treatment: Anodizing AA10 and above Dimensions：B=40mm，H1=（H-3mm）±2mm

6.5.2 Clean the roof

- Remove debris from the roof base. Clean the roof base with the specified or approved cleaning agent. If the roof base is very dirty, first spray it with low - pressure water or use a power washer before applying the cleaning agent. Use (1/4 cup of trisodium phosphate, 1/2 cup of liquid cleaning agent (optional) and 5 gallons of water) for cleaning.

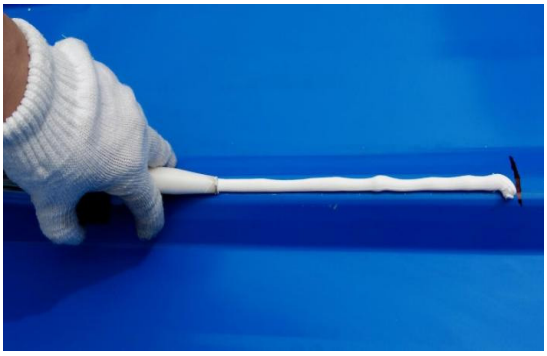
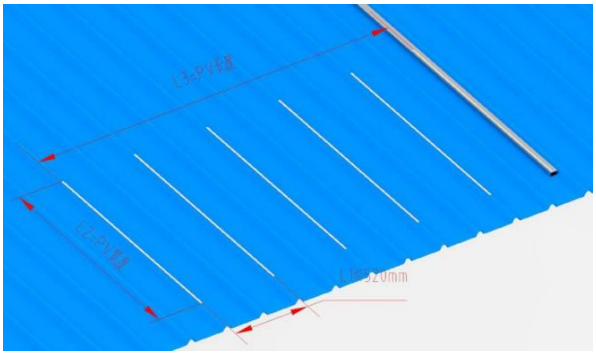
6.5.3 Laying out and positioning

- According to the design drawings, determine the position of the components on the roof and conduct layout and measurement；

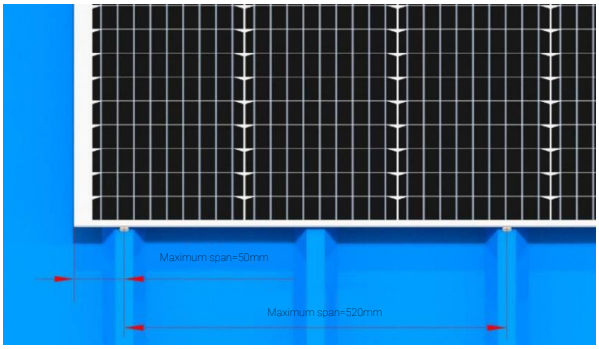
- If there is a splicing situation in the direction from the ridge of the color steel tile to the eaves, the joint should be placed between the components. A single component shall not cover the joint;


6.5.4 Apply structural adhesive

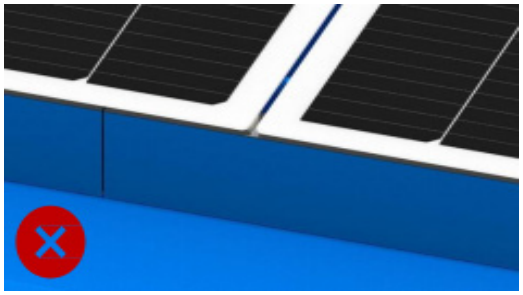
- On the peak platform of the color steel tile, apply glue continuously and evenly. Spot gluing or sectional gluing is strictly prohibited;

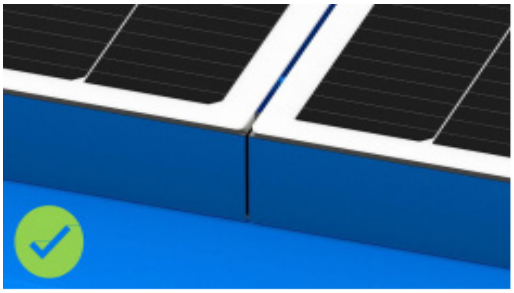



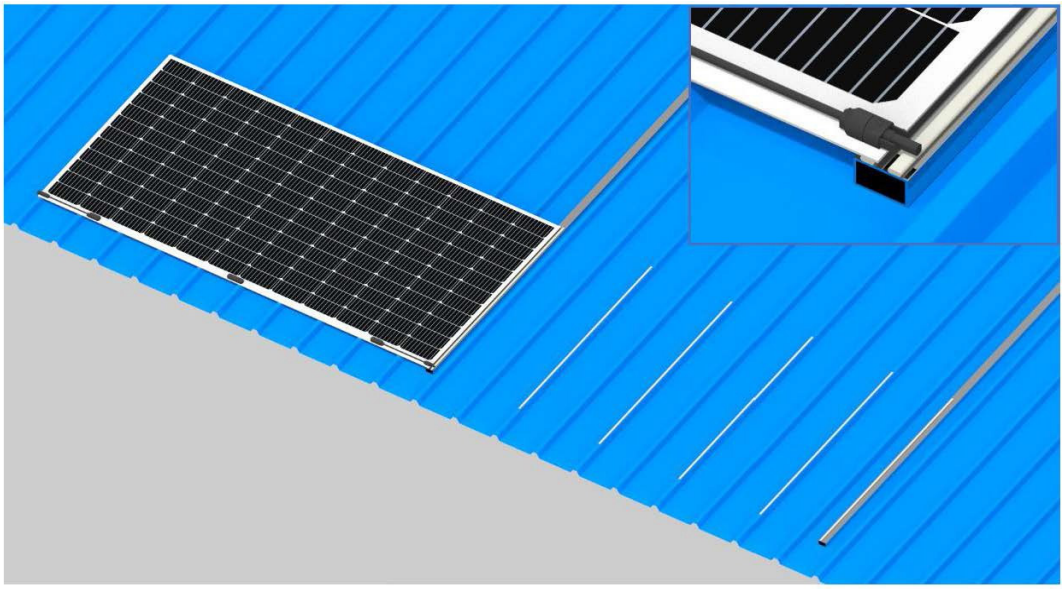
- The length L2 of the structural adhesive is equal to the width of the component. The spacing L1 of the structural adhesive is ≤ 520mm. When the cantilever part of the component is > 50mm, a leveling aluminum square tube shall be used;

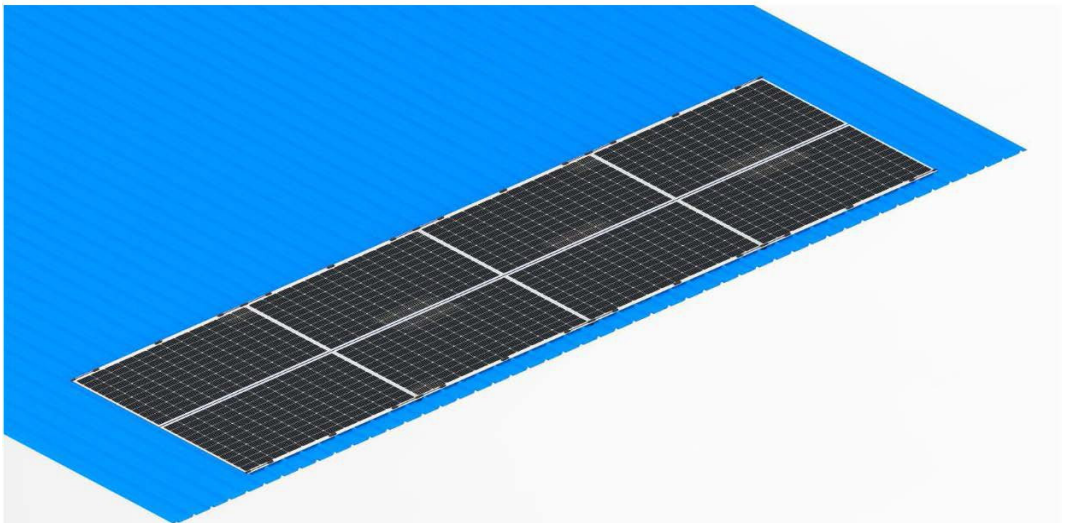


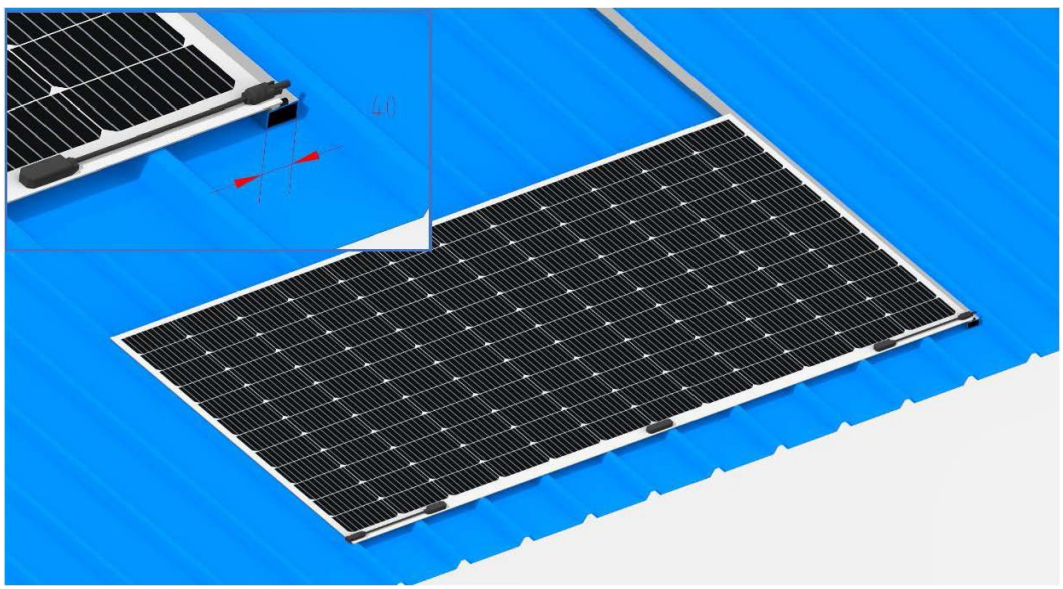
- If there is a splicing situation in the flattened aluminum square tube, the joint should be placed between the components. A single component should not cover the joint of the aluminum square tube;











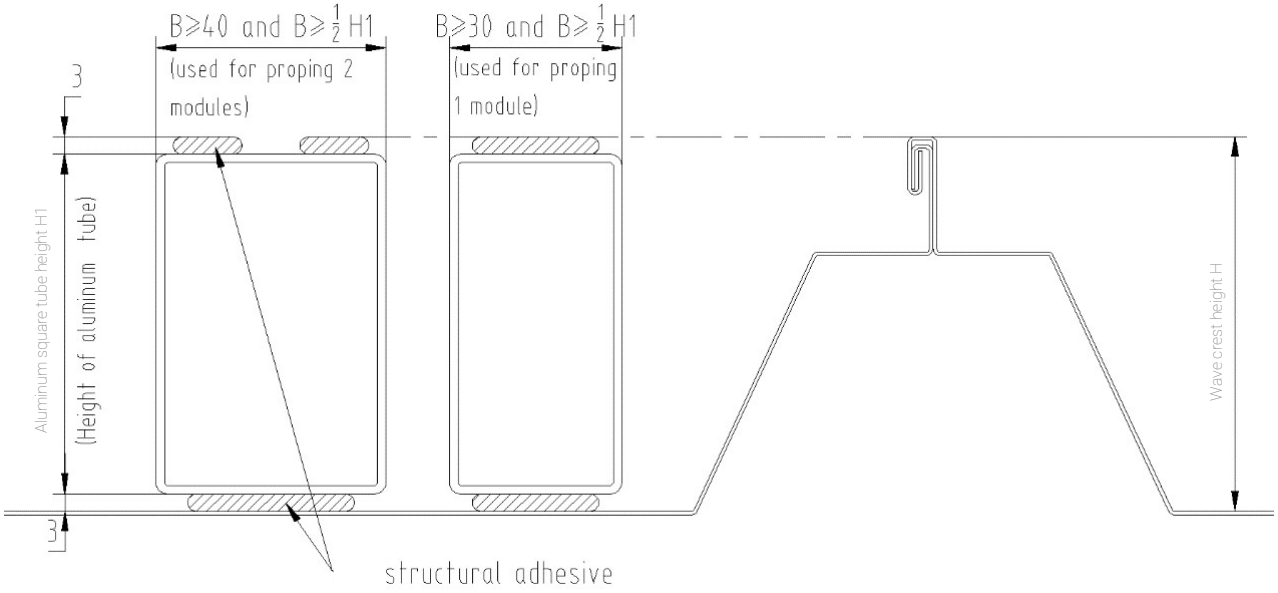
6.5.4 Apply structural adhesive

- When installing components, excessive distortion of components is prohibited. Two people should hold the white edges of the component and slowly place it into the gluing area. When pasting components, they should be made horizontal and vertical, and no secondary pasting is allowed.
- The short side of the component must be parallel to the peak of the color steel tile, and it is prohibited to be perpendicular to the peak of the color steel tile.
- After the component is pasted flat, it is prohibited to press the solar cells by hand for stabilization.
- The minimum distance between components is 5mm, and there should be a 500 - 800mm construction and maintenance passage between arrays (this spacing is for reference only).
- Adjacent components share the leveling aluminum strip.
- Place the junction box on the side of the maintenance passage for easy series connection of strings and maintenance inspection.
- Install other components according to the above steps.

6.6 Construction Plan for Standing Seam Color Steel Tiles and Aluminum Square Tubes

6.6.1 Supporting parts

- Level the aluminum square tube



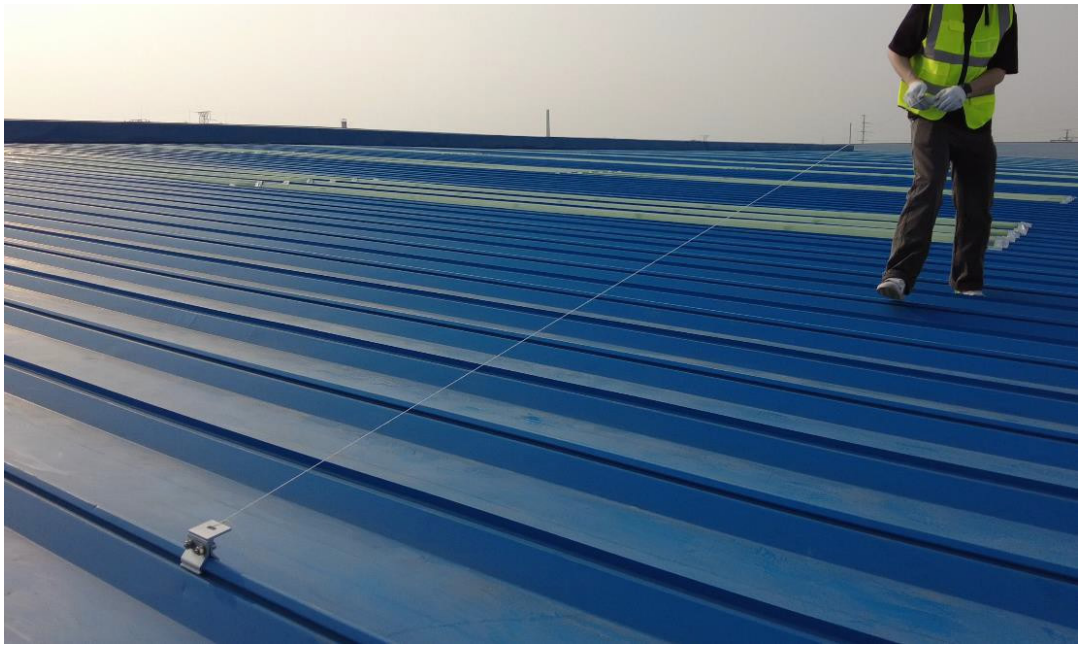
Material: Aluminum Profile 6063-T5/T6; Surface Treatment: Anodic Oxidation above AA10;
Dimensions：H1=（H-6mm）±2mm；For the square tubes shared by two components，B≥40mm且B≥½H1；
For other square tubes, B≥30mm and B≥½

6.6.2 Clean the roof

- Remove debris from the roof base. Clean the roof base with the specified or approved cleaning agent (Appendix B). If the roof base is very dirty, first spray with low - pressure water or use a power washer before applying the cleaning agent. Use (1/4 cup of trisodium phosphate, 1/2 cup of liquid cleaning agent (optional), and 5 gallons of water) for cleaning.

6.6.3 Set out and position

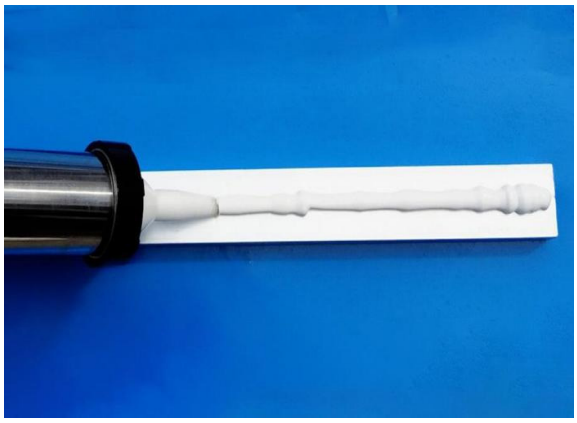
- According to the design drawings, determine the position of the components on the roof and conduct setting-out measurement；

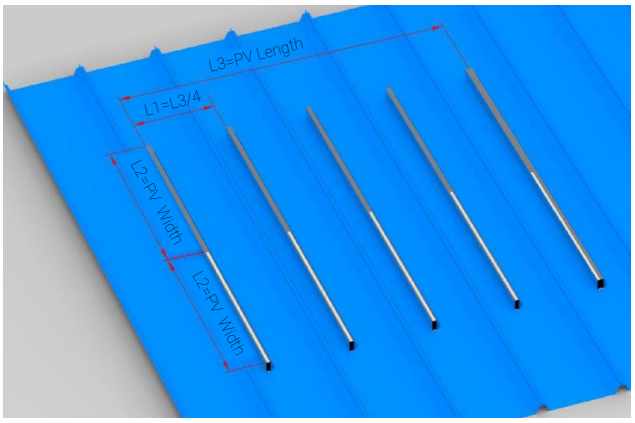


- For components, use no less than 5 aluminum square tubes for support, and distribute them evenly in the length direction of the components.
- When the position of the square tube interferes with the wave crest, the position of the square tube can be adjusted appropriately.
- If there is a splicing situation in the direction from the ridge of the color steel tile to the eaves, the splicing seam must be placed between the components. A single component shall not cover the splicing seam；

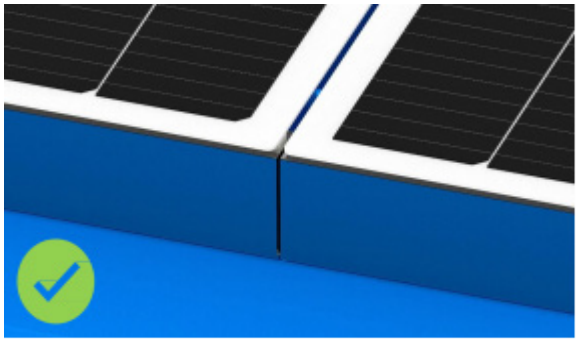
6.6.4 Apply structural adhesive

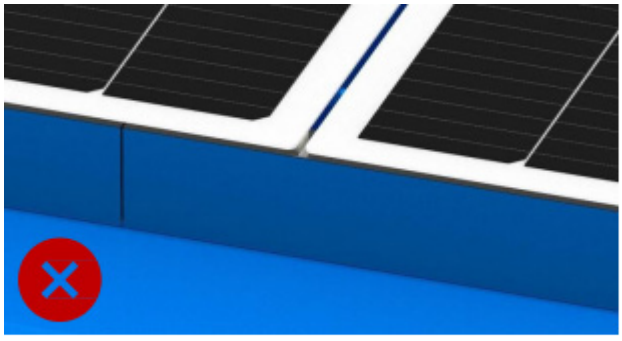
- Apply glue continuously and evenly in the trough of the color steel tile. Spot gluing or sectional gluing is strictly prohibited.;
- Paste aluminum square tubes. Use square tubes with a width of ≥40mm at the shared part of two components, and use square tubes with a width of ≥30mm in other positions.;
- The length L2 of the structural adhesive is equal to the width of the component, and L3 is equal to the length of the component;
- Apply glue evenly on the upper surface of the square tube;





- If there is a splicing situation in the leveled aluminum square tube, the joint seam must be placed between components. A single component shall not cover the joint seam of the aluminum square tube;

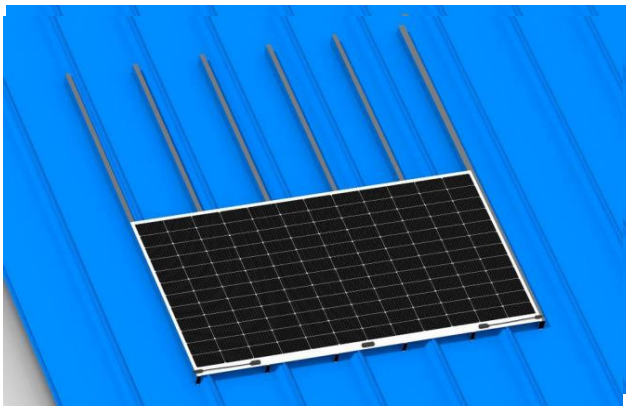


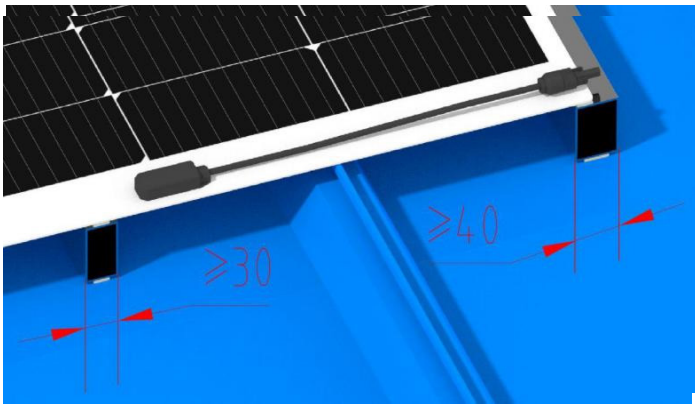


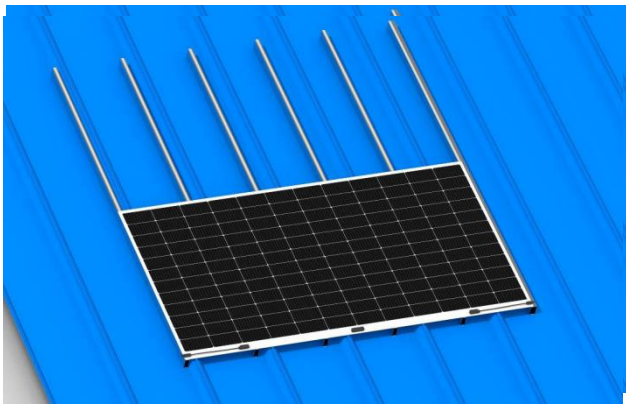
6.6.5 Paste component

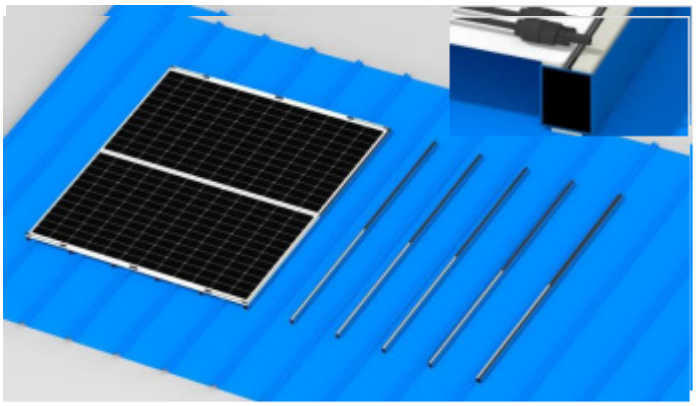
- When installing components, excessive distortion of components is prohibited. Two people should hold the white edges of the components and slowly place them into the gluing area. When pasting components, they should be kept horizontally and vertically straight, and re - pasting is not allowed.
- The short side of the component must be parallel to the aluminum square tube, and it is prohibited to be perpendicular to the aluminum square tube.

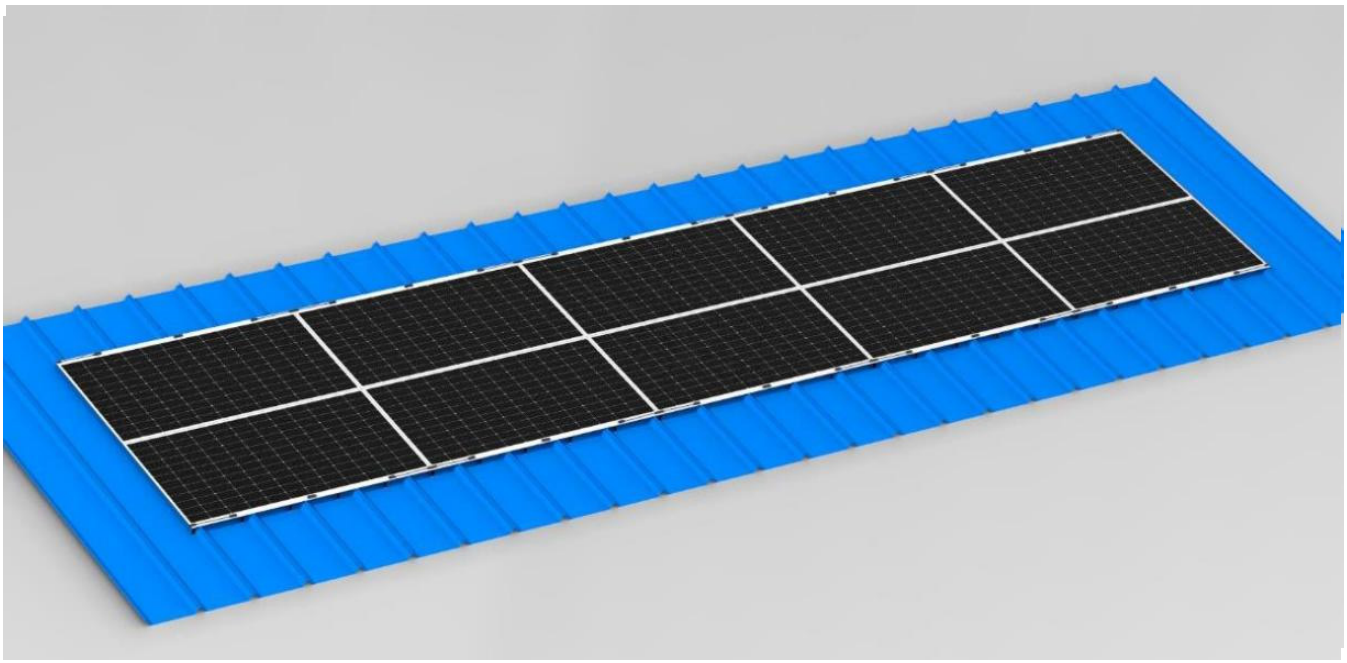
- After the component is pasted flat, it is prohibited to press the battery cells by hand for fixation.
- The minimum distance between components is 5mm, and there is a 500 - 800mm construction and maintenance passage between arrays (this spacing is for reference only).
- Adjacent components share the leveling aluminum square tube.
- Place the junction box on the side of the maintenance passage to facilitate series connection of strings and maintenance inspection.
- Install other components according to the above steps.











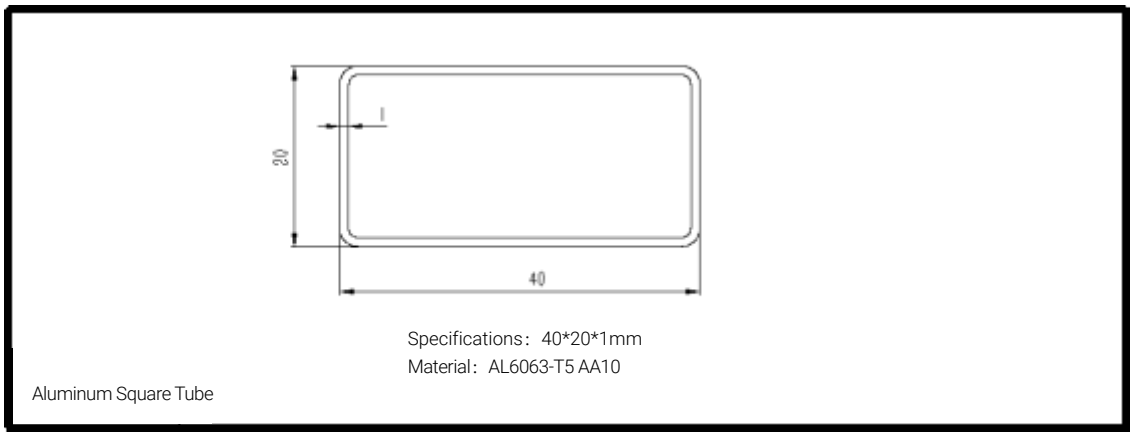
6.7 Construction Plan for Aluminum Square Tube of Flat RoofInstallation steps

- If the surface of the asphalt membrane roofing contains a protective film, the film must be removed before construction and installation can proceed.

  Note: The installation step illustrations are for TPO roofing and are for reference only. Different roofing types can refer to these steps for construction.

6.7.1 Support component

- Aluminum square tube



6.7.2 Clean the roof

Remove debris from the roof base. Clean the roof base with the specified or approved cleaning agent (Appendix B). If the roof base is very dirty, first spray with low - pressure water or use a power washer before applying the cleaning agent. Use (1/4 cup of trisodium phosphate, 1/2 cup of liquid cleaning agent (optional) and 5 gallons of water) for cleaning.

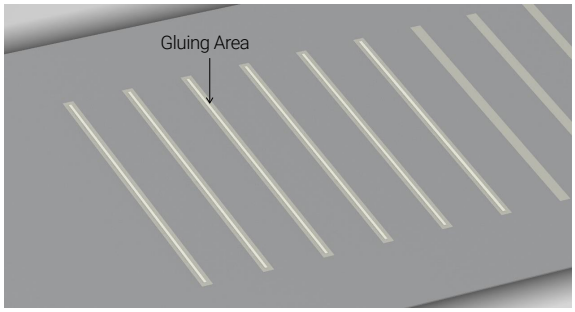
6.7.3 Positioning and setting out

- Determine the spacing of aluminum square tubes according to the design drawings；

- For components, use no less than five aluminum square tubes for support, and distribute them evenly in the length direction of the components.

6.7.4 Apply primer to the base material (this step can be skipped if the base material does not require primer).

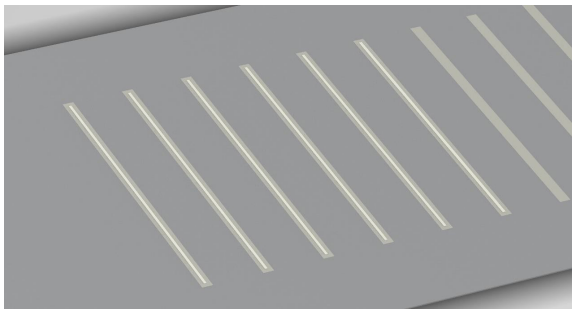
- Determine the glue - applying area of the components on the cleaned roof (refer to the design drawings for specific dimensions);



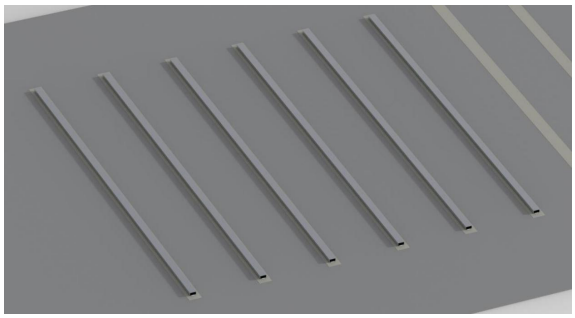
- Clean the glue - applied area again, and wipe the area with the special cleaning agent in Attachment B.
- In the gluing area, apply a layer of primer before the construction of structural adhesive to increase adhesion.

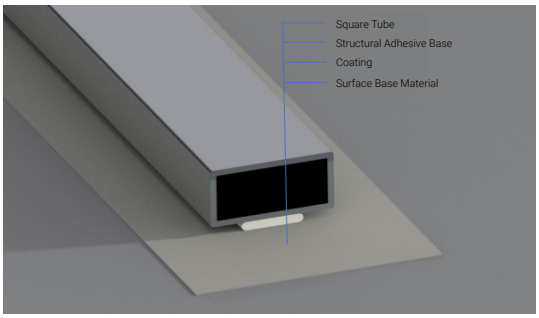
6.7.5 Paste square tube

- According to the requirements of the gluing specification, carry out gluing operations in the gluing area. Apply glue continuously and evenly. Spot gluing or sectional gluing is strictly prohibited;



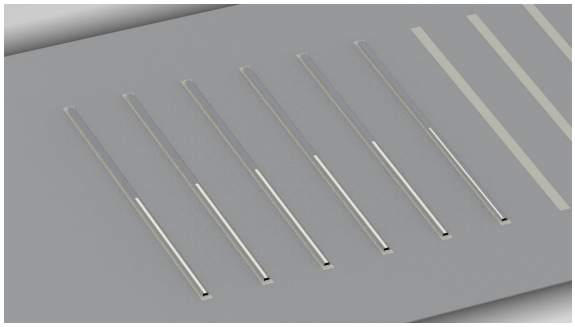
- Paste the square tube, paste the square tube along the gluing path, gently press it down, and ensure that the glue thickness is not less than 3mm;



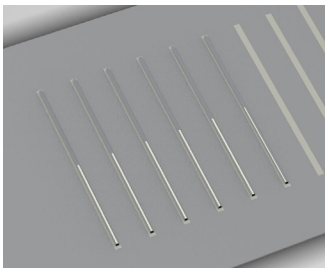


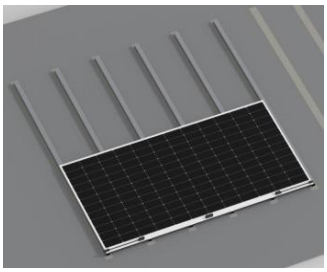
6.7.6 Paste component

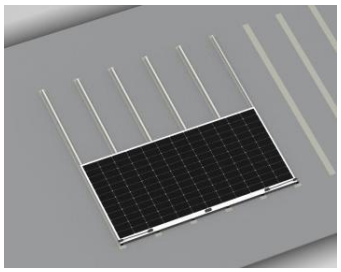
- According to the glue application specifications, carry out glue application operation on the upper surface of the square tube. Apply the glue continuously and evenly. Dot-like glue application or segmented glue application is strictly prohibited;

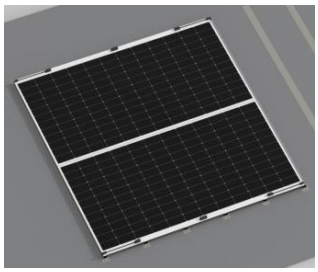


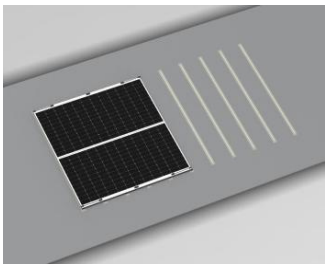
- When installing the components, excessive distortion of the components is prohibited. Two people should hold the white edges of the components and slowly place them into the gluing area. When pasting the components, they should be made horizontal and vertical, and no re - pasting is allowed.
- The short side of the component must be parallel to the aluminum square tube, and it is prohibited to be perpendicular to the aluminum square tube.;
- After the components are placed flat, do not press the battery cells by hand to secure them.
- The minimum distance between components is 5mm, and there is a 500 - 800mm construction and maintenance passageway between arrays (this spacing is for reference only);
- If the component selection is the 12*11 series (i.e., the junction box is on the long side of the photovoltaic module), place the junction box side at the edge position to facilitate series connection wiring and maintenance inspection;
- Install other components according to the above steps.

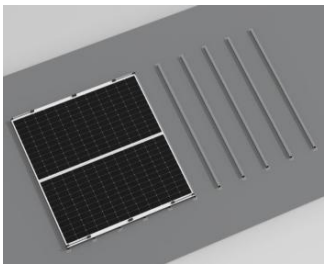


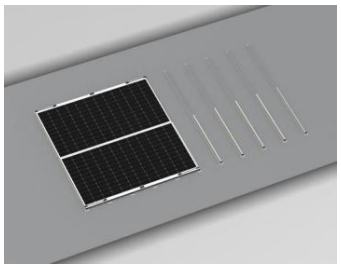


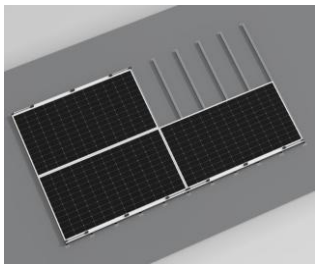


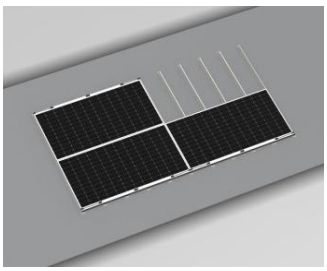


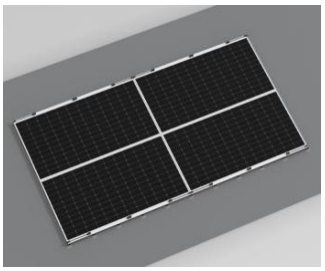


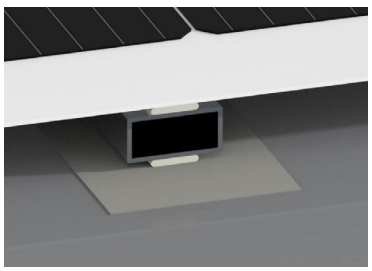






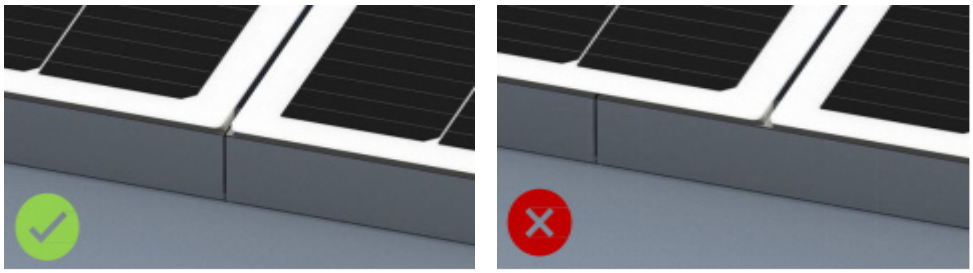






6.7.7 Square tube splicing

- If there are splicing situations in the flattened aluminum square tubes, the splicing seams must be placed between components. The splicing seams of aluminum square tubes shall not be covered by a single component;



6.8 Wiring and testing

- It is prohibited to use photovoltaic modules with different configurations in the photovoltaic system.
- Excessive cables must be organized or fixed in place and must not block the solar cells.
- For applications that require a high operating voltage, several photovoltaic modules can be connected in series to form a photovoltaic string, and the system voltage is equal to the sum of the voltages of each photovoltaic module.
- The maximum system voltage is DC1500V.
- The maximum number of series-connected photovoltaic modules depends on the system design, the type of inverter used, and environmental conditions.
- Refer to local regulations to determine the size, type, and temperature of system conductors;
- The PV modules are equipped with connectors for system electrical connections. Please refer to local regulations and data sheets that allow the use of connectors;
- To ensure reliable electrical connections and prevent possible moisture intrusion, the connectors must be mated and locked together until a click sound is heard. Otherwise, arcing and electric shock may occur. Please ensure that all electrical connections are secure and that all locked connectors are fully connected.

The direct current generated by the photovoltaic system can be converted into alternating current and connected to the public power grid. Since the policies of local power supply companies regarding connecting renewable energy systems to the grid vary by region. You can seek assistance from photovoltaic system design engineers or integrators, so that you can smoothly obtain building permits, inspections, and approvals from the local power supply company department.

7.0 Component operation and maintenance

To ensure that the components can achieve optimal performance and maximize the power generation of the system, the following maintenance measures are recommended:

1. Check the appearance of the components, with a focus on the following points:
If you need inspection or maintenance of electrical or mechanical properties, it must be carried out by certified and approved professionals to avoid electric shock or casualties.

- Check if the components are damaged. Do not replace components (such as diodes, junction boxes, connectors, etc.) without permission.
- Check if there are sharp objects in contact with the surface of the components.
- Check if the components are blocked by obstacles or foreign objects. Avoid new - grown trees, newly - erected utility poles, etc. from blocking the components. Routine maintenance measures should be taken to keep the components free from snow, bird droppings, seeds, pollen, leaves, branches, dust, stains, etc.
- Check if there is corrosion near the grid lines of the battery cells. This corrosion is caused by the damage of the encapsulation material on the surface of the components during transportation, which leads to the penetration of water vapor into the components.
- Check if the structural adhesive between the components and the roof is loose, and make timely adjustments or repairs.

2. Component cleaning. The accumulation of dust or dirt on the surface of the components will reduce the power generation output. Regular cleaning should be carried out to keep the surface clean. Generally, it should be cleaned at least once a month. In harsh natural environments, the frequency should be appropriately increased. When cleaning the photovoltaic components, attention should be paid to：

- First, rinse with clean water, then dry the water stains with a soft cloth. It is strictly prohibited to clean with corrosive solvents or wipe the photovoltaic modules with hard objects.
- It is recommended to clean when there is no sunlight, preferably in the morning or evening.

It is strictly prohibited to clean the photovoltaic modules under weather conditions with wind force greater than level 4, heavy rain or heavy snow. Note: Do not walk, stand or sit on the modules for cleaning.
If there is a lot of dirt accumulated on the surface of the modules, rinse the module array with water without detergent and a soft cleaning tool (sponge) during the cool hours of the day. Do not scratch or wipe the dust when it is dry, as this may cause minor scratches.

3. Check the component connectors and cable wires. A preventive inspection is recommended every six months:

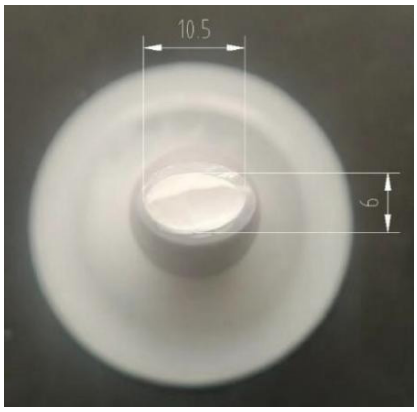
- Check for signs of aging of the photovoltaic components. This includes possible damage by rodents, aging due to climate, and whether all connectors are tightly connected and free from corrosion;

8.0 Attachment

Adhesive application operation specifications

8.1 Nozzle cutting

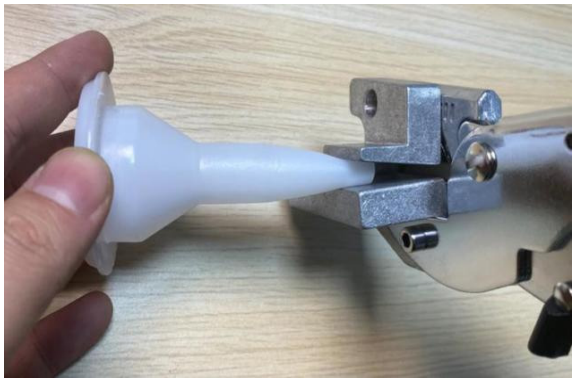
The inner dimensions of the standard glue nozzle incision are 10.5mm×6mm. During production, approximately 20mm of the length of the original glue nozzle needs to be cut off, and then it should be flattened to the required dimensions, as shown in the figure below:



The cutting of the glue nozzle should be carried out strictly in accordance with the following operating methods.

Standard tool scissors (presented with structural adhesive)

Operation steps

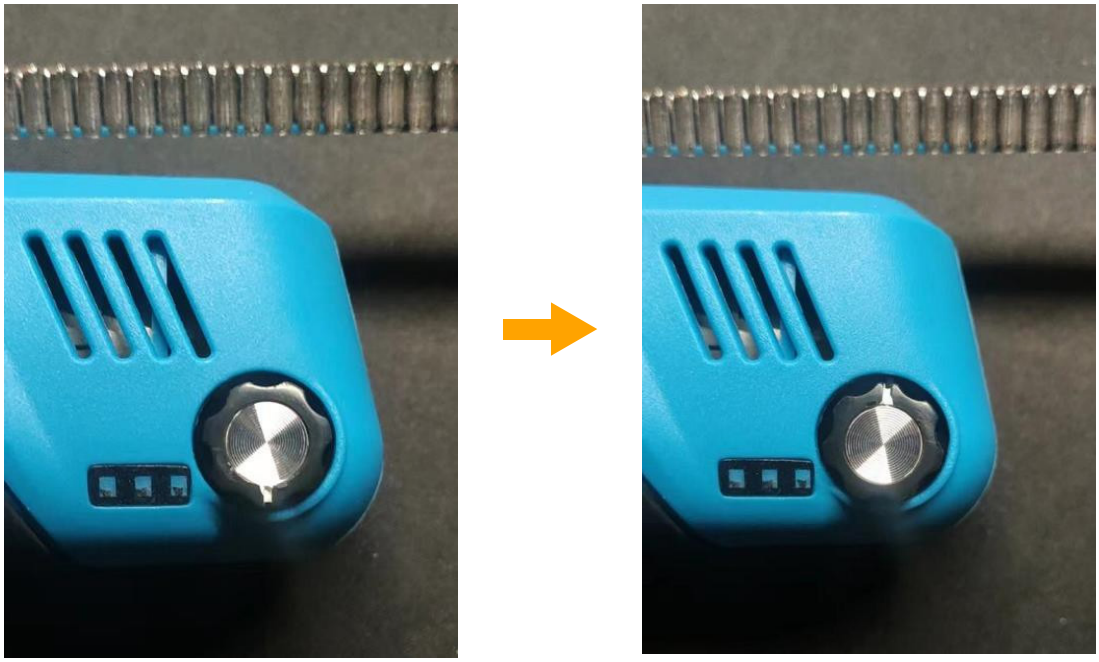


1. Use a ruler or tape measure to measure a 20mm length at the head of the glue nozzle, confirm the cutting position, and then use a pair of scissors to cut it off.

2. It is recommended to heat the tip of the glue nozzle with a lighter for about 2 seconds to prevent it from rebounding after being flattened.

3. Use the flattening die of the tool shear to extrude the glue nozzle to form it to the required size.

8.2 Adjust the standard glue output speed of the electric glue gun: Rotate the speed knob half a turn, as shown in the figure below:



Initial gear position

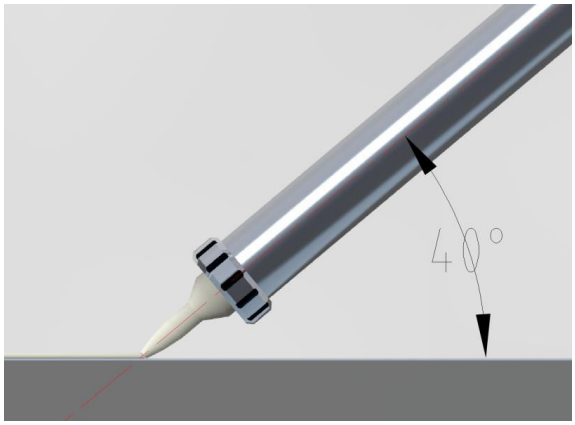
Construction gear

8.3 Glue application parameters

- Glue application length: average 10.8m/600ml

  Glue application speed: approximately 10cm/s

  Glue application angle: the glue gun makes an angle of approximately 40° with the ground, as shown in the figure below:



Glue size and standard dosage: at least 10*5mm; 5 strips per piece of module (the glue is along the width direction of the PV module); 3 strips per piece of module (the glue is along the length direction of the PV module)

8.4 Structural adhesive form (please read below for the correct one)

Application of structural adhesive

The correct form of the structural adhesive after pasting the component

9.0 Disclaimer

- This manual's usage constraints govern the conditions or methods for the installation, operation, use, and maintenance of photovoltaic products. If operations exceed the scope required by Sungold's installation manual, Sungold shall not be liable for any losses, damages, or costs arising from other installation, operation, use, or maintenance - related actions.

- Customers do not obtain any patent or authorization to use patent rights by using Sungold's products.

- The information in this manual is based on Sungold's knowledge and reliable experience; however, this information and recommendations, including product specifications (but not limited to), do not constitute any guarantee or warranty, whether express or implied. Sungold reserves the right to change the content of this installation manual without prior notice.