SunStyle®

Installation Manual

Version 1.3 (March 21, 2022)

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The SunStyle® system includes the SunStyle shingles and hardware for both active and inactive parts of your roof. This manual provides the complete system installation instructions including roof underlayment, support structure, edge flashing, solar electronics, and SunStyle shingles. Installation must be performed by certified SunStyle partners.

This guide will be continually updated by SunStyle; please refer to the latest version.

CODE COMPLIANCE

The SunStyle solar roof is classified as “Building Integrated Photovoltaic” (BIPV) within the International Residential Code, and must be installed in accordance with IRC Section R324.3.1 through R324.7.1, R902, R905, the National Electrical Code, NFPA 70, and this Installation Manual. Check with the local Authority Having Jurisdiction (AHJ) and permit departments for code cycles adopted.

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SunStyle

SunStyle AG
Gewerbestrasse 8
3065 Bolligen
Switzerland

Designed in Switzerland
www.sunstyle.com

Manufactured by:
SOLVIS d.o.o.
Cehovska 106
42000 Varaždin
Croatia
www.solvis.hr

SUNSTYLE MODEL: **M110 870**

Maximum Power	Pmax: 110 Wp -0 / +5 Wp
Voltage at Mpp	Vmpp: 13,1 V
Open Circuit Voltage	Voc: 16,1 V
Current at Mpp	Impp: 8,4 A
Short Circuit Current	Isc: 9,2 A
Reverse Current	Irc: 18 A
Maximum System Voltage	1000 V
Maximum Fuse Rating	15 A
Fire - Type	UL1703: Class A

Electrical Performance at STC
(Standard Test Conditions: 1000 W/m², 25° C, AM 1,5)
Electrical Values (Isc, Voc) Tolerance : +/- 3%
Machine Measurement Tolerance: +/- 3%
Machine Measurement Rating: AAA

For field connections, use 11 AWG wires insulated for a minimum of 90° C, rated for wet conditions, and resistant to ultra violet radiation (where exposed).

System Fire Class Rating: see Installation Instructions for Installation Requirements to achieve the specified System Fire Class Rating with this product.

WARNING:
For installation, activation, and service, follow instructions in the SunStyle Installation Manual. Do not connect or disconnect plug contacts when system is activated.

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GENERAL

Shingle Dimensions	34 1/4" x 34 1/4", 870 x 870 mm
Construction	Glass | EVA | Cells | EVA | Glass
Solar Cell Type	PERC Monocrystalline
Glass Thickness	3.2 mm (front) + 3.2 mm (back)
Glass Properties	Tempered Solar Glass
Weight	4.4 lbs/ft², 21.5 kg/m²
Temperature Range	-40° F to +185°F
Junction Box	TE Connectivity or equivalent
Bypass Diode	One Diode per shingle
Connection Cable	Solar Cable 4mm²
Connection Cable Length	800mm
Connector	TE Connectivity (PV4) or equivalent
Roof Pitch	2:12 or greater

WARRANTY

Product Guarantee	30 years
Performance Guarantee	10 years at 90% of nominal output 25 years at 80% of nominal ouptut

NOTES

1. Artificially concentrated sunlight shall not be directed on the module or panel.
2. BIPV roof coverings are not expected to withstand the wind forces of tornadoes, cyclones, or hurricanes.
3. Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. The requirements of the National Electrical Code (NEC) in Article 690 shall be followed to address these increased outputs. In installations not under the requirements of the NEC, 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 ampacities, overcurrent device ratings, and size of controls connected to the PV output.
4. Refer to the installation steps in this manual for the minimum mechanical means to be used for securement of the BIPV roof covering to the roof.
5. The PV system does not have a frame or accessible metal components to ground. The active and inactive shingles are non-metallic. There is no risk of the shingles being energized in case of a PV module fault.
6. If the BIPV roof covering is to be installed over solid sheathing, it will be installed over a natural asphalt-saturated felt meeting or exceeding the requirments of ASTM D226, Type II, or a synthetic underlayment compliant with ICC-AC188.
7. Openings into any airspace under the BIPV roof system are protected against intrusion of debris or animals. The means of protection does not allow a cylindrical test fixture Type 11 according to Figure 7 of IEC 61032 applied with a force of 2.24 lbs (10 N) to pass through any opening.

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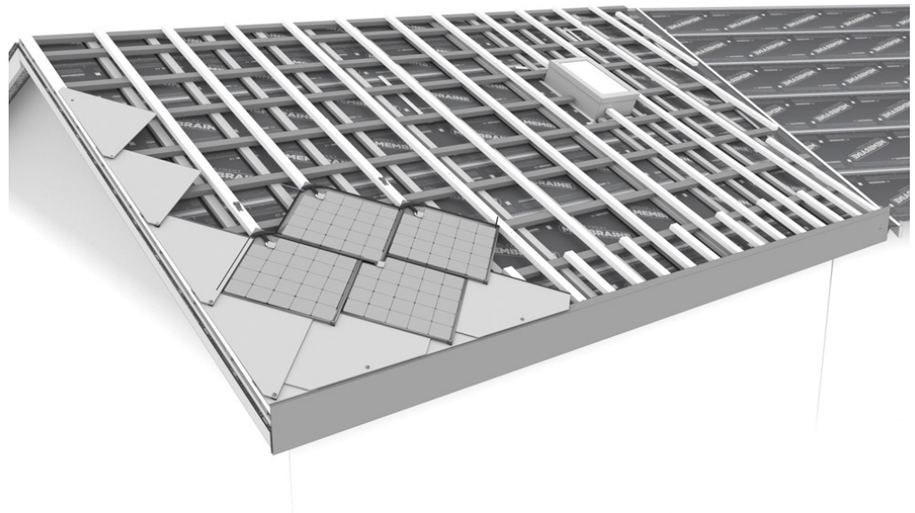
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Project Materials

This Installation Manual describes the installation procedure for SunStyle's Building Integrated Photovoltaic (BIPV) roof system. This includes components provided by SunStyle, such as active and inactive shingles with hardware, as well as components specified by SunStyle and provided by our installation partners, like roofing underlayment and solar electronics.

SunStyle Provides

Active Shingles	Full-size shingles with integrated solar cells
Inactive Shingles	Full-size shingles without solar cells for areas with poor sun exposure
Edge Pieces	Triangular shingles for 90° edges and corners
Customizable Shingles	Shingles designed for cutting on-site to accommodate protrusions, skylights, and off-angle edges
Hardware & Gasket System	Complete system of attachment and weatherization gaskets



Installer Provides

Roofing
- Roof Underlayment
- Mounting Structure
- Ridge Vents
- Eaves and Edges
- Flashing

Electronics
- Wiring
- Module-Level Power Electronics (MLPEs) & Inverters
- Storage (if desired)
- Monitoring

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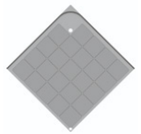
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Solar, Black, Textured (U.S. Version)
Part #100000



Inactive Bottom Small
Part #420000



Inactive Top Small
Part #420001



Inactive Bottom
Part #420002



Inactive Top
Part #420003



Inactive Left
Part #420004



Inactive Right
Part #420005



Inactive Corner Bottom Big Left
Part #420006



Inactive Corner Bottom Big Right
Part #420007



Inactive Corner Top Big Left
Part #420008



Inactive Corner Top Big Right
Part #420009



Inactive Corner Bottom Small Left
Part #420010



Inactive Corner Bottom Small Right
Part #420011



Inactive Corner Top Small Left
Part #420012



Inactive Corner Top Small Right
Part #420013



Inactive Full-size
Part #200000



Customizable
Part #300000

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Hardware & Gasketing



Mounting Bracket
Part #600018



Mounting Bracket Screw
Part #600009



Support Bumper
Part #600027



Support Bumper Screw
Part #600008



Double Panel Mount
Part #600024



Single Panel Mount
Part #600026



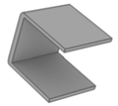
Mounting Washer
Part #600010



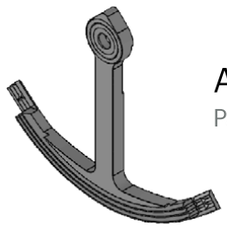
Mounting Bolt - Short
Part #600005



Mounting Bolt
Part #600006



Solar Clip
Part #600022



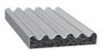
Anchor Seal
Part #600023



Edge Seal
Part #600011



Ridge Seal - Lower Edge
Part #600012



Ridge Seal - Upper Edge
Part #600013



Eave Edge Seal
Part #600031



Rake Edge Seal
Part #600032

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Project Delivery Checklist

While SunStyle provides the roof shingles and mounting system, additional components are required for the complete installation of the roof and solar electronics. To begin your project, you will need:

Project Planset
- SunStyle Shingle Plan & Bill of Materials
- Engineering & Wiring
- Metal Era Product Plan

SunStyle System
- SunStyle Shingles, Hardware, & Gasketing

Underlayment & Penetrations
- Underlayment (Requires Class A Fire ASTM E108, and ASTM D4869 Type I, II, III, or IV & ASTM D6757)
- Underlayment Tape
- 4” Butyl Joist Tape
- Attachment Mechanism
- Penetration Gasketing

Wood Support Assembly
- Fire-Retardant Treated-Wood (ASTM E84) 2x4s for Substructure
- Fire-Retardant Treated-Wood (ASTM E84) 1x4s for Supports
- Screws
  - 1st Layer 2x4 to Trusses: 3” #9
  - 2x4 to 2x4: 2 1/2” #9
  - 1x4 to 2x4: 1 1/2” #9
- Wood Shims for Planing 3rd Layer of Battens

Metal Era Flashing
- Drip Edge Flashing
- Rake Edges
- Valleys
- Eaves & Gutters
- Ridges

Electronics
- SolaDeck or IronRidge QBox
- Module-Level Power Electronics (MLPEs)
- Inverters
- Wiring
- Wiring Clips
- Battery Storage

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SunStyle Component Installation

- Metric & Imperial Tape Measure (provided by SunStyle)
- 3rd Layer Batten Spacer (provided by SunStyle)
- Mounting Plate Location Guides (provided by SunStyle)
- M6 Hex Torque Driver (provided by SunStyle)
- Speed Cordless Impact/Drill Combo
- Skill Saw for Batten Cuts
- Scissors or Utility Knife
- Chalk Line
- DEWALT FlexTorq Magnetic Bit Holder



Location Guide - Short
Part #600016



Location Guide - Long
Part #600017



Location Guide - Medium
Part #600015



Batten Spacer (24 1/16”)
Part #600030

Customizable Shingle Fabrication

- Skill Saw
- Jigsaw
- Metal File
- Safety Glasses
- Safety Gloves
- Big Hole Drill Bit (24mm)
- Small Hole Drill Bit (16mm)

Flashing Holes

- Drillbits (same as Customizable)
- Tin-snips

Appropriate Boots

- Slip-resistant work boots, Shoes for Crews

Safety Equipment

- As required by Occupational Safety and Health Administration

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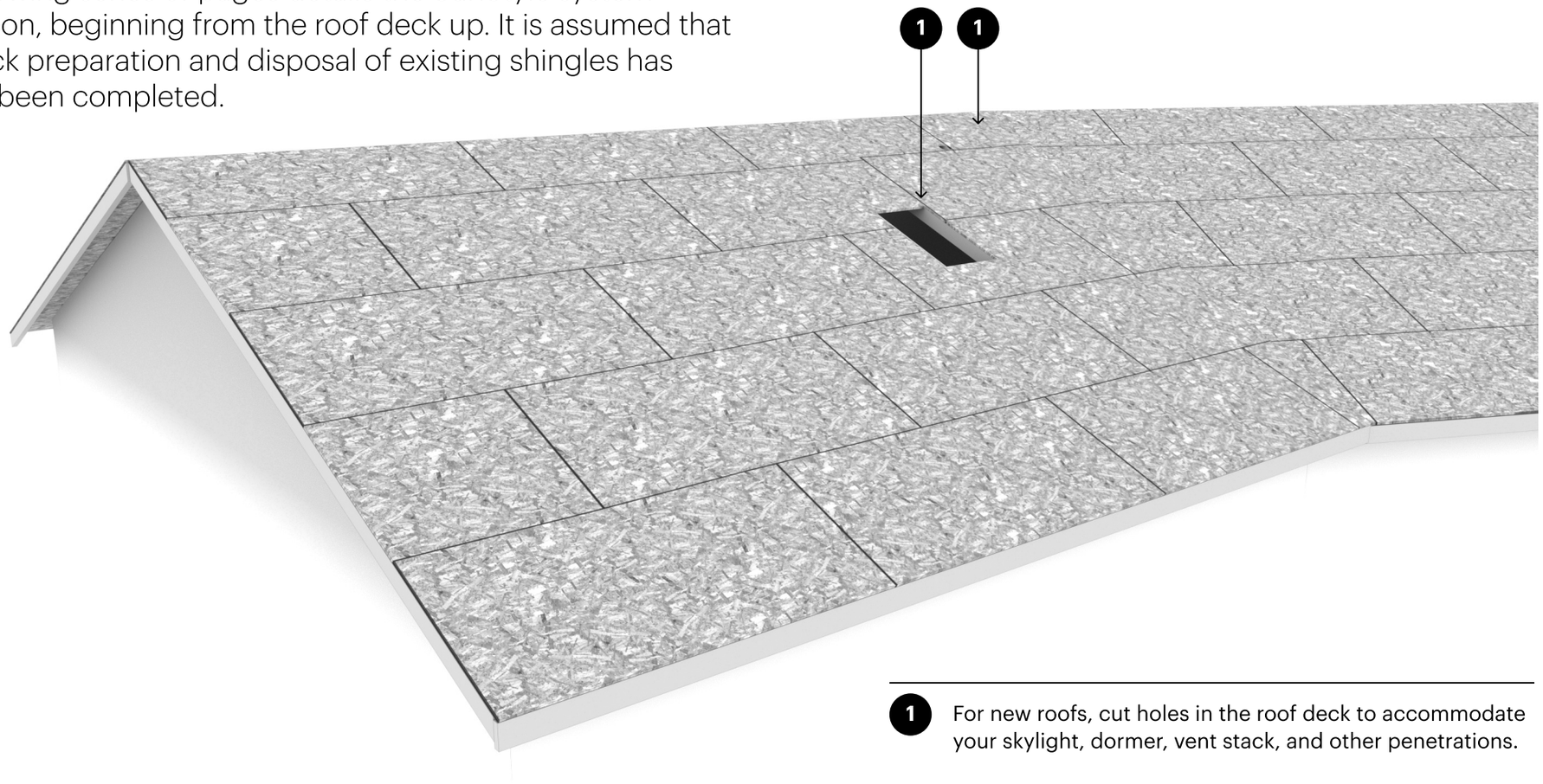
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Roof Deck Preparation

The following series of pages details the SunStyle system installation, beginning from the roof deck up. It is assumed that roof deck preparation and disposal of existing shingles has already been completed.



1 For new roofs, cut holes in the roof deck to accommodate your skylight, dormer, vent stack, and other penetrations.

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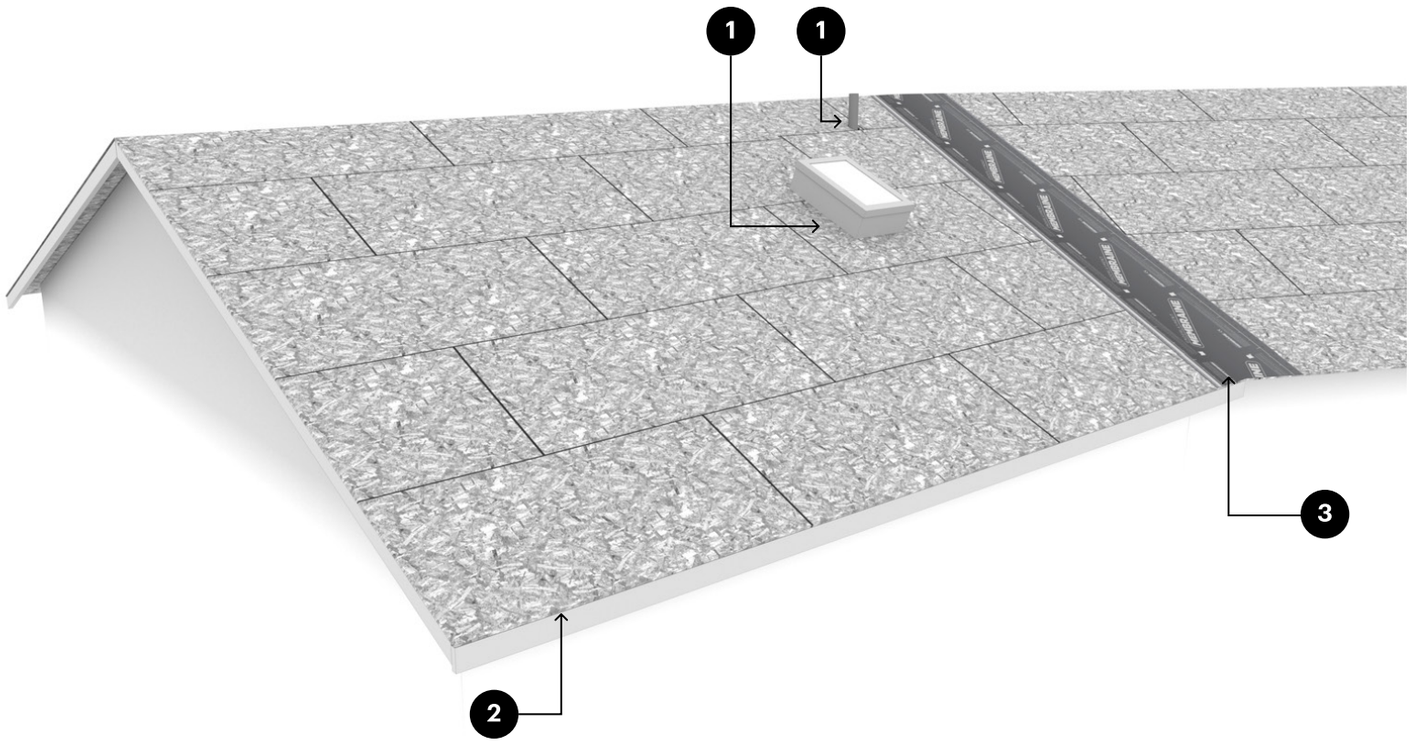
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Penetrations, Eaves & Valleys



1. Place your skylights, dormers, vent stack, and other penetrations.
2. Install a drip edge on the eave.
3. Install valley flashing.

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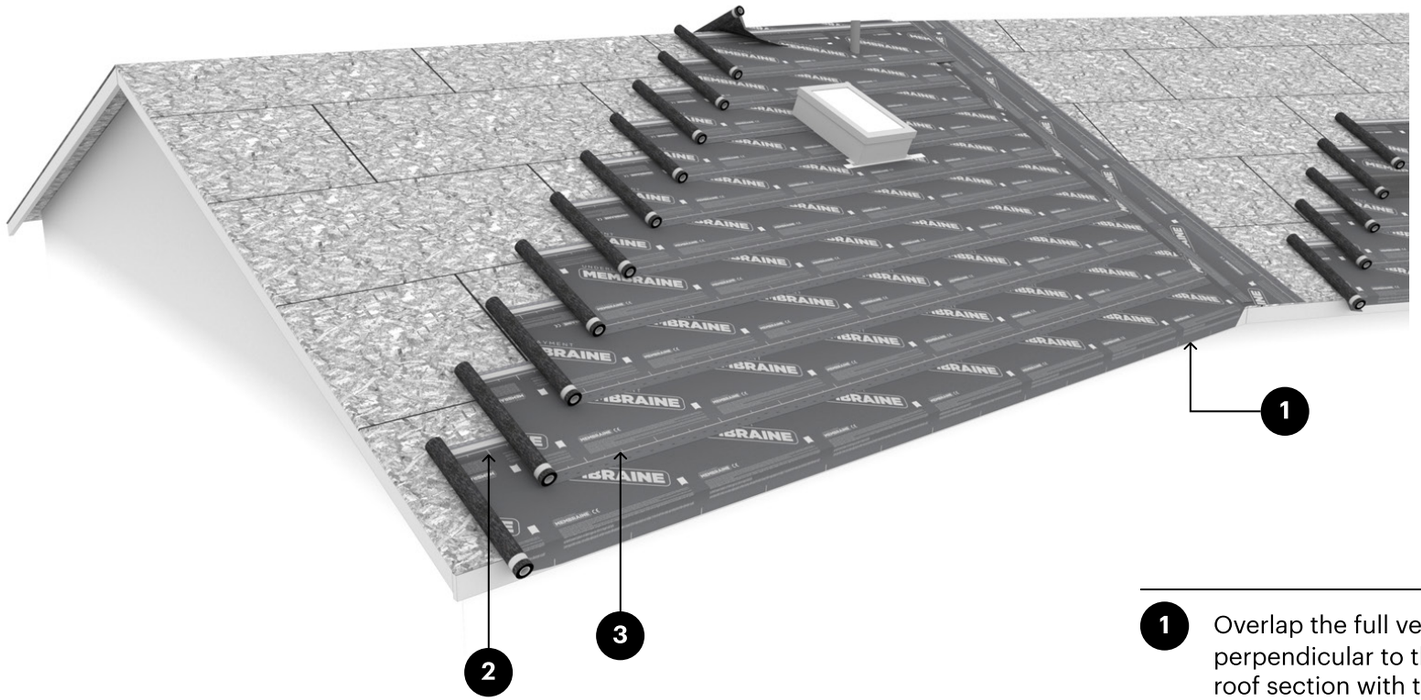
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Underlayment Application



1. Overlap the full vertical portion of the eave and unroll perpendicular to the pitch along the entire length of the roof section with the writing facing outward.

2. Attach the upper edge of the membrane to the sheathing in areas that will be under the overlap.

3. Unroll the next row of membrane and align by using the printed guides. Overlap the bottom according to building code and underlayment manufacter's instructions.

FOLLOW UNDERLAYMENT MANUFACTURER'S INSTRUCTIONS AND INTERNATIONAL RESIDENTIAL CODE, SECTION R905.1.1.

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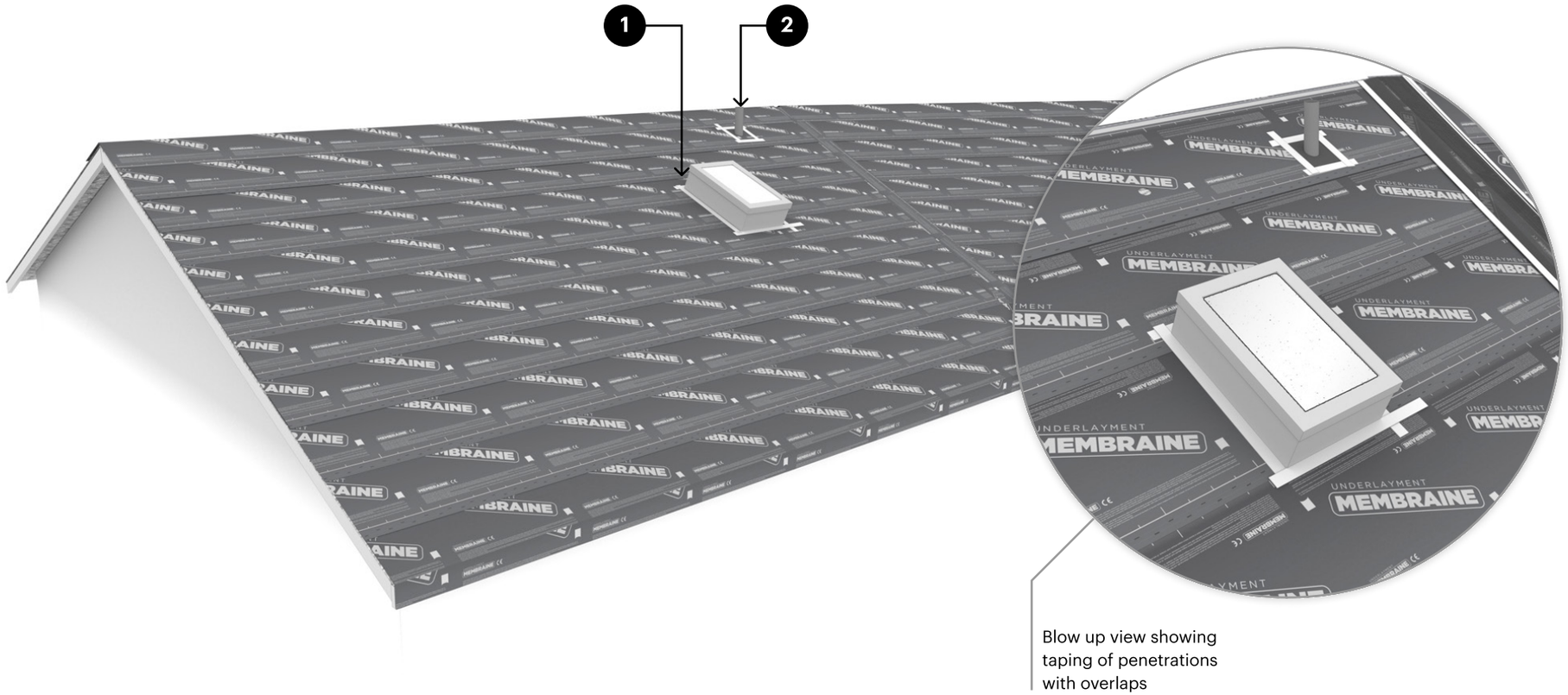
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Required Taping



Blow up view showing taping of penetrations with overlaps

1. Tape penetrations with overlaps as shown.
2. Use standard pipe gasketing and tape the vent stack.

INSTALL FLASHING AND TAPE PER UNDERLAYMENT MANUFACTURER'S INSTRUCTIONS.

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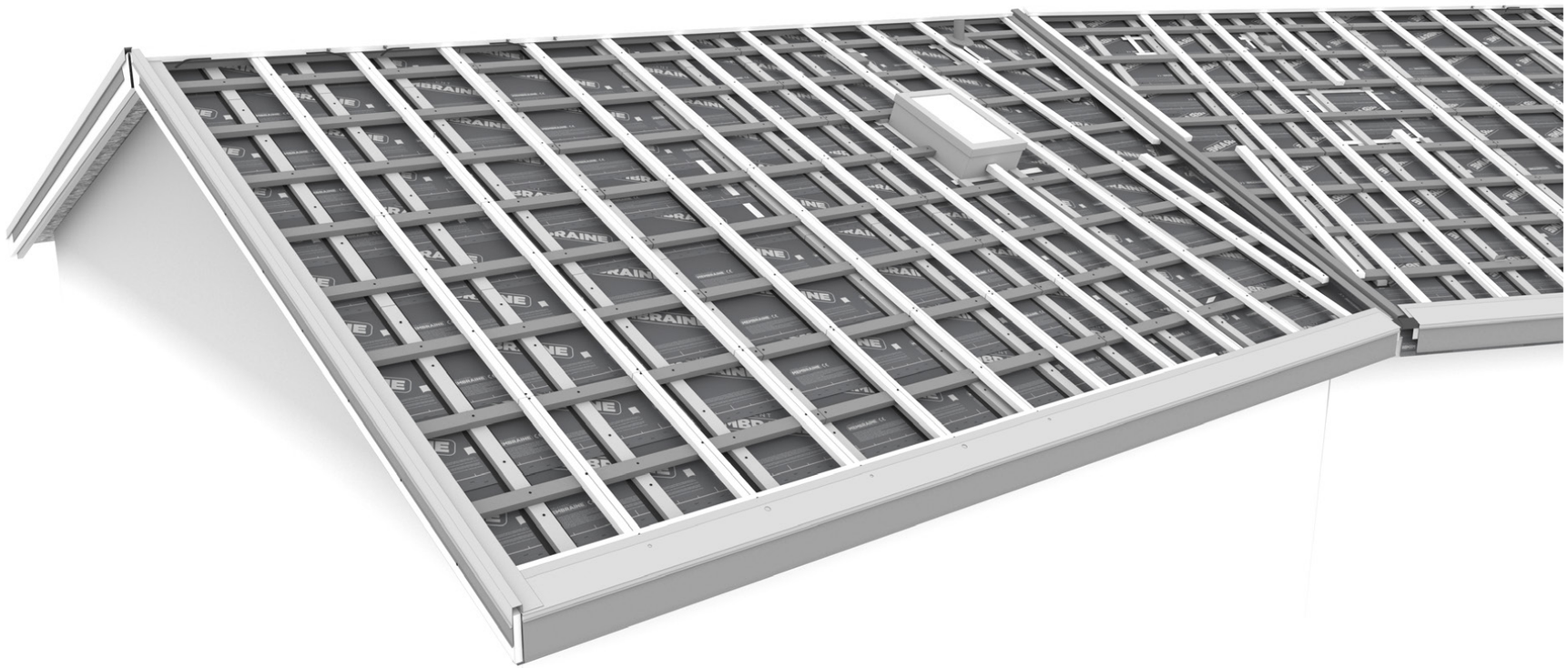
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Substructure Assembly

The full Substructure Assembly will include all battens, mounting brackets, supports, and flashing at rakes, eaves, and valleys.



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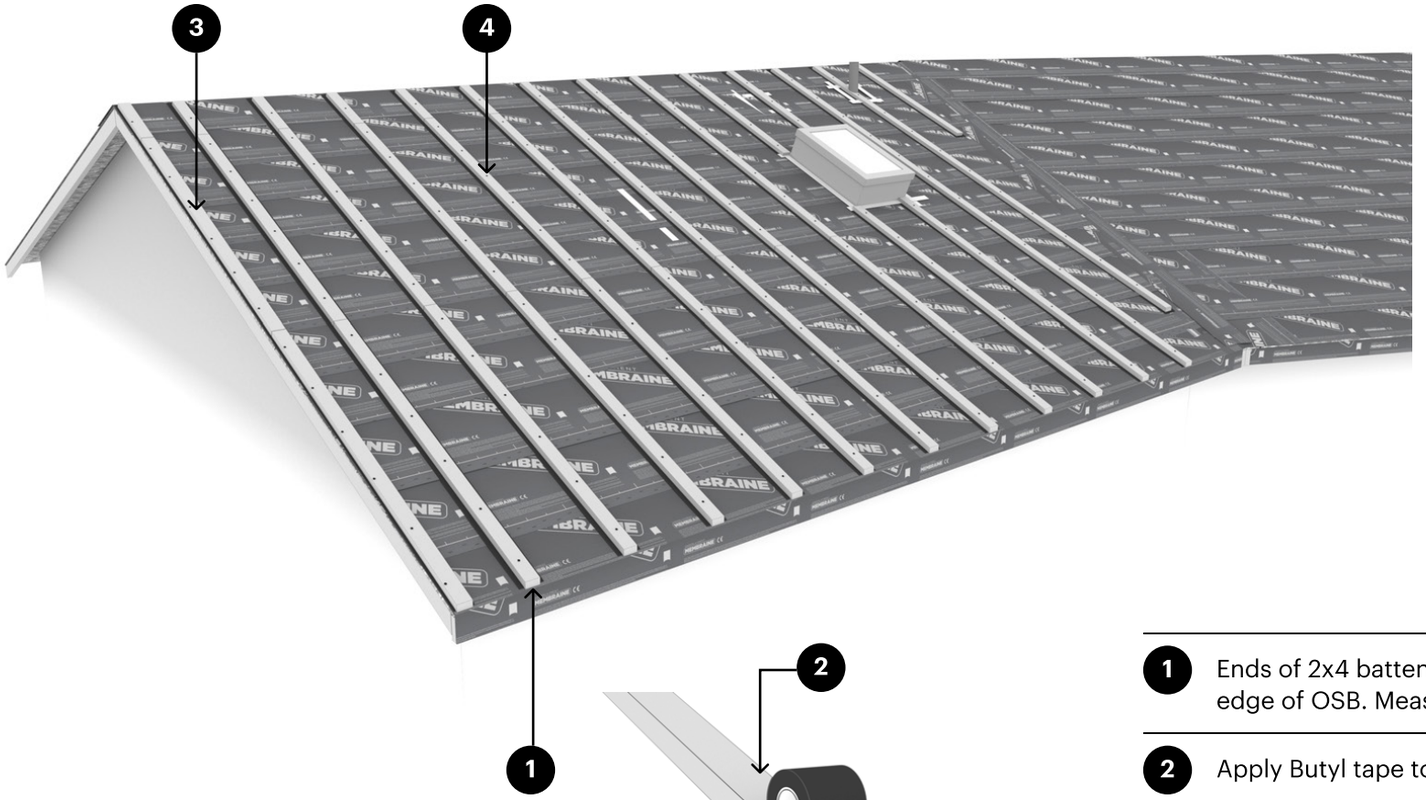
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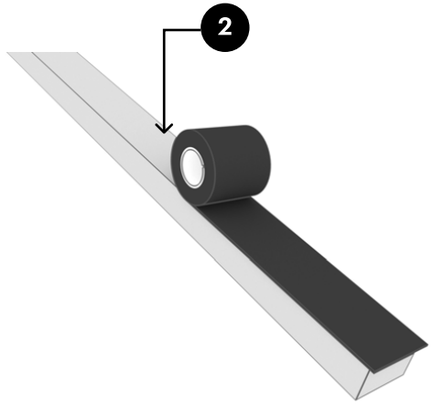
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1st Layer of Battens





1. Ends of 2x4 battens should be vertically cut to align with edge of OSB. Measure and cut the 2x4 battens to length.
2. Apply Butyl tape to back side of battens before installing.
3. Align the first batten flush with the edge of the roof deck, attaching through to the edge board with 3" #9 screws every 16" vertically.
4. Align the remaining battens on center with the trusses below (typically 24" O.C.), attaching through to the trusses with 3" #9 screws every 16" vertically.

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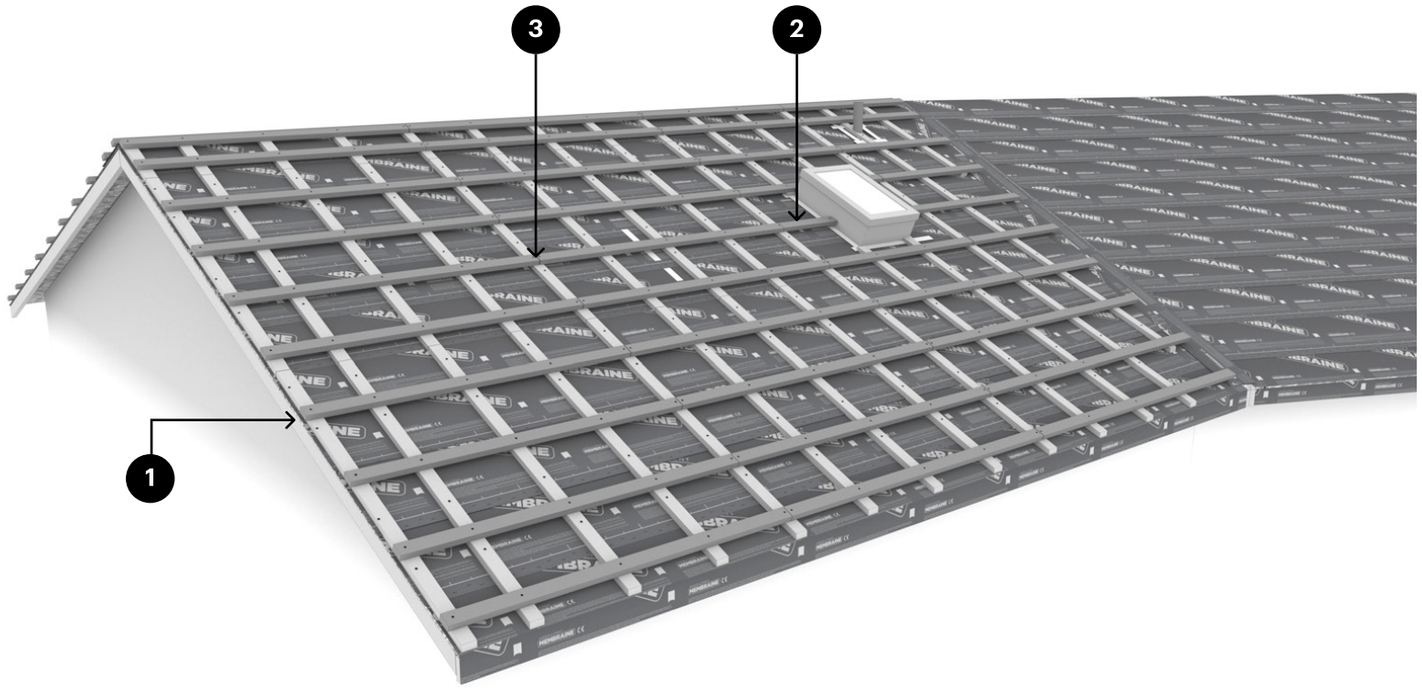
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2nd Layer of Battens



1. Ensure ends of battens are aligned with roof edge and cut the 2nd layer of 2x4 battens to length.
2. Cut special lengths where penetrations occur.
3. Install 2nd layer of battens to 1st layer with 2 1/2″ #9 screws at 24″ O.C.

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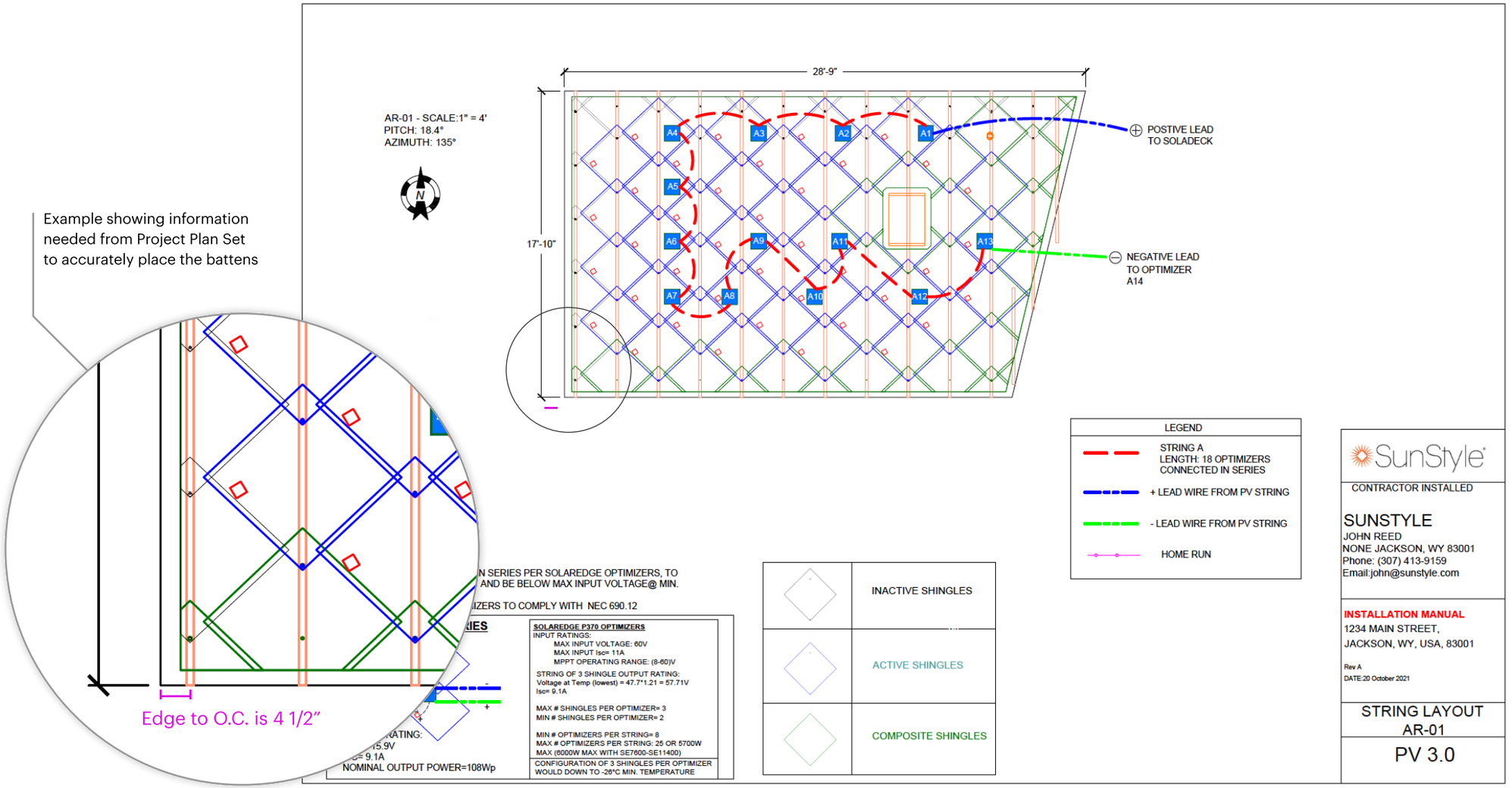
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Refer to Plan Set Diagrams

Refer to your Project Plan Set for placement of 3rd Layer of Battens.



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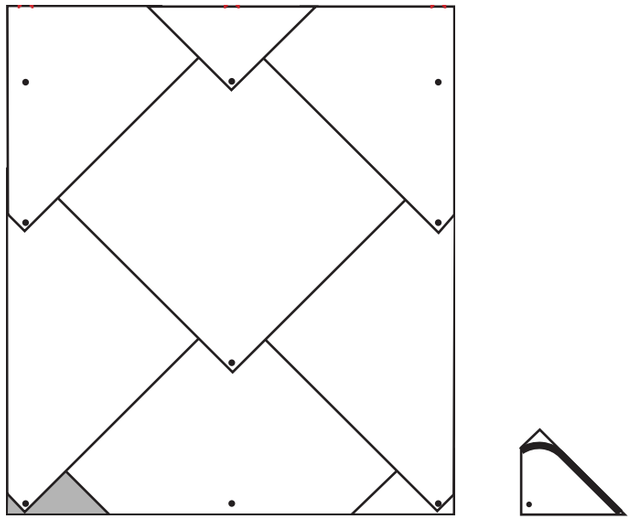
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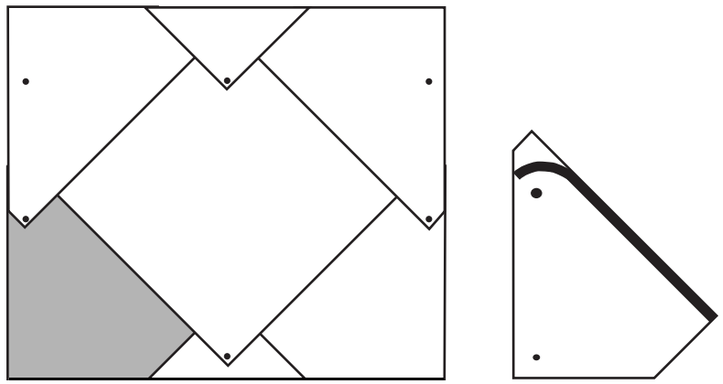
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Shingle Layout Scenarios

Depending on the layout of your roof, the bottom left corner may start with a small or big inactive shingle. Refer to your Project Plan Set for your specific corner shingle condition.



Inactive Corner Bottom Small Left
Part #420010



Inactive Corner Bottom Big Left
Part #420006

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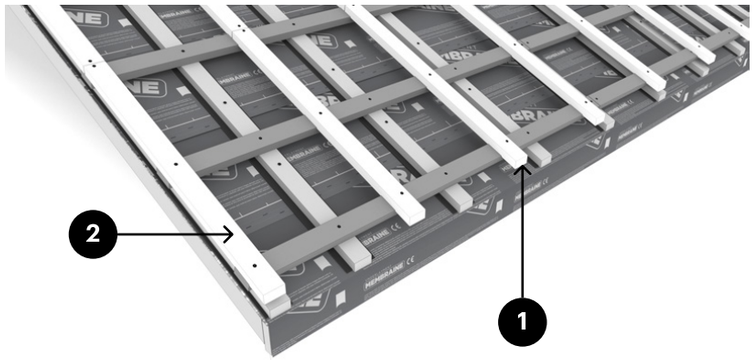
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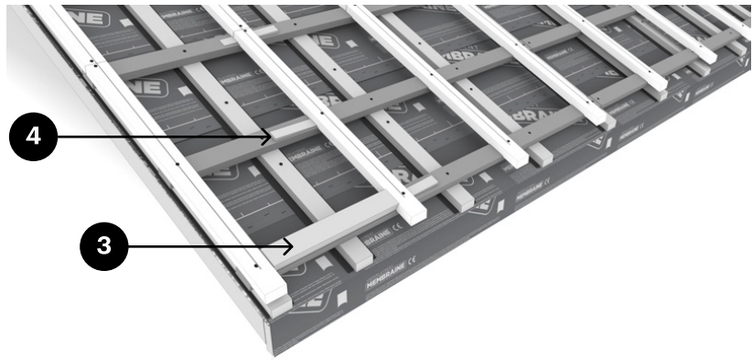
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3rd Layer of Battens



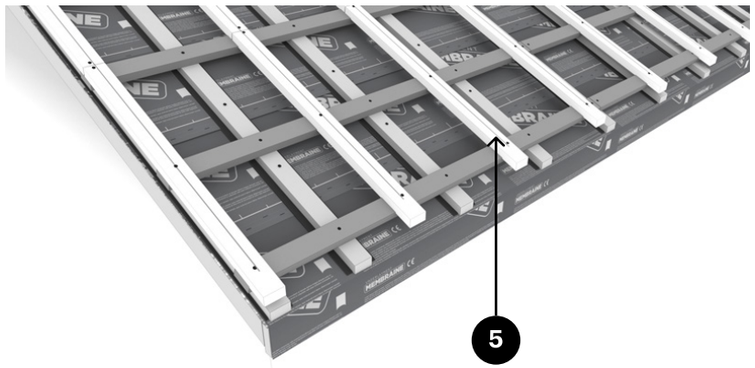
1 Cut 3rd layer of 2x4 battens beginning at the eave. Ensure battens are cut on plane and aligned with the fascia board.

2 Install first board, following your Project Plan Set to determine the exact location.

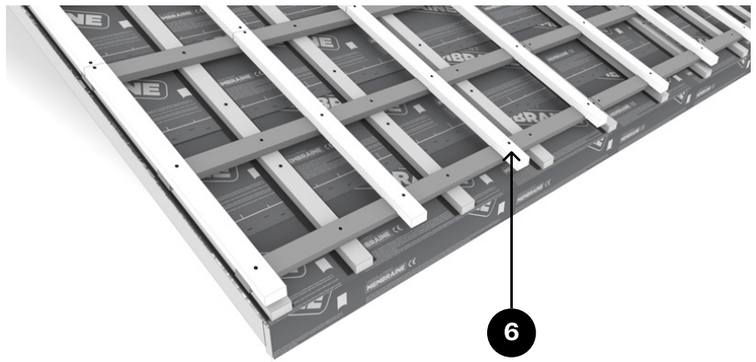


3 Use provided 2x4 wood spacer and provided metric tape measure to ensure 3rd layer is **700MM O.C.**

4 Determine how planar the roof is and use shims as needed to ensure the 3rd layer of battens will be on plane. 0.5% deviation from the plane is allowed, or 1/2" per 10'.



5 Make use of a chalk line to mark locations for mounting plates that will be spaced horizontally at 700mm and in a straight line vertically.



6 Install with 2 1/2" screws at each 2nd layer batten.

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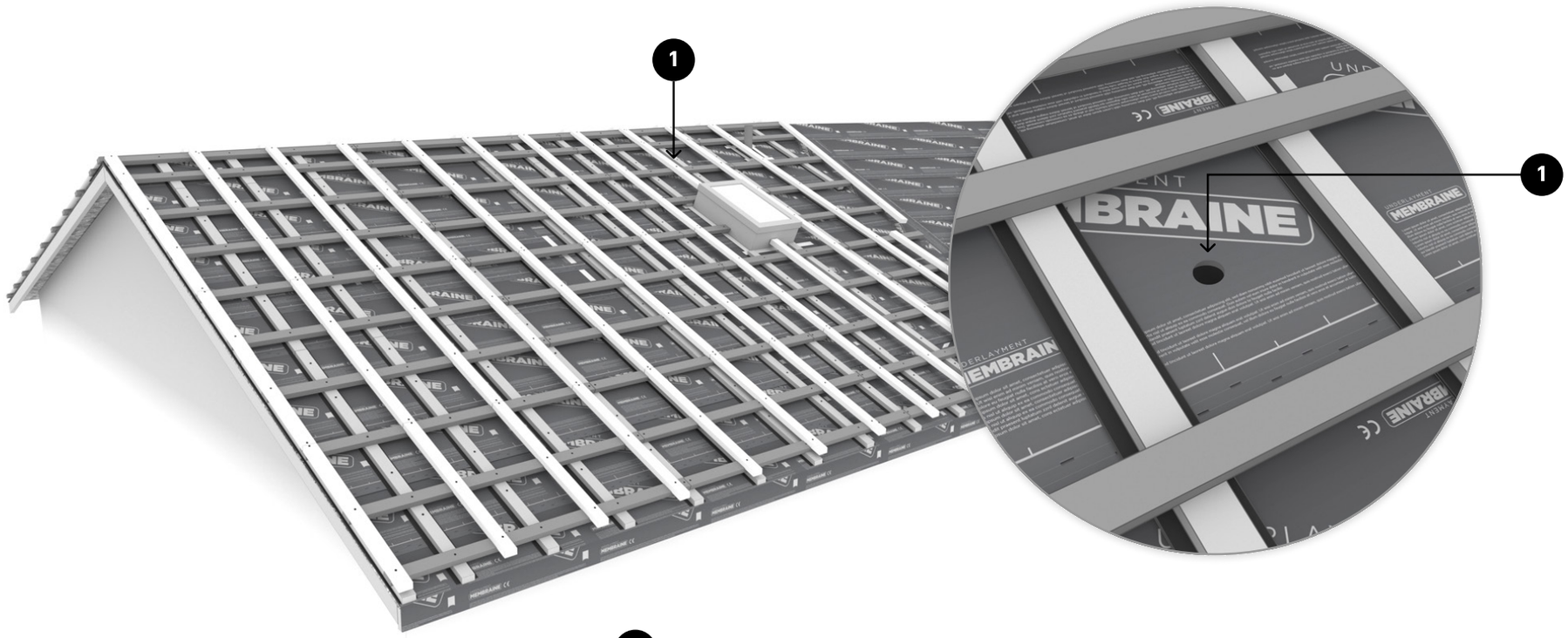
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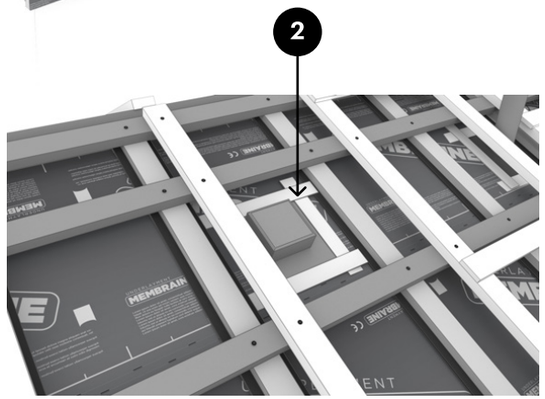
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Wiring Penetration





1 Work with your electrician and refer to your Project Plan Set wiring diagram for +/- 1” diameter home run location and placement between battens for your flashed PV junction box. SolaDeck or IronRidge QBox recommended; install per manufacturer instructions.

2 Tape junction box with overlaps as shown.

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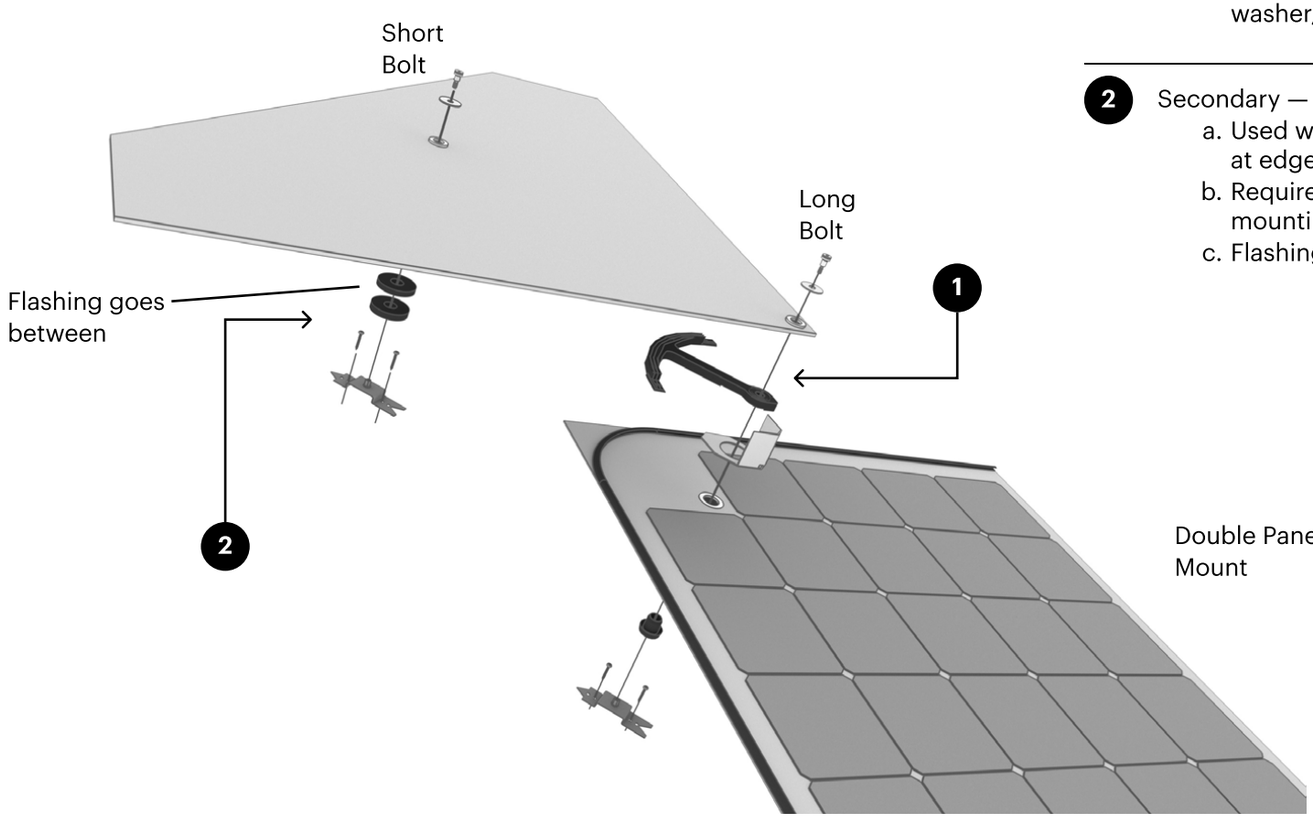
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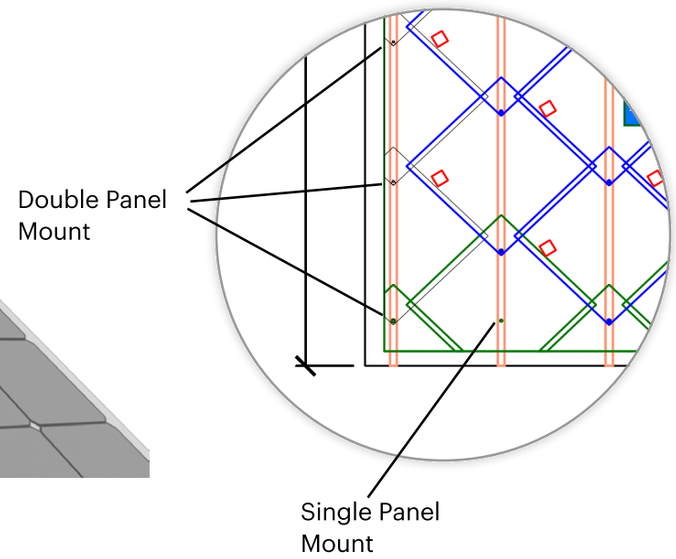
Single vs. Double Panel Mount

There are two mounting scenarios which you will need to review prior to the next installation steps. Refer to your Project Plan Set for your specific single panel and double panel mount locations.



1 Primary — Double Panel Mount
   a. Used where 2 panels overlap.
   b. Requires panel mount, anchor seal, snow stopper, washer, and long mounting bolt.

2 Secondary — Single Panel Mount
   a. Used where only 1 panel is to be attached, typically at edges.
   b. Requires 2 panel mount discs, washer, and short mounting bolt.
   c. Flashing will go between the 2 panel mount discs.



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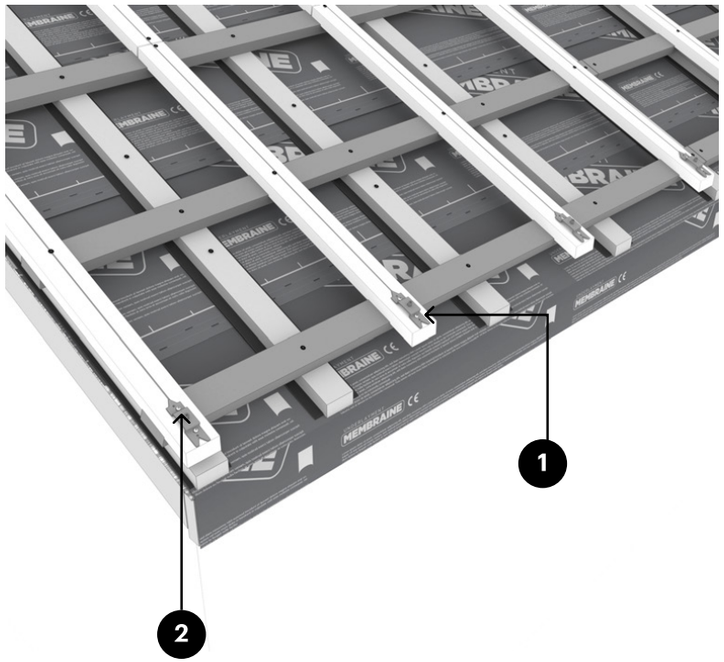
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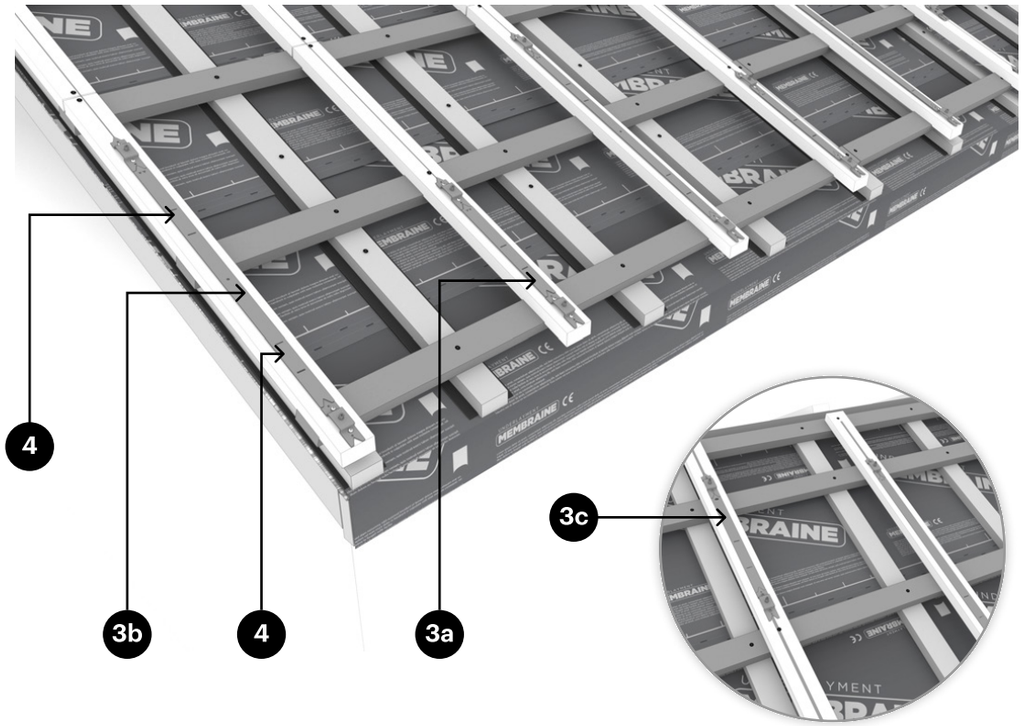
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Mounting Brackets





1 Follow your Project Plan Set for distance from bottom edge of brackets to end of battens. Mark with chalk line.

2 Install first row of mounting brackets using 1 1/4" cap screws.

3 Refer to your Project Plan Set for locations of single panel and double panel mounts. Install all mounting brackets.
a. Use the short location guide for the double mount locations.
b. Use the long location guide for the single mount locations.
c. Use the medium location guide only for large center triangles at ridge.

4 Refer to Project Plan Set for locations of 1x4 supports. 1x4s are in all areas around edges supporting composite shingles. See next page for typical placement. Draw pencil marks in slits of location guides to determine where 1x4s will be placed.

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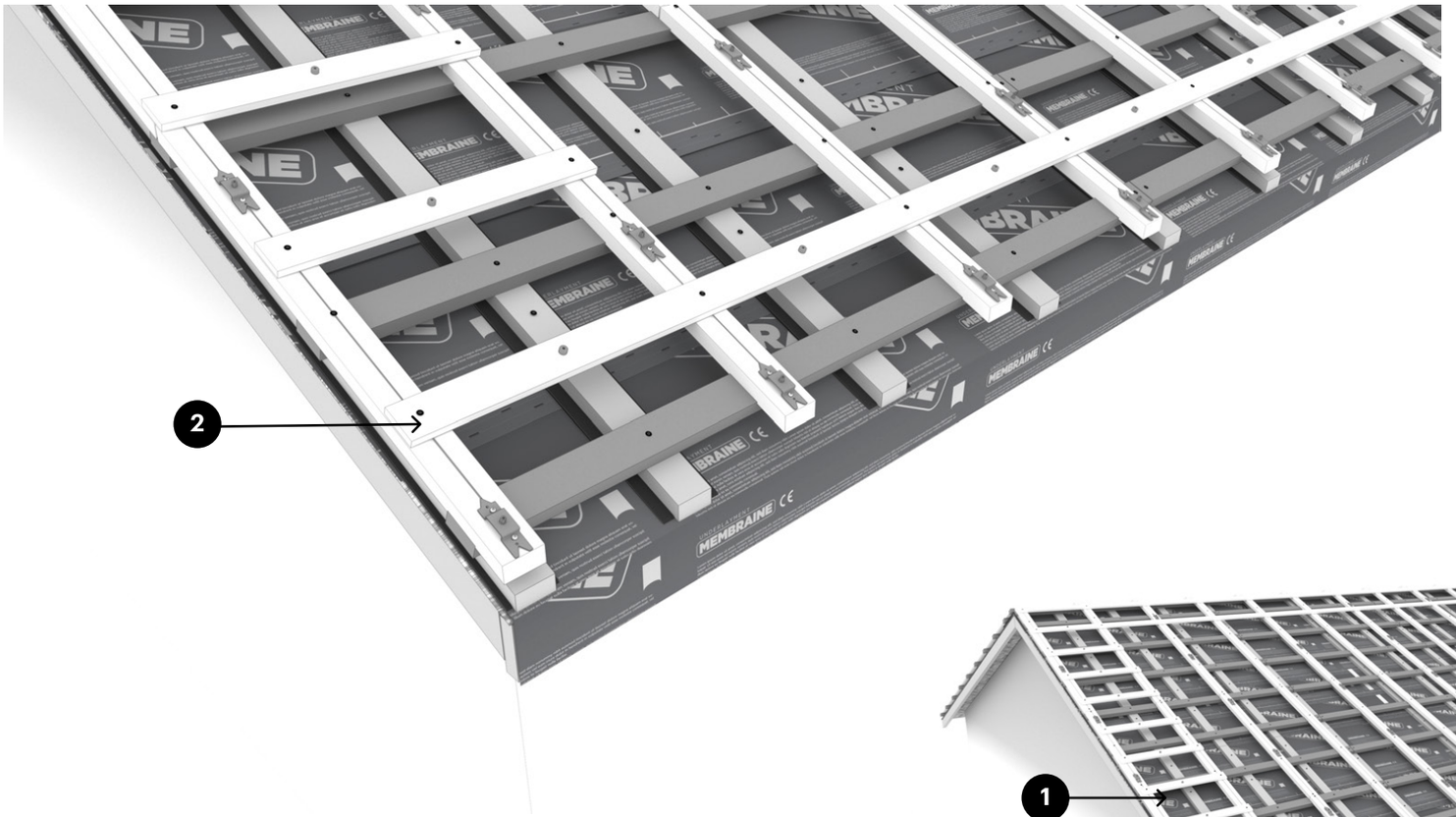
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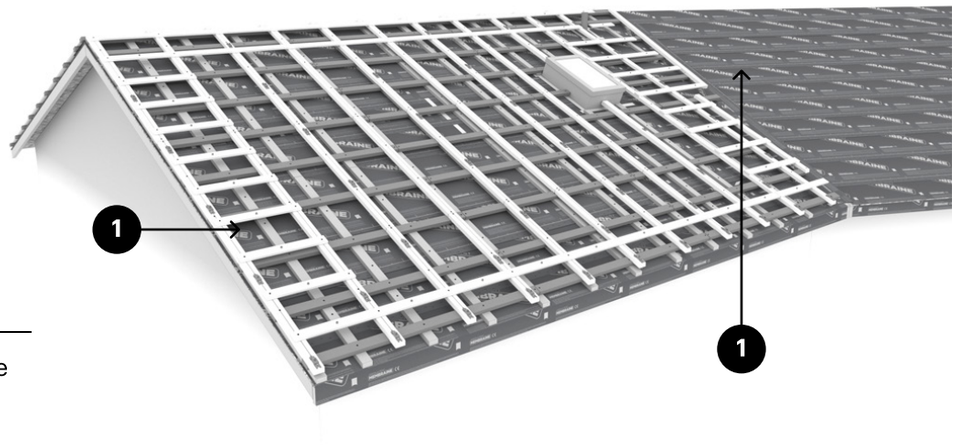
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1x4 Supports





1. Refer to your Project Plan Set for locations of composite shingles. These areas will require 1x4 supports with support bumpers.

2. Use pencil marks to align 1x4 supports. Drill pilot holes in 1x4. Use 1 1/2” screws to attach 1x4 supports to 3rd layer of battens.

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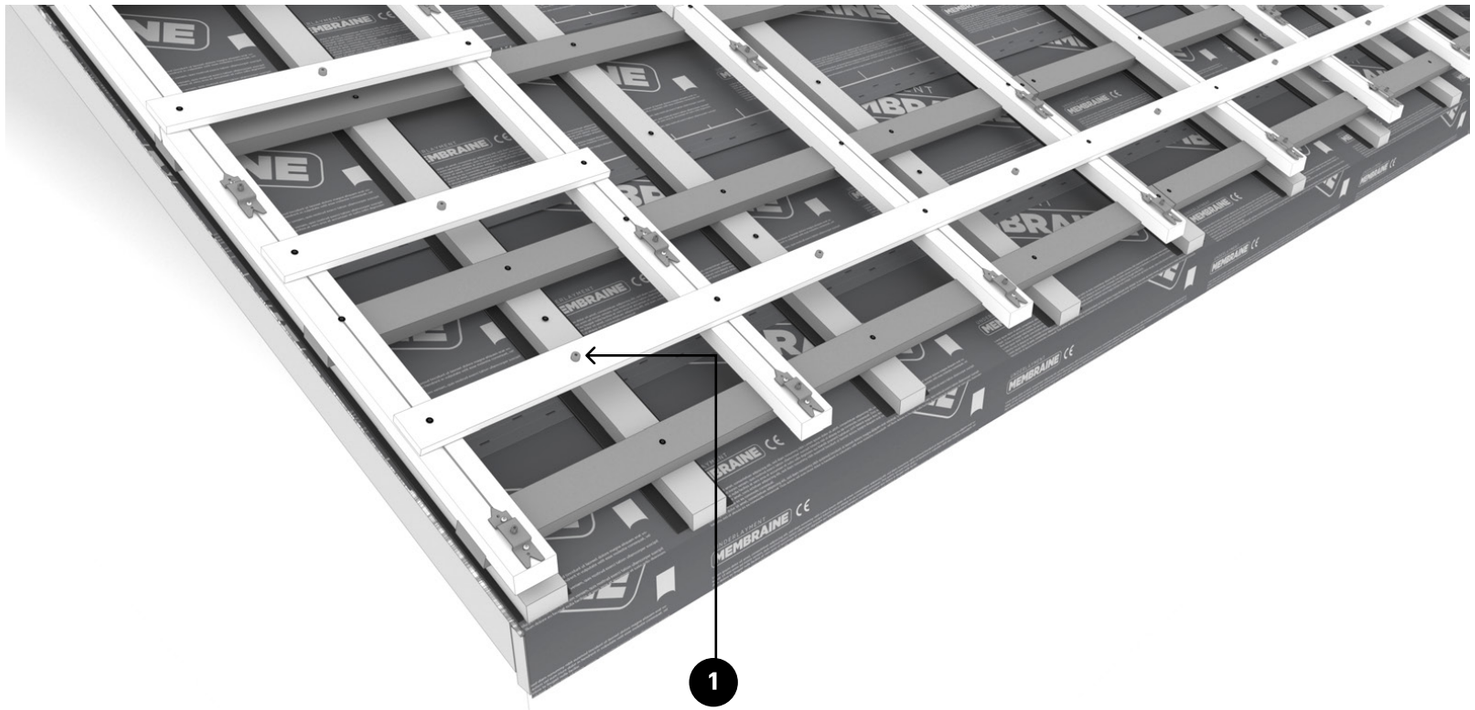
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Support Bumpers



1. Center each support bumper between the battens and attach using 3/4″ support bumper screw.

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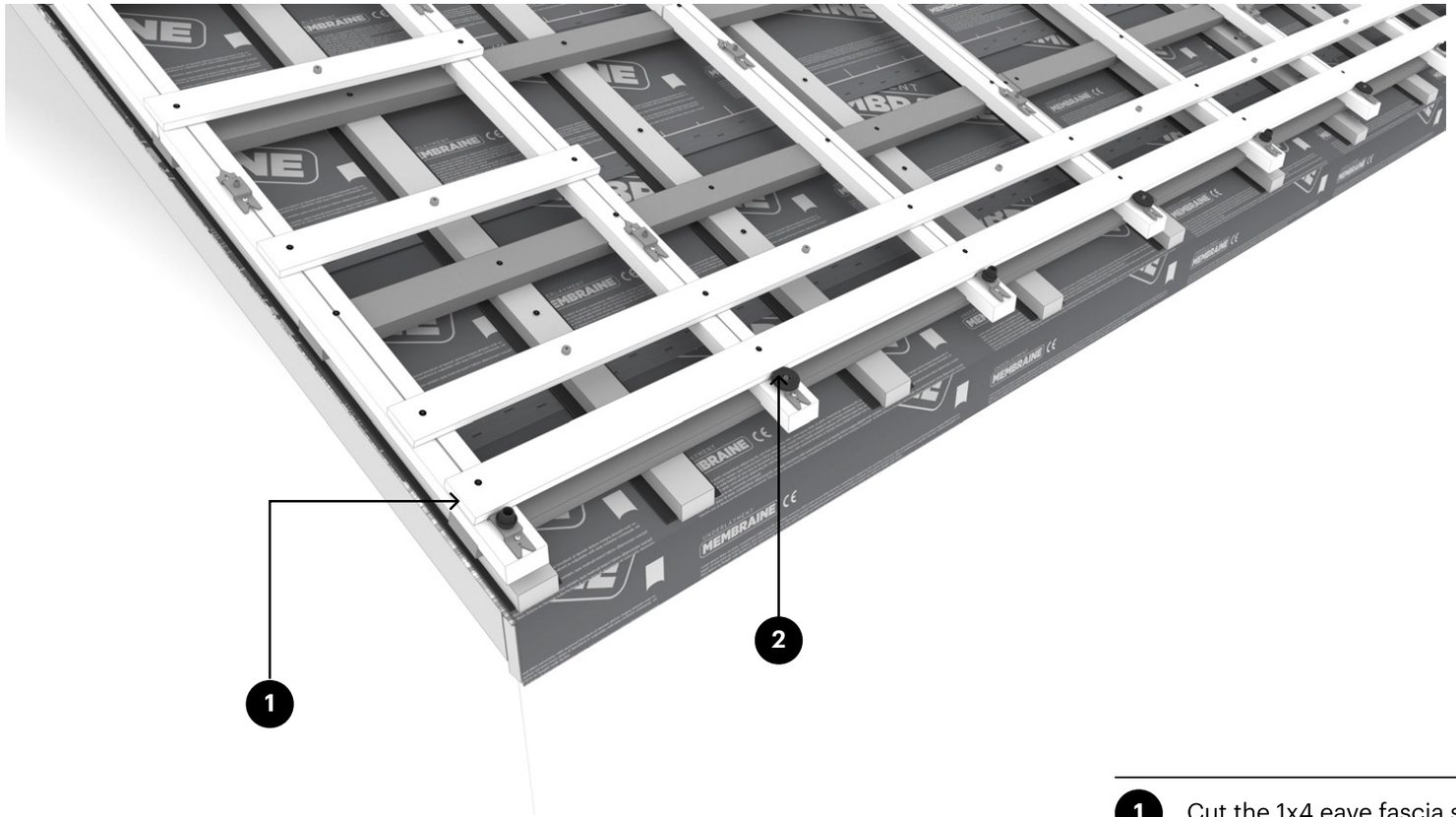
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1. Cut the 1x4 eave fascia supports to length, aligning edge of 1x4 to edge of 3rd layer of battens.

2. 1x4 should be flush up against the vertical surface of the mounting plate. Fur out as required so 1x4s lay flush to the battens.

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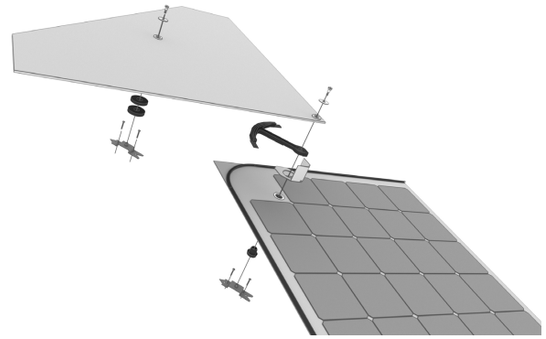
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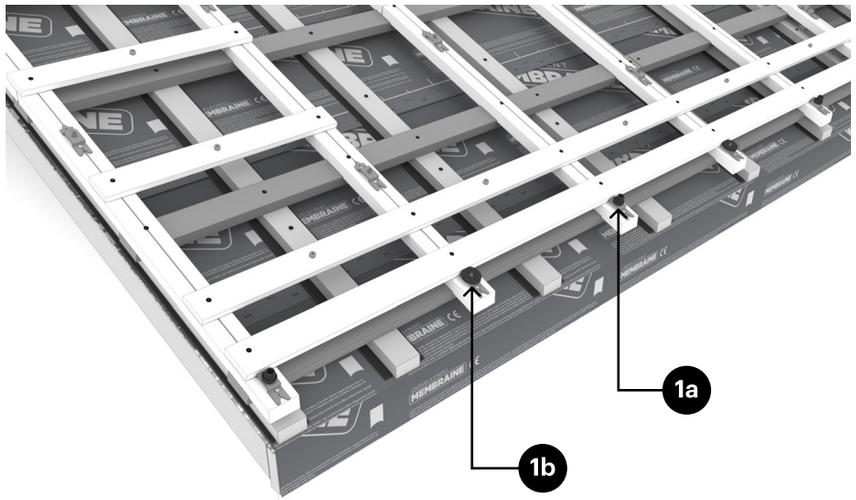
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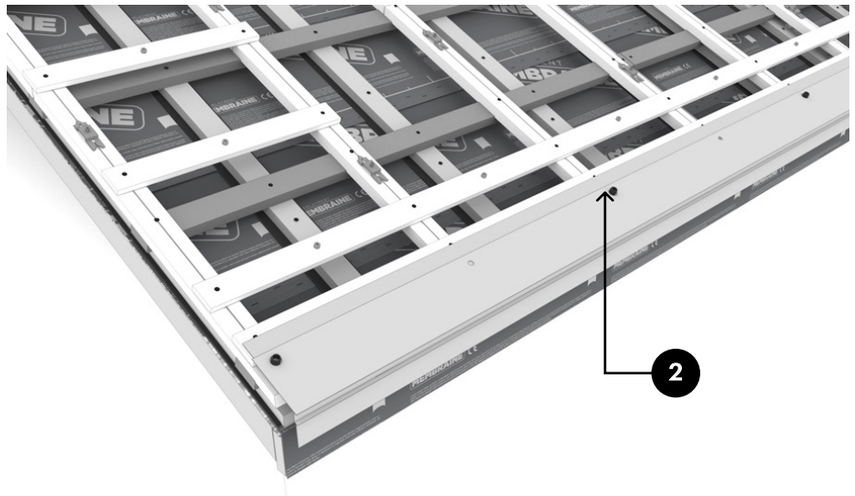
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Eave Flashing







1 Before installing the flashing, overlay each mounting bracket with the correct hardware.

a. At double panel mounts, overlay the double panel mount.
b. At single panel mounts, overlay the 1st single panel mount disc.

2 Drill holes in Metal-Era eave flashing using provided drill bits, 24mm for single panel mount holes and 16mm for double panel mount holes. Overlay provided eave flashing over mounting brackets and mounting hardware.

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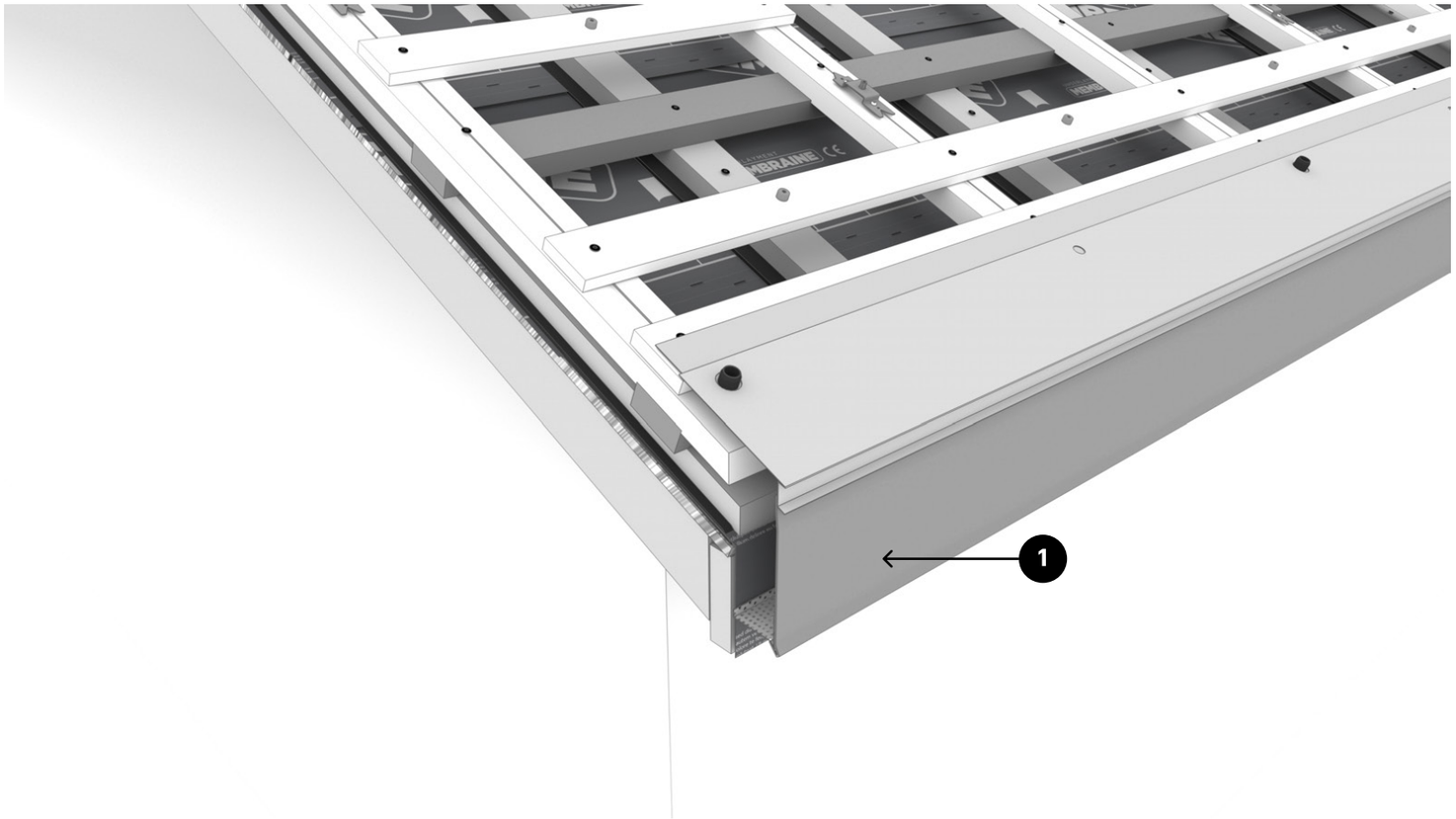
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Eave Venting



1. Install eave assembly following Metal-Era installation instructions.

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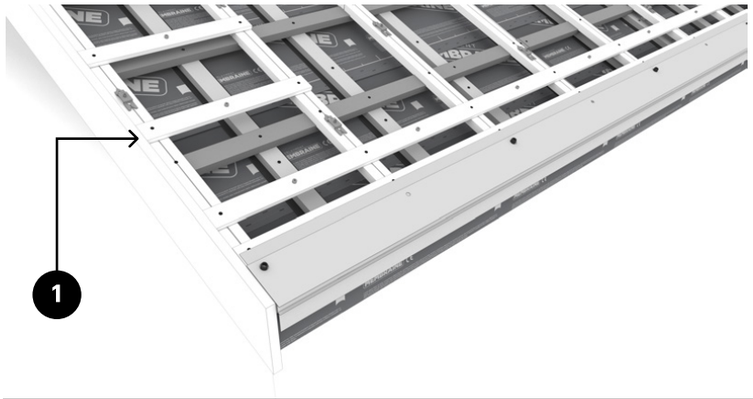
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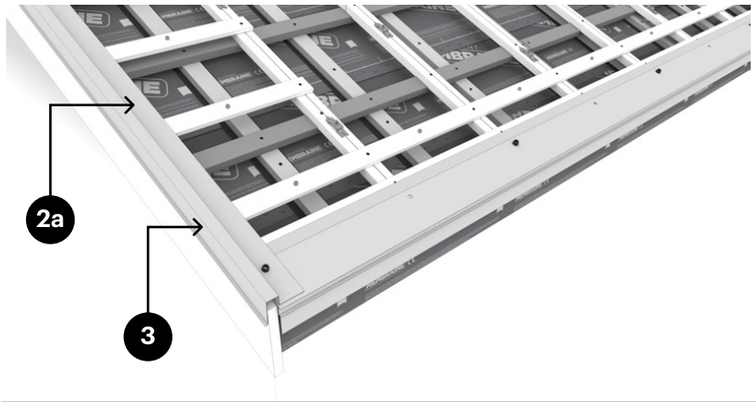
Rake Edge



1 Attach rake fascia to existing roof using appropriate wood screws.

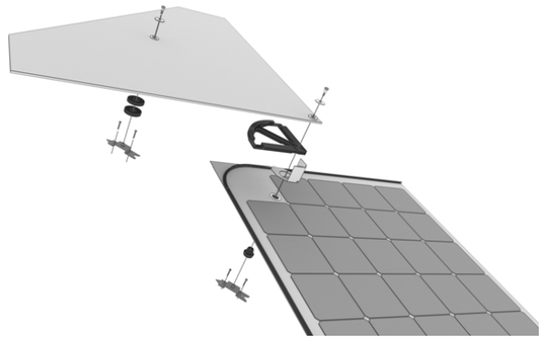


4 Apply expanding seal tape to inside edge of rake. Crush to 80% for watertight performance.



2 Before installing the flashing, overlay each mounting bracket with the correct hardware.
a. At 2 panel mounts, overlay the double panel mount.
b. At 1 panel mounts, overlay the 1st single panel mount disc (not shown).

3 Install pre-made Metal-Era rake edge flashing. Drill holes to align with mounting brackets below.



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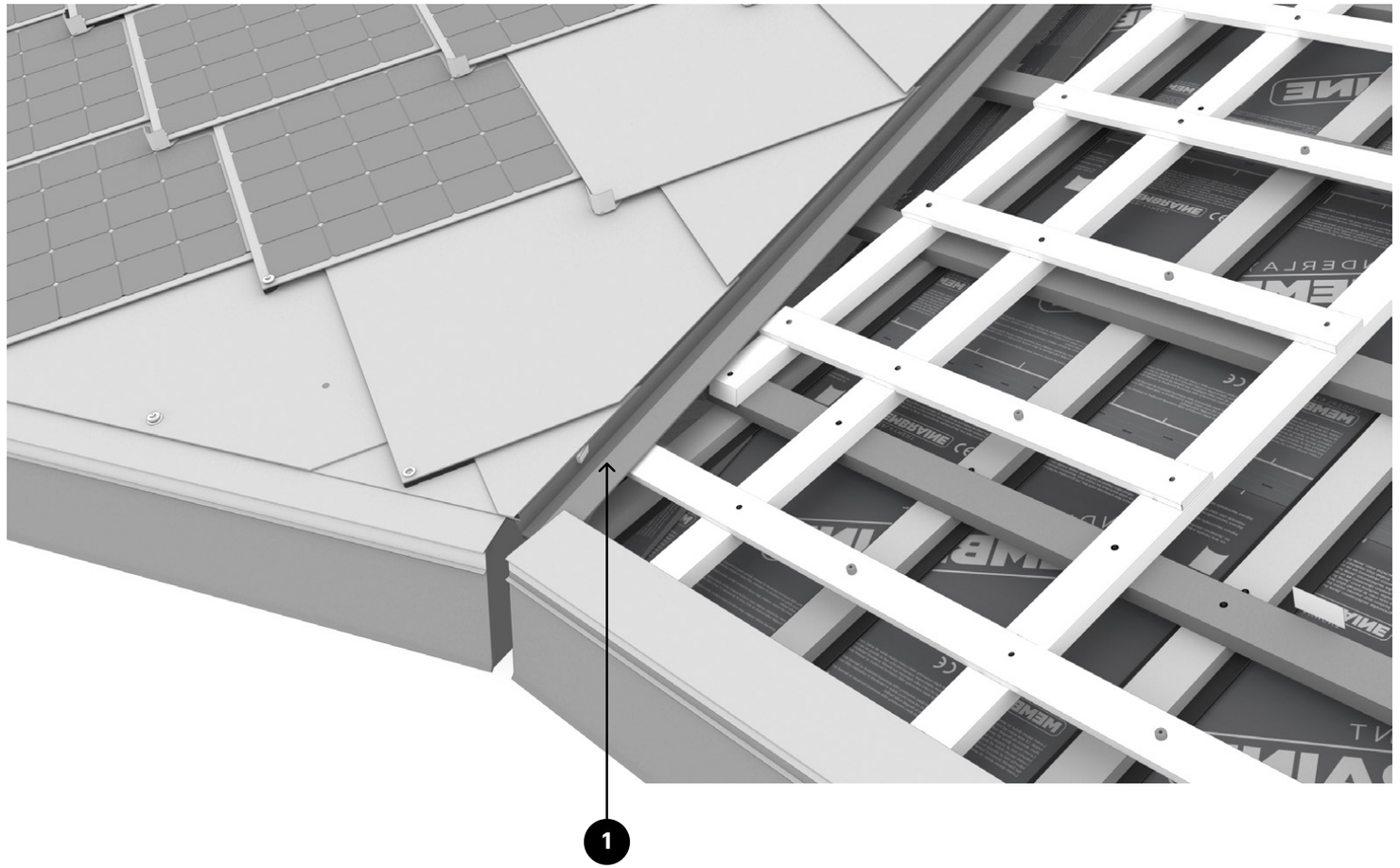
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1 Valleys are installed similar to the rake edge except that there is a channel for drainage.

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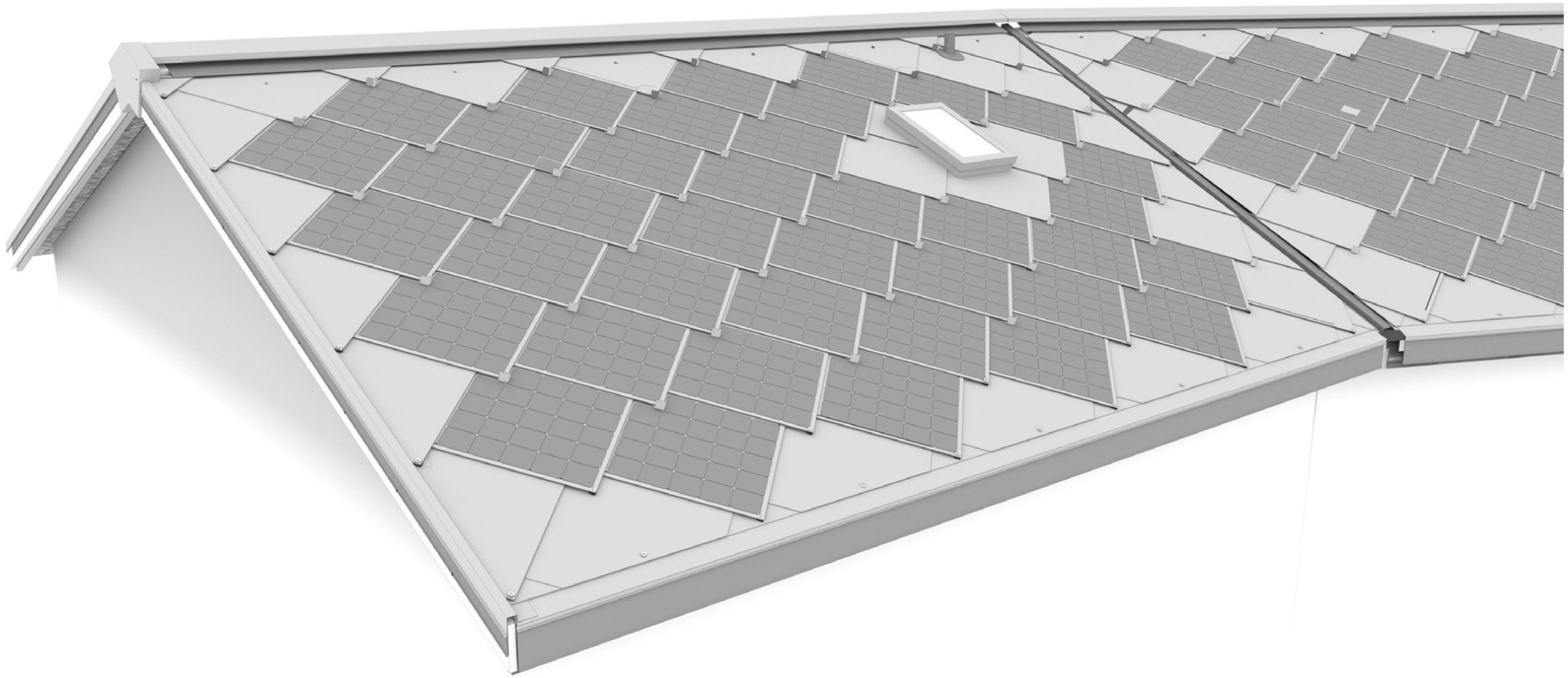
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SunStyle Roof Installation

The SunStyle Roof Installation includes steps to install the SunStyle system and electronics.



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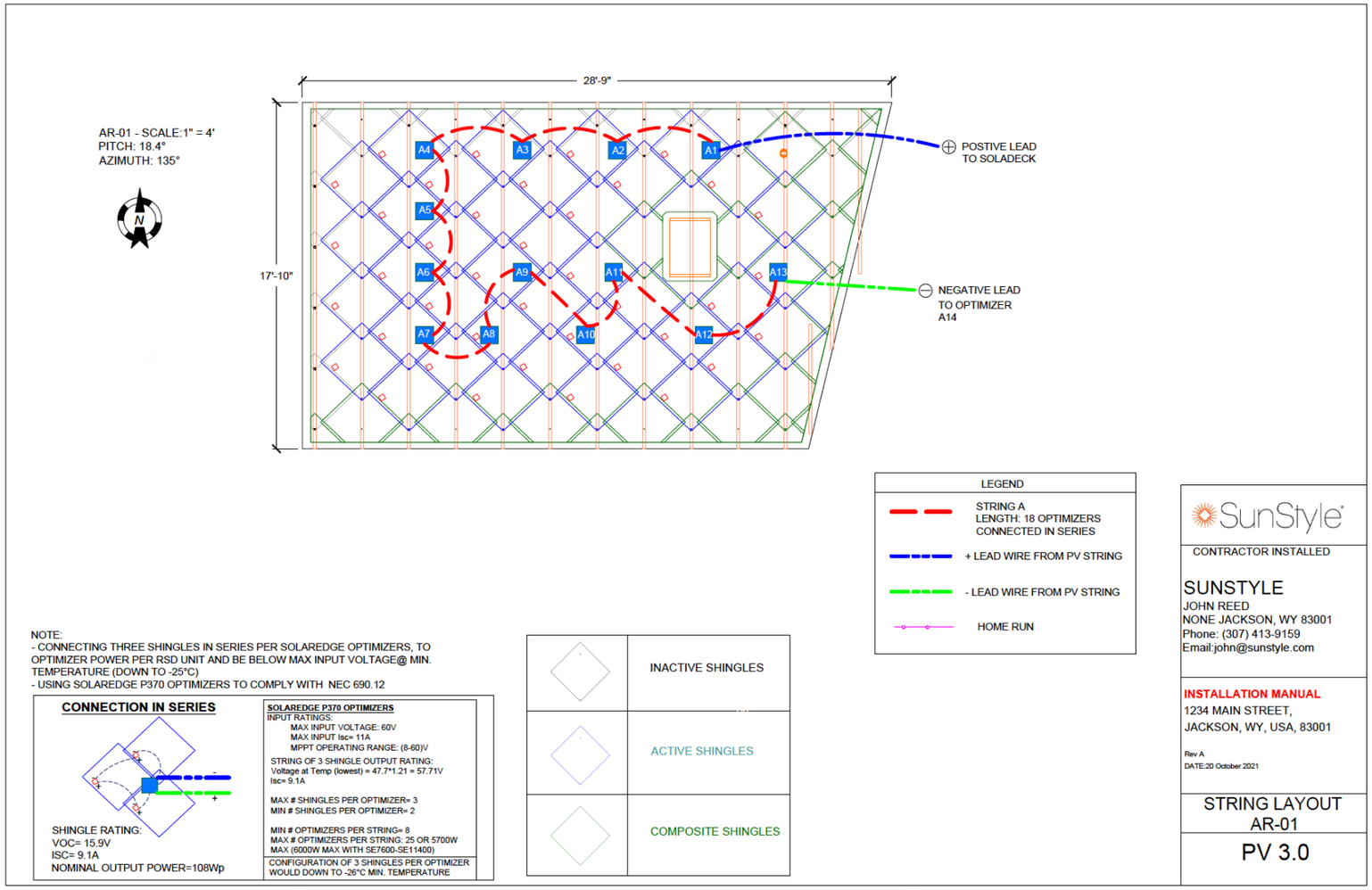
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Refer to Plan Set Diagrams

Perform all MLPE placement and wiring according to your approved SunStyle Electrical String & MLPE Layout Diagram. MLPEs are affixed to the 2nd layer of battens per manufacturer instructions and all wiring is affixed to the 2nd layer of battens with UL-approved wiring clips.



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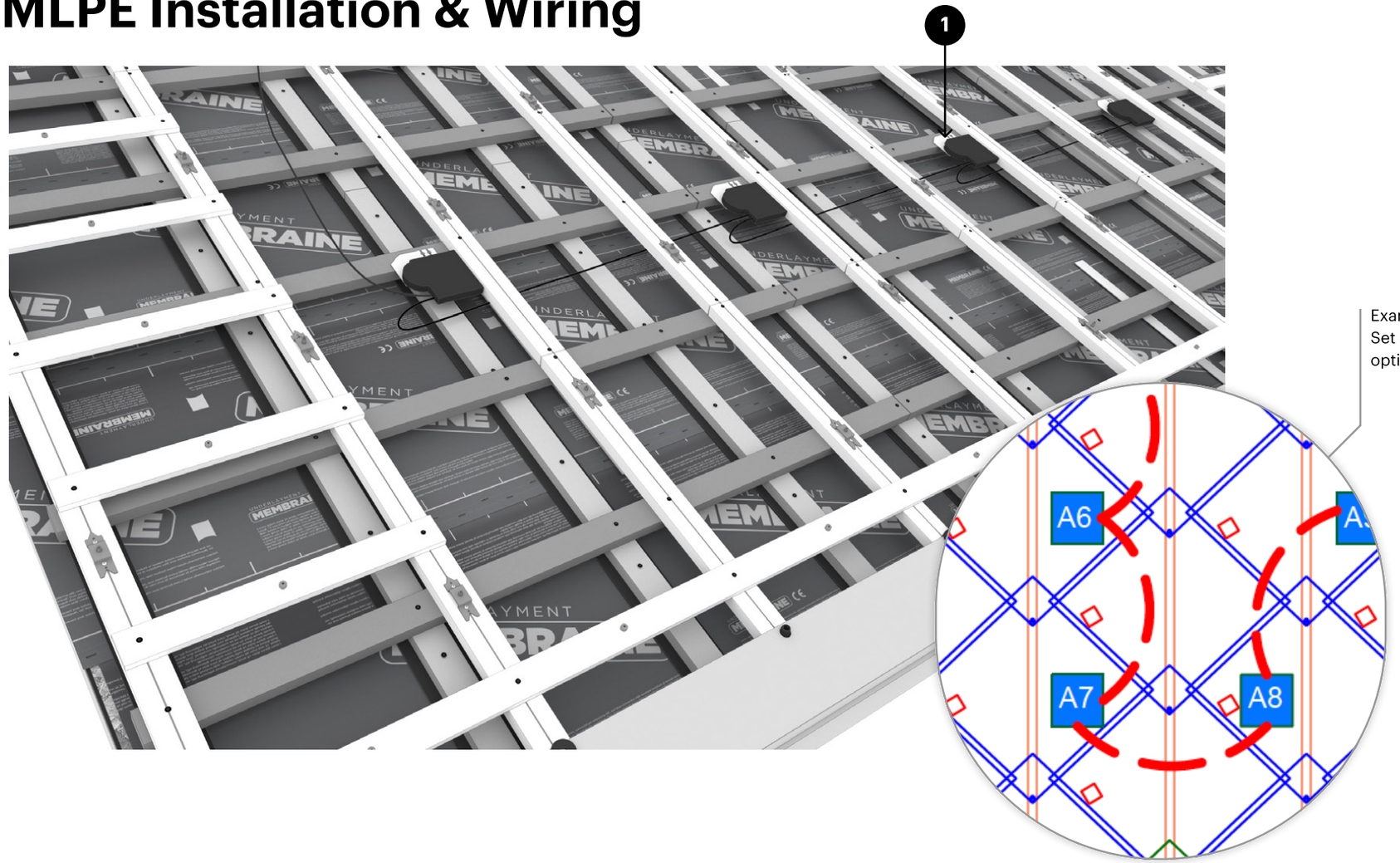
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MLPE Installation & Wiring



Example Project Plan Set detail showing the optimizer placement

1 Attach the optimizers to the 2nd layer of battens as shown in the Plan Set Diagram. Document MLPE placement for accurate system monitoring.

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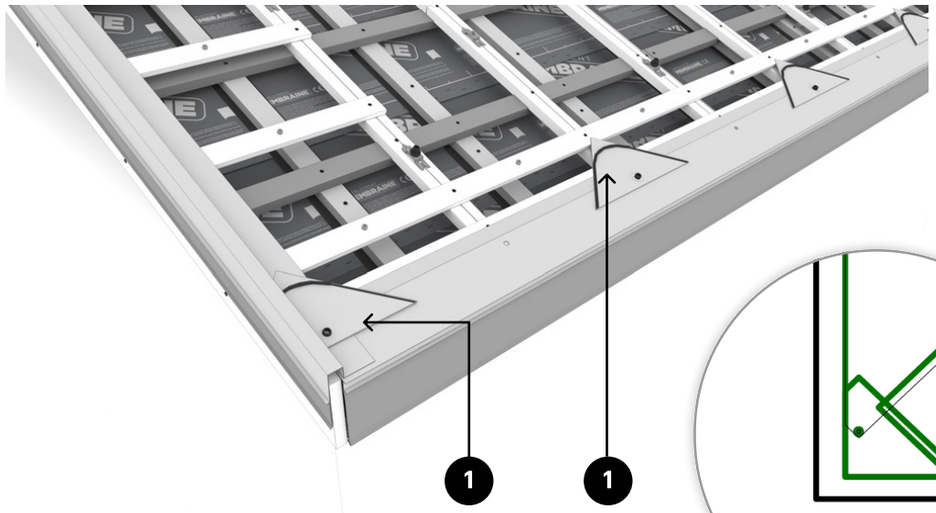
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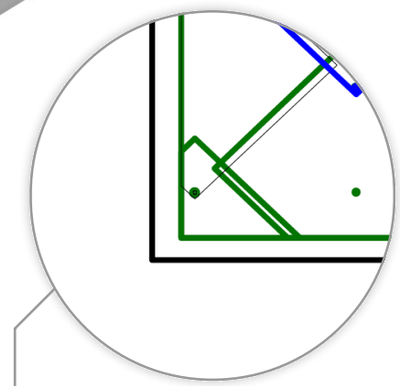
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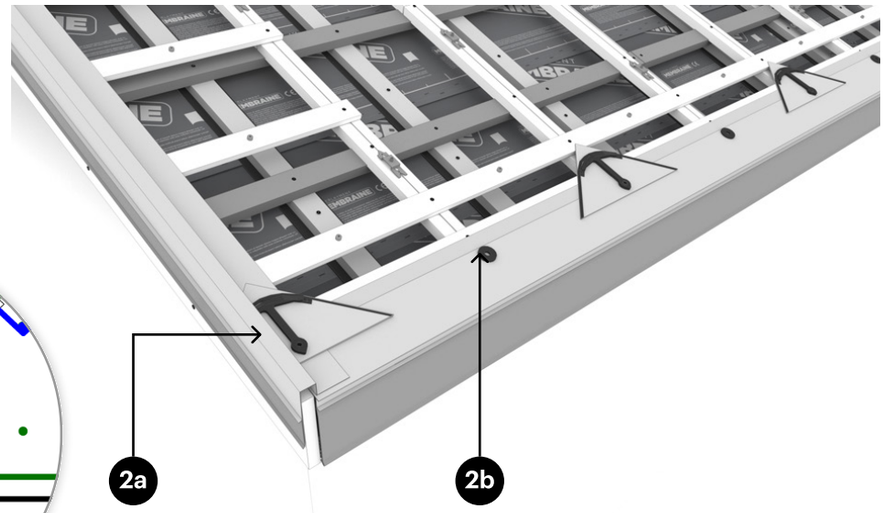
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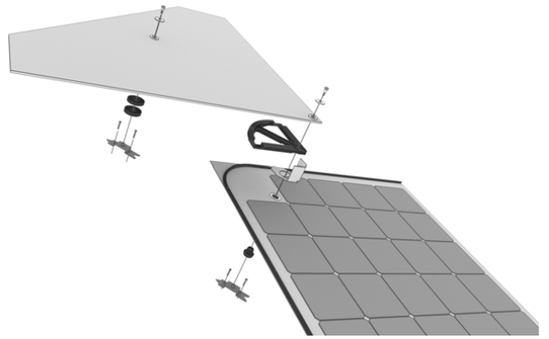
Begin Shingle Installation





Example Project Plan Set detail showing Inactive Shingles





1 Begin laying out the Inactive Shingles based on your Project Plan Set and the Shingle Shapes list provided in this manual. Start with the smaller bottom trim pieces (e.g. Inactive Corner Bottom Small Left and Inactive Shingle Bottom Small shown here).

2 Overlay with the correct hardware.

a. At double panel mounts, add the anchor seal and at edge conditions, cut to align with the edge of the shingle.
b. At single panel mounts, install the 2nd single panel mount disc on top of the flashing.

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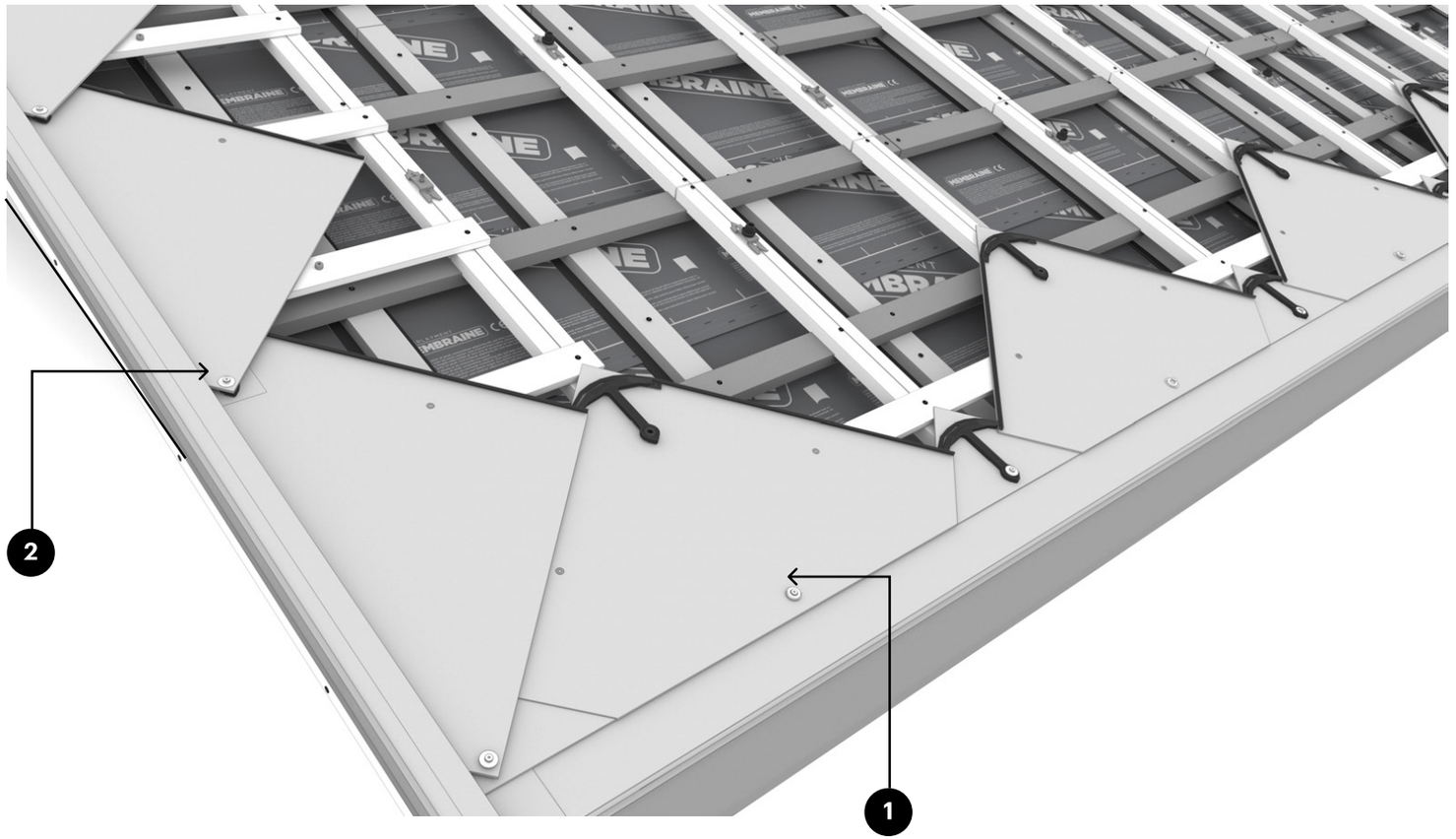
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Edge Shingles



1. Install shingles from left to right, bottom to top, based on your Project Plan Set and the Shingle Shapes list provided in this manual (e.g. Inactive Bottom and Inactive Left shown here). Use provided torque tool to tighten.

2. Layer the shingles so that they attach to one another as shown.

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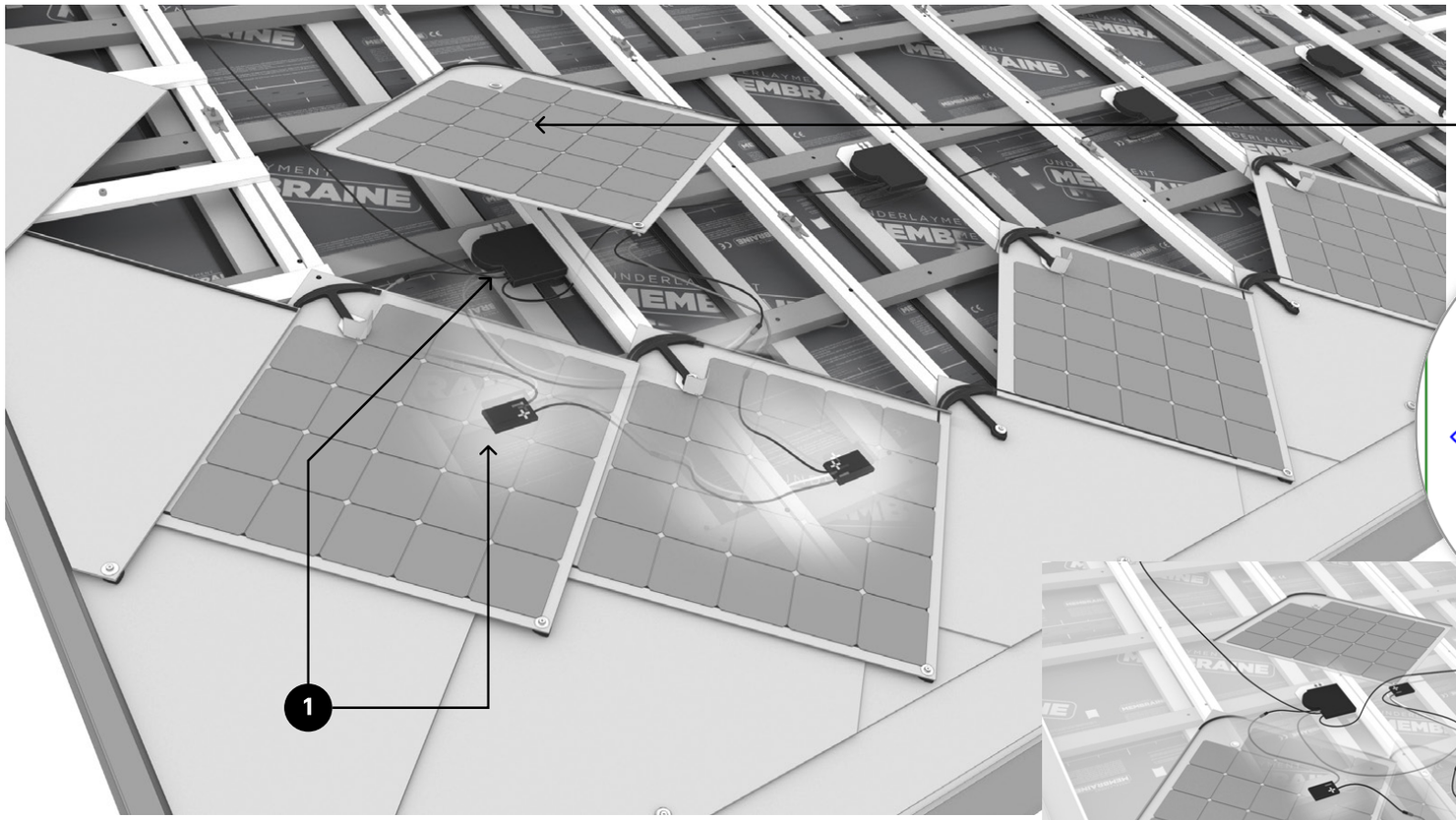
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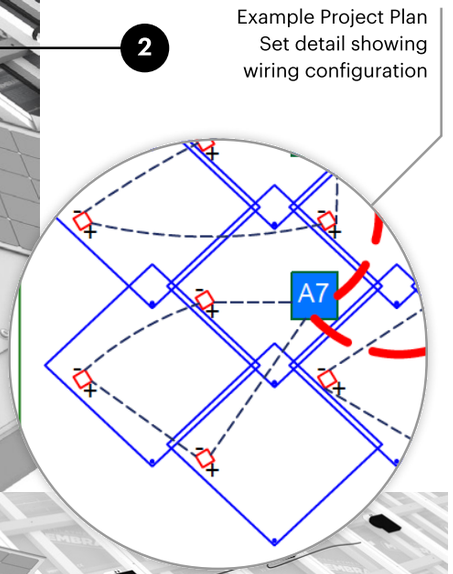
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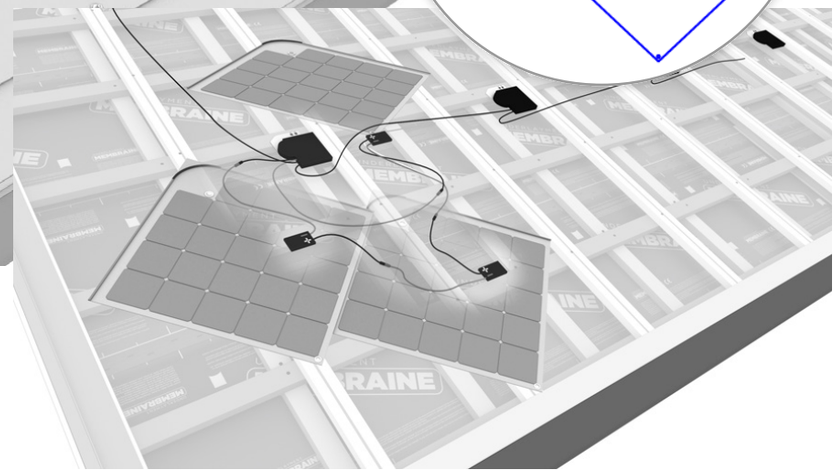
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Active Shingles







1 As the optimizers are attached to the 2nd layer of battens below, take photos showing wire management and test each string's voltage from MLPE/ Micro inverters, prior to covering the entire roof.

2 Install the next 2 Active Shingles and connect the electrical in adjacent groups of 3. Shingles must be in a triangular configuration as shown (not in a straight line). Refer to Project Plan Set for groupings and order of installation.

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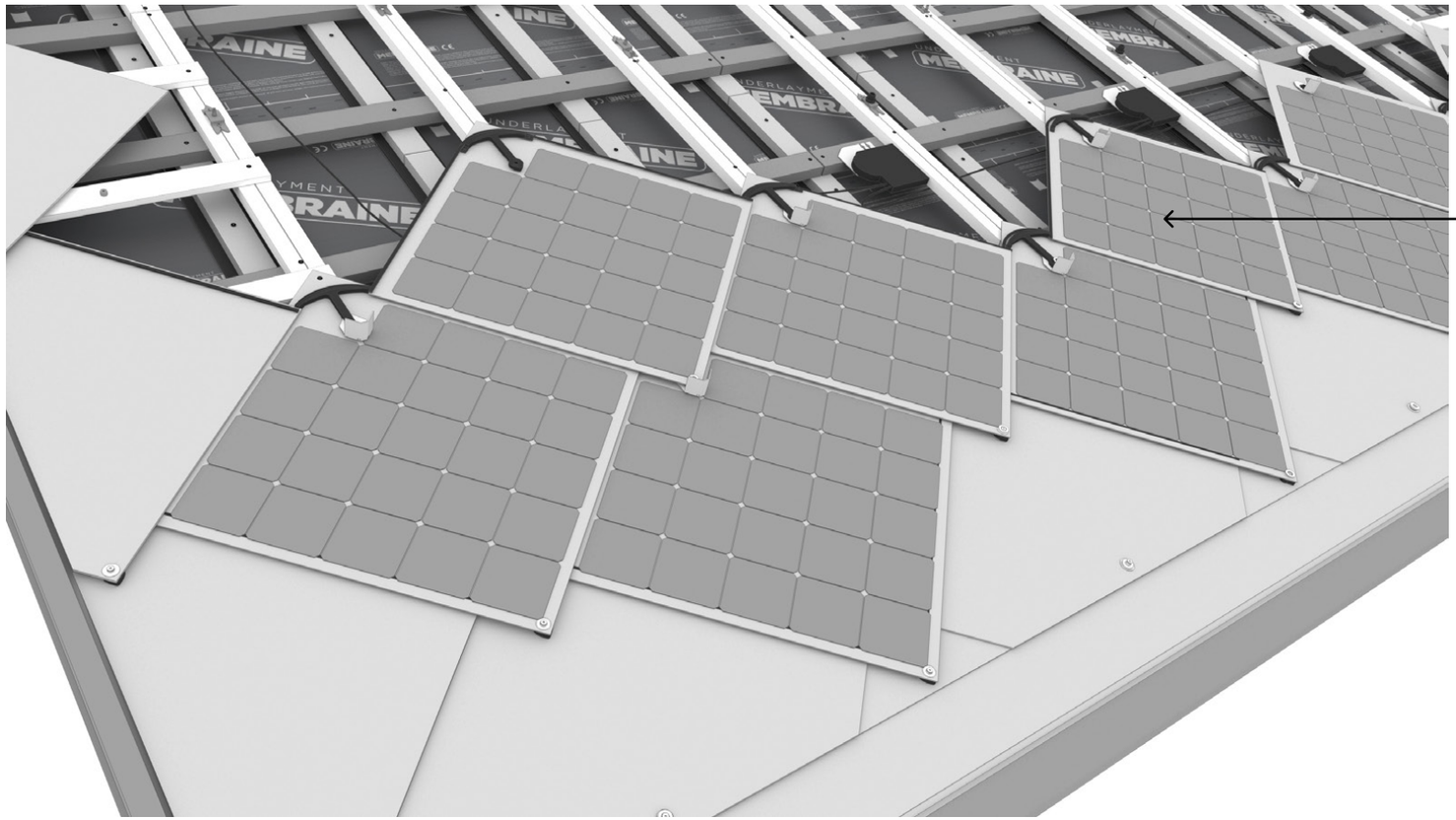
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Active Shingles



1. Install remaining Active Shingles in groups of 3, across first and then proceed with the next rows until you reach the top.

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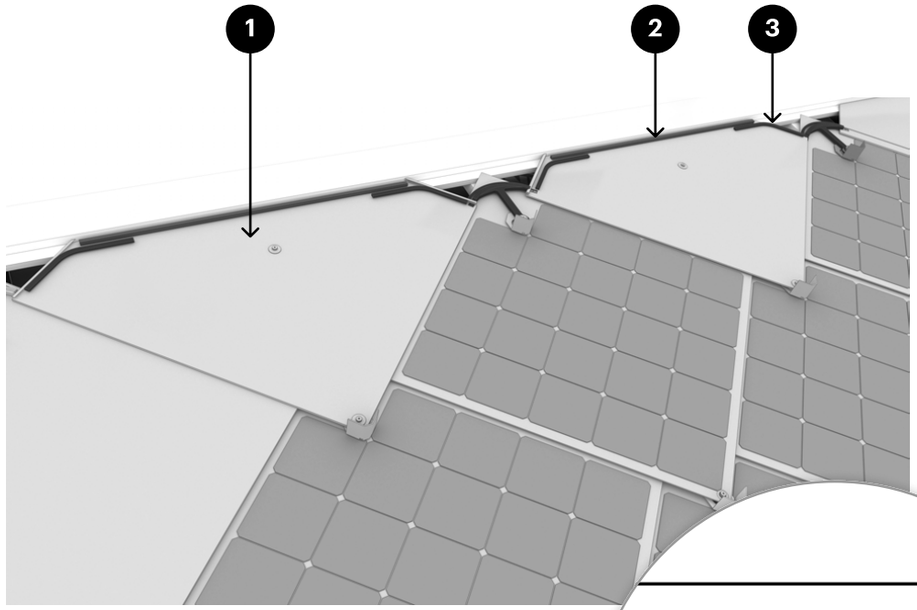
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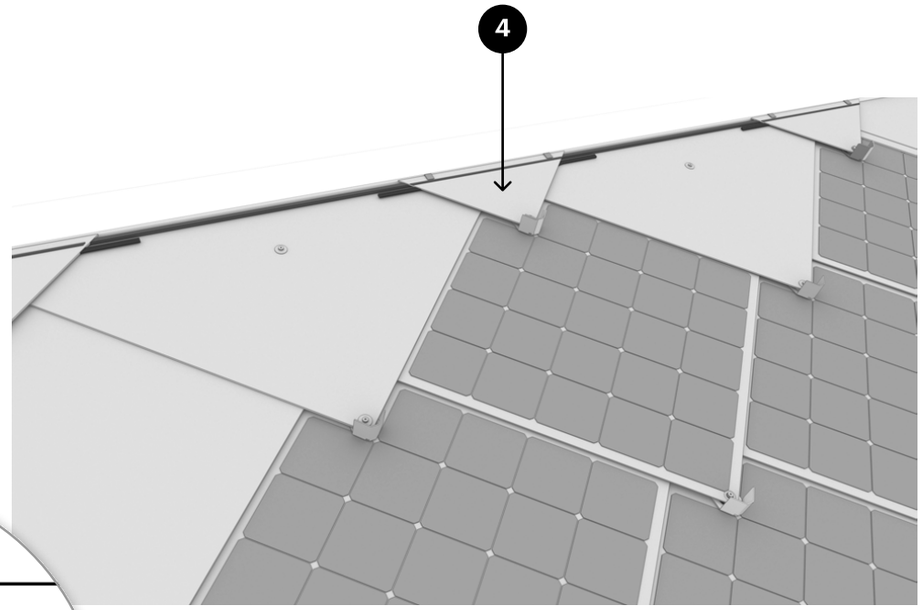
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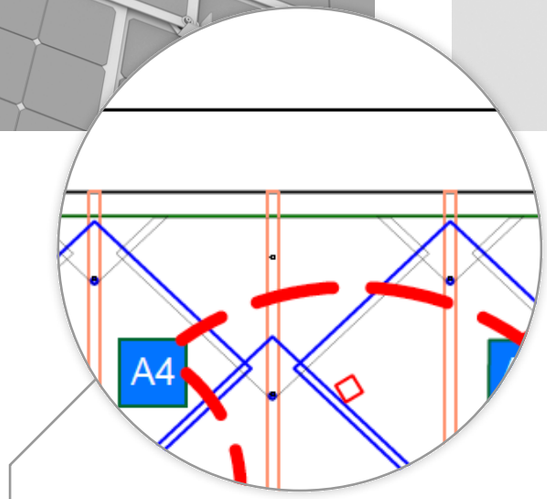
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Ridge Shingles







Example Project Plan Set detail showing top trim pieces

1. Install large top trim pieces based on your Project Plan Set and the Shingle Shapes list provided in this manual (e.g. Inactive Top shown here).
2. Install Ridge Seal - Lower Edge first along the top edge.
3. Install Edge Seal at corners.
4. Install small top trim pieces based on your Project Plan Set and the Shingle Shapes list provided in this manual (e.g. Inactive Top Small shown here).

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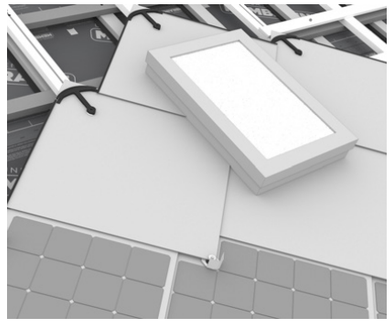
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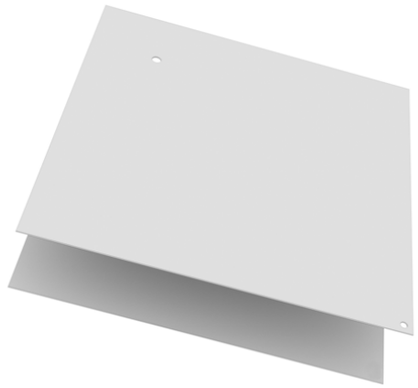
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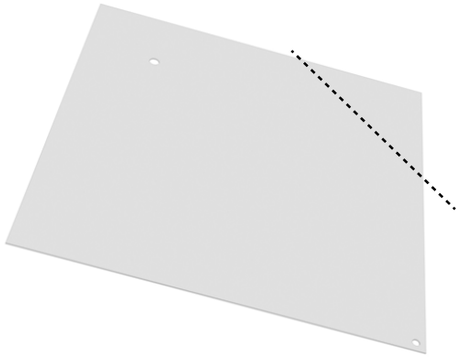
WARNING: Wear safety glasses and gloves. Cut edges will be razor sharp; file after cutting.



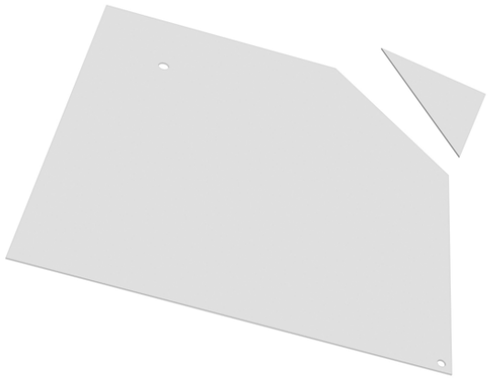
1 Identify the customizable shingle needed.



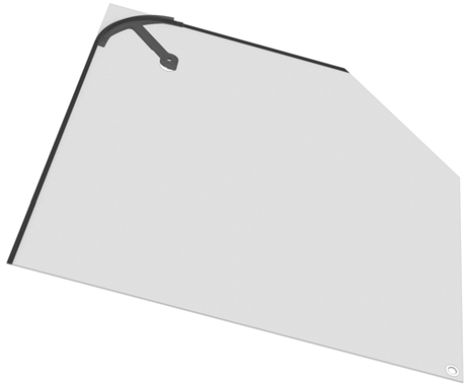
2 Determine hole locations by overlaying a pre-cut shingle, then drill 24mm and 16mm holes, using the pre-cut shingle as a template.



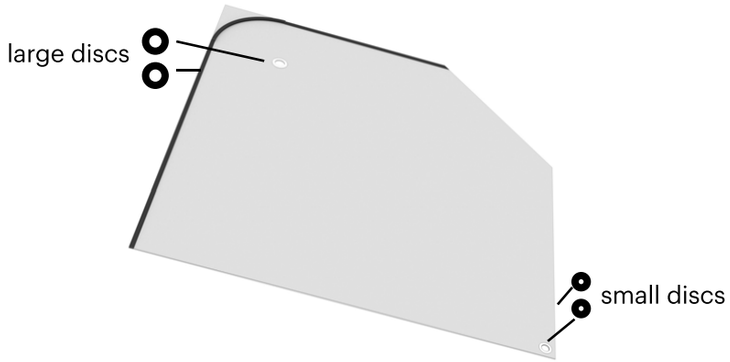
3 Measure and mark cut line.



4 Cut composite shingle with circular saw. File cut edges for safety.



5 Apply gasket using anchor seal as template.



6 Apply large and small discs to front and back of shingle.

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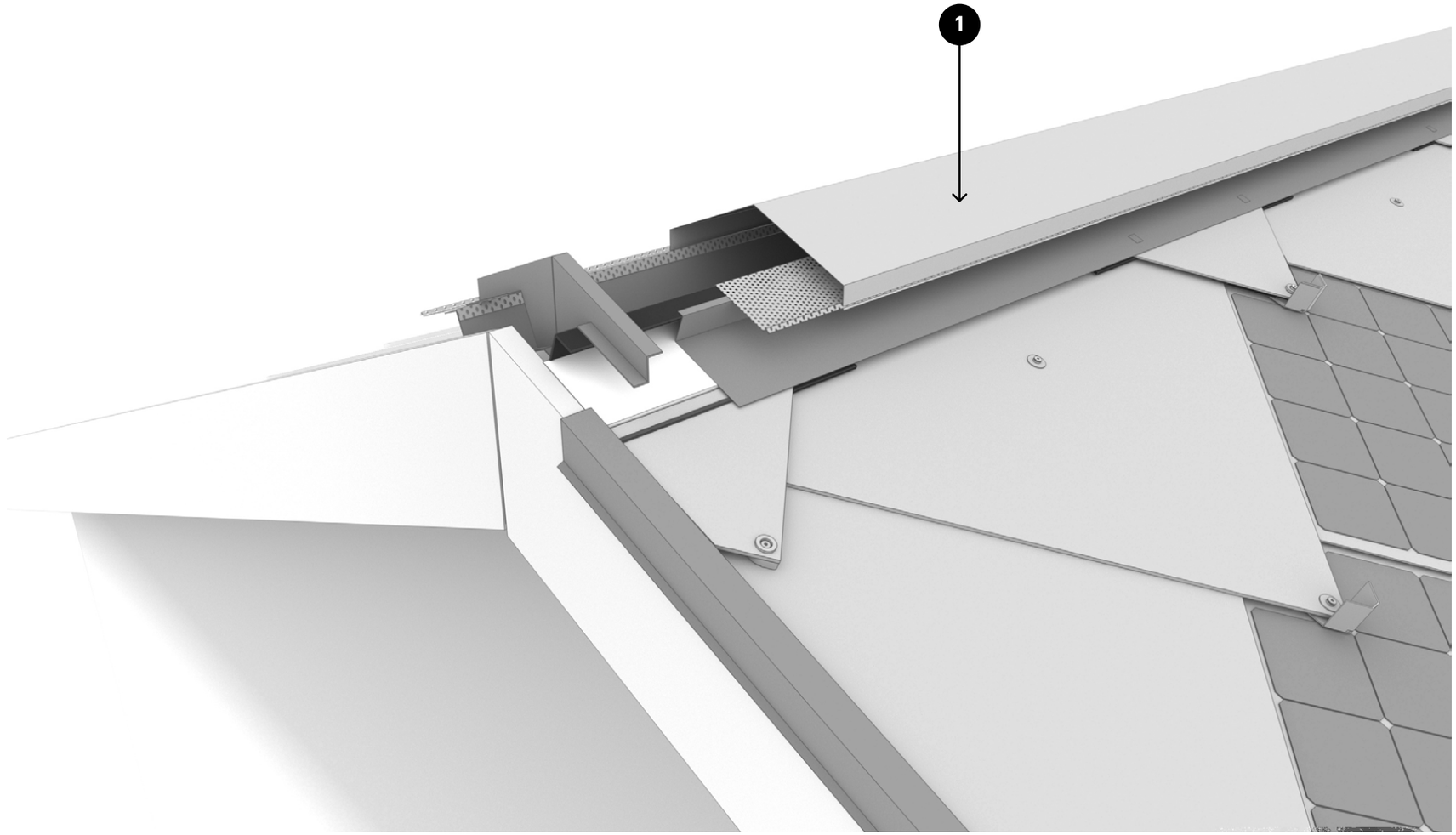
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Ridge Assembly



1. Install ridge assembly following Metal-Era installation instructions.

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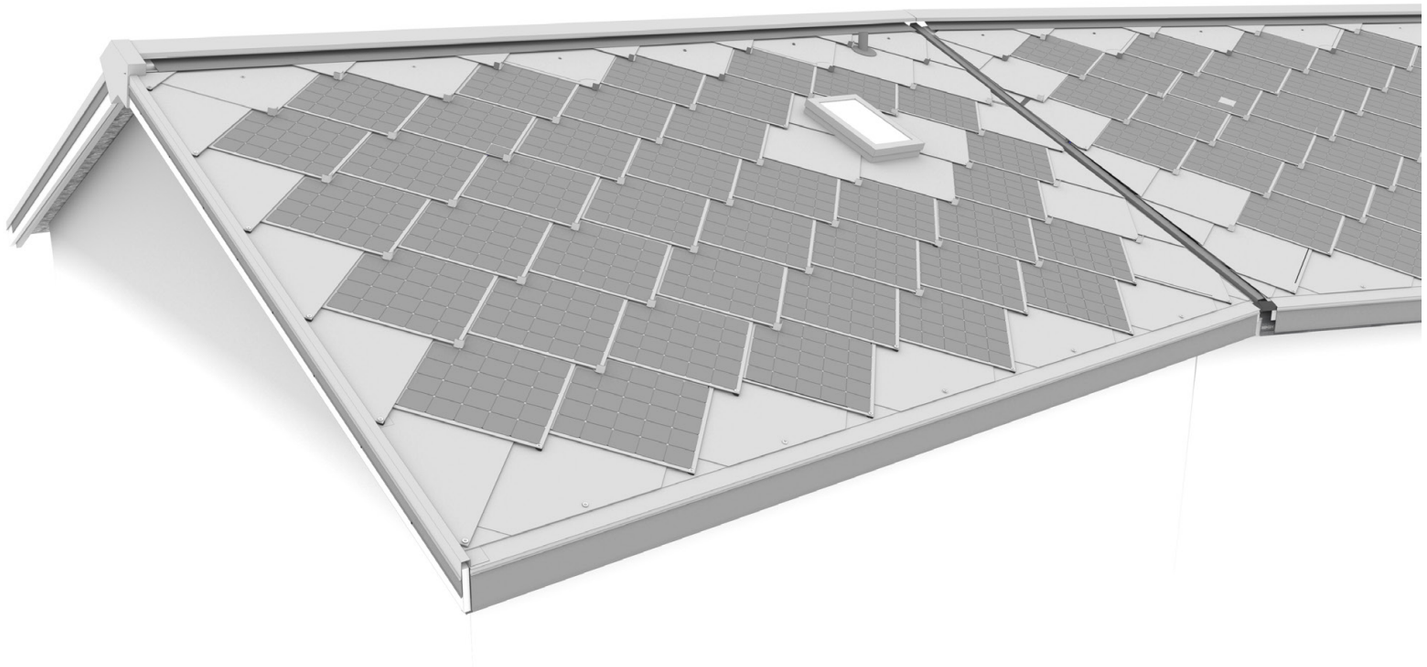
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System Activation



Once an system is completely installed, it needs to be commissioned, which is a process performed by a Licensed Electrician to ensure that the system is operating as expected. This process has several steps, largely completed through mobile application software. The process entails configuring communication type (Wi-Fi, LAN, cellular) for the inverters, and then pairing the Module-Level Power Electronics (MLPEs) with the inverter. The commissioning process confirms server connection, operation of all components, voltage in within acceptable parameters, and confirms the absence of any faults or errors in the system.

After installation is complete and commissioned, the system will need to be inspected by the Authority Having Jurisdiction (AHJ) with whom the plans were previously submitted, approved, and any permits were obtained. This inspection will ensure that the system is built to code and operates safely.

Once an inspection has been completed, the steps to install a net meter can begin. The system can be turned on for a short period of time to test and commission, however it cannot be left on or turned on permanently until both inspection and net metering are complete.

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Maintenance & Support

Maintenance & Support

WARNING: Do not disconnect or connect panels while system is activated.

Walkability

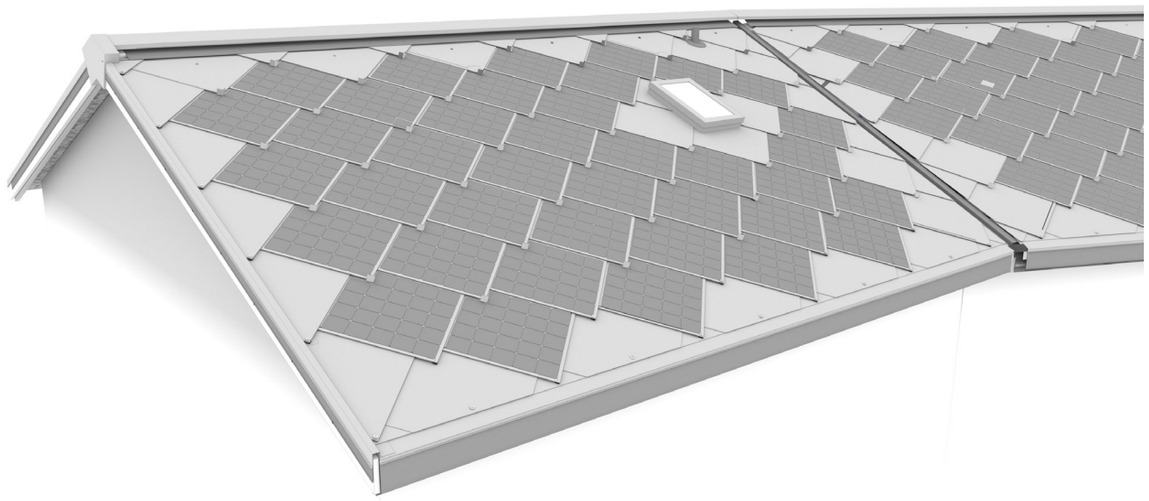
The SunStyle solar roof is walkable after proper installation and with appropriate safety precautions. Roof walk-on is only permitted with clean shoe soles and when the shingles are completely dry. Loads of more than 30.3 lb/ft2 are not allowed. No sharp or heavy objects are to be placed on the glass.

Maintenance

Since the SunStyle shingles are glass (and aluminum for the composite shingles), no additional maintenance or cleaning other than rain is required.

Repair

If a shingle or electrical component requires service, contact SunStyle Technical Support.



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