Sunport Power

Innovation Changes the World

Sunport Power

Solar PV Flexible Modules

INSTALLATION AND USER MANUAL

For professional use only

version：2024 01

1. Introduction

Thank you for choosing Sunport as your PV module provider. This manual contains important information about the safety, installation and maintenance of the modules. This manual does not have any warranty significance. It does not stipulate compensation scheme of any loss, damage or other expenses caused by or generated during module installation, operation or maintenance. Sunport PV modules shall not be liable for any infringement of patent rights or rights of third parties caused by the use of modules. Sunport reserves the right to change the product specification and this manual without prior notice.

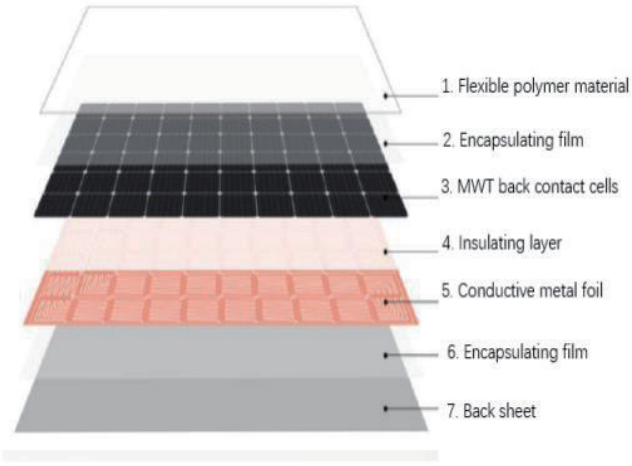
The installation personnel must read and understand this guide before installation. The installation personnel must follow all safety precautions, local requirements, and laws or regulations of authorized authorities described in this guide. Sunport shall not be responsible for injuries, losses or expenses arising from non-compliance with this manual, from or in connection with the products of other manufacturers. Please provide this manual to PV system owners for their reference and inform them of all safety, operation and maintenance requirements and recommendations. The installation manual is available in different languages. In case of any conflict, the Chinese version prevails.

2. Laws and Regulations

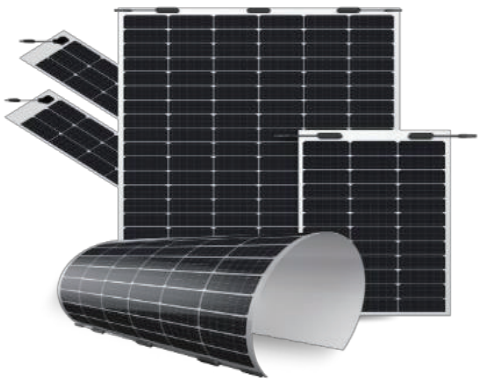
The mechanical and electrical installation of PV systems should be performed in accordance with all applicable codes, including electrical codes, building codes, and electric utility interconnect requirements. Those regulation may vary for mounting location and requirements may also vary with system voltage, and DC or AC application. Contact local authorities for detailed governing regulations, and make a point of getting confirmation and relevant permission.

3. Module Information

3.1 Encapsulation Structure Sketch Map



3.2 Module Section Structure Diagram.



3.3 Nameplate Information

The nameplate describes the product type, dimension, maximum power, optimum operating current, optimum operating voltage, open circuit voltage, short circuit current, certification mark and maximum system voltage etc. under standard test conditions.

Sunport 日托光伏		Maximum Power	360W	Maximum Power Tolerance	0~+5W
		Maximum Power Voltage (Vmp)	34.7V	Operating Temperature	-40~+85℃
		Maximum Power Current (Imp)	10.37A	Nominal Module Operating Temperature (NMOT)	43±2℃
		Open Circuit Voltage (Voc)	42.2V		
Model	SPP360QHES	Short Circuit Current (Isc)	11.02A	⚠ CAUTION	
Dimension (L×W×H)	1840×1040×2.5mm	Open Circuit Voltage Tolerance	±3%	Electricity is generated when this module is exposed to light. All applicable electrical safety precautions are obeyed. Only qualified personnel are allowed to install or perform maintenance work on modules. Be care of dangerous high DC voltage when connecting modules. Do not handle or install modules when wet.	
Weight	5.7Kg	Short Circuit Current Tolerance	±5%		
Maximum System Voltage	DC1500V	CE IEC 61215:2016 IEC 61730:2016		Jiangsu Sunport Power Corp.,Ltd. http://www.sunportpower.com Tel:+86-510-81123333 Fax:+86-510-84390626 Made in China	
Maximum Series Fuse Rating	18A				
Application Class	Class A				

4. Safety

Sunport's flexible modules are compliant with IEC 61215 and IEC 61730 standards and the application rating is class A. The modules can be used for systems that may be exposed to the public and are larger than 50V or 235W DC. The modules passed the two parts of IEC 61730-1 and IEC 61730-2 and met the safety Class II requirements.

All installation work must comply with local and local regulations and corresponding national or international electrical standards. Do not install in rainy days, strong winds, rain or snow. To avoid potential safety risks, such as water immersion into the connector etc.

4.1 Transportation & Storage Safety

- Do not open the original package during transportation and storage until they are ready to be installed;
- Use lifting to uploading and downloading for package, refer to standard operation to prevent fail and other risks;
- Use reasonable assembly fixtures to support transfer, lifting 1pallet and stacking 2 pallets per time;
- Keep good packaging, prevent no broken and moisture. Keep in a well-ventilated, rainproof and dry place anytime;
- The unloading ground must be smooth and free from inclination;
- Note same power level products in same area when unloading, keep around 30cm distance between two stacks.

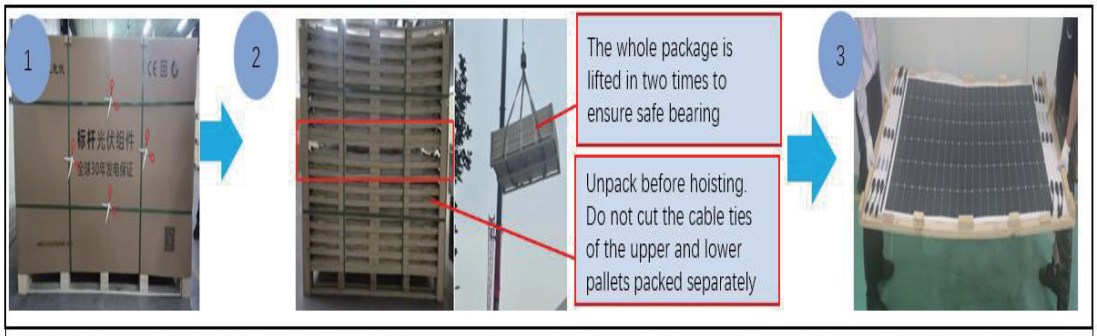
4.2 Packing & Operation Safety

Verify no packaging is damaged before unpacking. If the modules are damaged, contact the company from which you purchased the modules so that you can obtain the information to raise complaint for defective modules.

- Unpacking procedure, first save the side documents effectively, then cut the cable ties, remove the top cover and long cardboard
- When unpacking, if lifting is required, do not cut the cable ties that are separately packed for the upper and lower pallets, so that the crane can lift the upper and lower pallets separately.
- modules should be placed on flatness ground, prevent hard scratch, damage;
- Ensure surface is clean, use soft cloth to wipe if dirty before installation;
- ⌦ Do not exceed 6pcs modules for a single handling and stacking, refer to the below photo;
- ⌦ Do not hand grasp junction box or picked up the wire to move modules;
- ⌦ Do not stand, climb, walking and jumping on modules;
- ⌦ Do not use rope, back modules as transport method;
- ⌦ Do not touch with hard objects, sharp objects contact, impact, pressure;
- ⌦ Do not paint on the surface, add label or tear down label or nameplate;
- ⌦ Do not install the scratches, damaged or other faulty module;
- ⌦ Do not drilling extra hole on panels within installation process, unless confirmed accepted by Jiangsu professionals in advance.
- ⌦ Do not disassemble or modify the modules in any way that may affect the performance and safety of the modules or even cause irreparable damage and void applicable warranty;

⌦ Do not directly damage the module under any circumstances. Disassemble or replace the module according to the installation manual.

Disassembly and handling diagram



Note: Packing specification 100 pieces/box. Divided into two trays, the upper tray 8 layers, the lower tray 9 layers, 6 pieces each layer (except the bottom 4 pieces)

4.3 Electrical Safety

The module will generate direct current in the light environment when there is no connected or external circuit. So it will cause shock or burns when the non-protected touch the modules, 30V or higher DC voltage can be fatal.

- Use insulation tools and wear rubber gloves to operating modules in sunshine;
- Note no on/off switch on module, stop work only carry out to moving modules away sunlight area or shielding modules surface with cloth, cardboard, opaque material, or reverse module on a smooth, flat surface;
- Note the wrong connection may happen in arcs and electrical shock;
- Note to keep connectors dry and clean, ensure it in proper working condition;
- Note the snow and water will reflect light and then increase light intensity to improve current and output power.
- Note the voltage and power of the modules also increase at low temperatures.

⌦ Do not disconnect electrical connections under load to avoid arcs and electrical shock;

⌦ Do not insert any objects into the connector, or make wrong electrical connections;

⌦ Do not touch the fall off junction box or other damaged module unless it disconnected in advance and you are wearing proper PPE；

⌦ Do not touch damp modules under power running condition. According with this manual requirement for modules cleaning guide when need clean up.

⌦ Do not touch damp connector without wearing PPE or rubber glove.

4.4 Fire Safety

- Consult your local authority laws and regulations before installation work，comply with the building fire protection requirements. Pay attention the modules are generating equipment and may affect the fire safety of the building.
- Note the wrong installation method or faulty modules may produce electric arcs which have potential fire risk accidents.
- Do not install in the vicinity of flammable liquids, gases, or dangerous materials. If exposed flammable gas occurs in the vicinity of the modules after installation, please stop using the modules;
- In the event of a fire, modules may continue to generate dangerous DC voltage even if they are disconnected from the inverter, partially module damaged or full damaged, broken system cables or even destroyed;
- In case of fire, the firemen should be informed of the special danger of the modules and should stay away from the photovoltaic system during and after the fire until appropriate measures are taken to ensure the safety of the photovoltaic system.

5. Installation

5.1 Installation Conditions

Classic flexible PV modules installed in a suitable building or other suitable installation locations (e.g.floor, roof). Preferably face south when installed in the Northern Hemisphere and north when installed in the Southern Hemisphere.

- Note the installation site or surface no aging, damage, dirt, rust, and the connection is firmly fixed. Need repair, replace, cleanup, and rectify the installation conditions if can't meet installation to ensure long-term effectively.
- Note the installation area no shelter, such as trees, poles, billboards, etc., the module power will significantly reduce and impact system performance once the surface are blocked;
- Note to install the lightning protection device to prevent damage on where have higher frequency of the lightning activity；
- Note to keep a certain height or angle condition to prevent long-term damage in rainy days. At the same time, the dip angle can wash the surface in rainy days to reducing the frequency of maintenance and cleaning;
- Installed in operating temperature ranges from -40 ° C to 85 ° C environment;

- If install in a special environment, consult the technical support personnel in advance (for example, the altitude is higher than 2000 m). If you do not comply with the above precautions, the warranty will be invalid.
- ⌦ Do not install in places with strong corrosive substances such as active chemical vapors, acid rain, sea water or other corrosive substances;
- ⌦ Do not near an open flame or flammable object;
- ⌦ Do not install in the long-term socking in water or immersion in water (pure water or salt water) environment (such as fountains, spray, etc.);
- ⌦ Do not install in frequent hail, year-round snow, perennial wind sand, smoke, air pollution, soot and so on, security or performance will affect. If installation is required, the installation plan should be evaluated by technician.
- ⌦ Do not mirror or magnifying glass focusing light directly into the surface;
- ⌦ Do not install modules in windy, rainy, snowy weather to prevent accidents;

5.2 Installation Methods

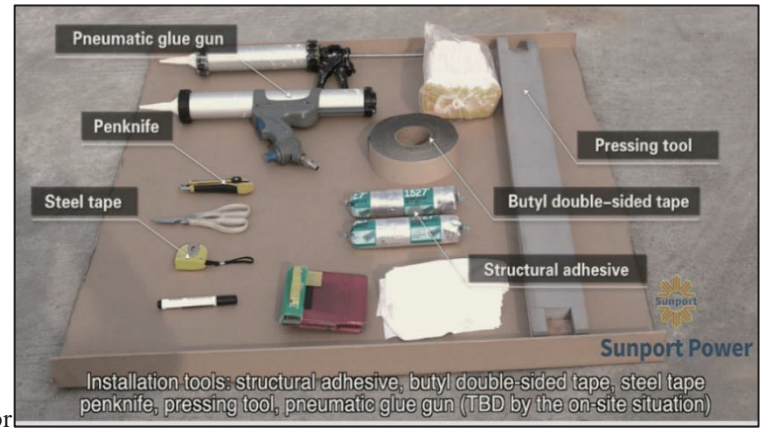
Flexible PV module can be installed in different ways according to different installation environments, including direct adhesive installation, support and fixture auxiliary installation, removable fixture installation, and replacement module installation.

a. Flat roof, curved surface or trapezoidal color steel tile can be directly used adhesive installation method;

b. For uneven installation scenarios, such as Angle flanging or vertical locking type color steel tile, additional support system is required for installation;

c. The customized module installation method is subject to the technical evaluation method.

Common installation tools for flexible modules

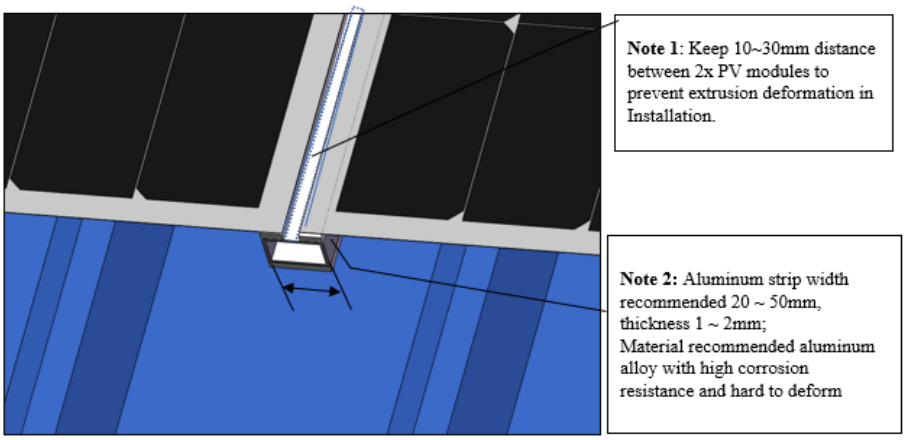


or

Guide rail or aluminum strip width is recommended 20 ~ 50mm, thickness is recommended 1 ~ 2mm, the material is recommended aluminum alloy 6063 or equivalent material high corrosion resistance, not easy to deformation.

PVC /TPO/ asphalt/concrete/color steel tile and other surfaces are recommended to use Tianshan 1527, Huitian 906Z or other Sunport approved structural adhesive.

Supporting bracket installation diagram



Double-sided tape recommended 3M-2204（Apply for circular surface as pre-installation）;

High viscosity waterproof coating is recommended by Manbalit T401/T8000 or Tianshan P10

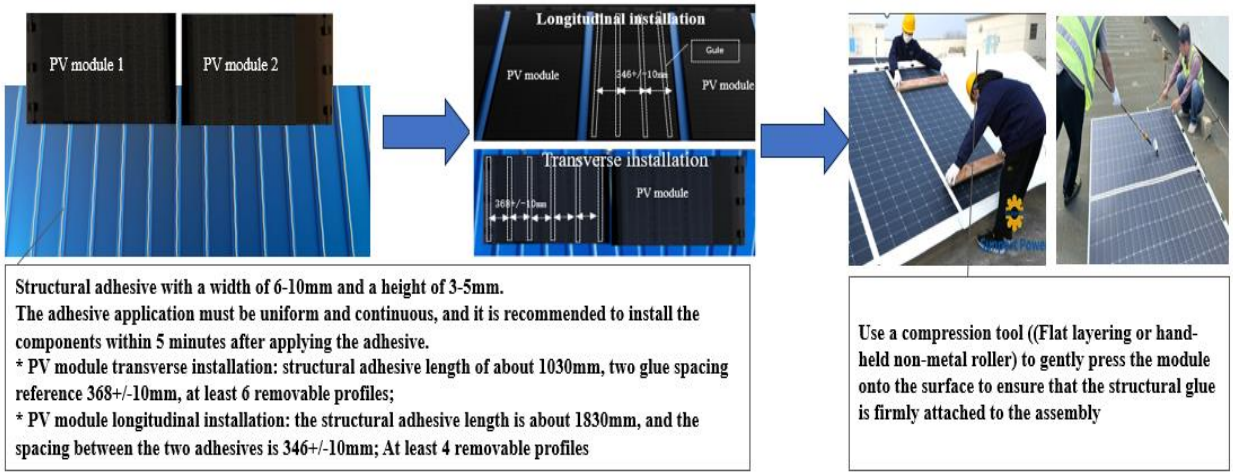
Color steel tile and other metal surface recommended structural adhesive for Tianshan-1527 or approved structural adhesive.

The following are the points for attention when making structural glue:

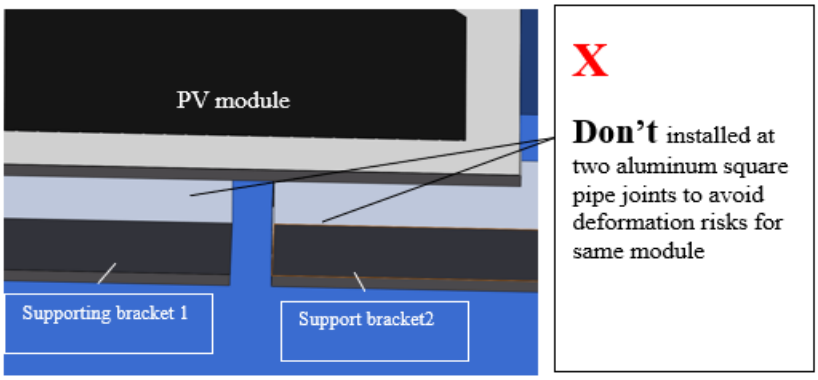
After cleaning the construction surface, the surface can be glued without water stains;

- Recommended that the spacing between two modules be 10~20mm to avoid deformation extrusion in long-term use;
- Glue along the center of the crest, glue width of 6 ~ 10mm, about 3 ~ 5mm high;
- Smear must be uniform, continuous, before pasting is not allowed to scrape the rubber strip, to rely on extrusion to make the glue spread;
- Glue and assembly time should be controlled in the shortest time (not more than 5 minutes);
- Structural adhesive in 48 hours, the colloid will be cured 2~3mm depth, not fully cured before do not force;
- PV module have transverse direction installation: The length of the structural glue is about 1030mm, and the spacing between the two glue refers to 368+/-10mm. can't less 6 sets of detachable rails;
- PV module have longitudinal direction installation: The length of the structural adhesive is about 1830mm, and the spacing between the two adhesive refers to 346+/-10mm, can't less 4 sets of detachable rails.
- After installation, press the surface of the module with a wooden strip or a hand-held roller to make the adhesive and the module tightly bonded.

Structural adhesive installation diagram



- Layout design should avoid the color steel tile joint, bracket and bracket joint easy to produce relative displacement area leading to fold or tear damage;
- Module layout design should avoid the color steel tile joint (bracket and bracket joint should also be avoided), to avoid the relative displacement of the module caused by folding or tearing;



- Two adjacent flexible modules keep a distance of 10mm to 30mm to avoid deformation affect;
- Proper operation and maintenance channels should be set aside around modules. Do not step on modules.
- Recommended to test the pullout force of the gluing effect to ensure the effective binding force of installation.
- If the overhang height at both ends of the module is too long, use aluminum square strip to flatten the overhang height. The height of the aluminum strip is consistent with the height of the wave crest, and the width of the module beyond the aluminum strip is less than 50mm;

For the installation methods not mentioned above, please consult technical engineer, otherwise the loss caused by improper installation methods will not be borne.

5.2.1 Plane, Curved Surface, Trapezoidal Color Steel Tile Installation

Flat roof, curved surface or trapezoidal color steel tile can be installed by direct adhesive.

Flat and curved roof including but not limited to: PVC/TPO/ asphalt waterproof coil, metal curved surface and color steel tile or flat roof;

During installation, refer to the requirements of the installation design scheme to evaluate whether the TPO/ asphalt material needs to be undercoated first. For TPO/ concrete roofing there are possible weathering and aging problems, direct installation will affect the bonding degree of modules and other problems, the roof must be treated first. For details, see the following steps:

① Polish the roof to remove the powdery layer;

② Repair the water leakage point with waterproof glue;

③ The module installation position should be brushed with high-stick waterproof paint;

④ After the coating is cured, ensure no gap, no water leakage, then install the module.

After installation, the integrated waterproof roof will ensure additional waterproof performance.

a. Plane Direct Gluing Installation

① Clean up the roof and the back of the module, no particle, dust and residues on the surface;

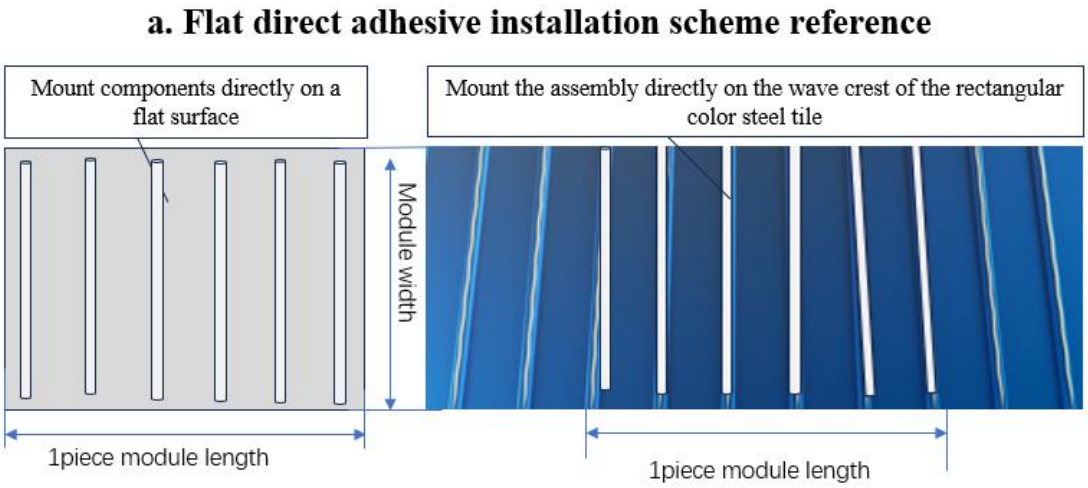
② Stick a double-side tape on the back, the distance between the double-side tape to edge around 50mm(apply for curved surface , arch surface pre-installation)；

③ Make structural glue on the back of the module, the glue width is 6 ~ 10mm, the height is 3 ~ 5mm, should be installed within 5 minutes after gluing to prevent the silicone solidification to affect the bonding Performance;

④ Two people together to lift the module on face up gently on the faulty module surface;

⑤ Use press tools to slightly squeeze and fix, press tools or rollers are recommended;

⑥ Be installed at least 4 hours before electrical connection, choose operated time on the morning and evening when the light is weak.



5.2.2 Metal Roofing of Vertical lock Type and Angle Break Type

Metal roofing, the most typical and most common is color steel tile vertical locking type, angular roof.

b. Auxiliary fixture and bracket installation

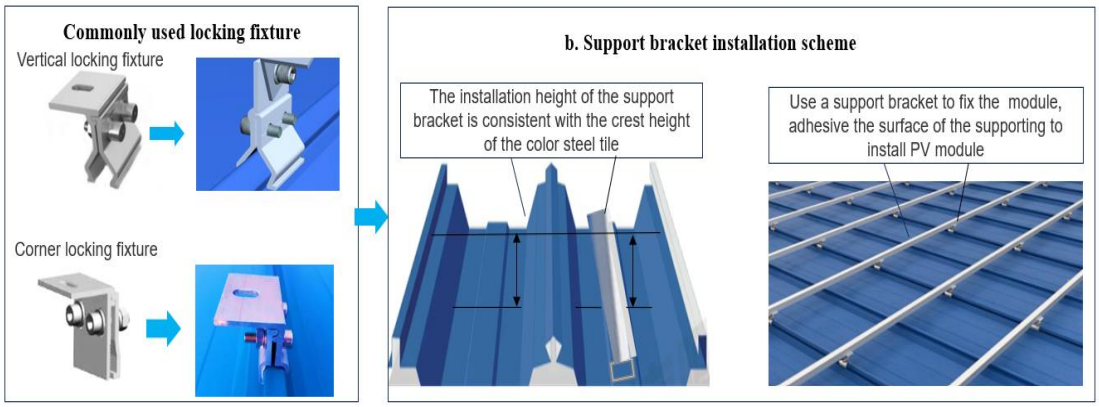
the aluminum bar is installed in the trough position of the color steel tile, the aluminum bar and the color steel tile are fixed with structural adhesive, the surface of the aluminum bar is flush with the surface of the color steel tile, the structural adhesive is placed on the aluminum bar, and the modules are installed. This scheme can be used alone or in conjunction with the crest guide scheme.

① Use of vertical locking or special angular fixture, connect the fixture and color steel;

② Connect the guide rail to the fixture and tighten it, then connect the corner code to the fixture. Note: The fixture should be drawn and tested on site to ensure its firmness;

③ Clean the surface of the guide rail, and then apply structural glue on the back of the guide rail contact module;

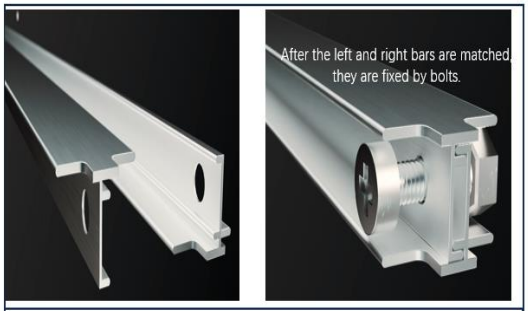
④ Put the modules on, and press the gluing position with a press tool or roller in sequence to ensure good contact between the structural adhesive and the modules and guide rail. The height of the fixture is 20 ~ 50mm.



c. Detachable Bracket Installation

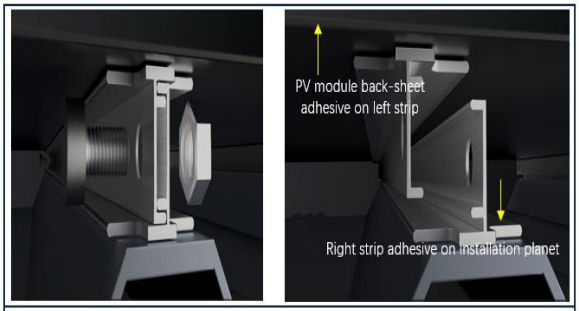
Detachable aluminum bracket (below left picture) is composed of left and right rails, fixed by bolts. The left and right guide rails are glued to the back of the photovoltaic module and the mounting surface with structural adhesive, and the detachable bracket facilitate the flexible replacement of the photovoltaic module or the mounting surface. For details pls refer to b.

Detachable bracket structure drawing



Consisting of two left and right strips, fixed by screws. Respectively adhesive to the photovoltaic module and the installation planet.

Support removal method



1. Unscrew the bolt; 2. Two people lift the periphery of the component from both sides with their hands (non-black battery parts)

5.2.3 Module Removal, Replacement and Installation

Suitable for replacement and installation of faulty PV module. This section describes how to perform operations when some modules fail to work properly or need to be transferred for update.

Apply to replace new module when some modules do not work properly due to certain reasons.

The installation method of gluing new modules directly on defective one.

① Should to be power off the series circuit of the module to be replaced in advance (important);

② Remove the junction box on the front of the abnormal module with a tool to ensure that the front of the abnormal module is smooth;

③ Clean up the surface by soft cloth and dry it;

④ Refer to 5.2.1 installation step for add glue on the opposite of the new flexible module;

⑤ Two people lift the module together and put on faulty module, then use the roller brush to gently press the glue position to finish the installation.

⑥ After 24 hours, check sticky and connect the circuit.

Remove the defective module carrier support, and then change the module installation method (optional)

① Confirm the number of modules to be replaced and remarked on surface, prepare the new modules quantity, aluminum strip or guide rails and tools;

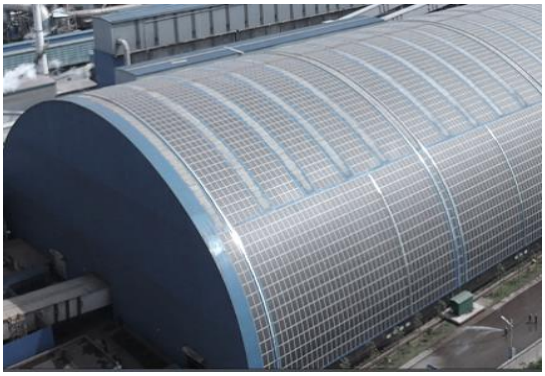
② Loosen the bolts at both ends with tools, and separate the auxiliary aluminum profiles and modules to be replaced from the connecting fixture;

③ Two people use steel wire or other tools at the same time to cut the adhesive of the bad module and remove the bad module after cleaning the glue on the glue base material;

④ Refer to 5.2.1 Aluminum profile to install the new module directly glue, and then carry the carrier support to the original position with bolts for connection;6. After 24 hours later, ensure sticky

then install circuit.

Curved surface, plane, trapezoidal color steel tile installation scheme



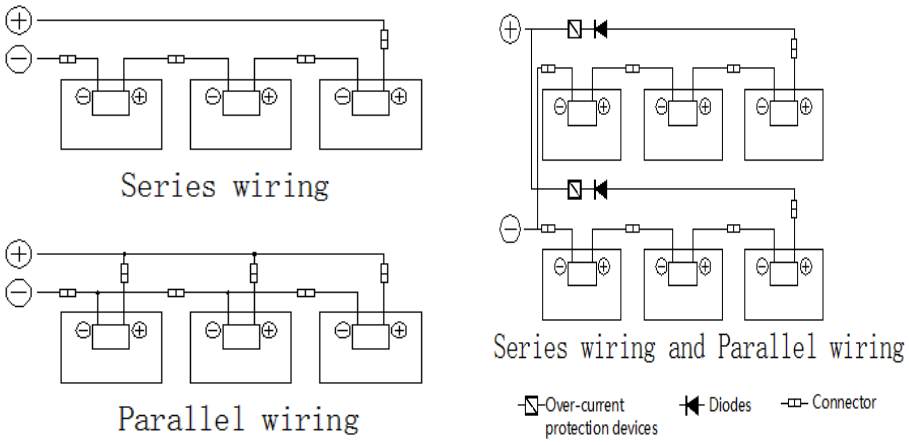

5.3 Electrical Installation

- Electrical parameters such as the Isc,Voc and Pmax nominal value have deviate with the standard test conditions. Standard test conditions: irradiance 1000W/m², battery temperature 25℃, atmospheric quality AM1.5. When irradiance plus normal conditions, the current and voltage values generated may be higher than those obtained under standard test conditions. Therefore, when determining the controller model associated with the module rated voltage, wire rated current, fuse type and module power output, on the basis of the highest ambient temperature at the installation site, combined with the temperature coefficient of the current in the technical manual, the short-circuit current is multiplied by the coefficient of 1.25 to calculate the short-circuit current.
- On the basis of the installation lowest temperature which combining the technical manuals to calculate the open circuit voltage. The voltages are added up when the modules is in series; current are added up when modules are connected in parallel.
- Different electrical characteristics of PV modules cannot series. It may cause electrical connections mis-match. should be carried out according to the manufacturer's installation manual.

5.3.1 Connection Type

- The maximum number of modules that can be connected in a series string must be calculated in according with applicable regulations in such a way that the specified maximum system voltage (According to IEC61730 tests and appraisal, the maximum system voltage is 1000Vdc or 1500Vdc depending on the series and model.) of the modules and all other electrical DC modules will not be exceeded in open circuit operation at the lowest temperature expected at the PV system location. Variation of open-circuit voltage with temperature can be calculated based on the following formula: $Voc_{(T)} = Voc_{(25)} \times [1-\beta \times (25-$

T)]. $Voc_{(25)}$ is open-circuit voltage at standard temperature 25°C. T is the lowest expected ambient temperature at the system location. B (%/°C) is the temperature coefficient of the selected module Voc (Refer to corresponding datasheet).

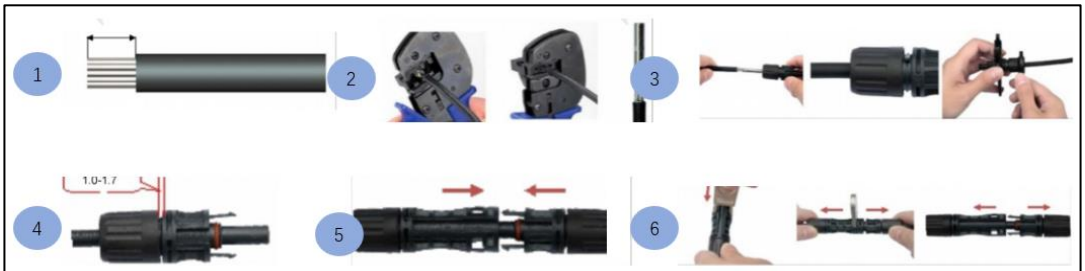


- An appropriately rated over-current protection device must be used when the reverse current could exceed the value of the maximum fuse rating of the modules. An over-current protection device is required for each series string if more than two series strings are connected in parallel;
- In the design of the modules, field connections use sealed IP68 junction boxes to provide environmental protection for the wires and their corresponding connections and accessible protection for uninsulated live parts;
- The junction box is provided with connected cable and IP68 connector, which is used for series between modules; Each module has two wires (a positive electrode and a negative electrode) separately connected to the junction box. The two modules can be connected in series by inserting the positive interface at the other end of the wire of one module into the jack of the negative wire of the adjacent module. The connection is successful when the clicking sound is heard.

5.3.2 Cable

- Field connection modules with cable must meet the maximum short-circuit current, use photovoltaic (pv) systems special light resistant cable.
- Recommended to fixed cable by the binding wire resistance to light and line card to fixed on the bracket;
- ⌦ Avoid cable or modules by mechanical forces crushed;
- ⌦ Avoid long soak in the water cables.

Precautions of connection head modulation



1.Strip the cable insulation layer L= 7-9mm (Figure 1)
2. Place the bare wire with the insulation layer removed into the end of the pin (or sleeve), and use the riveting pliers to rivet the pin (or sleeve) and the bare wire together; (Figure 2)
3. Assemble the negative (or positive) connector as shown below. Parts from left to right are: negative connector, inner plug, flower basket, nut; (Figure 3)
4. Turn the nut clockwise and tighten it so that the gap between the nut and the connector is controlled between 1.0-1.7mm; (Figure 4)
5. Insert the pin (or sleeve) of the riveted cable into the negative (or positive) connector. When you hear a clicking sound, pull the cable outward until it does not come out. (Figure 5)
6. Disconnect the connector, use the tool to insert the bayonet position of the connector, and pull the connector with the right hand and left hand respectively to separate the positive and negative connectors. (Picture VI)

5.3.3 Connectors

- Ensure connector is dry and clean to avoid immersion in water before installation;
- Avoid connectors falling on the ground or roof;
- A faulty connection may produce electric arcs and shocks;
- Ensure check all electrical connections for reliability;
- Ensure that all locking connectors are fully locked.

5.3.4 Bypass Diode

The junction box of modules contains a bypass diode connected in parallel to a battery string inside the module;

When hot spots occur in parts of the module, the diode will work, so that the main current will not flow through the hot spot cell, thus limiting the module heat and performance loss;

- Note that the bypass diode is not an overcurrent protection device;
- ⌦ When the diode is known or suspected to be faulty, please contact the installation or system maintenance provider for Sunport company;
- ⌦ Do not attempt to open the junction box of the module yourself.

6. Maintenance and repair

Sunport recommends that PV systems shall be periodically inspected by the installer or qualified person. Module's problems due to improper maintenance or mis-operation will void the warranty. Clean up modules at least once a year or according to contamination. Stained or contaminated modules may reduce the power generation of the system.

- Check the front board no scratches and damage before installation;
- No signs of burning on backplane traces;
- No damaged for cable and plug, and insulation protection are in good condition;
- Check hardware fastening after installation.

- Check all electrical mechanical connection parts, modules, a clean, safe, no damage and no rust;
- Replace the same model if needed.
- It is recommended to clean modules in the morning or evening when the temperature is low to reduce potential electrical or thermal shock, especially where the temperature is high;
- Clean up all surface organic matter to ensure surface no covered, such as: building or utility poles and other shadow, birds stay, a large amount of dust, dirt or trees;
- Recommended to use a damp sponge or a soft cloth, damp sponge or related soft material to wipe the surface and do not press the surface when wiping.
- Conventional non-high-pressure water gun can be used for module surface cleaning options, PH value is controlled between 6~8, use a mild, non-abrasive cleaner to remove stubborn stains;
- ⌦ Before cleaning, ensure that power connection operation;
- ⌦ forbidden with high-pressure electric or cleaning machine, straight flush modules;
- ⌦ containing alkali, acid cleanser modules is strictly prohibited;
- ⌦ it is forbidden to remove modules with good thing on the surface of the thin snow or other dirt, can use soft brush gently remove snow.
- ⌦ don't try to remove the module surface frozen snow or ice.

PV module surface cleaning tool reference组件表面清洁工具参考

7. Product Appendix.

The installation manual applicable module types are as follows. The module types are subject to changes without prior notice due to continuous module innovation research and development., all flexible module type reference to this manual. “XXX” shows the peak power of the module label in increment of 5.

Module Type	Power(W)	Module size (L*W*T) mm
SPPXXXM60S	295~325	1660 x 990 x 1.4
SPPXXXNHES	355~375	1840 x 1040 x 2.5
SPPXXXNH1S	75~90	1810 x 290 x1.4
SPPXXXQHES(Full-black)	355～380	1840 x 1040 x 2.5
SPPXXXQHES	365～385	1840 x 1040 x 2.5
SPPXXXQH1S	80~85	463 x 1040 x 2.5
SPPXXXQH1S	80~85	1840 x 295 x 2.5
SPPXXXQH12S	30~35	545 x 365 x 2.5
SPPXXXQH18S	45~50	545 x 365 x 2.5
SPPXXXQH36S	100~105	580 x 1040 x 1.7
SPPXXXQH36S	100~105	1075 x 535 x 1.7
SPPXXXQH60S	170~180	920 x 1040 x 12.5
SPPXXXQHES(Hole)	365~385	1850 x 1070 x 2.5

8.Contact Information

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9.Reference attachment

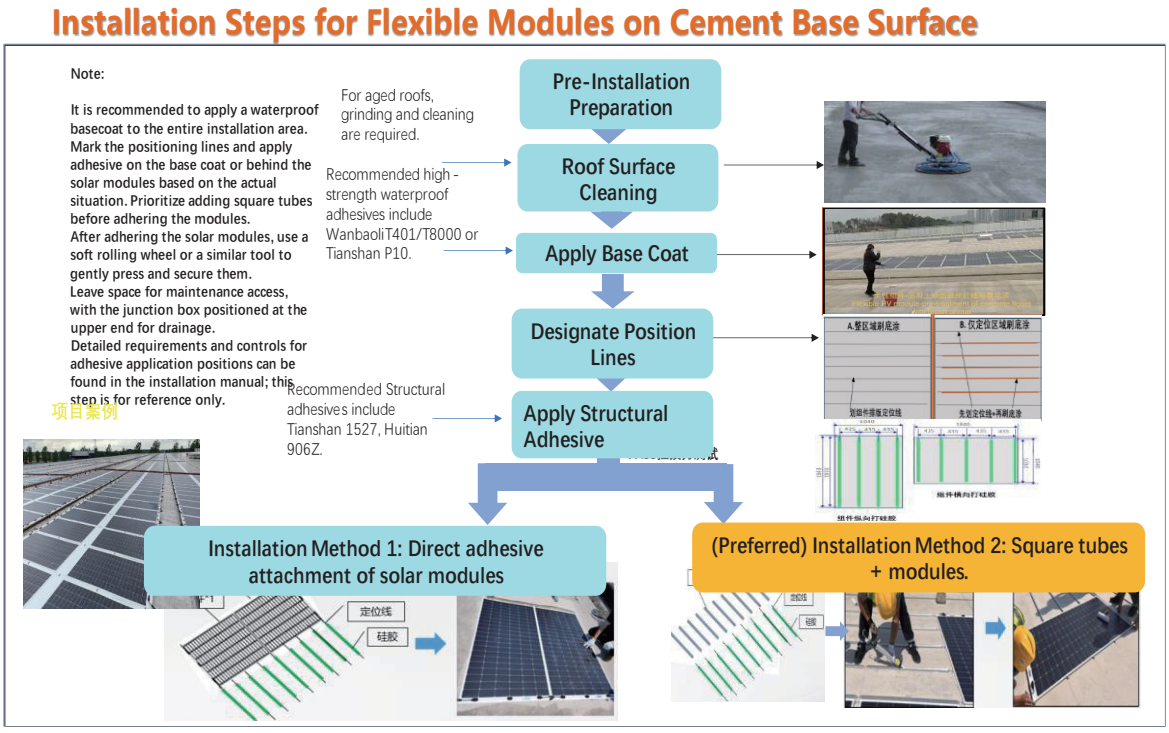


Figure 2: Reference for Installation Steps of Color Steel Tile Base Surface

Figure 3: Reference for Installation Steps of SBS,TPO,PVC base surface

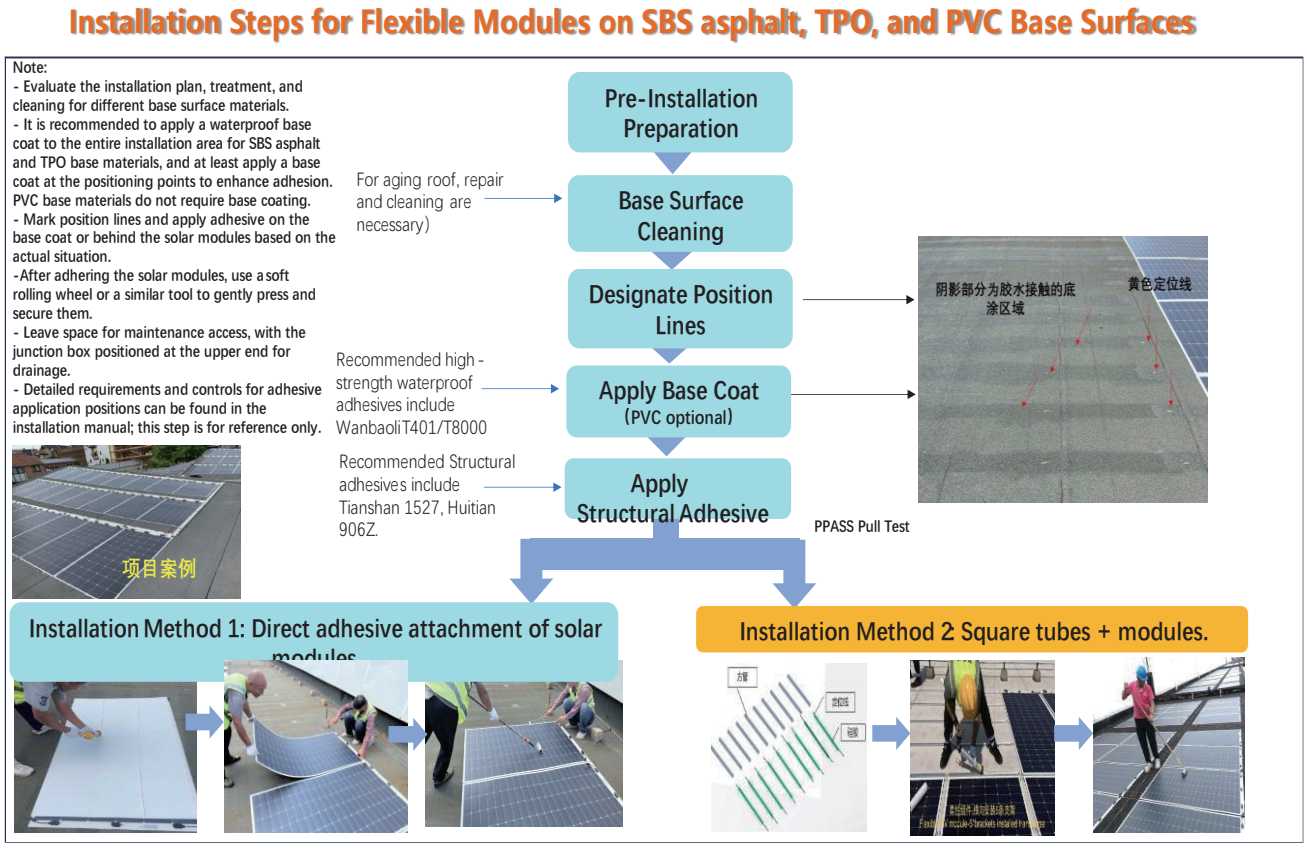


Figure 4: Reference for installation steps of exterior wall base surface

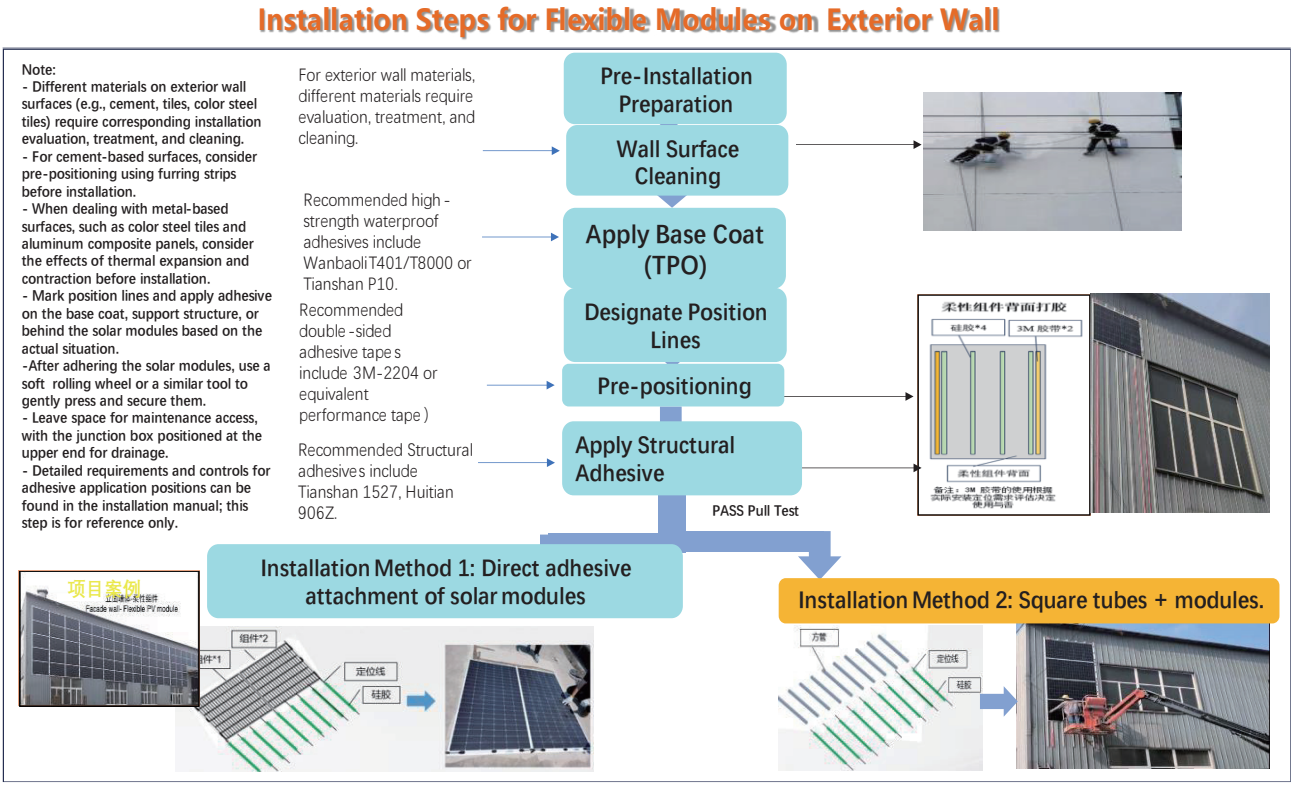
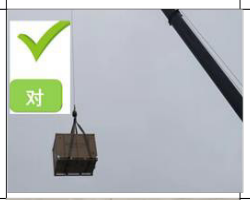
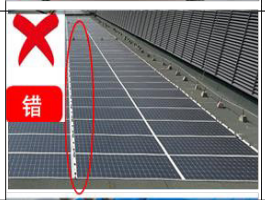
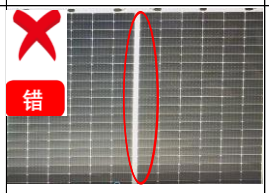


Figure 5: Comparison Diagram of Correct and Incorrect Behavior of Flexible Modules

Comparison Diagram of Correct and Incorrect Behavior of Flexible Modules

PROCESS	TRUE	FALSE	REASON	CONSEQUENCE	AVOIDANCE METHODS
Transportation			Excessive tightrening	Makes the rope too tight, the external force will damage and crack the upper end of the module.	Do not overtighten and place protective plates at the stressed areas.
Storage			No shelter, air storage	Rain will cause deformation of the outer packaging of the goods and damages the modules.	Indoor storage or covered with waterproof cloth.
Hoisting			Inclined hoisting	Two pallets of modules are squeezed, thus will lead to a risk of hidden cracks in the modules.	One pallet at a time When lifting modules.
Carrying			No staggered stacking	The junction boxes at the head of the modules are stacked, and there is a risk of hidden cracks when the junction box compresses the cells.	Place every 2 pieces staggeredly. Place corrugated paper strips in the packaging box on the second piece to separate them, and then stack two more pieces.
Carrying			Single person carrying	Bending will cause cracks	Two people use the long side plate of the outer packaging box to carrythe modules.
Carrying			Hand press the black cell area	Pressing on the cell area of the component will cause cracks.	Do not press the black battery cell area of the component during carrying.
Design&Installation			No reserved maintenance channels	Easy to cause module cracking due to other external forces.	Reserve maintenance space during design.
Installation			Discontinuous adhesive glue	Causing a small contact area between the modules and the adhesive glue, affecting the overall bonding effect of the modules.	The glue application should be continuous and there should be no breakage. The glue application width should be 6-10mm and the thickness should be 3-5mm;

Installation			Insufficient positioning guide rails	There are fewer guide rails, and modules are prone to have large wavy indentations.	For the installation method of guide rails, it is recommended to have at least 5 guide rails for horizontal installation of components and at least 4 guide rails for vertical installation
Installation			Incorrect pressing method	Module will be cracked caused by hand pressure or other hard auxiliary tools during installation.	After sticking the module, use a roller to gently press the component at the glue application area until the glue fully overflows.
Installation			No gap between two modules	During long-term use, deformation and extrusion will occur between the two modules.	When arranging adjacent modules, it is recommended to keep them between 5mm and 10mm to avoid deformation and compression during long-term use
Installation			Not avoiding the seam position	Modules will be wrinkled or torn at the seam position.	Modules shall not be installed at the joints of colored steel tiles, i.e. one component spans two colored steel tiles or two areas where relative displacement may occur. Once there is relative displacement of colored steel
Maintenance			Component surface obstruction	Impact on power generation, and the risk of causing hot spots.	Specify a reasonable maintenance time based on the actual environment to ensure an effective power generation system.
Maintenance			Use cleaning agents with high alkalinity and acidity	Residual liquid will damage the surface coating of the modules.	Regular cleaning with clean water.
Maintenance			Use a metal brush or hard tool, high-pressure water gun for flushing	Causes surface damage and deformation of modules	Use flexible tools such as drum and mop, and low-pressure water pipes

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