

# SOLARSAVE®

## PHOTOVOLTAIC ROOFING TILES

INSTALLATION AND OWNER MANUAL  
VERSION 3.30



OPEN ENERGY CORPORATION



Open Energy manufactures a photovoltaic (PV) roofing tile that blends solar electric cells into a roof system. The SolarSave™ Roofing Tiles generate electricity by converting sunlight into Direct Current (DC) power. Please read and understand this manual carefully before installing and operating the SolarSave™ Roofing Tile system.

**!ATTENTION!**

**SAVE THESE INSTRUCTIONS** – This manual contains important instructions for SolarSave™ Roofing Tiles that must be followed during installation. Before installing SolarSave™ tiles, thoroughly read, understand and follow all cautionary markings and instructions in this manual and on the product.

**!WARNING!**

SolarSave™ tiles generate electricity when exposed to light and can cause electrical shock or burn. Care must be taken to not touch live terminals with bare hands or conductive materials. PV roof tiles have no “ On/Off ” switch. The only way to make them inactive is to remove them from any light source or by covering the front of the tile with opaque material.

The photovoltaic roof tiles described herein must be installed by qualified personnel only. The tiles and their related system components carry electrical voltage and currents and can be dangerous. Personnel must be familiar with appropriate safety procedures for handling electricity.

**Local Codes and Regulations:**

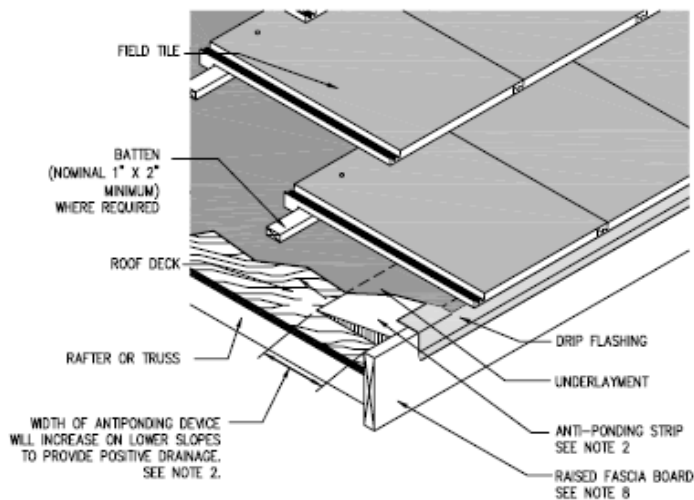
Before installing your SolarSave™ tile system, be sure to contact your local utility and building department to determine the necessary permit, installation and inspection requirements for your local jurisdiction.

The installation of the PV roof tiles system must be performed in compliance with all applicable building and safety codes including but not limited to the National Electric Code (USA installations) and local utility interconnection requirements.

**INSTALLATION**

SolarSave™ roofing tiles are installed in the same manner as standard concrete roof tiles. The Tile Roof Institute (TRI) has developed installation guidelines for roof tiles which are recommended reference materials as SolarSave™ tiles are designed to be installed in conjunction with and in the same manner as concrete tiles. The TRI manual can be ordered at [www.tilerroofing.org](http://www.tilerroofing.org). A copy of the TRI manual can be provided with a SolarSave™ system purchase.

Typical concrete roof tile systems are installed over plywood or OSB decks covered with 30# tar paper. Horizontal strips of 1 x 2 wood battens are applied to the deck and concrete roof tiles are fastened with nails or screws to the battens.



SolarSave™ roof tiles are installed in the same method. A minimum of two (2) #10 x 1-3/4” coated deck screws are required to provide an 80 mph wind load rating. There are four (4) mounting holes located along the top edge of each SolarSave™ tile, locate the screws in alternating mounting holes. Additional screws are required for wind load ratings over 80 mph. Refer to your system layout and permitting drawings.

Wind clips can be added for certain areas requiring wind load ratings over 100 mph. Wind clips are added to the rain channel on the left side of the tile and hidden below to course above. Wind clips can be purchased at <http://www.wire-works-inc.com> or by calling Wire Works Inc. at **1-800-341-8828**. The “grip clip” model #107 is recommended.



For the minimum watertight installation, a single layer of 30# roofing felt is to be applied on top of the roof decking in accordance with the manufactures specifications and your local building department. Refer to the “Concrete and Clay Roof Tile DESIGN CRITERIA & INSTALLATON MANUAL” written by the Roof Tile Institute and the Western States Roofing Contractors Association for proper lapping protocols.

In order to provide a Class “A” fire rating for your roofing system with SolarSave™ tiles, it is required that you install two layers of VersaShield Fire Barrier FB-2S or VersaShield Underlayment as manufactured by Elk Premium Building Products, Inc. over the top of two layers of 30# roofing felt. Follow the installation instructions for installing VersaShield products as provided by Elk Roofing (see below):

SPECIAL NOTES:

1. Decks should be dry before application.
2. Unroll and use like regular asphaltic underlayment.
3. Do not crease the underlayment; bend to small radius, but do not crease.
4. Underlayment may be applied at any temperature save for the roofer to work.
5. These application instructions also cover cases where the VersaShield Fire Barrier FB-2S or VersaShield Underlayment is being applied as a system component where a combustible space is created per section 1516.3 of the Appendix to the Uniform Building Code or as a system component on slat deck construction.
6. These are the minimum acceptable application instructions. More stringent requirements of the model building codes or local building codes should be followed. For further details, see the RARM (Residential Asphalt Roofing Manual).

VersaShield Application Instructions:

After the deck has been properly prepared, cover it with two layers of VersaShield Fire Barrier FB-2S or VersaShield Underlayment. Lay the underlayment parallel to the eaves, lapping each course at least half the width of the underlying course (this will constitute two layers). Secure the underlayment with only enough nails (tin caps or 1” diameter plastic caps recommended) to hold it in place. If two or more pieces are required to continue the course, lap the ends at least 4”.

End caps in succeeding courses should be located at least 6” from both sides, over all hips, valleys and ridges. Where the roof meets the vertical surface, carry the underlayment 3” to 4” up the surface.

When there is a possibility of ice buildup along the eaves or a backup of water from pine needles or leaves, cement all laps in the underlayment courses from the eaves to a point at least 24” beyond the interior wall line of the building, using asphalt roofing cement (conforming to ASTM D4586) or asphalt lab cement (conforming to ASTM D3019). The cemented double-ply underlayment is also compatible with the use of self-adhered eaves and flashing membrane, as described in the ARMA.

After completing the eaves flashing, secure each successive course by using only enough fasteners to hold it in place until the final roof covering is applied.

Part of the layout procedure for a tile roof is to determine the amount of “exposure” for each row of tiles. “Exposure” is the area of the tiles face that is not covered in the overlap. Black SolarSave™ tiles with Sunpower solar cells provide an exposure option of 12-1/4” up to 13-1/2”. **All SolarSave™ tiles with cells other than Sunpower will have a set exposure that must be 13-3/8” (+, - 1/8”).**

The exposure of the tiles will be the dimension that determines the distance on-center of the horizontal battens. This measurement is critical and will set the layout for the entire roof system.

Battens have 3 methods of application:

1. Direct to the deck (on top of the underlayment)



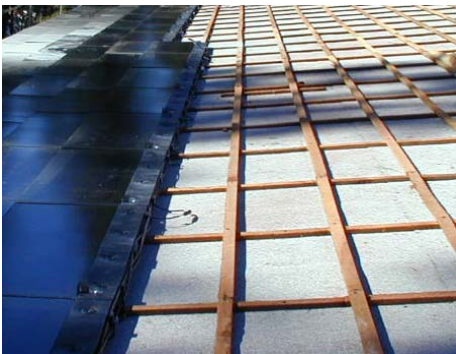
Battens fastened to deck, no air space

2. Raised Batten with a 2" x 2" x 3/4 inch plywood block underneath every 2 feet



Raised batten installed with one piece turned over to show blocks preattached

3. Counter-batten, vertical battens laid first with horizontal battens on top

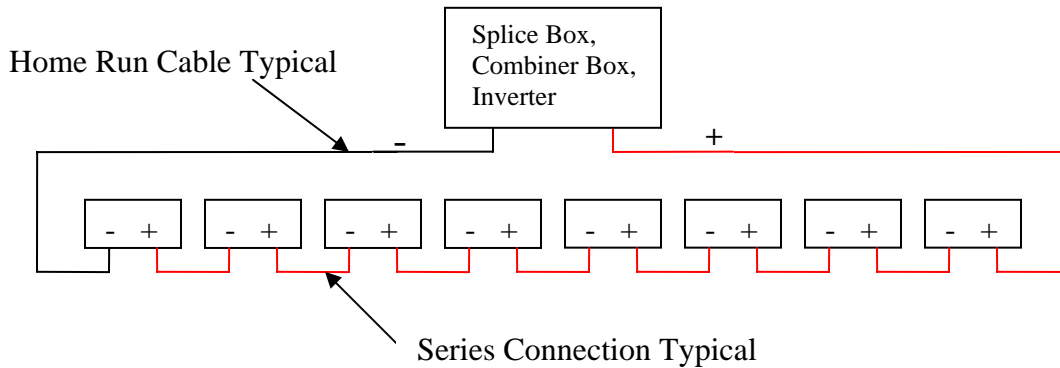


A counter-batten grid laid in place

Of the three methods shown above, the raised or counter-battens are preferred and recommended as they allow natural airflow to help cool the SolarSave™ tiles, make the wire homeruns easier to install and avoid blocking waterflow in the event condensate or rain penetration were to occur. Please refer to the Tile Roofing Institute recommended installation practices.

## WIRING

The SolarSave™ tiles are provided with two (2) Multi-Contact (MC) plugs for positive to negative series and homerun connection. A series connection connects + to -, this increases voltage. A homerun connection is the long cable which is routed from the ends of a series string and terminates at a splice box, combiner box or inverter.



An MC connector completing a series connection

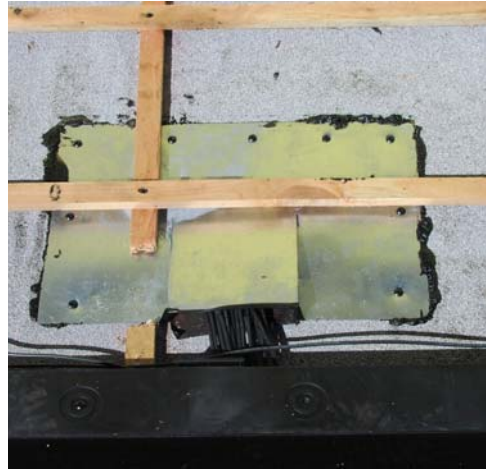
The number of SolarSave™ tiles connected in series will determine the voltage produced by the “series string”. Refer to your project-specific roof layout diagram to determine the number of tiles to be connected in series, or contact Open Energy for design assistance.

Be sure that the plug connectors are firmly seated together when making the series connection from one tile to the next.

**WARNING**

SolarSave™ tile connectors are not make / break rated, DO NOT make or break a connection when connected to an inverter or under load.

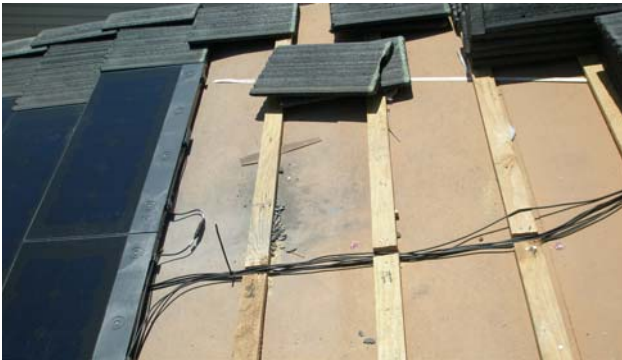
At the termination of each series string, the homerun cables will run to a roof sub-deck penetration point. The penetration is through the underlayment and plywood into the attic or through the overhang of the roof. The wireway penetration point is typically placed underneath the top course of SolarSave™ tiles. One or more penetrations can be used, though commonly there is one penetration per 100 SolarSave™ tiles. A galvanized flashing is placed over the penetration hole after the homeruns are routed. It is important to provide a low profile (1 inch or less in height) flashing that fits within the space provided under a SolarSave™ tile. It is advised that the hole be lined with underlayment or other material to avoid chafing of the cable. A fire-stopping foam or silicone should then be used to fill under the flashing.



A penetration point for homeruns – before and after flashing

Often, series strings must be completed by jumping to the course of tiles above. In this case, the output wires must be reversed so that the positive and negative leads are on the proper side of the tile for termination. When looking at the back of the tile, the positive cable is located on the left-hand side. The cables can be removed from their respective cable tracks, reversed, and reinstalled in the opposite cable tracks so that the positive and negative are on the correct side of the tile.

Homerun cable routing must be laid for each course before any further courses are laid. Running homeruns by cutting out 4” to 5” of horizontal battens as the homeruns are routed to the penetration point facilitates a clean installation.

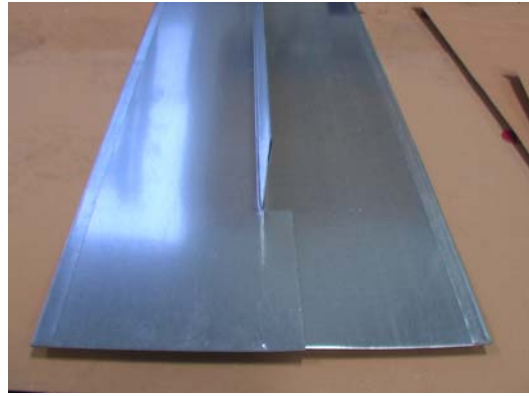
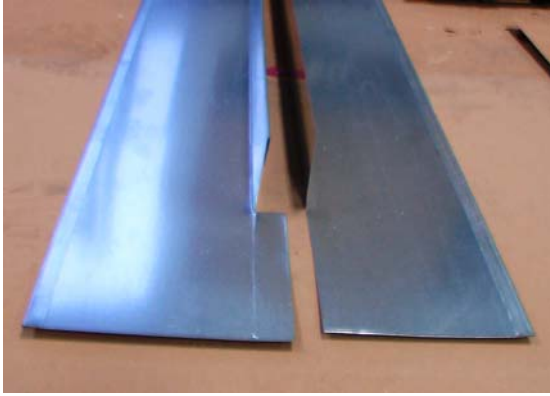


Homerun routing by removing portions of horizontal battens

It is important to check open circuit voltage (Voc) on every homerun wiring in advance of covering the tile course connections. Depending on the series string wiring count and the specific inverter to be used, the Voc may vary from project to project. It is critical to be certain that all series strings within a project are equal within 2 volts DC with all other series strings.

## INSTALLING SOLARSAVE TILES WITH OTHER ROOF MATERIALS

In order to complete a roofing system installation with roofing materials other than concrete roof tiles a flashing is used to provide a transition. In this application the SolarSave™ tiles are laid in line with each other – no offset on the ends – and laid into a “T” flashing. Other roofing materials are then begun to be laid from the opposite side of the flashing in a similar condition as a wall-to-roof detail.



A two piece “T” flashing before and after assembly.



Typical T Flashing installed as transition between composition shingles and SolarSave™