

Customer Manual

Installation for RK1 series module

The information provided in the manual is intended to provide the minimum requirements and recommendations that design of installation solutions for Ruike new energy **PV** modules .

This installation scheme will meet the technical and mechanical requirements of Ruike new energy and provide a safe and widely recognized installation solution for all RK1 series pv module.

This manual is not exhaustive and does not take into account all technical design requirements. The manual provides only the minimum installation requirements to ensure that the RK1 series pv module can operate in a safe, compliant and reliable mode. It is impossible to guarantee that the designed pv system is fully recognized, if only following the document requirements.

Attention: It is the responsibility of the supplier, customer, installer, professional designer, and engineer to conduct due diligence to ensure that the structure meets the current structural and electrical specification requirements of the area where the product is sold or installed. RuiKe new energy RuiKe New Energy Co., Ltd. is not responsible for adhesion failure, breakage, damage, wear or component performance problems that are considered to be caused by design or installation.

This manual is drafted primary for Australia.The wiring standards is AS 3000 and PV panels installation standards is AS/NZS 5033

● Physical specifications and dimensions of PV modules

The physical dimensions provided are for reference only

Length 1200mm \pm 1mm

Width 600mm \pm 1mm

Height 6.8mm \pm 0.2mm

Weight 12 kg

Area 0.72m²

● Installation site for module

The module shall be fixed to the support structure with a fixed clamp (or equivalent) located at four (4) symmetrical points. The fixture should be distributed along the length of the module(1200mm) and its center point should be located 250mm to 300mm away from the corner of the module. Figure 1 and figure 2 describe the location of the module clamp.

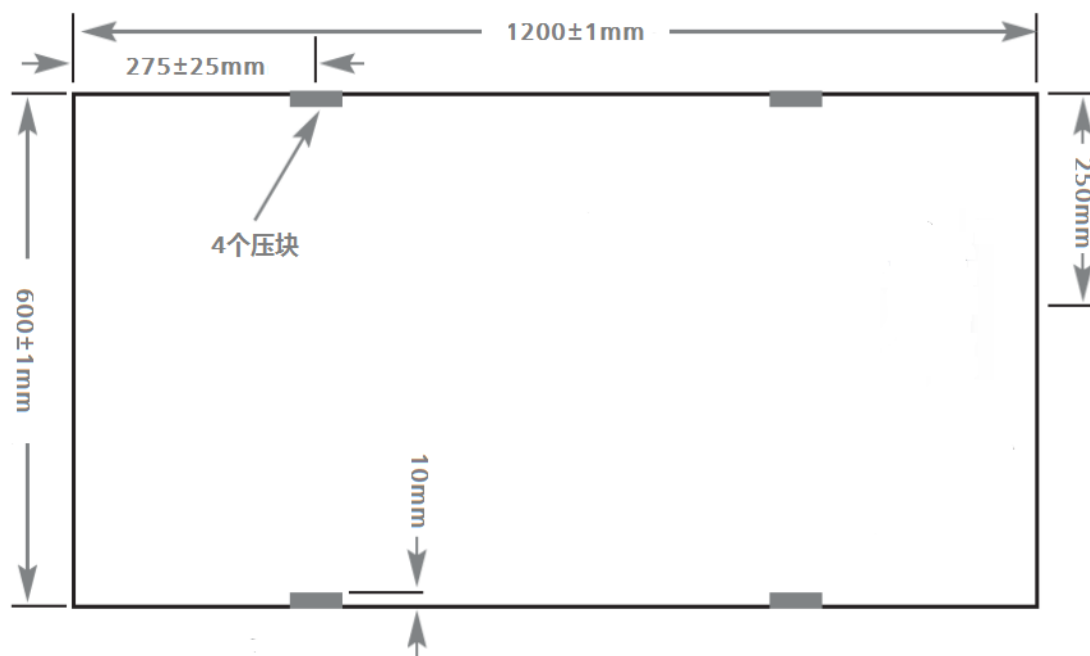


Figure 1. Recommended position of clamp (front side)

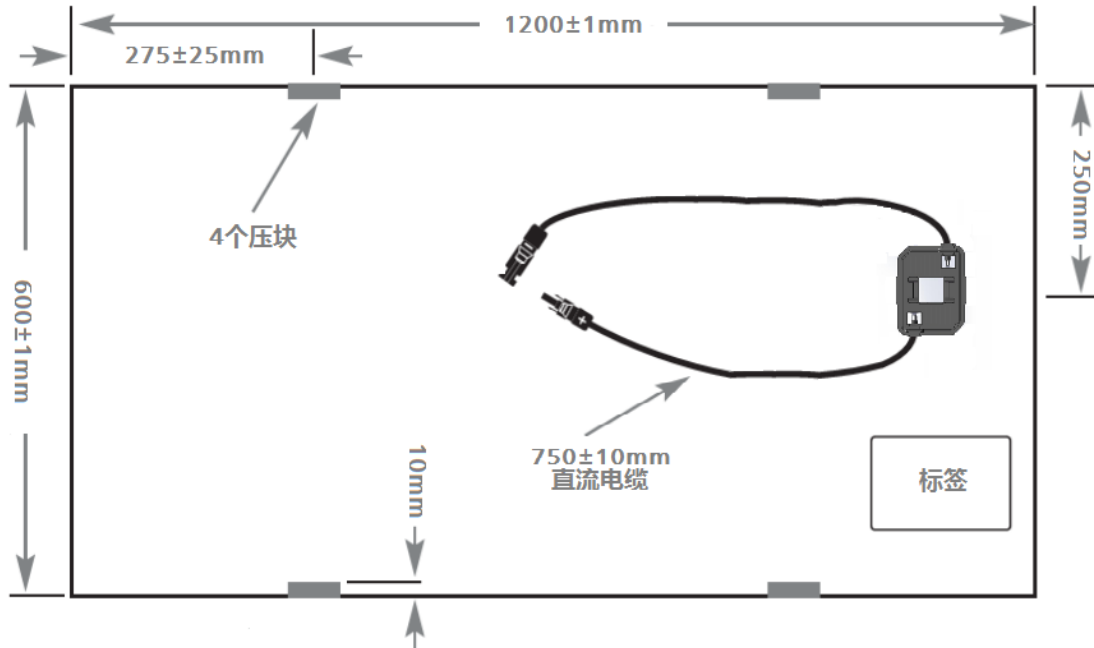


Figure 2. Recommended position of clamp (back side)

● Minimum specifications required to clamp and install system

Module clamp and install system are required to meet the following minimum specifications as required by RuiKe new energy:

1. Clamp and install system (stabilization system) shall not affect the integrity of the module under load defined in IEC 61215.
2. The deflection of stabilization system shall not be greater than 0.01mm/mm
3. The clamps and the supporting guide rail fixation system shall adopt a combined design method, and the gap between the vertical edge and the module shall be kept at 1mm to adapt to the thermal expansion in the long and wide direction of the module glass. See figure 3.
4. A minimum of 10mm clearance is required between the two module to prevent contact.
5. The fastening clamp shall have a "hard block" so that the compression amount of the top and bottom of the insulating material does not exceed 10%, even when the fastener is at its maximum torque.
6. Clamps shall provide a gap of less than 6.8mm +/- 0.2mm to accommodate the component thickness; When installed, the insulation material should be compressed in a range of 5% to 10% with the hardware at maximum torque.



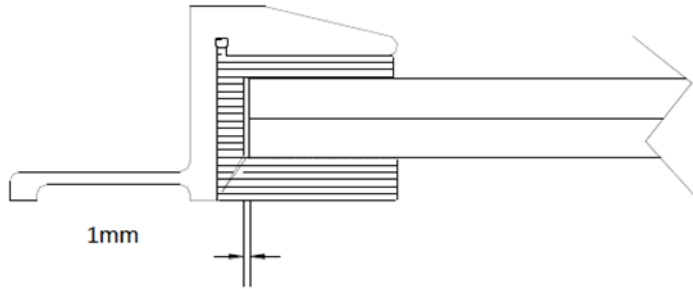


Figure3. 1mm from the vertical edge of a stationary clip

7. The support rails, clamps, and rubber pads of the module shall be made of corrosion-resistant and uv-resistant materials (for example, pre-galvanized steel, hot-dipped galvanized steel, aluminum, stainless steel, powder coated steel, etc.) that are able to maintain structural integrity over the life of the module (at least 25 years).

● Recommended clamping and mounting system minimum specifications

The module clamping and mounting system should meet the following minimum specifications as recommended by Ruike new energy:

1. The surface contact length of the module is 120mm
2. The front surface contact width of the module is between 10mm and 15mm
3. The minimum back surface contact width of the module is 15mm

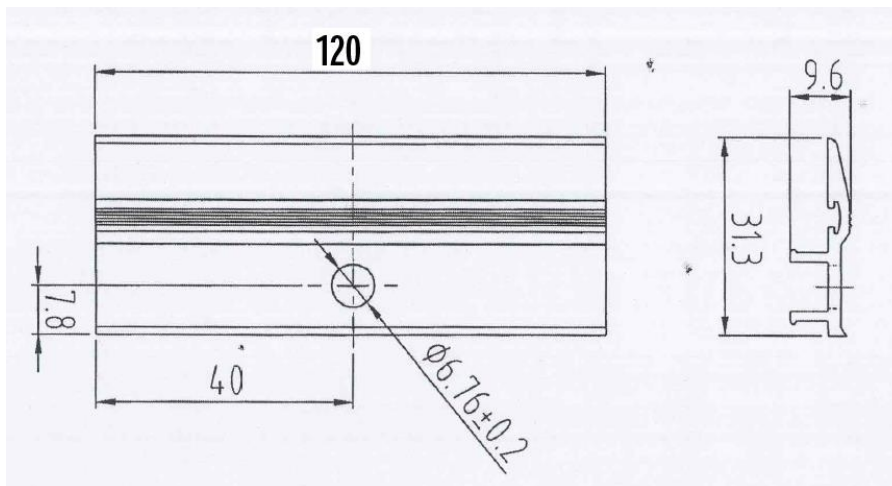


Figure4 fixed clip size drawing

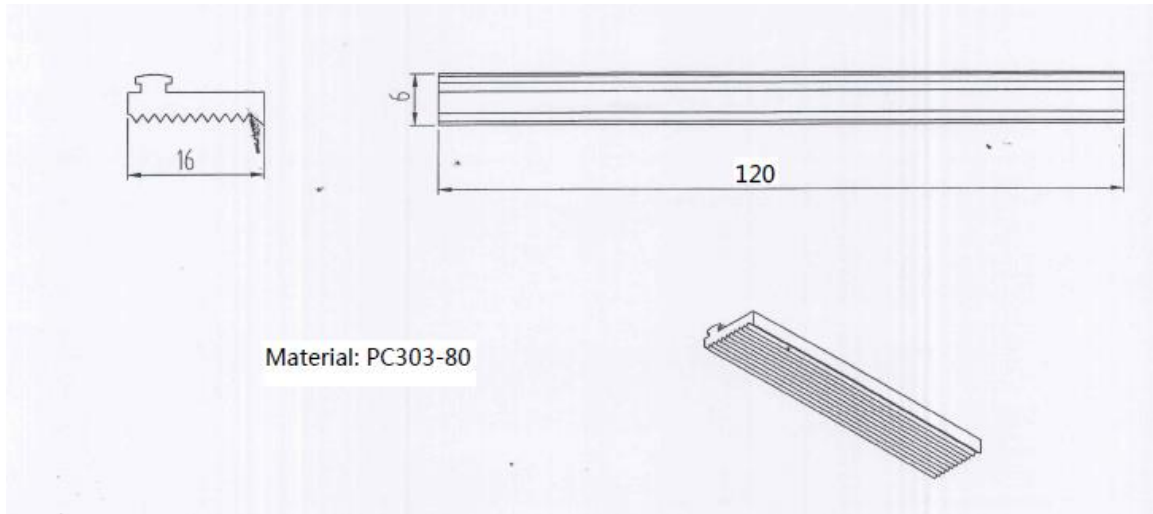
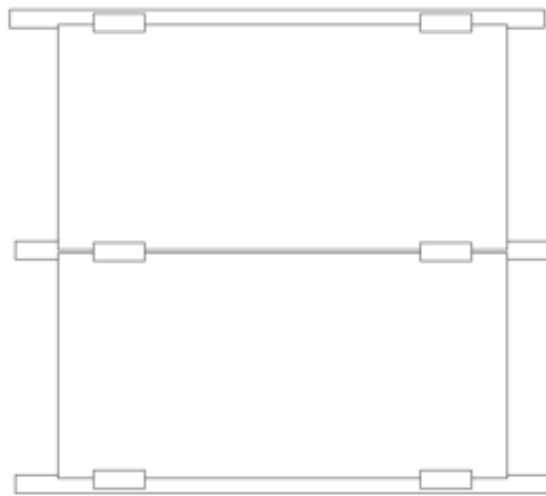


Figure5 The gasket size

The fixture can be designed to support the assembly from both sides, or it can be designed to support only from the front. If the clamps are designed to provide support to the assembly from the front only and are fixed, the design and profile of the supporting guide rail where the clamps are located must satisfy the minimum back surface contact width.

● Support rail

The module support guide (or equivalent) shall provide a uniform mounting plane for the module and the deflection of the module guide shall not be greater than the maximum deflection specified above. The support guide shall support the module in two ways: either across the width of the module 600mm or along the full length of the module 1200mm. See figure 4 for details A, B, and C.



- Three east/west supporting rails, parallel installation
- The assembly is installed horizontally parallel to the supporting guide rail

Figure6. Support rail and module orientation

● Attaching clamp

The module clamp can be designed as one or two pieces (the upper and lower parts are separated from each other).

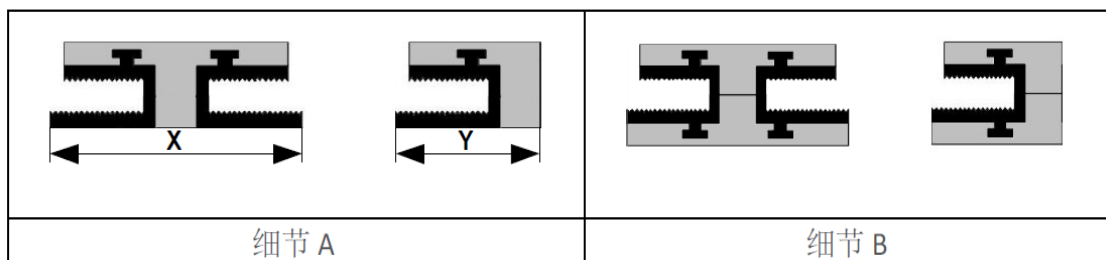


Figure 7. One pieces and two pieces clamp

If a two-piece design is used, the width of the bottom module guide is irrelevant, but the deflection of the module guide must not exceed the maximum specified.

If a one-piece design is adopted, the support rail width and contact surface area width of the two typical module supporting the guide direction are defined in table 1 below. The deflection of the module guide shall not exceed the maximum deflection specified. See details A, B, C, and D in figure 6 for an example of module guide and surface contact required.

● Fastener

It is the responsibility of suppliers, customers, installers, professional designers and engineers to conduct due diligence to ensure that the fasteners used are resistant to galvanic and environmental corrosion and provide electrical adhesion between the fixture and the underlying structure in accordance with local regulations and judicial requirements. Ruike new energy will not provide fastener recommendations or test fasteners to meet requirements. Fasteners provided by suppliers, customers, installers, professional designers and engineers for the installation of system tests shall meet the above requirements and all necessary mechanical strength requirements.

● Insulating protective material

The laminate assembly shall be electrically insulated and shall not be in direct contact with the metal surface of the retaining clamp, support guide rail or other structural support components. Insulation protective materials that have been tested by Ruike new energy and approved for use in RK 1 series of module are generally thermoplastic elastomer (TPE) materials, such as cross-linked EPDM + polypropylene mixtures or their equivalents, and must meet the minimum thickness specified in figure 7. At the bottom of the top section and cross section, the minimum material thickness is 3 mm, longitudinal profile of the minimum material thickness of 2 mm, the volume resistivity of both were greater than $1.0 \times 10^{14} \Omega \cdot \text{cm}$ (according to the ASTM standard D257).



The laminate assembly shall be electrically insulated and shall not be in direct contact with the metal surface of the retaining clamp, support guide rail or other structural support components. Insulation protective materials that have been tested by Ruike new energy and approved for use in RK 4 series of module are generally thermoplastic elastomer (TPE) materials, such as cross-linked EPDM + polypropylene mixtures or their equivalents, and must meet the minimum thickness specified in figure 7. At the bottom of the top section and cross section, the minimum material thickness is 3 mm, longitudinal profile of the minimum material thickness of 2 mm, the volume resistivity of both were greater than $1.0 \times 10^{14} \Omega \cdot \text{cm}$ (according to the ASTM standard D257). Insulation material should be able to resist ultraviolet light and remain intact throughout the life of the module (at least 25 years). The range of type A hardness is 45 to 75.



● Precautions for handing module

1. When the module are stored, transported and unloaded, the lid of the box shall be upward, and the box shall not be flat or inclined.
2. When the module are transported, the direction of the box length should be parallel to the forward direction, and measures should be taken to prevent dumping and sliding.
3. When the module are in use, measures should be taken to prevent damage to the glass surface and edges. In general, the components should be placed on wood.
4. When the shelved module are subject to head-on wind pressure or wind blowing, it is possible to collapse, and measures should be taken according to the actual situation to prevent the components from being blown down.
5. When carrying the module manually, hold the middle position of the two long sides of the component with both hands, and pay special attention to the corner of the component in the process of handling do not touch hard objects.

● Precautions for installation structure and clamp shadow

When a large area of shadow of the structural part is projected over the entire length of the module unit, there may be local area reverse bias (negative voltage/positive current) in the module unit, which may cause damage to the module and avoid tall buildings as much as possible.

1. Although there are many scenarios that lead to projections on modules, several typical regional scenarios that are directly related to the fixture and structural modules can be classified as risk-free and high-risk.
2. **No risk:** the shadow of the effective area under a typical module installation clip on the long side of the module does not pose any risk to reliability or performance.
3. **high risk:** a situation where the shadow is cast completely over the full length of the cell (part or all of the width of the cell) or installed on the short sides of the module can pose a higher risk.



● **Module orientation specification**

Modules must be installed horizontally in any inclined application site where interline shadows exist. Vertical installation of components in the presence of interline shadows is strictly prohibited. Allows longitudinal mounting of modules when there is no inter-row shadow (such as flat roof or parallel to inclined roof). Sliding protection is required for inclined longitudinal mounting.

1. Dehumidifying and circulation with air
2. The clamp shall be designed and installed to facilitate draining of the assembly interface and to prevent moisture retention in the fixture or laminate edges.

In addition, the structural design of the module should be able to maximize the air flow under the module, so it can controlling the operating temperature of the module.



Clamp and installation system approval

Ruike new energy reserves the right to conduct internal testing of its design samples prior to approval of the proposed clamps and support guides for the Ruike new energy module. Ruike new energy may at its discretion conduct such tests as may be deemed appropriate in accordance with the sample provided under the program test defined in IEC 61215 (2400Pa mechanical load test) and UL 1703 - 41 (2154Pa mechanical load test). If multiple combinations of clamps and guide rail sections are available, all combinations should be disclosed to Ruike for review and testing of worst-case scenarios. Samples submitted for testing by Ruike new energy shall be accompanied by corresponding fixture, fasteners and module guides according to the design drawings submitted.

It is the responsibility of the supplier, customer, installer, professional designer, and engineer to conduct static load tests in the manner defined in IEC 61646 - 10.16 and to verify compliance before submitting the sample to Ruike new energy for approval.

For any deviation from the above specified clamp, installation guide rail size or configuration solution, as long as its with high reliability of each configuration (sample weight > 5) by IEC 61215 (pa 2400 mechanical load testing), IEC 61730 MST 32 fracture test (components), UL 1703 - 41 (2154 pa mechanical load testing) and IEC 62782 (dynamic mechanical load testing) defined in the test and/or other rico new energy think proper test, namely as a solution to comply with this document. A detailed test report containing test equipment, methods and results shall be provided to Ruike new energy for review and approval.



● Installation system design approval process

According to the requirements of the new energy module warranty, the installation hardware of the module shall be subject to review and approval in the process of the design and approval (SDA) of the new energy system. The required manual is shown below and should be submitted to the Ruike new energy technology support team.

1. It is recommended to fix clamps, insulators, fasteners, and parts drawings of several support guides (with critical dimensions).
2. Recommended assembly, clamps, support guide (with critical dimensions) and assembly drawings for specified fasteners.
3. Assembly instructions including mounting position and fastener torque specifications.
4. Detailed description of all special tools or equipment required for assembly.

Upon receipt of the above, Ruike will review the proposed design and decide whether to accept the test or reject it. If the design is accepted, Ruike new energy will need all of the following parts to install the two module, as shown in details A and B in figure 4.

Sample with rubber pads (4 end clamps, 2 middle clamps)

Assembly guide (minimum value of each guide is 1600mm)

Install all the hardware and fasteners required for both module.

If the test is successful, RK clamp number and compliance confirmation will be provided. We will keep copies of all submitted drawings and samples for historical record. Ruike reserves the right to charge for system installation approval and testing.

● Product information

1.Product parameters

No.	1	2	3	4	5
Model	RK-85	RK-90	RK-95	RK-100	RK-105
Single battery type	CdTe	CdTe	CdTe	CdTe	CdTe
Rated Maximum Power at STC, (Watts)(with tolerance) #	85	90	95	100	105
Rated Voltage at STC, (V dc)	81.5	87.4	91.1	94.1	97.2
Rated Current at STC,(A DC)	1.04	1.04	1.05	1.06	1.08
Short Circuit Current at STC, (A dc) (with tolerance) #	1.21	1.22	1.22	1.23	1.24
Open Circuit Voltage at STC, (V dc) (with tolerance) #	117.5	117.8	119.9	121.7	123.8

Maximum System Voltage, (V dc)		1000	1000	1000	1000	1000
Temperature Coefficient for cells*	Pmax	- 0.29%/ °C	- 0.29%/ °C	- 0.29%/ °C	- 0.29%/ °C	- 0.29%/ °C
	Isc	+0.04%/ °C	+0.04%/ °C	+0.04%/ °C	+0.04%/ °C	+0.04%/ °C
	Voc	- 0.28%/ °C	- 0.28%/ °C	- 0.28%/ °C	- 0.28%/ °C	- 0.28%/ °C
Maximum Series Fuse,(A)		2	2	2	2	2
Protection Class (IEC 61140)*		class II	class II	class II	class II	class II
Fire Performance		Class C	Class C	Class C	Class C	Class C
Pollution Levels		PD=1	PD=1	PD=1	PD=1	PD=1
Cell Type		CdTe				
Number of cells		146				
Application of temperature		-40°C+85°C				
NOMT of temperature		42°C				
Module Dimension		1200*600				
Weight of module (Kg)		12.2kg				

All electrical data shall be shown as relative to standard test conditions (1 000 W/m2, (25 ± 2) °C, AM 1,5 according to IEC 60904-3).

The maximum number of components in series is 8

2. Terminal box information

Type	Manufacturers	Model
Junction box	Cixi Boneng	PV-BN128
diode	Nantong Hornby	6A10
cable	Ningbo Kai bo	H1Z2Z2-K



The connector	Stäubil/mc	PV-KST4/xy-UR , PV-KBT4/xy-UR
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3. Safety considerations

3.1 artificially concentrated sunlight shall not be directed onto the front or back face of the PV module;

3.2 Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of ISC and VOC marked on this module should be multiplied by a factor of 1,25 when determining component voltage ratings, conductor current ratings, fuse sizes, and size of controls connected to the PV output.";

3.3 Recommended maximum series/parallel module configurations;
 $[(1000V/(1.25*Voc))/[fuse\ rating/Isc+1]]$;

3.4 The design safety factors $\gamma_m=1.5$, positive/ negative 1600 Pa;

3.5 Installation ambient temperature: - 40 °C to +40 °C;

3.6 The modules are rated fire Class C, and are suitable for mounting over a Class Croof. To maintain the corresponding fire prevention level, the tilt angle should be no less than 5 in/ft (127 mm/305 mm) when the modules are mounted on the roof;

3.7 Fitting dimensions and recommended mounting torque:

Accessories	Material	Size and Length
Bolt	Stainless Steel 304	M6*16mm
Washer	Stainless Steel 304	M6
Spring Washer	Stainless Steel 304	M6
Nut	Stainless Steel 304	M6
Side Upper Clamp	aluminium alloy 6005-T5 EPDM rubber	Length * Width * Height 120mm*40*17.6mm
Side Lower Clamp	aluminium alloy 6005-T5 EPDM rubber	Length * Width * Height 120mm*50*10.4mm
Middle Upper Clamp	aluminium alloy 6005-T5 EPDM rubber	Length * Width * Height 120mm*55*17.6mm
Middle Lower Clamp	aluminium alloy 6005-T5 EPDM rubber	Length * Width * Height 120mm*75*10.4mm



Rubber Gasket	PC303-80	Length * Width * Height 120mm*15*3mm
Stainless Steel Gasket	Stainless Steel 304	Outer diameter:16mm Inner diameter:8mm Thickness:2mm

Recommended torque is between 10N.m to 15N.m.

3.8 Before mounting the module, please consult your local building department to determine approved roofing materials.

- A. The System Fire Class Rating of the module or panel in a mounting system in combination with a roof covering complete with requirements to achieve the specified System Fire Class Rating for a non-BIPV module or panel.
- B. Any module or panel mounting system limitations on inclination required to maintain a specific System Fire Class Rating.

Maintenance of modules during operation

The dust accumulated on PV modules shall be removed at planned interval. Cleaning frequency vary by season and region. Dust can be removed either by dry cleaning or water spray cleaning. For those regions lack of water, dry-cleaning method could be an economic solution.

Thick snow should be removed as soon as possible since it will prevent the light from reaching PV junction.

The outputs of those modules in various series should be monitored and compared. For those series whose powers are significantly lower than adjacent ones, investigation should be performed by measuring their current with clip-on ammeter or other I-V meters. Replacement or adjustments of modules can reduce power loss due to mismatch between I_m 's of modules in one serial of modules.

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