



Residential Design Guide



Version 2.0 (May 2024)

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Notices

The SunStyle[®] system includes the SunStyle tiles and hardware for both active and inactive parts of your roof. This guide covers the complete system design instructions including roof underlayment, support structure, edge flashing, solar electronics, and SunStyle tiles. Installation must be performed by certified SunStyle partners.

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

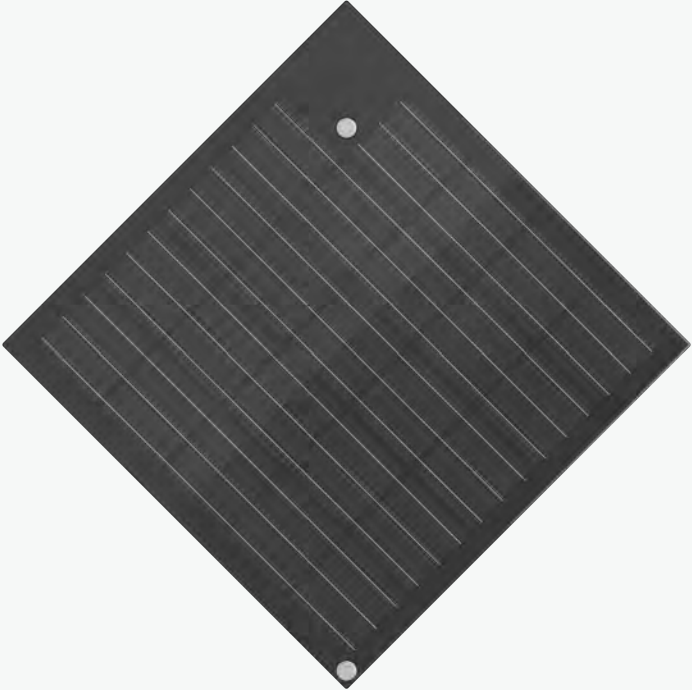
CODE COMPLIANCE

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 the SunStyle Installation Manual. Check with the local Authority Having Jurisdiction (AHJ) and permit departments for code cycles adopted.

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Welcome to SunStyle

SunStyle[®] is the global leader in building-integrated photovoltaic (BIPV) roofs. We have manufactured beautiful, proven solar tiles since 2007, with installations all over the world. Our patented solar roof system maximizes your roof’s solar potential, complements any architectural style, and protects your building in even the harshest conditions.

The SunStyle[®] system includes the SunStyle tiles and hardware for both active and inactive parts of your roof. This manual should be used in tandem with the Installation Manual for instructions regarding roof underlayment, support structure, flashing, solar electronics, and SunStyle tiles. Installation must be performed by certified SunStyle partners to ensure a quality, on-time, on-budget, and code compliant project.



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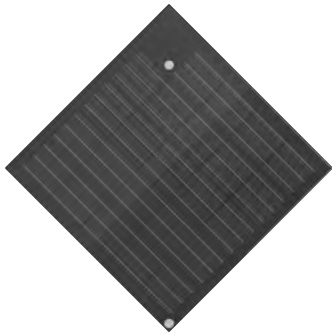
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SunStyle
8140 McCormick Blvd. #141
Skokie, IL 60076-2920

Designed in Switzerland
www.sunstyle.com

SunStyle Model **M110 870**

General Characteristics

Tile 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	Renhe or TE Connectivity
Connection Cable	Solar Cable 4mm²
Connection Cable Length	800mm
Connector	MC-4 or TE PV4-S
Frame Material	Frameless
Roof Pitch	2:12 to 16:12

Quality and Warranty

Product Guarantee	25 years
Performance Guarantee	10 yrs at 90% nom output 25 yrs at 80% nom output

Certifications

PV Module Safety	UL/IEC 61730-1, 61730-2
PV Module Performance	UL/IEC 61215-1, 61215-2
Building & Construction	UL SUB 7103
Module Fire Type	UL61730 Type 13
System Fire Class	UL790 Class A
Impact Resistance	FM4473 Class 4
Design Load Ratings (Top & Bottom)	1600 Pa
Wind Resistance	ASTM D3161 Class F
Wind-Driven Rain	TAS 100 (A)
Grounding	UL 2703

Solar Roof System Weight

4mm Alucobond w/ 3 layers of wood battens	4.5 psf
Solar w/ 3 layers of wood battens	6.75 psf

Electrical Properties

Type of Tile	BIPV & BAPV
Nominal Output	110 Wp per tile
Efficiency	17%
Open Circuit Voltage Voc	16.1 V
Short Circuit Current Isc	9.2 A
Maximum System Voltage	1000 V DC
Maximum Fuse Rating	15 A

Electrical Performance at STC: 1000 W/m², 25° C, AM 1,5
Electrical Values (Isc, Voc) Tolerance : +/- 3%

Temperature Coefficients

Pmax	-0.33% / °C
Isc	0.03% / °C
Voc	-0.44% / °C

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System Overview

This guide details the entire SunStyle integrated solar roofing solution, which encompasses all components above the roof deck. This includes components provided by SunStyle, such as active and inactive tiles with hardware, as well as components specified by SunStyle and provided by our installation partners, like roofing underlayment, flashing, and solar electronics.

SunStyle Provides

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

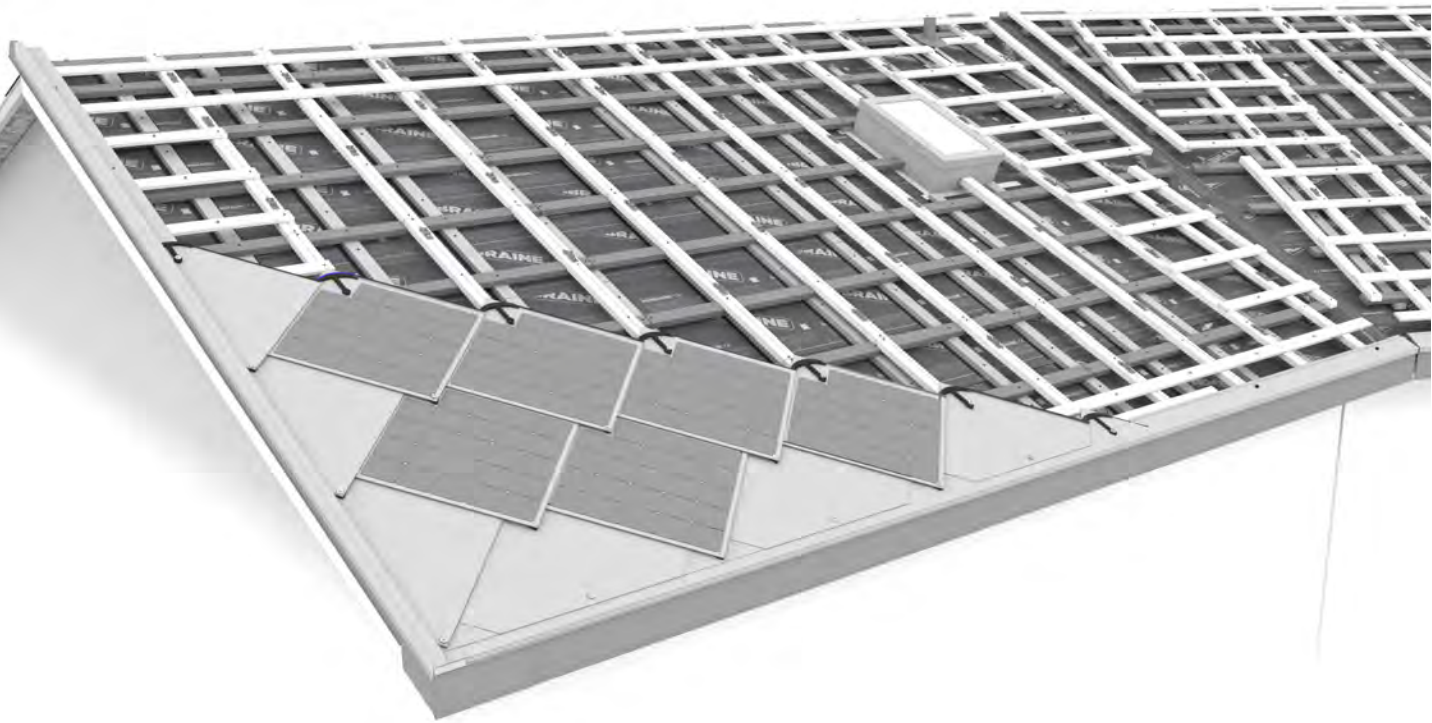
Installer Provides

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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CERTIFICATIONS

Photovoltaic Module Safety & Performance

UL/IEC 61730-1, 61730-2

This code specifies and describes the fundamental construction requirements for photovoltaic (PV) modules in order to provide safe electrical and mechanical operation. Specific topics are provided to assess the prevention of electrical shock, fire hazards, and personal injury due to mechanical and environmental stresses.

UL/IEC 61215-1, 61215-2

This standard lays out requirements for design qualifications and type of PV modules that are suitable for long-term operation in general open air climates. This test sequence of UL/IECv61215 is to determine the electrical and thermal characteristics of the module and to show, as far as is possible within reasonable constraints of cost and time, that the module is capable of withstanding prolonged exposure in climates described in the scope.

Building & Construction (UL 7103)

Fire Classification - Class A

A roof fire protection is rated in UL790 as varying class: class C for light protection, B for moderate and A for severe. SunStyle has met class A. Our roof assembly affords the highest level (severe) of fire protection. Key tests to provide fire classification of roof covering materials and systems are the Spread of Flame Test, Intermittent Flame Test, and Burning Brand Test.

Wind Resistance - ASTM D3161 Class F

To hold up to winds, a series of wind tests are performed in ASTM D3161, which is a two-hour test duration of wind hitting a roof with classes rated from A (for 60 mph) to D (for 90 mph) and F (for 110mph). SunStyle tiles passed Class F, the highest wind rating.

Hail (Iceball) - FM 4473 Class 4

Under UL 7103's this FM 4473 test standard is applied to roof covering materials with various size ice balls shot multiple times at the roof covering. SunStyle's Class 4 rating is the highest rating and requires tiles do not crack after repeated terminal velocity hits by a 2" ice ball. This impact class can help lower insurance rates for homeowners.

Wind-Driven Rain - TAS 100 (A)

TAS 100 (A) is a Testing Application Standard (TAS) where the test procedures determine whether a soffit ventilation and a continuous or intermittent ridge area ventilation system installed within a discontinuous roof system, consisting of an underlayment and a prepared roof covering, provides sufficient wind driven rain resistance to allow minimal water infiltration through the soffit and ridge area vent during a predetermined test period. In short, the roof will be leak-proof.

Mechanical Loading - UL 7103 Section 31

UL7103 Section 31 has passed and SunStyle is underway testing Mechanical Load at varying Alpine Load scenarios.

Grounding - UL 2703

SunStyle is certified under UL 2703 to not require grounding due to no metal casing in the system. UL 2703 requirements cover all ground/bonding paths, and SunStyle's mounting system and roof assembly comply with this standard.

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Applicable Code - R324 Solar Systems

SunStyle’s installation partners are responsible for complying with the Authority Having Jurisdiction (AHJ) and the building code cycle they have currently adopted. The list below is intended to be used as general guidance regarding the Residential Building Code for building-integrated photovoltaic systems.

International Residential Code, Section R324, Solar Energy Systems (2018 black) (2021 changes are in orange)

R324.1 General.

Solar energy systems shall comply with the provisions of this section.

R324.2 Solar thermal systems. (n/a)

R324.3 Photovoltaic systems.

Photovoltaic (PV) systems shall be designed and installed in accordance with Sections R324.3.1 through R324.7.1 and the manufacturer’s installation instructions.

The electrical portion of solar PV systems shall be designed and installed in accordance with NFPA 70.

R324.3.1 Equipment listings.

Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703 or with both UL 61730-1 and UL 61730-2. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction. Mounting systems listed and labeled in accordance with UL 2703 shall be installed in accordance with the manufacturer’s installation instructions and their listings.

R324.4 Rooftop-mounted photovoltaic systems. (n/a)

R324.5 Building-integrated photovoltaic systems.

Building-integrated photovoltaic (BIPV) systems that serve as roof coverings shall be designed and installed in accordance with Section R905.

R324.5.1 Photovoltaic tiles.

Photovoltaic tiles shall comply with Section R905.16.

R324.5.2 Fire classification.

Building-integrated photovoltaic systems shall have a fire classification in accordance with Section R902.3.

R324.5.3 BIPV roof panels.

BIPV roof panels shall comply with Section R905.17.

R324.6 Roof access and pathways.

Roof access, pathways and setback requirements shall be provided in accordance with Sections R324.6.1 through R325.6.2.1. Access and minimum spacing shall be required to provide emergency access to the roof, to provide pathways to specific areas of the roof, provide for smoke ventilation opportunity areas, and to provide emergency egress from the roof.

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Applicable Code - R324 Solar Systems

[CONTINUED] International Residential Code, Section R324, Solar Energy Systems (2018 black) (2021 changes are in orange)

Exceptions.

- 1. Detached, nonhabitable structures, including but not limited to detached garages, parking shade structures, carports, solar trellises and similar structures, shall not be required to provide roof access.
- 2. Roof access, pathways, and setbacks need not be provided where the code official has determined that rooftop operations will not be employed.
- 3. These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (17-percent slope) or less.
- 4. BIPV systems listed in accordance with Section 690.12(B)(2) of NFPA 70, where the removal or cutting away of portions of the BIPV system during fire-fighting operations has determined to not expose a fire fighter to electrical shock hazards.

R324.6.1 Pathways.

Not fewer than two pathways on separate roof planes from the lowest roof edge to ridge and not less than 36 inches (914 mm) wide shall be provided on all buildings. Not fewer than one pathway shall be provided on the street or driveway side of the roof. For each roof plane with a photovoltaic array, a pathway not less than 36 inches (914 mm) shall be provided from the lowest roof edge to ridge on the same roof plane as the photovoltaic array, on an adjacent roof plane, or straddling the same and adjacent roof planes. Pathways shall be over areas capable of supporting fire fighters accessing the roof. Pathways shall be located in areas with minimal obstructions such as vent pipes, conduits, or mechanical equipment.

R324.6.2 Setback at ridge.

For photovoltaic arrays occupying not more than 33 percent of the plan view total roof area, not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge. For photovoltaic arrays occupying more than 33 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of the horizontal ridge.

R324.6.2.1 Alternative setback at ridge.

Where an automatic sprinkler system is installed within the dwelling in accordance with NFPA 13D or Section P2904, setbacks at ridges shall comply with one of the following.

R324.6.3 Emergency escape and rescue openings.

Panels and modules installed on dwellings shall not be placed on the portion of a roof that is below an emergency escape and rescue opening. A pathway not less than 36 inches (914mm) wide shall be provided to the emergency escape and rescue opening.

Exception: BIPV systems listed in accordance with Section 690.12(B)(2) of NFBA 70, where the removal or cutting away of portions of the BIPV system during fire-fighting operations has determined to not expose a fire fighter to electrical shock hazards.

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Applicable Code - R902 Fire Classification

International Residential Code, Section R902, Fire Classification (2018 black) (2021 changes are in orange)

R902.1 Roofing Covering Materials

Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line. Class A, B and C roofing required by this section to be listed shall be tested in accordance with UL 790 or ASTM E108.

Exceptions:

1. Class A roof assemblies include those with coverings of brick, masonry and exposed concrete roof deck.
2. Class A roof assemblies include ferrous or copper tiles or sheets, metal sheets and tiles, clay or concrete roof tile, or slate installed on noncombustible decks.
3. Class A roof assemblies include minimum 16 ounces per square foot copper sheets installed over combustible decks.
4. Class A roof assemblies include slate installed over underlayment over combustible decks.

R902.3 Building-Integrated Photovoltaic Product

Building-integrated photovoltaic products installed as the roof covering shall be tested, listed and labeled for fire classification in accordance with Section R902.1 **UL 7103**. Class A, B, or C BIPV products shall be installed where the edge of the roof is less than 3 feet (914mm) from a lot line.

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Applicable Code - R905 Roof Coverings

International Residential Code, Section R905, Requirements for Roof Coverings. (2018 black) (2021 changes are in orange)

R905.16 Photovoltaic tiles.

The installation of *photovoltaic tiles* shall comply with the provisions of this section, Section R324 and NFPA 70

R905.16.1 Deck requirements.

Photovoltaic tiles shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.

R905.16.2 Deck slope.

Photovoltaic tiles shall be used only on roof slopes of 2 units vertical in 12 units horizontal (2:12) or greater.

R905.16.3 Underlayment.

Underlayment shall comply with Section R905.1.1.

R905.16.3.1 Ice barrier.

Where required, ice barriers shall comply with Section R905.1.2

R905.16.4 Material standards.

Photovoltaic tiles shall be listed and labeled in accordance with **UL7103** or with both **UL 61730-1** and **UL 61730-2**.

R905.16.5 Attachment.

Photovoltaic tiles shall be attached in accordance with the manufacturer’s installation instructions.

R905.16.6 Wind resistance.

Photovoltaic tiles shall comply with the classification requirements of Table R905.16.6 for the appropriate maximum basic wind speed.

TABLE R905.16.6 Classification of Photovoltaic Tiles

MAXIMUM ULTIMATE DESIGN WIND SPEED, V_{ult} , FROM FIGURE R301.2(2) (mph)	MAXIMUM BASIC WIND SPEED, V_{ASD} , FROM TABLE R301.2.1.3 (mph)	UL 7103 TILE CLASSIFICATION
110	85	A, D or F
116	90	A, D or F
129	100	A, D or F
142	110	F
155	120	F
168	130	F
181	140	F
194	150	F

For SI: 1 mile per hour = 1.609 kph.

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Applicable Code - R905 Roof Coverings

[CONTINUED] International Residential Code, Section R905, Requirements for Roof Coverings. (2018 black) (2021 changes are in orange)

R905.17 Building-integrated photovoltaic (BIPV) roof panels applied directly to the roof deck.
The installation of *BIPV roof panels* shall comply with the provisions of this section, Section R324 and NFPA 70.

R905.17.1 Deck requirements.
BIPV roof panels shall be applied to a solid or closely-fitted deck, except where the roof covering is specifically designed to be applied over spaced sheathing.

R905.17.2 Deck slope.
BIPV roof panels shall be used only on roof slopes of 2 units vertical in 12 units horizontal (17-percent slope) or greater.

R905.17.3 Underlayment.
Underlayment shall comply with Section 905.1 .1.

R905.17.3.1 Ice barrier.
Where required, an ice barrier shall comply with Section R905.1.2.

R905.17.4 Ice barrier.
In areas where there has been a history of ice forming along the eaves causing a backup of water, as designated in Table R301.2, an ice barrier that consists of not less than two layers of underlayment cemented together or of a self-adhering polymer-modified bitumen sheet shall be used in lieu of normal underlayment and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that do not contain conditioned floor area.

R905.17.5 Material standards.
BIPV roof panels shall be listed and labeled in accordance with UL 7103 or with both UL 61730-1 and UL 61730-2.

R905.17.6 Attachment.
BIPV roof panels shall be attached in accordance with the manufacturer's installation instructions.

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Applicable Code - R905 Roof Coverings

[CONTINUED] International Residential Code, Section R905, Requirements for Roof Coverings. (2018 black) (2021 changes are in orange)

R905.1 Roof covering application.

Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer’s installation instructions. Unless otherwise specified in this section, roof coverings shall be installed to resist the component and cladding loads specified in Table R301.2.1 (1), adjusted for height and exposure in accordance with Table R301.2.1 (2).

R905.1.1 Underlayment

Underlayment for asphalt tiles, clay and concrete tile, metal roof tiles, mineral-surfaced roll roofing, slate and slate-type tiles, wood tiles, wood shakes, metal roof panels and photovoltaic tiles shall conform to the applicable standards listed in this chapter. Underlayment materials required to comply with ASTM D226, D1970, D4869 and D6757 shall bear a label indicating compliance to the standard designation and, if applicable, type classification indicated in Table R905.1.1 (1). Underlayment shall be applied in accordance with Table R905.1.1 (2). Underlayment shall be attached in accordance with Table R905.1.1 (3).

Exceptions:

1. As an alternative, self-adhering polymer-modified bitumen underlayment bearing a label indicating compliance with ASTM D1970.
2. As an alternative, a minimum 4-inch-wide (102 mm) strip of self-adhering polymer-modified bitumen membrane bearing a label indicating compliance with ASTM D1970, installed in accordance with the manufacturer’s installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment shall comply with Table R905.1.1 (1) for the applicable roof covering.

R905.1.1 Ice Barrier (not applicable to Photovoltaic Tiles)

Underlayment Types R905.1.1 (1)

Roof Covering	Section	Areas Where Wind Design Is Not Required	Areas Where Wind Design Is Required
Photovoltaic tiles	R905.16	ASTM D4869 Type I, II, III, or IV or ASTM D6757	ASTM D4869 Type III or Type IV

Underlayment Application R905.1.1 (2)

Roof Covering	Section	Areas Where Wind Design Is Not Required	Areas Where Wind Design Is Required
Photovoltaic tiles	R905.16	For roof slopes from 2 units vertical in 12 units horizontal (2:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied in the following manner: apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide sheets of underlayment, overlapping successive sheets 19 inches. Distortions in the underlayment shall not interfere with the ability of the tiles to seal. End laps shall be 4 inches and shall be offset by 6 feet. For roof slopes of 4 units vertical in 12 units horizontal (4: 12) or greater, underlayment shall be one layer applied in the following manner: underlayment shall be applied tile fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the tiles to seal. End laps shall be 4 inches and shall be offset by 6 feet.	Underlayment shall be two layers applied in the following manner: apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide sheets of underlayment, overlapping successive sheets 19 inches. Distortions in the underlayment shall not interfere with the ability of the tiles to seal. End laps shall be 4 inches and shall be offset by 6 feet.

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Applicable Code - R301 Design Criteria

SunStyle Tiles should be treated as any roof covering or cladding and are designed to meet the appropriate wind and seismic requirements for a given site.

- For Dead Loads calculation, the SunStyle system weighs 4.4 lbs/ft².
- For tested Wind Resistance, SunStyle has passed UL7103’s ASTM D3161 Class F (110 mph sustained)

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Applicable Code - NEC/NFPA70 Rapid Shutdown

NEC 690.12(B)(2) Rapid Shutdown - 2020 cycle

As of 2020, the National Electric Code (NEC or NFPA 70) has been updated to include a photovoltaic hazard control system, otherwise know as ‘rapid shutdown’, in section 690.12(B)(2). The revisions are intended to provide effective means for emergency response teams, such as firefighters and utility personnel, to reduce solar system voltage low enough that cut wires pose no shock hazard on the roof deck.

Section 690.12(B)(2) of the 2020 NEC (NFPA 70) provides three options for rapid shutdown control system compliance:

- 1) Install a photovoltaic hazard control system with each array, such as an optimizer or micro-inverter, listed with capacity to meet rapid shutdown compliance.
- 2) Require the controlled conductors to fall below 80 volts in under 30 seconds of rapid shutdown initiation.
- 3) Design and install photovoltaic arrays so as to have no exposed wiring/conductive parts as well as 8 feet or more from any exposed groundings and/or conductive grounding components.

SunStyle’s Compliance with Rapid Shutdown 2020

Through the use of 3rd party MLPE systems or string inverters used in tandem with rapid shutdown devices, SunStyle’s overall system achieves compliance with 690.12(B)(2). For additional information about regulatory compliance by company, follow the links below.

Enphase:

https://www4.enphase.com/sites/default/files/downloads/support/IQ7X_UL1741SA_Certificate.pdf

SolarEdge:

<https://www.solaredge.com/us/products/power-optimizer#/>

IMO FireRaptor:

<https://www.imoautomation.com/pages/fireraptor>

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Project Coordination

SunStyle installations require coordination between the architectural, financial, structural, and electrical trades both on the design side (A/E team) and the installation side (Contractors). Typical items of coordination are shown in the table. Note: Leads may vary depending on specific project.

Key

- A
- Architect / Design Professional
- AHJ
- Authority Having Jurisdiction
- C
- Contractor
- E
- Electrical Engineer / Design Professional
- O
- Owner
- SC
- Solar Consultant / Solar Installer / SunStyle

Installer Provides

- Roofing
 - Roof Underlayment
 - Mounting Structure
 - Ridge Vents
 - Eaves and Edges
 - Flashing
- Electronics
 - MLPEs / Inverters
 - Storage (if desired)
 - Wiring

Description	Project Phase	Typical Lead
Building/Roof Orientation	Schematic Design	A/SC
Estimate Production	Schematic Design	A/E/SC
Financial/Tax incentives	Schematic Design	A/O/SC/C
Regulatory Coordination	Schematic Design	A
Utility Coordination	Schematic Design	A/E/C
Electrical Coordination	Schematic Design	A/E/C
Preliminary Pricing	Schematic Design	A/C/SC
Detailed Layout	Design Development/ Construction Documents/ Construction	A/C/SC
Confirm pricing and lead times	Construction	SC
Shop Drawings/Submittals	Construction	C/SC
Installation	Construction	C
Inspection	Construction	AHJ
Testing/commissioning	Construction	SC/C

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Roof Styles

SunStyle roofs meet a wide variety of architectural styles.



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Roof Pitch

As per International Residential Building Code, Building Integrated Photovoltaic (BIPV) roofs are limited to a specific range of pitches.

For SunStyle, these code requirements mean that our roofs cannot be installed below a slope of 2:12 (9.46° slope) and not beyond a 16:12 pitch.



Venting Requirements

All SunStyle roofs require venting at the eaves and ridges to ensure the system remains cool. Design should ensure all areas remain under 150 degrees F. See the sample calculation results below.

Inputs

The inputs used for this calculation are listed to the right. The air gap is the most influential variable and most within the architect's control to achieve the correct air space. If you are unsatisfied with the results you received, try increasing the air gap.

Ventilation Needed for Specified Air Gap

Pitch on 12	3
Length of passage from eaves vent to ridge vent	25 feet
Thickness of OSB/Plywood	0.5 inches
Height of Air Gap	1.5 inches
Ridge Length	50 feet
Eave Length	50 feet

Thermal Information

Roofing Composition	Snow Covered
Ceiling/Wall Insulation R-Value	19
Outside Temperature	22 °F

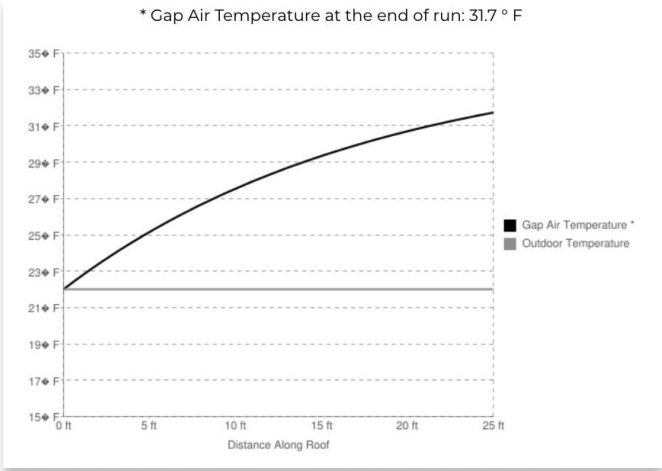
Results

Summertime Ventilation
To avoid premature shingle degradation and baking of the shingles, maintain an air gap temperature of no more than 150° F.

Wintertime Ventilation
To avoid ice damming, maintain an air gap temperature below 32° F (freezing). This will help prevent the freeze-thaw cycle that creates ice damming.

Ventilation Needed for Specified Air Gap

A. Height of Air Gap	1.5
B. Required Inches² of Net Free Area per Linear Foot at Ridge	18
C. Required Inches² of Net Free Area per Linear Foot at Eave	18
D. Recommended Ridge Opening	1.5
E. Recommended Fascia Vent Width	3



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Setback Requirements

Authority Having Jurisdictions (AHJ) specify requirements for fire setbacks, allowing firefighters a safe and non-energized pathway across rooftops. Setback requirements for BIPV have been removed from 2021 IRC if the system is rapid shutdown compliant.

The architect and installation partner should work with the project-specific AHJ to clarify applicable code (see Applicable Code – R324 Solar Systems page) and identify the appropriate setback requirements for the project.

If necessary, SunStyle roofs can be installed with large, non-energized tiles in setback pathways using inactive glass or composite tiles.

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Snow Load

Light snows will naturally slide off the roof, and ultimately help keep the tiles clean. SunStyle roofs can be equipped with snow hooks in regions with high annual snowfall, depending on the goal of snow management. Snow hooks and rails allow snow to accumulate providing some protection from sliding onto entrances and walkways.

Snow hooks are attached to the top of the mounting bolt system across an entire roof plane and serve as friction anchors, allowing snow to accumulate and then slowly shed. If additional preventative measures are required, snow rails can be installed at the base of the roof face and integrated in the flashing design but are not provided by SunStyle.



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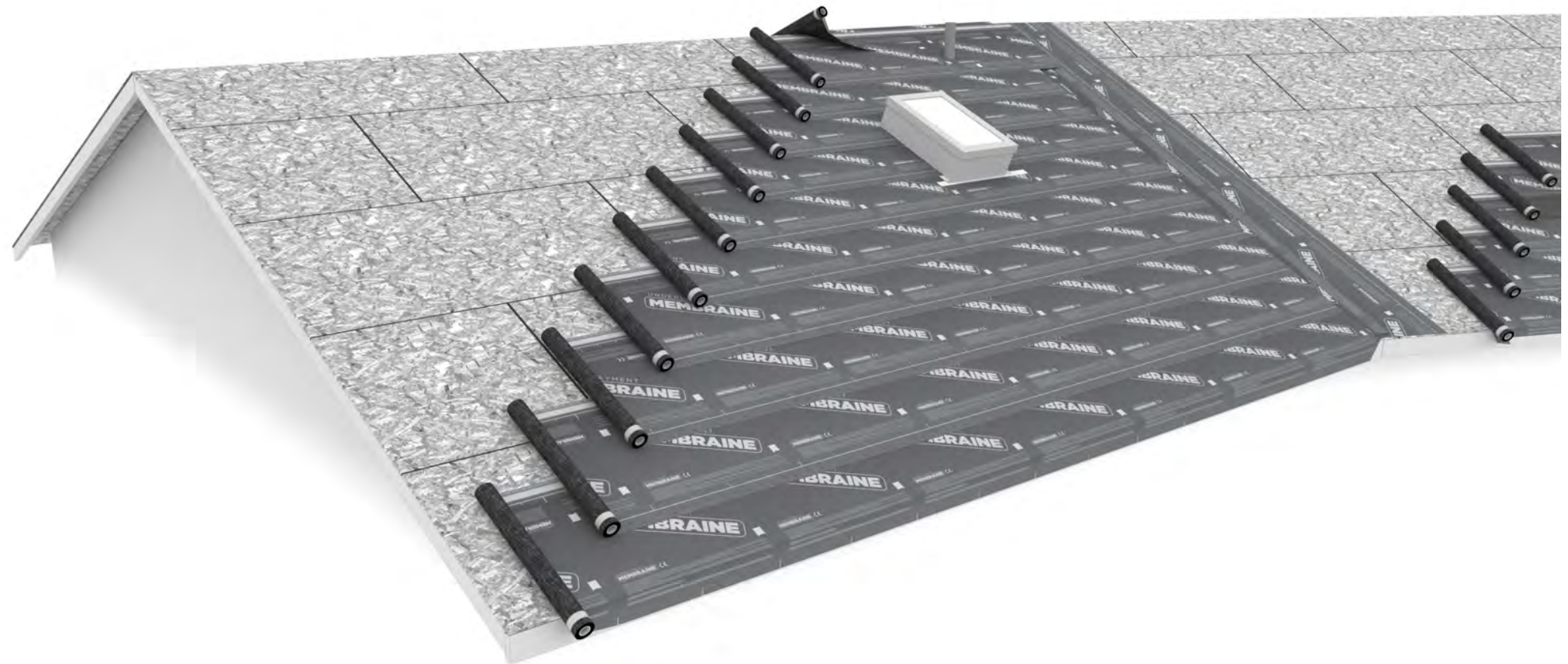
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Roof Deck Preparation

International Residential Code Section R905.1.1(1) Underlayment Types requires underlayment meet or exceed ASTM D4869 Type I, II, III, or IV or ASTM D6757. SunStyle requires underlayment also meet Class A Fire - ASTM E108.



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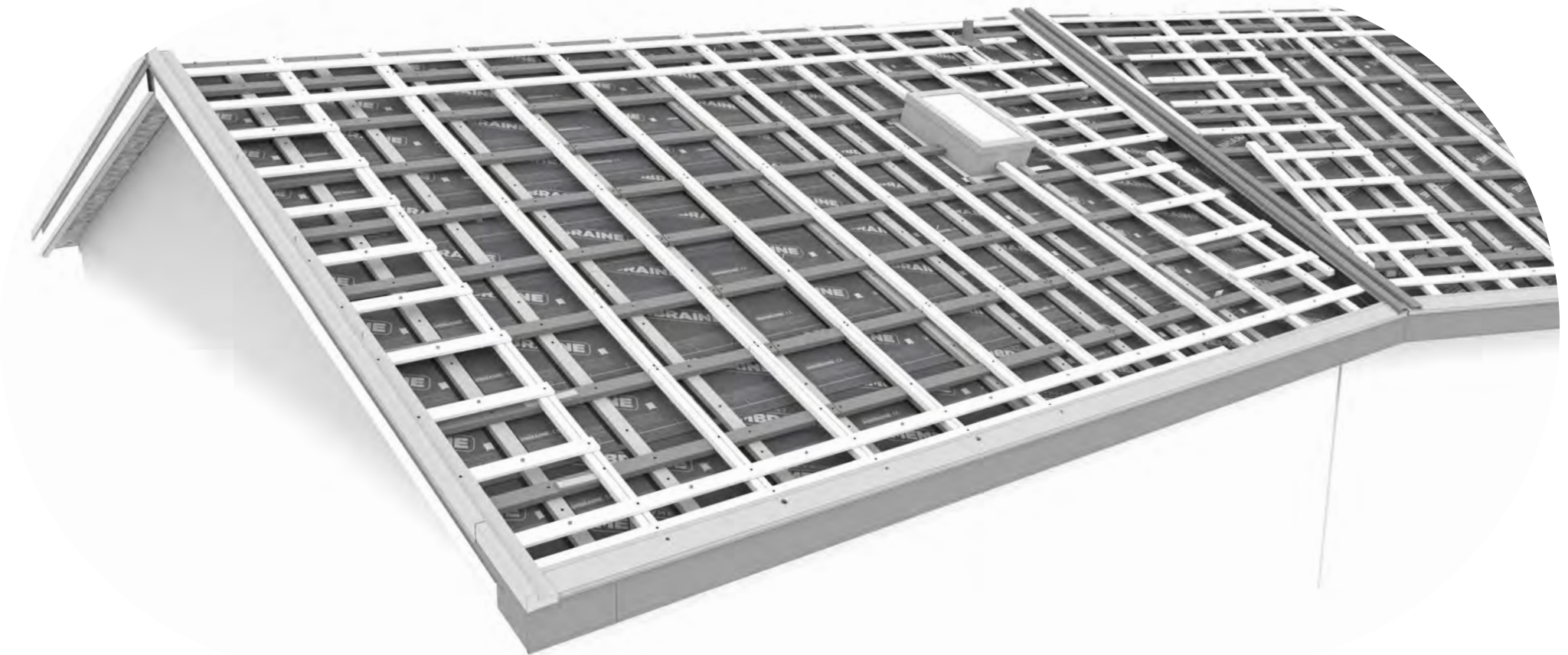
Support Structure Assembly

SunStyle tiles are fastened to a wood batten system consisting of 2x4 and 1x4 supports. SunStyle requires:

- Fire-retardant-treated wood (ASTM E84) 2x4s for substructure
- Fire-retardant-treated wood (ASTM E84) 1x4s for supports

The substructure serves multiple functions:

- Creates an air space for temperature control
- Allows for adjustment from the main structural framing system to the horizontal and vertical module of the SunStyle tiles
- Provides a structure for attaching MLPEs and wiring



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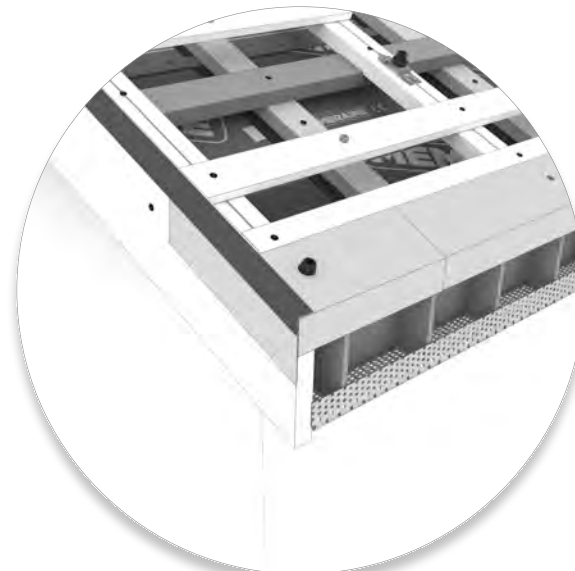
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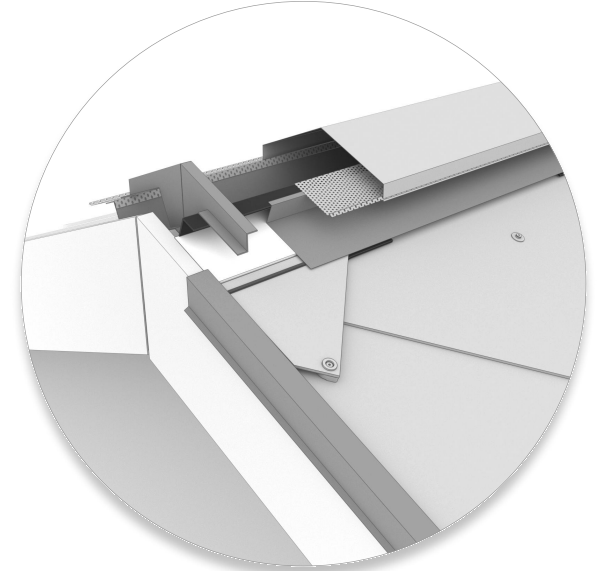
As part of your project design phase, SunStyle will work with you to help specify all flashing.



Rake Edge



Eave Vent



Ridge Vent

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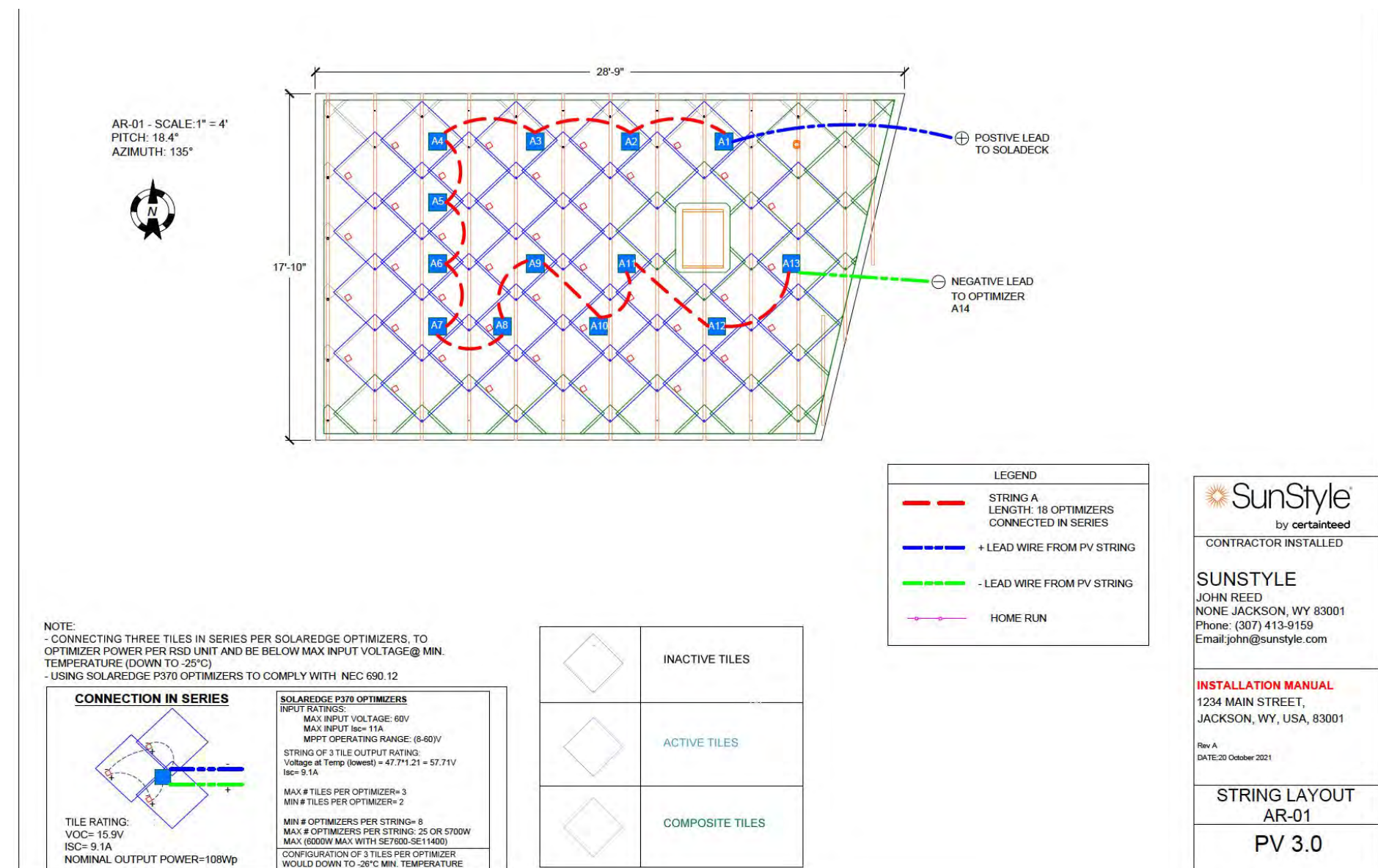
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Solar Engineering & Design

SunStyle works with partners to complete solar engineering and design. This includes the final kW system size, final module placement, choice of module-level power electronics and string layout.



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Roof Penetrations

Roof penetrations for SunStyle tile arrays should be installed with the same watertight sealing considerations as with standard solar installations. Notably, roof penetrations will be covered by the solar tiles and therefore placement, wire pulls, and mechanical interconnection by a certified electrician must precede tile installation.

It is important that the penetration point not be a point of leakage. Waterproof flashing should be used to seal the point of penetration in the membrane.

Acceptable options include:

- SolaDeck flashed PV roof mount enclosure
- IronRidge QBox junction box
- Or code-compliant junction box where roof penetration do not occur



QBox Junction Box

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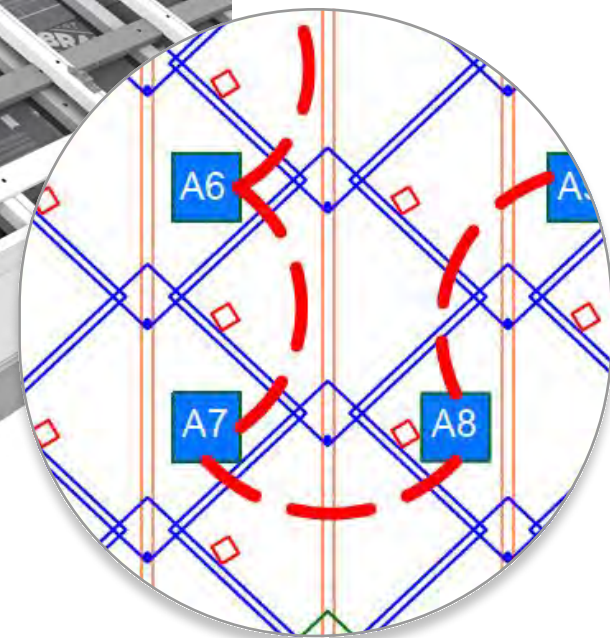
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MLPE Installation & Wiring

The SunStyle batten support system serves as a natural cable management solution. The second and third level battens provide horizontal and vertical planes that are used to keep tile cables and trunk cables off the roof deck.

Cables are secured to the 2x4 battens using code compliant ties. Alternative forms of cable management, based on project specific needs, must be approved by SunStyle prior to installation.

Once all three levels of the batten system are in place, installers attach the MLPEs to the second layer of battens using T-25 wood screws, layout and install each string between MLPEs, as well as homeruns to the designated roof penetration based on the one-line or simple diagram and tile layout.



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Edge Tiles

Edge tiles are installed diagonally from the bottom left corner, beginning at the eaves and working upward.



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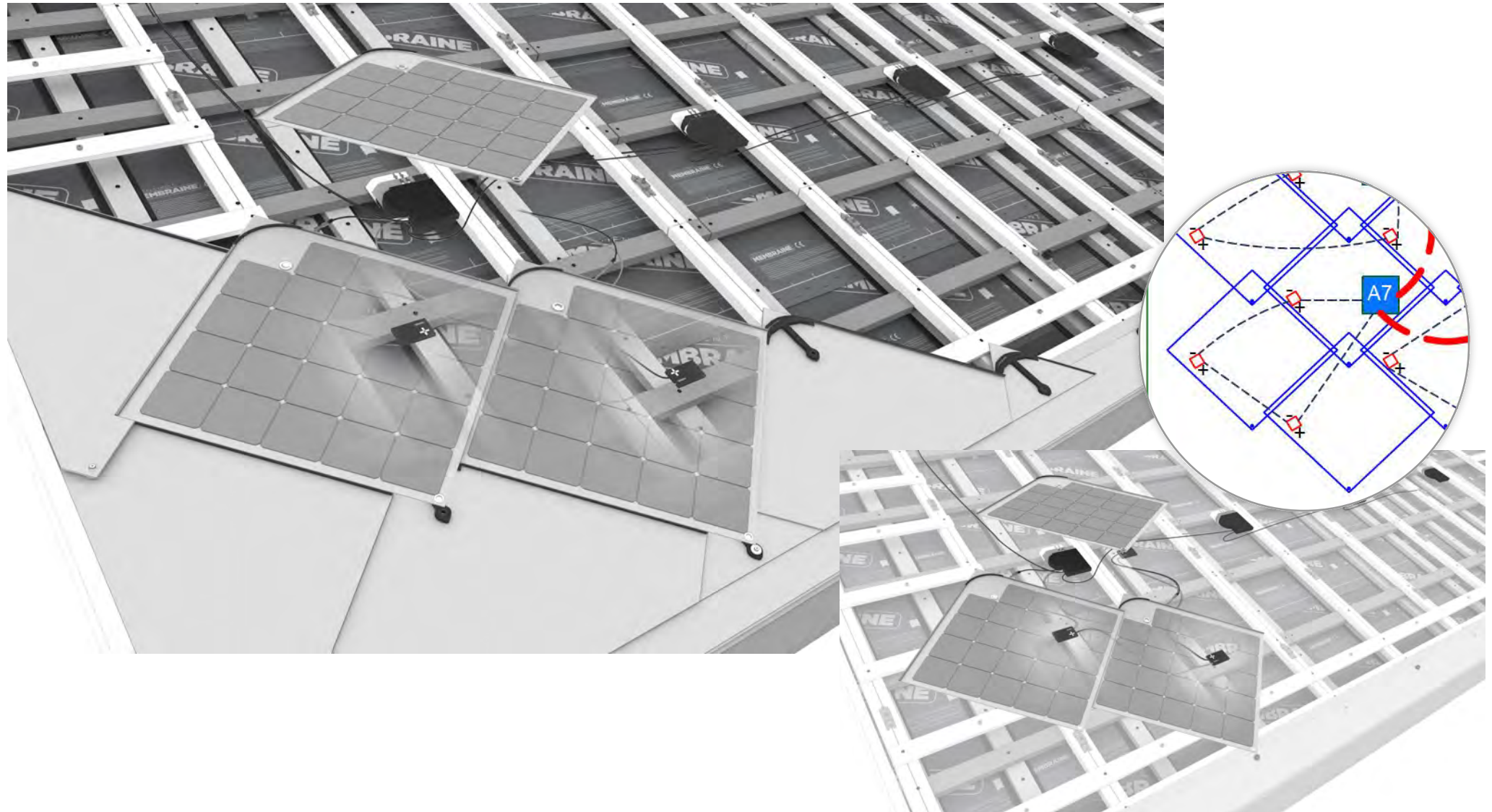
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Active Tiles

Active tiles are installed diagonally from the bottom left corner beginning at the eaves and working upward. Active tiles are connected to their designated strings in groups of 3 according to the string layout.



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Roof Obstructions & Penetrations

Skylights and roof penetrations including chimneys and exhaust vents require special attention, whether in new or existing construction.

All skylights and roof penetrations must extend above the top of the layer of tiles (~ 6" from the roof deck) in order for proper flashing and waterproofing around the protrusion.

For existing construction, all roof protrusions should be accurately measured, both in size and in distance from the roof edge, prior to beginning the design phase. If the height is found to be inadequate, the roof protrusions, including skylights, may have to be raised to a height equal to or greater than the top of the tile layer.

SunStyle manufactures active, inactive, and composite tiles. Active and inactive tiles cannot be cut or modified in any way. Inactive tiles have mounting holes that align with the module. Composite tiles can be cut or drilled in the field or shop. A combination of inactive and composite tiles are used at the ridge, eaves, hips, and valleys to accommodate various roof geometries.



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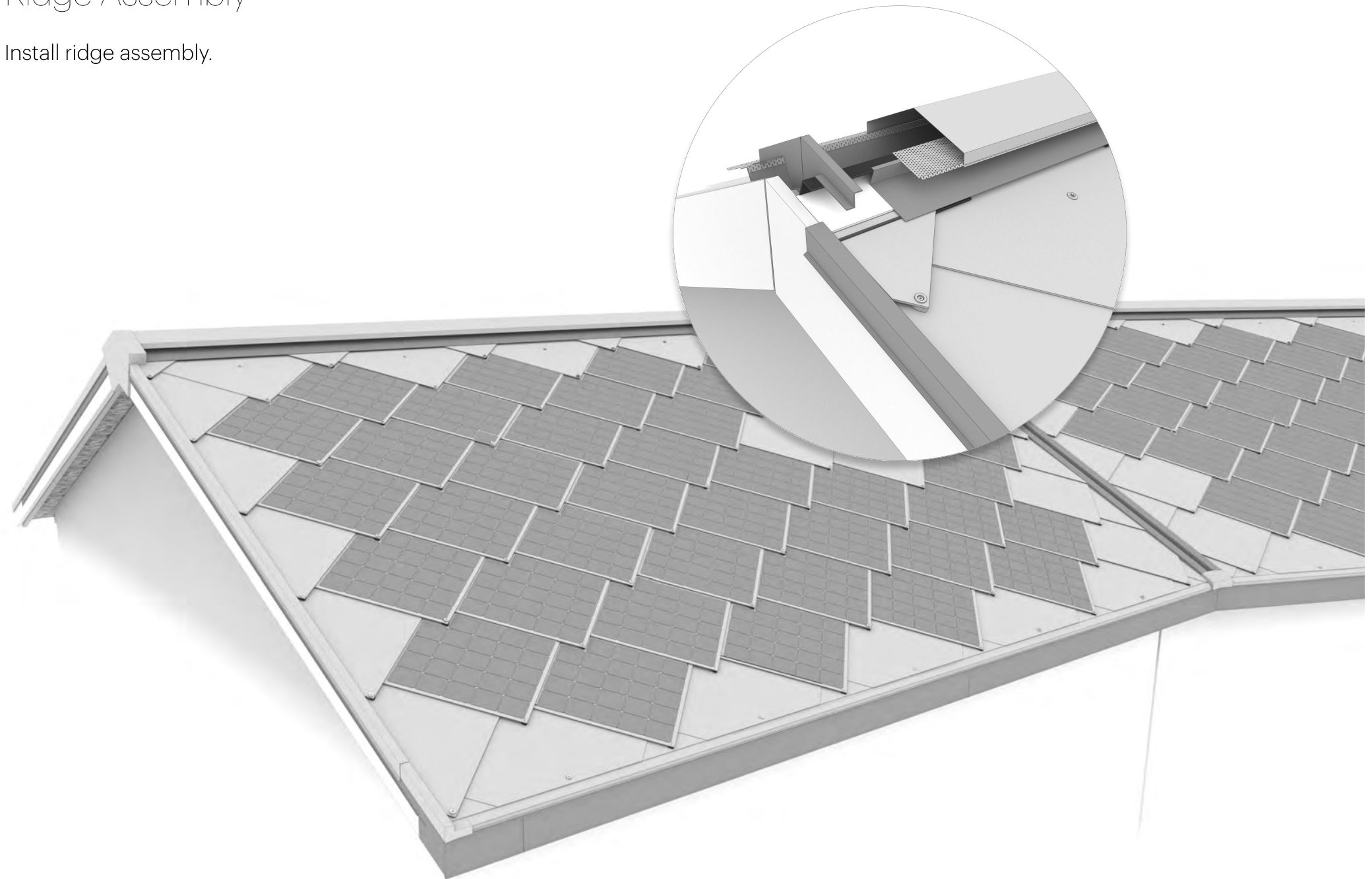
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Install ridge assembly.



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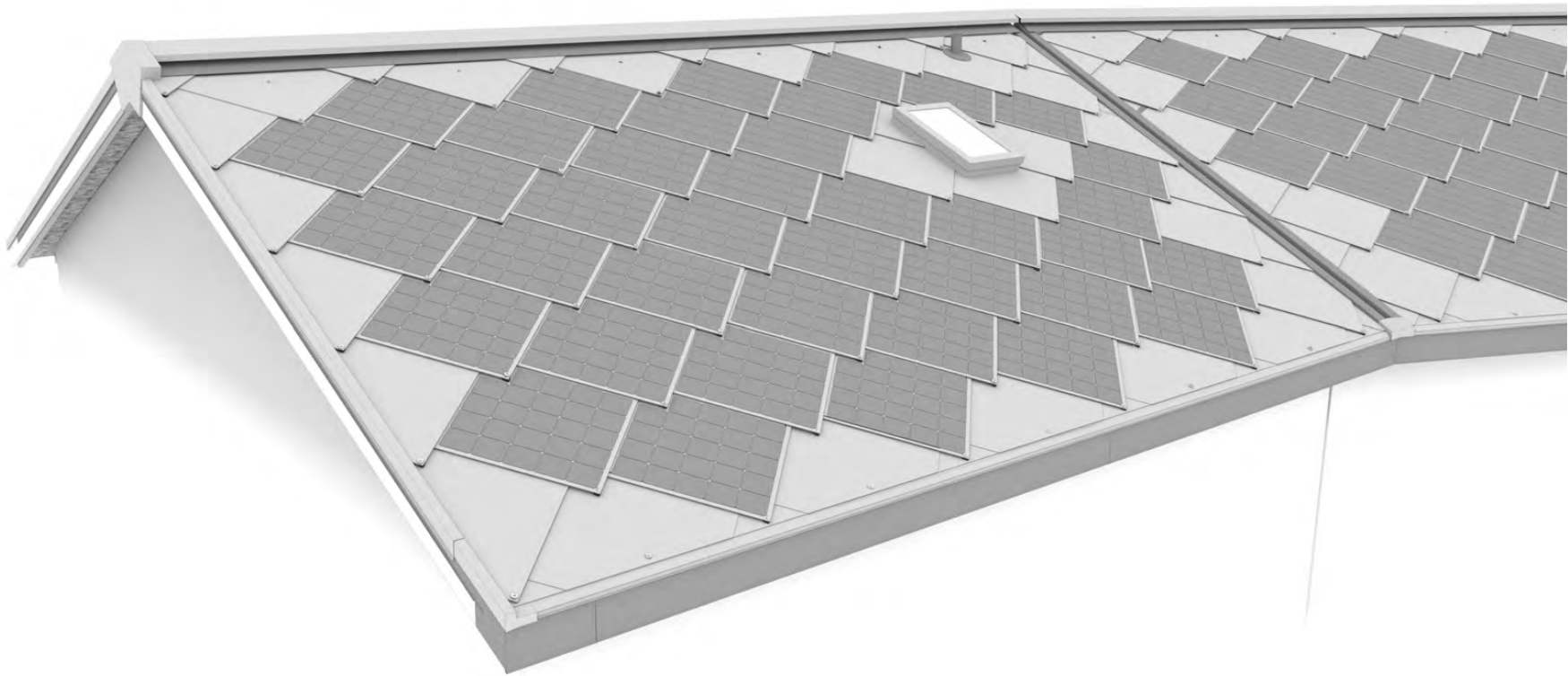
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System Activation

Once a 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 is 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 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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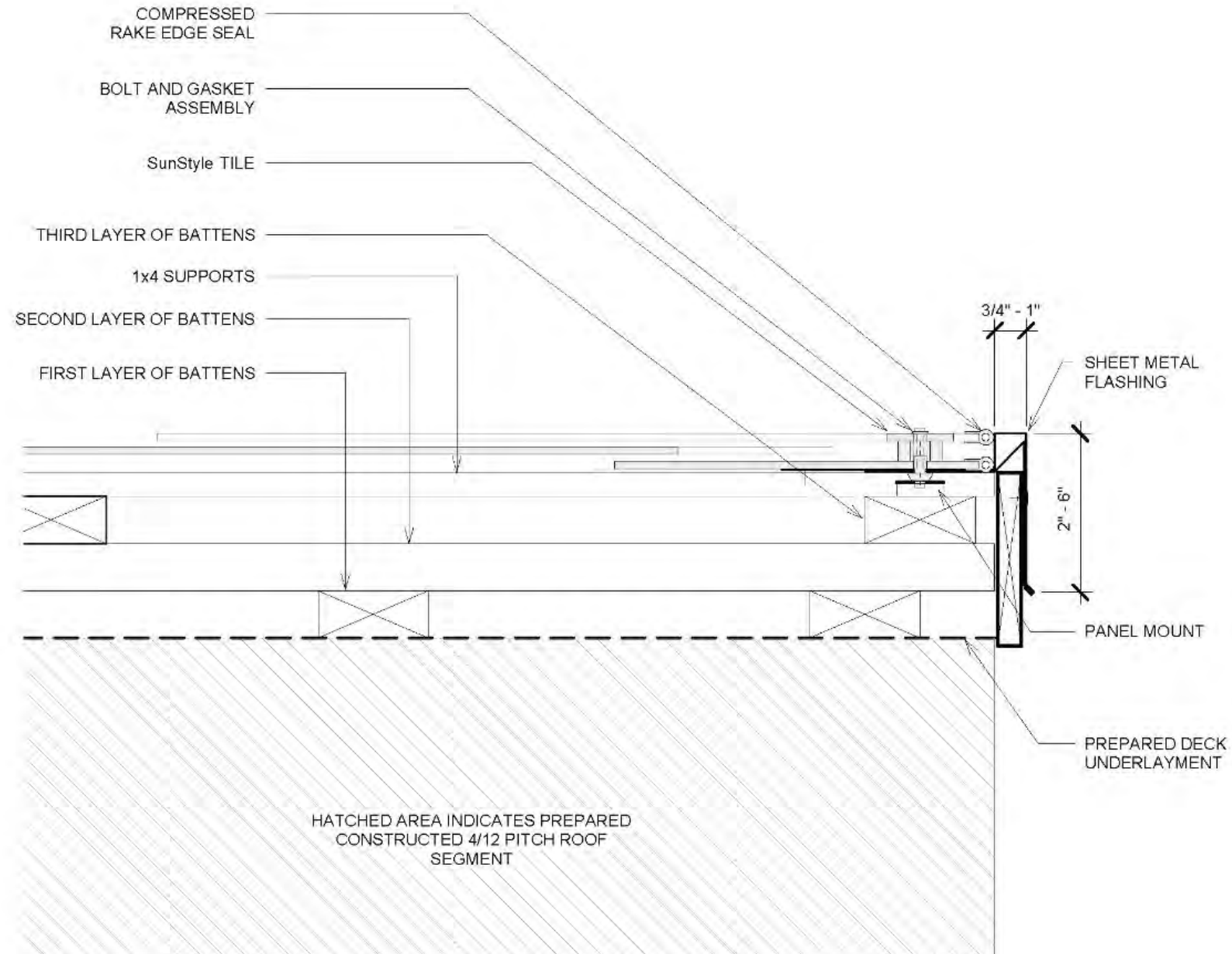
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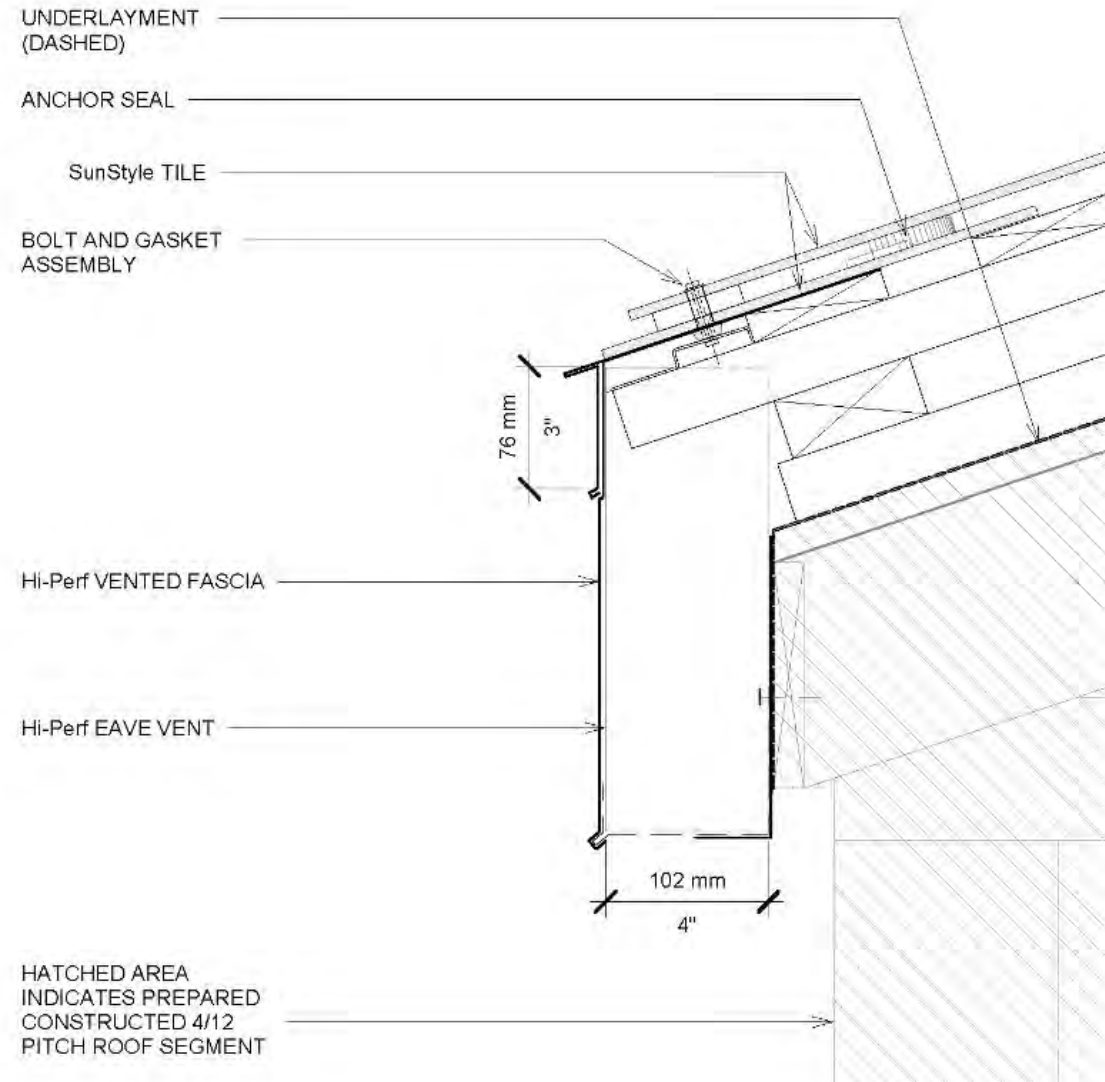
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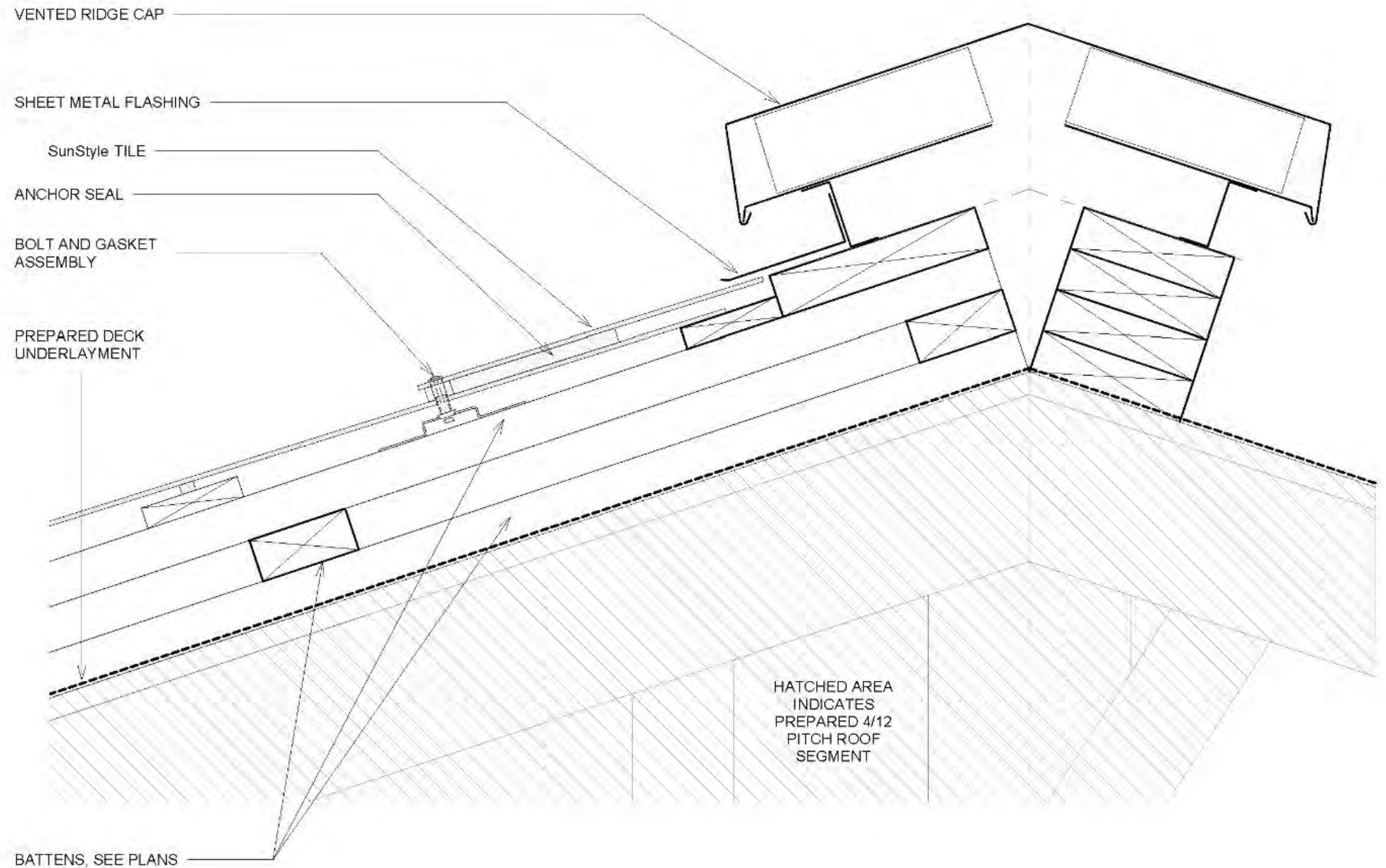
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Performance Monitoring

An installed system’s functionality may be monitored remotely, depending on the solar electric components that were chosen and installed. Most solar electronic manufacturers offer system-level monitoring through a screen on the inverter or remotely via website or application. Monitoring can be installed to show system production, and may have the capability to provide details down to the MLPE, depending on the chosen equipment.

Specific monitoring systems offer the opportunity to track the building’s consumption as well as the system’s production. If storage is included in the system, the settings for how much energy is used onsite, when it is used on site, and/or when it is exported are all set up remotely through a monitoring system.

Note that monitoring typically does not have any effect on the performance of the system and a system will perform perfectly without continuous monitoring. However, monitoring can be used to help identify and troubleshoot production issues.

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Walkability

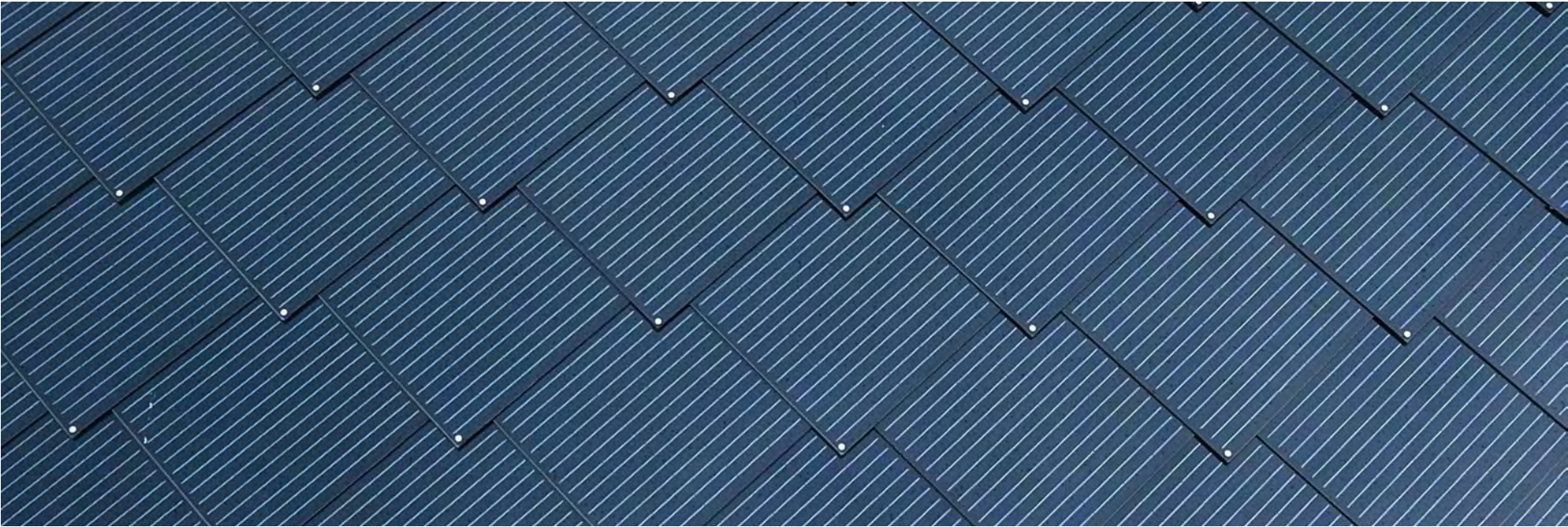
The SunStyle solar roof is walkable after proper installation and with appropriate safety precautions. Roof walk-on is only permitted with clean shoe soles and when the tiles are completely dry. No sharp or heavy objects are to be placed on the glass. During installation and maintenance, prioritize walking on the active tile surfaces where anchor seals are present to avoid excessive loading of the tiles. Never step directly on the composite (alucobond) tiles.

Maintenance

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

Repair

If any component of the SunStyle systems needs to be repaired, individual active tiles can be removed by reversing the installation process described in the install manual.



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At SunStyle, we believe in our product and want you to feel confident in your investment. The SunStyle roof is both a solar system and a premium roofing solution, so our warranty covers both product and performance. We guarantee energy output at 90% of the tile’s rated power for 10 years and 80% rated output for 25 years. Our tiles are guaranteed for 25 years.

What We Cover

The Limited Warranty covers SunStyle solar tiles when installed by a solar installer according to the specifications of the SunStyle Installation Manual, subject to normal conditions of application, use and maintenance. The warranty covers both the tile and power performance:

(1) Product Warranty

Tiles will be free from any defects in material and workmanship for 25 years from the time of installation, except as otherwise provided in the Performance Warranty below.

(2) Performance Warranty

For 10 years following installation, SunStyle warrants that power output capacity of each tile will be at least 90% of the power output capacity of the rated power specified on the nameplate. Power output shall be at least 80% for 25 years following installation.

This Limited Warranty does not cover (i) ancillary materials and equipment supplied by the installer which may include, for example, roof underlayment, flashing, and gutters or (ii) power level electronics which may include inverters, rapid shut-down devices, and mid-circuit interrupters. Warranties for ancillary materials and power level electronics shall pass through to the customer.

Submitting a Claim

If there is a problem, customers should first contact the installer. If the installer is not available, the customer may submit a claim directly to SunStyle by emailing info@sunstyle.com.

Maintenance and Operation

SunStyle tiles may require routine maintenance not covered by this Limited Warranty. This required maintenance is set out in the Owner’s Manual and must be performed in compliance with its requirements.

Transferring Your Warranty

This Limited Warranty is provided to the end user who purchases SunStyle tiles for installation on his or her property, or any subsequent owner of the property who provides proof of ownership of the property, provided that the subsequent owner has not relocated the Solar Tiles.

SunStyle’s full Limited Warranty document is available at contract execution and upon request. To request a copy of the full Limited Warranty, please email info@sunstyle.com.

