# Packaging Handling and Storage Instructions for Crystalline Solar PV Modules

<table>
<thead>
<tr>
<th>REVISIONS</th>
<th>Risen Energy Co., Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>REV</td>
<td>ECO/NPA</td>
</tr>
<tr>
<td>A</td>
<td>07-2015</td>
</tr>
</tbody>
</table>

**Title:**
PACKAGING HANDLING AND STORAGE INSTRUCTIONS FOR CRYSTALLINE SOLAR PV MODULES

**Specification No:**
RSM

**Part No:**
N/A

**Drawn By:**
Chaudary

**Rev:**
A
The following are recommendations for the proper packing, unpacking, storing and moving of the Pack Carton for standard modules at Risen Energy facilities.

- For Risen Factory & potential Distributors
- Includes all standard modules

The PV modules are packaged in a box made from triple-strength cardboard and resting on a wooden or plywood pallet. The outer carton tube lid of the box is made from double strength cardboard.

### Solar PV Module

<table>
<thead>
<tr>
<th>Type (Typical)</th>
<th>Dimension L×W×H (mm)</th>
<th>Module Qty Per pallet (pcs)</th>
<th>Dimensions of Pallet L×W×H (mm)</th>
<th>Gross Weight (kg)</th>
<th>Module QTY per container (pcs)</th>
<th>Max. Stacking Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSM60-6-250P-270P</td>
<td>1650×992×35</td>
<td>30</td>
<td>1680×1120×1120</td>
<td>580</td>
<td>30x 28 Pallets = 840 pcs = 40ft 30x 12 Pallets = 360 pcs = 20ft</td>
<td>2</td>
</tr>
<tr>
<td>RSM72-6-300P-320P</td>
<td>1956×992×40</td>
<td>26</td>
<td>1980×1120×1120</td>
<td>680</td>
<td>26x 24 Pallets = 624 pcs = 40ft 26x 10 Pallets = 260 pcs = 20ft</td>
<td>2</td>
</tr>
</tbody>
</table>

### BASIC HANDLING SAFETY RULES

- Move full bulk pack solution via forklift or jack entering from the short side.
- **Warning:** For safety reasons never manipulate or move a partially full carton, without stabilizing the remaining modules against shifting. Movement may cause the remaining modules in a partially full carton to shift within the carton, even with the stabilizing horizontal separator strips affixed, causing an unsafe handling situation, particularly when utilizing a forklift.
- When handling goods it is obligatory to use correct safety equipment: e.g.: gloves and safety shoes.
- Move closer to the object when lifting.
- Make sure you have a strong foothold, keeping feet evenly spaced.
- Two people are necessary to lift modules, one person on each short side.
- One person should not attempt to pick up the module by the long side of the frame as this may cause frame integrity damage. It could also lead to back strains.
- Do not lift a heavy weight above the waist in a single movement.
- When lifting a module above waist height you should not have your arms fully extended, always with your arms bent.
- Check beforehand the route you will take when moving the goods, making sure there are no obstacles on the way.
- Anything that may cause physical injury due to excess weight should be moved by mechanical means (e.g.: forklift etc…)
- Keep the work area clean.
PACKAGING STEPS

1. Place the pallet and bottom cover against the bracket or support surface

2. Start to pack the modules successively against the bracket or support surface.
   Inside the box, 30 modules are placed sideways and are alternately protected with protector on each corner.
   **Important note:** The first & last module should be placed so that the glass faces inward.

3. After installing the 30 modules, set 2 straps near the corner protections.

4. Put down a set of cardboard around the modules. Make sure each module barcodes is not damaged.

5. After setting the lower enclosure frame, attach the module barcodes sheet (each box has a unique code). Then cover the top and remove the bracket.
6. Bound two straps vertically on the short side, then 2 straps vertically on the long side.

7. Repeat the operation with a second box on top of the other. Bound two straps vertically on the short side.

8. Finally, cover both boxes with plastic wrap.

Example of Module Barcode Sheet:
CONTAINER LOADING & HANDLING GUIDE LINES & INSTRUCTIONS

- The boxes should always be handled using mechanical equipment (e.g. Forklift truck).
- It is recommended to lift the pallets from the short side. The forklifts should not be too small because it needs to avoid pallet tilting back during transport. The mobile forklifts need to slowly move up and down to grasp the center of gravity of the modules.
- Pallets should be stored a maximum of 2 high in the container.
- It is recommended that loading is done lengthwise both in trucks and containers; this also applies to storage in warehouses.
- For lengthwise handling is it necessary to attach extensions to the forks of the truck, to reach at least 1,9m length for RSM72 modules & 1.6m for smaller ones.
- Pallets should be piled one on top of the other so that corners are flush and there is no overhang. The critical path for the loading is to align the pallets in the container with equal gaps as shown in the picture below for the 1st tier and also align the second tier exactly on the 1st tier in order to prevent the overhang or damage of the pallets.
- Once loaded the goods should be attached inside the storage area of the truck or container, so as to avoid any kind of movement. All trucks or containers must be provided with straps to fasten the goods.
- Once loaded the goods are locked with supporting wooden planks nailing on the floor board to prevent shifting.
- The container doors should be locked properly, so as to avoid any kind of movement.
INSTRUCTIONS FOR SAFELY OPENING THE PACKING BOX

Inspection of external packaging after receiving the goods

To ensure that the products inside are not damaged it is first necessary to make a visual check:

- The pallet should be in good condition: that is to say without broken or badly fastened slats or other elements.
- Ensure that the box and lid are in perfect condition; i.e.: no evidence of it having been hit or dented, no breakage or other visual defects.
- Ensure that the boxes are correctly aligned to the pallet dimensions.

Equipment and tools: cutters or scissors, gloves, forklift.

Staff: at least three people

Attention:

- In case of opening the box outside, please avoid during rainy conditions. The rain will soften the box, may damage the modules and hurt the staff.
- Please pay special attention to the safety when it is windy. When the wind is strong, it is recommended not to handle the PV modules.
- Please ensure that the box is placed stably and horizontally to avoid tilting.
- Please wear gloves during the opening of the packing box to avoid hurting the hands and leaving finger-marks on the glass.
- Move the packing box with pallet by forklift to the operation area.
- The long side of the unopened PV modules need to be near a solid wall, stand or other unopened PV modules with the same specifications, parallel with the long side of pallet; the recommended distance is 15-20cm.

Unpacking Sequence

1. Check the box label for all module information.
2. Remove the plastic film. Cut the straps of the carton box. Use appropriate cutting devices (scissors or cutters)

3. Remove the box lid. Lift up the carton frame, then cut the bottom strap
   Suggestion: The box lid, once on the floor could be used as a base for resting the modules as they are removed, thus protecting them from potential damage.

4. Put down the carton frame, cut a small opening on the carton frame, cut the top strap above the pack.

5. After cutting the strap, please remove the PV modules out of the carton.
   *First remove the module on the side, which should have corner protectors.*

6. Place the module in a safe place to avoid damage. The box lid is a good option.

7. Repeat the process with all modules until all are out of the box.
   Removal and handling of modules should always be undertaken by 2 people using the short sides and the line of vision should never be impaired. During handling or movement of modules take care never to take up a potentially dangerous posture. When moving more than one module you should always use mechanical equipment.

8. The PV modules which have been taken out should be lie flat on the pallet. Stacked quantity should be no more than 30pcs. Please put a carton lid on the pallet. Then put the first module with the glass upward and others with the glass downward. Stacked quantity should no more than 30pcs.
STORAGE INSTRUCTIONS

- Pallets should be handled so as to minimize any chance of damage to the box or its contents.
- Any transportation within the warehouse should be authorized by the person in charge.
- All handling inside or outside the warehouse using a machine should only be undertaken by people correctly trained for this activity.
- Pallets should be handled using forklift trucks or loading bays.
- For safety reasons pallets should not be piled more than specified layers as shown on the outer carton box tube, and they should only be moved using the correct mechanical equipment.
- Pallets should be piled one on top of the other so that corners are flush and there is no overhang.
- The warehouse should be correctly laid out and the storage area clearly signaled.
- The plastic film around the carton of the PV modules of Risen Energy is waterproof and dustproof for the modules. If the modules will have a long period of storage, please don’t remove it.
- The carton is not completely waterproof. The structural strength will be low after the carton is wet and danger may occur. So please put the modules in a ventilated and dry place where they can be protected from rain.
- The carton boxes can be stored by stocking, but the height should not be more than two levels.
- Don’t step on the cartons and PV modules.
- It is forbidden to put the modules near corrosive chemicals or gases and location needs to be fireproof.
### ANALYSIS OF RISKS AND PREVENTATIVE MEASURES

<table>
<thead>
<tr>
<th>TASK</th>
<th>RISKS</th>
<th>PREVENTATIVE MEASURES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manual Handling of Modules</strong></td>
<td>Falling objects during handling</td>
<td>- Use of safety shoes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Avoid distraction</td>
</tr>
<tr>
<td></td>
<td>Hitting standing/moving objects</td>
<td>- Avoid distraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Neat and tidy work area</td>
</tr>
<tr>
<td></td>
<td>Cuts</td>
<td>- Use of safety gloves</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- All cutters or other type of bladed implement should be a safety version</td>
</tr>
<tr>
<td></td>
<td>Overexertion and back injuries</td>
<td>- Training and information to workforce regarding the correct way to handle loads and the potential risks (according to the laws of the country in question)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Whenever possible use mechanical lifters</td>
</tr>
<tr>
<td></td>
<td>Tripping</td>
<td>- Avoid distraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Use of safety shoes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Neat and tidy work area</td>
</tr>
<tr>
<td></td>
<td>Physical tiredness</td>
<td>- Take rest as necessary according to risk evaluation</td>
</tr>
<tr>
<td><strong>Mechanical Handling of Modules</strong></td>
<td>Accidents involving vehicles</td>
<td>- Signposting the loading area and warehouse as required by law of the country in question.</td>
</tr>
<tr>
<td>(forklift truck and loading bays)</td>
<td></td>
<td>- Only use the lanes signaled and set aside for vehicle movement, ensuring that visual and audio warnings are clear.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Regular servicing of vehicles (as necessary in EU, NA &amp; MOW and according to the law of the country in question)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Employees should receive necessary training before using such equipment.</td>
</tr>
<tr>
<td></td>
<td>Objects falling through collapsing or slippage</td>
<td>- Keep surfaces in good repair, avoiding slippery areas or non-uniformity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Respect maximum loads for all equipment</td>
</tr>
<tr>
<td></td>
<td>Pallets falling during handling</td>
<td>- As the measurements of the pallets are above Standard size, it is recommended that extensions are used to help stability. (at least 1.6m or 1.9m long)</td>
</tr>
</tbody>
</table>