

Topic: Packaging Design Improvement

Issue date: April 23, 2010

Contact: Quality Assurance, quality@uni-solar.com

Technical Information:

We are pleased to announce the finalization of an internal project aimed at improving the efficiency of our packaging methodology. The result is a significant reduction of the impact of transportation in terms of both cost/Watt and CO2 emissions/Watt.

Our prime deliverables for this project were to increase packing density by at least 30% while producing a stronger, reliable and more user friendly solution:

- Pallet deck boards have been standardized at 16mm width for added strength.
- Cardboard used for the container is stronger.
- Lids are shorter, allowing the product label to stay with the container box.
- Lids no longer overhang beyond pallet plane and are easier to handle.
- Container allows easier access to the product.
- All internal surfaces are now coated with a new release agent to prevent the PVL adhesive from sticking to the box.

The above improvements can support an increased product density by more than 50%.

Storage Conditions:

PVL Series laminates are shipped coiled in cardboard transport boxes which are then placed on a wooden pallet. For shipping and storage purposes these pallets can be stacked up to 3 boxes high.

These changes in design do not impact United Solar's requirements for storage. PVL laminates should continue to be stored, within their original packing box, in a clean, dry location where ambient temperatures are within the range of 15 to 30°C (50 - 85°F) and relative humidity is less than 80% until the moment of their application to the final substrate.

This document may contain information that is confidential and proprietary information of United Solar Ovonic LLC. The dissemination, distribution or copying of this document is strictly prohibited without the express written consent of United Solar Ovonic LLC. All technical information contained is subject to changes without prior notice.

Pallet Specifications:

Product type	Pallet Length	Pallet Width	Pallet Height	Pallet Weight	OLD PACKAGING	NEW PACKAGING	Pallets per 20 ft. Standard Container	kW per 20 ft Container	Pallets per 40 ft. Standard Container	kW per 40 ft Container
					Pieces per pallet stack	Pieces per Pallet stack				
PVL 136	1130.3	1130.3	1676.4	762	60	90	10	122.4	20	244.8
PVL 144	1130.3	1130.3	1676.4	762	60	90	10	129.6	20	259.2
22L 136	1130.3	1130.3	1676.4	688.5	78	120	10	163.2	20	326.4
22L 144	1130.3	1130.3	1676.4	688.5	78	120	10	172.8	20	345.6
PVL 68	1130.3	1130.3	1676.4	708	78	150	10	102	20	204
11L 68	1130.3	1130.3	1676.4	599.4	150	180	10	122.4	20	244.8

*Measurements are listed in millimeters and kilograms.

Safety:

The overall weight of a packing box means that these should not be attempted to be manually carried.

The packaging is designed to allow stacking of up to 3 boxes. Exceeding this limit can cause instability causing the stack to topple over and/or deform the packaging resulting in unacceptable stresses which can damage the laminates.

When stacking packing boxes on top of each other they should be banded together as shown.

Each packing box is provided with labels showing the serial numbers of the products incorporated as well as essential shipping information.



This document may contain information that is confidential and proprietary information of United Solar Ovonic LLC. The dissemination, distribution or copying of this document is strictly prohibited without the express written consent of United Solar Ovonic LLC. All technical information contained is subject to changes without prior notice.

Effective Date:

This improvement will be introduced gradually across our different manufacturing factories over the coming months. The earliest date that you will begin to see this in your deliveries will be during the second quarter 2010.