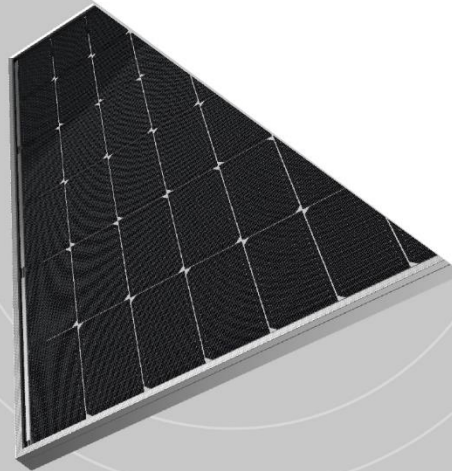
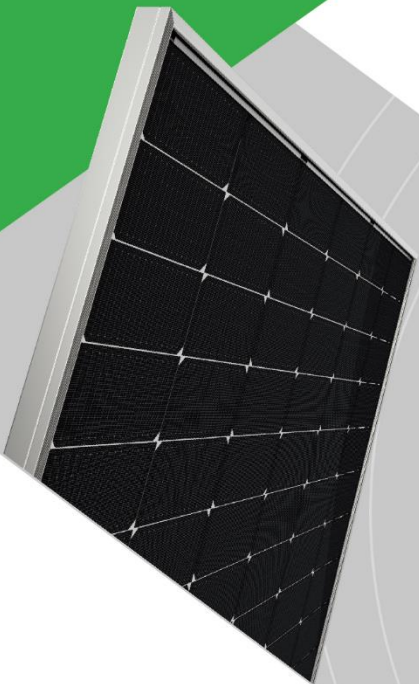


**OYUNGSOLAR**

Storage and Unpacking Instruction of  
Photovoltaic Modules



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# 1. General Information

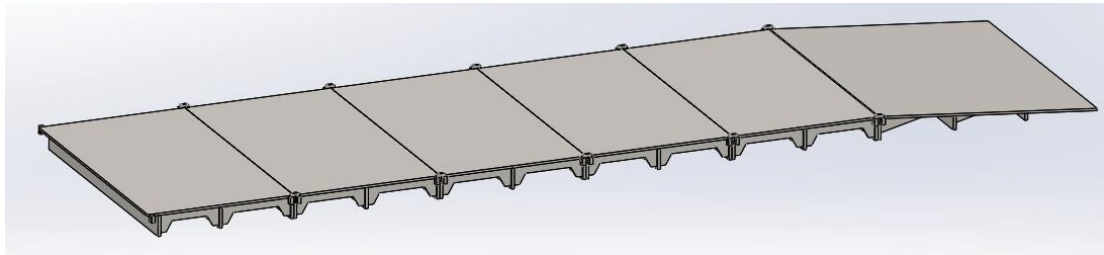
● Thanks for choosing OYUNGSOLAR PV modules (hereafter referred to as 'modules'). To ensure the safety of loading, unloading, unpacking and storage of PV modules, please read this manual carefully. When you need to unpack and install the modules, you can search and download relevant content from OYUNGSOLAR's official website. Please do not hesitate to contact us if you have any question. ([www.oyungsolar.com](http://www.oyungsolar.com))

## 2. Loading and Unloading Information

● Upon arrival of the modules, please check the packaging box is in intact, and check whether the module type and quantity on the outer packaging are consistent with the delivery order, if any abnormality is found, please retain this information before opening the box and contact the relevant personnel immediately.

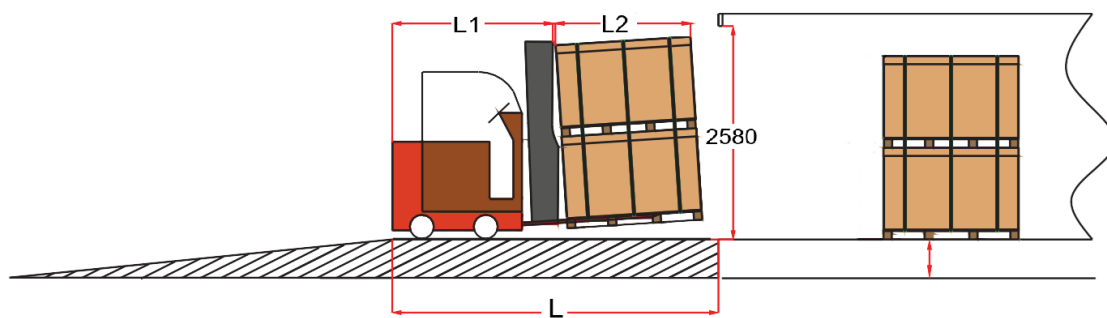
### 2.1 Notes for Container Handling

● Unloading tools: Forklift/Unloading platform/Unloading pad tooling.



When unloading on the platform or ground, steel plate pads or tooling shall be used to assist in moving the goods out of the container smoothly.

● Unloading tools requirements:



$$L \geq L1 + L2$$

L: Length of the horizontal extension of the unloading platform or unloading tooling

L1: Length of unloading forklift

L2: Length of the module packing box

Height of the container above the ground

The height of the unloading platform and the height of the unloading tooling should be kept at the basic level with the bottom of the container (loading bottom plate), and the height tolerance should be controlled within  $\pm 10\text{mm}$ .

It is recommended that the inclination angle between the fixture pad and the plane should be less than  $5^\circ$ , to avoid the forklift hit the top of the container due to too much inclination when it comes out of the container.

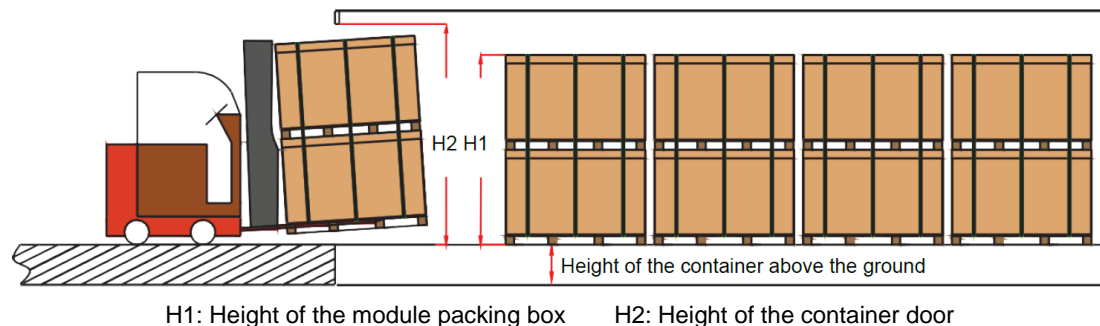
The length of the horizontal extension of the unloading platform or unloading tooling  $L \geq$  the total length of the unloading forklift and the length of the module packing box.

- When the container is unloaded:

When using the fuel forklift, adjust the height of the forks from the ground, the forks into the short side of the pallet, after the forks into the bottom, lift the modules at an appropriate height (the tilt angle required to lift the modules  $< 2^\circ$ ), the smaller the distance from the ground when the forklift out of the container door, ensure that the height of the forks from the ground and the distance from the goods to the top of the container is not more than 80mm;

When the horizontal electric forklift is used to unload the goods, the arm length of the forklift mechanical arm is required to be  $\geq 1800\text{mm}$ . The arm length of the forklift mechanical arm is required to lift the modules from the short side of the pallet with a fork (the height of the forklift is required to be  $\leq 40\text{mm}$  from the ground), and the modules are moved out slowly.

If the modules are unloaded from long side forks, fuel oil forklifts are needed to unload.



When unloading, the whole modules should be balanced as far as possible, the forklift arm should be kept relatively horizontal and 2~3cm spacing between modules and walls or adjacent modules is allowed. Besides, the forklift truck should fork the modules out of the container slowly and smoothly to prevent the carton from being damaged by friction between modules and wall or adjacent modules. When the goods go out of the container port, please slow down, and lower the height of the forklift arm from the ground (it is recommended to close to the bottom plate to reserve enough space for the top), pay attention to the distance between the bottom of the goods and the top of the container, prevent the goods from colliding with the top of the container, and ensure that the whole pallet module is safely removed from the container.

- In order to prevent the safety of placing and unpacking modules affected by tilt and uneven ground, please choose flat ground when unloading.

- If the modules need to be temporarily stored after unloading, it is recommended to keep sufficient space between each pallet to avoid scratching the carton or pallet during the second transfer.
- When unloading cross-loading modules, special command is required to ensure that the forklift does not exceed the modules, and prevent damage to adjacent modules when fork is raised or placed due to excessive length of forklift arms.
- See other requirements below for forklift unloading considerations.

## 2.2 Hoisting Precautions

- The hoisting rope of crane unloading needs to choose a longer nylon sling, wire rope is not allowed to use.
- Before lifting, the length of the sling should be evenly distributed on both sides to avoid the case body tilting to one side during lifting, which causes the sling to be too tight and the module to explode.
- When lifting, the box should be kept balanced to avoid module tilting.
- When unloading, someone should direct the lifting and dropping of the box, it should be kept as gentle as possible to avoid touching and dropping the module box, and the ground should be levelled;
- It is strictly prohibited to carry out hoisting operations in adverse weather conditions such as winds greater than force 6, heavy rain or snow.
- In order to minimize the impact of the sling on the safety of the goods during the lifting process, the necessary support should be done during the loading and unloading process, such as the use of wooden sticks, iron rods or other tooling to support the sling on the top of the box and the same width of the outer box, as well as the bottom of the bottom of the pallet to increase the metal steel pipe to fix the sling, in order to reduce the pressure of the contact position of the box and the pallet.



## 2.3 Forklift Handling Precautions

- In the process of loading and unloading, the forklift should be selected reasonably according to the size and weight of the goods. If the fork length is less than 3/4 of the size of the goods, extension sleeves should be fitted on the forks before the module is forked, in order to avoid the packing container dumping when moving the forklift (Figure 1) .
- When the forklift is loaded with modules, the spacing between the two forks should be adjusted as required. The load of the two forks should be balanced without deflection. One

side of the module package should be close to the retainer (Figure 2) .

- The shelf wall of the forklift truck could have cushions, such as foam or silicone pads, to prevent hidden cracks caused by the collision or extrusion between the modules and the shelf wall.
- When the forklift truck is loading and unloading from the long side of the module, the height of the forklift truck shelf wall should be  $\geq 1200\text{mm}$  and the contact surface between the shelf wall and the module should be flat without any protruding point to avoid collision or extrusion which may cause hidden cracks and glass bursting (Figure 3) .
- Avoid sharp objects (such as forklift pallet fork) contact or collision with module box, so as not to damage the internal modules (Figure 4) .
- For stacked modules, the forklift truck is prohibited to lift more than one stack of modules at a time.
- Loading and unloading process, except forklift operator, others should be kept at a safe distance from range, ensure the safety of personnel.
- During loading and unloading, special person is required to command to avoid failure and making modules down;
- When using a forklift to move palletized packing boxes to the operation area, the forklift shall be slowly and steadily lifted and put down gently during loading and unloading, and the modules shall avoid turbulence and violent vibration during transportation.



Figure 1



Figure 2



Figure 3





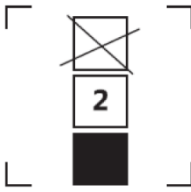
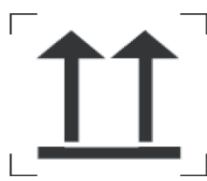


Figure 4

## 3. Storage Information

### 3.1 Notes for Storage

- Due to the complex environment and climate of the project site, it is recommended to store the stacked modules with single pallet after dismounting in order to ensure the safe storage of the modules on site (Only after cutting the outer packing belt of the connecting two pallets, separate the upper and lower pallets), the double-glazed frameless modules shall be stored with single pallet after dismounting.
- The modules shall be stored in a complete outer package. The storage area shall be protected pallets and boxes from damp, direct sunlight and waterproof (rain) measures.
- The modules storage areas should be kept dry, level, the ground and the horizontal angle is less than 10 °.
- Make sure that all modules with the same current class are installed in the same area centrally (Square matrix, combiner box).
- The modules should be placed neatly with a safe distance between the boxes. The spacing between boxes should be greater than 30cm.
- Please do not stack other items on the modules or boxes.
- Please note the following storage information labelling instruction.

### 3.2 Storage Information Labelling Instruction

 <p><b>MODULE SHOULD BE HANDLED BY 2 PERSONS</b></p>	 <p><b>KEEP DRY</b></p>	 <p><b>STACK LIMIT IN 2 UNITS</b></p>
 <p><b>THIS SIDE UP</b></p>	 <p><b>FRAGILE</b></p>	 <p><b>DO NOT STEP ON</b></p>








## 4. Unpacking Instruction

- The number of persons required for unpacking should not be less than 2.
- Equipment and tools: cutter, glove, forklift.

### 4.1 Packing Information



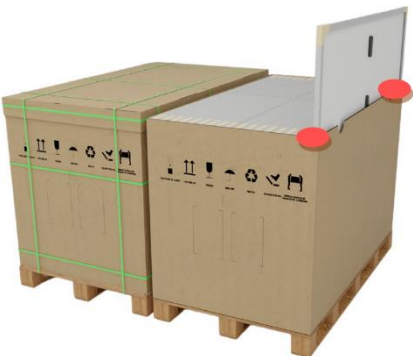

- The following are five commonly used standard packing methods for OYUNGSOLAR modules (If you have any questions? please contact us), please select the corresponding unpacking method according to the specific type of package.

<p>Packing method A Shaking cap packing with no internal strap</p>	
<p>Packing method B: Plan1 Conventional packing</p>	
<p>Packing method B: Plan2 With the internal wooden protectors</p>	
<p>Packing method B: Plan3 With the exterior wooden protectors and cross-packing</p>	
<p>Packing method B: Plan4 Exterior cross packing</p>	



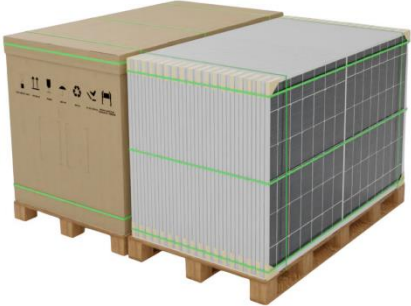
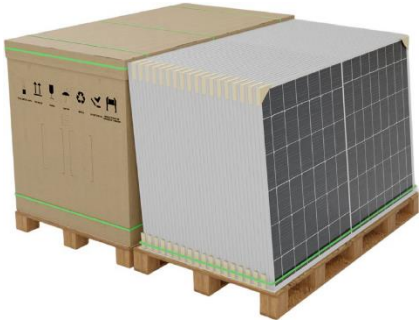


## 4.2 Unpacking Methods






### Unpacking method A (Shaking cap packing with no internal strap)

	<p>1. Cut off straps within the two pallets, and use a forklift to separate the two pallets.</p>
	<p>2. Then cut off the packing straps of the single pallet and remove the isolated wood (or plastic wrap) and the carton cover.</p>
	<p>3. Remove the first module labeled "1" from the opening position (marked in red) firstly. Then remove the remaining modules from the box sequentially.</p>
	<p>4. When the last 5 pieces of modules are left in the box, please placed to a solid support on the side of modules to avoid the box turned over due to the strong wind and accidental collision.</p>





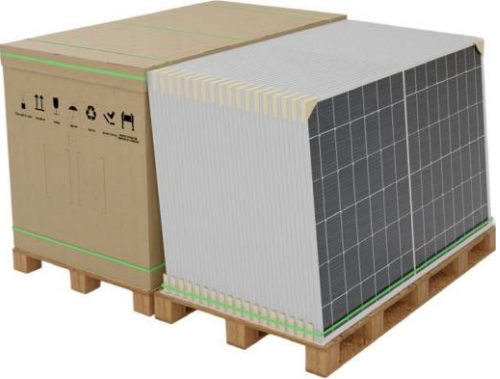
**Unpacking method B: Plan1 (Conventional packing)**

	<p>1. Remove the wrapping film around the box and separate the upper and lower boxes.</p>
	<p>2. The long side of the module to be unpacked needs to be close to a solid support for about 15-20cm distance, the support could be a wall, rack or another unpacked module box of the same type, and then use scissors to cut all the packing strap of the outer box.</p>
	<p>3. Remove the top cover of the box, and then remove the carton by lifting it. Two persons hold the modules to prevent them from tipping over. The other person cuts the upper-middle horizontal straps and the vertical straps of the modules, retaining the bottom horizontal strap.</p>
	<p>4. Stand on both sides of the short side of the module and slowly lean the module towards the support, and when the module is completely leaning on the support, cut the remaining bottom horizontal packing strap on the short side; finally, remove all modules sequentially from the outer one.</p> <p>Note: When cutting the internal packing strap, the person must stand on both sides of the short side to avoid the modules from sliding down and hitting person due to rough ground.</p>




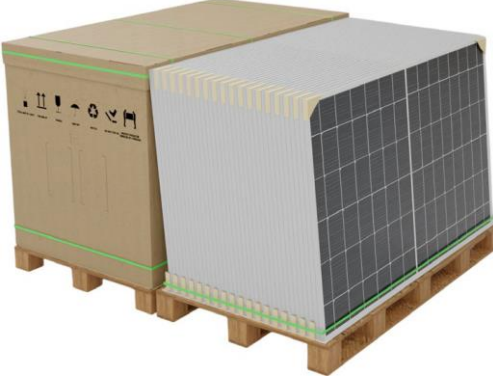
## Unpacking method B: Plan2 (With the internal wooden protectors)

	<p>1. Remove the wrapping film around the box and separate the upper and lower boxes.</p>
	<p>2. The long side of the module to be unpacked needs to be close to a solid support for about 15-20cm distance, the support could be a wall, rack or another unpacked module box of the same type, and then use scissors to cut all the packing strap of the outer box.</p>
	<p>3. Remove the top cover of the box, and then remove the carton by lifting it. Cut the horizontal straps on the wooden protectors and then remove the wooden protectors.</p>
	<p>4. Two persons hold the modules to prevent them from tipping over. The other person cuts the upper-middle horizontal straps and the vertical straps of the modules but retaining the bottom horizontal strap.</p>
	<p>5. Stand on both sides of the short side of the module and slowly lean the module towards the support, and when the module is completely leaning on the support, cut the remaining bottom horizontal packing strap on the short side; finally, remove all modules sequentially from the outer one.</p> <p>Note: When cutting the internal packing strap, the person must stand on both sides of the short side to avoid the modules from sliding down and hitting person due to rough ground.</p>

## Unpacking method B: Plan3 (With the exterior wooden protectors and cross-packing)

	<p>1. Remove the wrapping film around the box, then cut the cross-packing straps and remove the exterior wooden protectors.</p>
	<p>2. Cut the straps of the upper and lower modules packages, then separate the upper and lower modules boxes.</p>
	<p>3. The long side of the module to be unpacked needs to be close to a solid support for about 15-20cm distance, the support could be a wall, rack or another unpacked module box of the same type, and then use scissors to cut all the packing strap of the outer box.</p>
	<p>4. Remove the top cover of the box, and then remove the carton by lifting it. Two persons hold the modules to prevent them from tipping over. The other person cuts the upper-middle horizontal straps and the vertical straps of the modules but retaining the bottom horizontal strap.</p>
	<p>5. Stand on both sides of the short side of the module and slowly lean the module towards the support, and when the module is completely leaning on the support, cut the remaining bottom horizontal packing strap on the short side; finally, remove all modules sequentially from the outer one. Note: When cutting the internal packing strap, the person must stand on both sides of the short side to avoid the modules from sliding down and hitting person due to rough ground.</p>

## Unpacking method B: Plan4 (Exterior cross packing)

	<p>1. Remove the wrapping film around the box, then cut the cross-packing straps.</p>
	<p>2. Cut the straps of the upper and lower modules packages, then separate the upper and lower modules boxes.</p>
	<p>3. The long side of the module to be unpacked needs to be close to a solid support for about 15-20cm distance, the support could be a wall, rack or another unpacked module box of the same type, and then use scissors to cut all the packing strap of the outer box.</p>
	<p>4. Remove the top cover of the box, and then remove the carton by lifting it. Two persons hold the modules to prevent them from tipping over. The other person cuts the upper-middle horizontal straps and the vertical straps of the modules but retaining the bottom horizontal strap (The distribution of packing straps inside the package may be different from the one shown in the picture, but it doesn't affect the order of removing the packing straps).</p> <p>5. Stand on both sides of the short side of the module and slowly lean the module towards the support, and when the module is completely leaning on the support, cut the remaining bottom horizontal packing strap on the short side; finally, remove all modules sequentially from the outer one.</p> <p>Note: When cutting the internal packing strap, the person must stand on both sides of the short side to avoid the modules from sliding down and hitting person due to rough ground.</p>



### 4.3 Unpacking Precautions

- When opening cartons outdoors, avoid operating on rainy days because the cartons will soften and spread out to damage modules after rain.
- Fixed measures shall be taken for disassembled modules when outdoor wind-operated. It is advisable not to move the modules to avoid damage.
- Stack modules in a ventilated, rainproof, and dry place before the modules are unpacked.
- Use scissors or art knife to cut the outer box packing tape. Do not scratch glass. Confirm the number of modules in the box immediately after opening the case.
- The working ground needs to ensure that the packing box can be stably placed horizontally to avoid dumping of the modules.
- Please wear protective gloves during unpacking and handling to avoid scratching hands or leaving fingerprints on glass.
- Each module needs to be carried by 2 people, pull the junction box is prohibited in any case, when lifting the module, grab the short edge and take out the module (Figure 5).
- When taking the modules out of the box (for packaging method A) , it is recommended to use protective tooling to separate the modules to prevent friction from producing flecks. Hard pulling and skewed drawing of the modules are not allowed (Figure 6).
- Before installation, please use scissors to cut the binding band of the fixed wire to avoid the connector hitting the back and damaging the modules.
- Do not remove the corner guard from the modules before installation.
- The install remaining modules should be placed centrally and protected by packing case.



Figure 5



Figure 6

### 4.4 Instruction for Transshipment and Handling at Project Site

- The transshipment movement of the packing box shall be completed before the outer packing case is removed, and after unpacking, it shall no longer be transshipped with no fixed protection of the packaging material, and it shall be repackaged before being transported, or a single piece of manual short distance lifting shall be carried out.
- When the modules are transported at the project site, the transportation route shall be selected on



a smooth road to avoid damage or cracks of the modules caused by turbulence, collision, extrusion, tilt and other factors. The modules shall be transported on a flat ground.

## 5. Instruction for Sampling

### 5.1 Instruction for Sampling at Project Site

- If the modules need to be spot tested, please refer to the preceding unpacking instructions of this manual to unbox the modules.
- After modules are taken out of box, they should be placed on a vacant pallet. Module should be carried by two people and handled with care during the sampling process (Figure 7). In the process of sampling, the following precautions should be paid attention to avoid causing secondary cracks of modules:
  - a) If you need to remove the ties which are used to fix cables, hold the connector upward with your right hand, twist the connector, and pull it slightly upward, then use a tool such as scissors to cut off the ties. And do not hit the rear side of module with the connector (Figure 8).
  - b) Connect the connector: When connecting the connector, do not shake the cable to avoid damaging the module.
  - c) If the module needs to be turned over, fixing measures (adhesive tape, etc.) shall be adopted to fix the connectors to prevent the cracks caused by the drop of the connectors (Figure 9).
  - d) After the completion of the test, remove the tape on the cable, and then fix the cable with a tie, and then pack the modules again for secondary transport.



Figure 7



Figure 8



Figure 9

### 5.2 Instruction for Sample Modules

- Sample modules must be selected for sampling with no damage to the outer package.
- If the client will have a second transfer of modules, OYUNGSOLAR is only responsible for the EL test results of the modules at the first unloading point.