



SunStyle[®]

Installation Manual

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Introduction

The SunStyle system includes the SunStyle (solar) shingles as well as the mounting and sealing elements for both active and inactive parts of your roof. This manual provides the system installation instructions; these instructions are only applicable for the SunStyle solar roof. This document does not describe the preparation of the sub roof. Please read this manual completely and in detail before starting the installation of your project.

This manual may be frequently updated by SunStyle; please refer to the latest version.

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DOCUMENT CONTROL

Version	Date	Changes
1.0	July 2023	Initial version
1.1	Dec. 2023	Corrections
1.2	Dec. 2024	p. 13: "IMPORTANT: ..."



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Shingle Specifications



SunStyle Model M84 745

General Characteristics

Shingle Dimensions	745 x 745 x 7.5 mm
Construction	Glass EVA Cells EVA Glass
Solar Cell Type	PERC Monocrystalline
Glass Thickness	3.2 mm (front) + 3.0 mm (back)
Glass Properties	Tempered Solar Glass
Weight	20.5 kg/m²
Temperature Range	-40° C to 85°C
Junction Box	Renhe or TE Connectivity
Connection Cable	Solar Cable 4mm²
Connection Cable Length	950mm
Connector	Original Staubli Multi-Contact (MC-4)
Frame Material	Frameless
Roof Pitch	4° to 60°

Certifications

PV Module Safety	UL / IEC 61730-1, 61730-2
PV Module Performance	UL / IEC 61215-1, 61215-2
System Fire Rating	UL790 Class A
Test Load	12750 Pa
Design Load	8500 Pa
	Higher pressure available on demand
Alpine support slats	above 3600 Pa

Temperature Coefficients

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

Quality and Warranty

Product Guarantee	12 years
Performance Guarantee	10 yrs at 90% nom output 30 yrs at 80% nom output

Electrical Properties

Maximum System Voltage	1000 V DC
Maximum Fuse Rating	18 A
Open Circuit Voltage (Voc)	10.2 V
Maximum Power Voltage (Vmp)	8.1 V
System Power	up to 172 Wp/ m²
Nominal Power (Pmax)	
Short Circuit Current (Isc)	84 Wp
Maximum Power Current (Imp)	10.5 A
	10.4 A

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



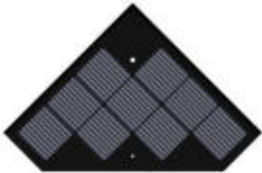
Class II

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Shingle Specifications



M84 745 - Solar Shingle Bottom

Electrical Properties

Maximum System Voltage	1000 V DC
Maximum Fuse Rating	18 A
Open Circuit Voltage (Voc)	6.1 V
Maximum Power Voltage (Vmp)	4.8 V
Nominal Power (Pmax)	50 Wp
Short Circuit Current (Isc)	10.5 A
Maximum Power Current (Imp)	10.4 A

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



Class II



M84 745 - Solar Shingle Top

Electrical Properties

Maximum System Voltage	1000 V DC
Maximum Fuse Rating	18 A
Open Circuit Voltage (Voc)	6.8 V
Maximum Power Voltage (Vmp)	5.3 V
Nominal Power (Pmax)	55 Wp
Short Circuit Current (Isc)	10.5 A
Maximum Power Current (Imp)	10.4 A

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



Class II



M84 745 - Solar Shingle Left

Electrical Properties

Maximum System Voltage	1000 V DC
Maximum Fuse Rating	18 A
Open Circuit Voltage (Voc)	4.1 V
Maximum Power Voltage (Vmp)	3.2 V
Nominal Power (Pmax)	33 Wp
Short Circuit Current (Isc)	10.5 A
Maximum Power Current (Imp)	10.4 A

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



Class II



M84 745 - Solar Shingle Right

Electrical Properties

Maximum System Voltage	1000 V DC
Maximum Fuse Rating	18 A
Open Circuit Voltage (Voc)	4.1 V
Maximum Power Voltage (Vmp)	3.2 V
Nominal Power (Pmax)	33 Wp
Short Circuit Current (Isc)	10.5 A
Maximum Power Current (Imp)	10.4 A

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



Class II

Safety Instructions

Please read the following safety instructions carefully. Non-compliance with these instructions could cause serious injury or death and void the warranty.

1. Purpose of these Safety Instructions

This manual contains basic information regarding SunStyle solar shingles, their installation and safe handling. All instructions should be read and understood before attempting installation. If there are any questions, please contact your dealer or SunStyle AG for further information.

This documentation refers to the solar shingles themselves and is not meant to be a complete installation manual for personnel not specifically trained to photovoltaic installations.

Generally, the installer must comply with all safety precautions in this documentation, as well as the applicable local, national and international regulations and standards when installing SunStyle solar shingles. Before installing a photovoltaic system, the installer should become familiar with the mechanical and electrical requirements for photovoltaic systems.

Keep this documentation in a safe place for future reference.

2. General Safety Relevant Aspects

Do not attempt to disassemble the solar shingle itself, and do not remove any attached nameplates or components. Doing so will void the warranty.

- The photovoltaic shingles are qualified for application class A: Hazardous voltage, current or power applications (IEC 61730 2016: higher than 35V or 8A or 240W) where general contact access is anticipated.
- Installing photovoltaic systems requires specialized skills and knowledge. It should be performed only by qualified and specially instructed personnel. The installer assumes all risk of injury, including risk of electric shock.
- Use only equipment, connectors, wiring and mounting hardware specifically designed for use in a photovoltaic system and especially for the SunStyle photovoltaic shingles.

2.1. Precautions for Mechanical Installation

- SunStyle photovoltaic shingles have to be installed with the specific SunStyle mounting system, either over an under-roof membrane for elevated temperatures or a non-combustible under-roof. Other use is out of the standard specification and lies within the full responsibility of the installer.

2.2. Precautions for Electrical Installations

Caution: Before any manipulation at an installed PV plant, switch off first the output side of the inverter or the charge controller and after on the input side.

- Disconnecting wires connected to a solar shingle that is exposed to light, can cause electric arcing. Arcing can cause burns, start fires or otherwise create safety (up to lethal electric shock) problems.
- Check for remaining voltage before starting and observe the local safety relevant regulations for such working conditions.
- Contact with a DC voltage of 30 V or more is potentially hazardous. Exercise caution when connecting or disconnecting solar shingles exposed to sun-light.
- Under normal conditions, a solar shingle may produce more current and/or voltage than specified under standard test conditions.
- Accordingly, the values of I_{sc} and V_{oc} marked on this solar shingle should be multiplied by a factor of 1,25 when determining the rated voltage of components, the rated current of conductors, the size of overcurrent devices, and the size of controls connected to the PV output.
- If the solar shingles are connected in series, the sum of the open-circuit voltages (V_{oc}) at the lowest expected temperature should not exceed the maximum specified system voltage.
- Only connect solar shingles with the same rated output current in series. If solar shingles are connected in parallel, the total current is equal to the sum of the individual solar shingles connected in parallel. Install the appropriate overcurrent protective device, where required.
- Only connect solar shingles or series combinations of solar shingles with the same voltage in parallel.

Safety Instructions

- Never connect solar shingles in parallel without string diodes or adequate devices to avoid reverse current from one string to the other.
- If the sum of short circuit currents of the parallel connected solar shingles exceeds the permissible reverse current (specified on the rating plate or data sheet of the solar shingle), string diodes or fuses have to be used in each string of solar shingles connected in parallel. These must be dimensioned for the maximum expected current and the maximum expected voltage.
- Observe the instructions and safety precautions for all other components used in the system, including wiring cables, connectors, DC-breakers, inverters, etc.
- Use appropriate safety equipment (insulated tools, insulating gloves, etc.) approved for use on electrical installations.

2.3. General Prescriptions for Installation

- Do not apply any paint or adhesive to the solar shingles.
- Do not use mirrors or other devices to artificially concentrate sunlight on the solar shingles.
- If required by applicable national, regional or local laws and regulations of the country, obtain a building and/or electrical license.
- Keep children well away from the system while transporting and installing mechanical and electrical components.
- Do not wear metallic rings, bracelets, ear, nose, or lip rings or other metallic devices while installing or troubleshooting photovoltaic systems.
- Do not attempt to drill holes in the glass surface of the solar shingle. Doing so will destroy the photovoltaic shingle and void the warranty.
- Do not lift the solar shingle by touching the junction box or the electrical cables.
- With the necessary safety precautions, dry photovoltaic shingles can be walked on with clean shoes, but there is a risk of slipping.
- Do not drop the photovoltaic shingle or allow objects to fall on the solar shingle.

- Do not place any heavy or sharp objects on the solar shingle.
- A load of more than 160 kg/m² is not permitted.
- Inappropriate transport and installation may damage the solar shingle glass or the solar cells inside the solar shingle.

3. Mechanical Installation

3.1. General Note

The SunStyle solar shingles are designed to be installed as building integrated photovoltaics (BIPV) on a pitched roof. Therefore, local building codes have to be observed.

The balance of the system components (e.g. tin smith items) not provided by SunStyle should be made of durable, corrosion- and UV-resistant material.

The load calculation and applicability for a specific installation are the responsibility of the system planner or installer.

Caution! The glass of the SunStyle solar shingle (especially the edges and corners) must never touch each other, as the glass could break! Also avoid any contact between the glass and hard objects such as metal, sand, cement or stones.

3.2. Robustness of SunStyle Photovoltaic shingles and Mounting System

Observe the tested and permissible pressure and suction loads according to the data sheet. The data sheet also states the pressure load above which additional alpine support battens must be used.

If the solar shingles are installed in areas where stronger wind and snow loads are expected than the values listed in the data sheet, SunStyle must be contacted in advance.

The entire substructure must be strong enough to withstand the above loads.

Safety Instructions

3.3. Selecting the Location

- Select only suitable locations for installation of the SunStyle solar shingles.
- The solar shingle should not be shaded. If shading cannot be avoided, the shaded solar shingles must be connected in such a way that they are not damaged.
- Do not install the solar shingle near equipment or in locations where flammable gases can be generated or collected.

4. Electrical Installation

4.1. Grounding

- The SunStyle solar shingles are unframed. Grounding is therefore neither possible nor necessary. Regardless of this, metallic objects on the roof must be grounded, and all local electric codes and regulations must be observed.

4.2. General Electrical Installation

CAUTION! Risk of electric shock! Do not touch bare conductors or other potentially energized live parts.

- Solar shingles convert light energy into direct-current electrical energy. They are designed for outdoor use.
- SunStyle solar shingles are supplied with IEC and UL certified cables and plugs for serial electrical connections.
- Only plugs of the same manufacturer as those solar shingles may be combined. Where permitted by the manufacturer, its different types may be combined.
- Only use IEC and UL certified cables as string cables, which are double insulated and suitable for at least 90°C. They should be suitable for the expected maximum current. They should be suitable for the expected maximum current, the maximum voltage and the local environmental conditions. Refer to the relevant standards in your country to determine the requirements for overcurrent, current carrying capacity and conductor size. Minimum cross-section for serial connection: 4mm² (#12 AWG).
- The solar plugs should never be disconnected under load! Follow the first rule in chapter 2.2.

If the field combiner cables are not equipped with touch safe plugs on both ends, it is highly recommended to install them safely into the clamps of the field combiner box, because they will be under high voltage once the modules are attached and there is daylight.

- For best performance, ensure that positive and negative DC wires run closely together avoiding loops, which will also reduce the strength of inductive impacts of nearby lightning strikes.
- After installing a string, use suitable measuring equipment and circuit breakers to measure at least the short-circuit current and open-circuit voltage to check the performance.

5. Maintenance

SunStyle recommends the following maintenance items to ensure optimum performance of the solar shingles:

- Check solar shingles regularly, at least every 12 months, for major soiling, leaves of trees and bird droppings.
- The most important maintenance is the regular monitoring of energy yields. Only if they do not meet expectations, further investigations are necessary.
- Eventually occurring problems must only be investigated by qualified personnel.
- In most cases, cleaning SunStyle solar shingle is not necessary. If it is, refer to the separate cleaning instructions.
- Observe also the maintenance instructions for all other components used in the system.

6. Shutting Down the System

- Disconnect system from all power sources in accordance with instructions for all other components used in the system.
- The PV-DC-connectors must never be disconnected under load! Use switches designed for being disconnected under the prevailing DC-load or stick to the first rule of chapter 2.2.

Safety Instructions

- The system should now be out of operation and can be dismantled. If you do this, observe all safety precautions regarding the installation.

8. Disclaimer of Liability

Due to the fact that the use of this documentation and the conditions or methods of installation, operation, use and maintenance of photovoltaic products are beyond SunStyle AG's control, SunStyle AG does not accept responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance.

The information in this documentation is based on SunStyle's knowledge and experience and is believed to be reliable, but such information including product specification (without limitations) and suggestions does not constitute a warranty, expressed or implied. SunStyle reserves the right to change the manual, the product, the specifications, or product information sheets without prior notice.

9. Transportation and Storage Conditions

- SunStyle photovoltaic shingles should be stored in a dark, dry location between -10 °C and 40°C in the original package with the installation manual, palette number and other original material. Connectors of solar shingles are sensitive, and the technical parameters are degrading if exposed to moisture and dew when not connected.
- The storage conditions should also be applied also during transportation.
- Do not expose the photovoltaic shingles to strong vibrations during transportation.

10. Information about Manufacturer

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Please consult your dealer or the manufacturer concerning the warranty of your solar shingles. If you have any further questions, your dealer will gladly assist you.

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Shingles

Ridge Shingles

Customisable Shingles

Full Shingle Installation

Shingle Types

	Solar Shingle		Corner Bottom Big Left		Shingle
	Solar Shingle Bottom		Corner Bottom Big Right		Shingle Bottom
	Solar Shingle Top		Corner Top Big Left		Shingle Top
	Solar Shingle Left		Corner Top Big Right		Shingle Left
	Solar Shingle Right		Corner Bottom Small Left		Shingle Right
			Corner Bottom Small Right		
	Shingle Bottom Small		Corner Top Small Left		Shingle Customisable
	Shingle Top Small		Corner Top Small Right		Shingle Transparent

Hardware & Gasketing



Mounting Bolt Short



Mounting Bolt



Mounting Screw



Screw Sealing Cap



Support Unit



Distance Socket



Solarclip



Sealing Anchor



Roof Ridge Sealing Profile



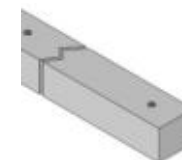
Sealing Profile



M6 Inlet



Snow Hook



Solar Slat
(with thread inserts)

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Required Tools

SunStyle Component Installation



Metric Tape Measure



RAMPA Insertion Tool
Type 507 M6



Cordless Screwdriver



Do not use Impact Screwdriver



Insert for hexagon socket 8mm



MC4 Assembly Tool

Customisable Shingle Fabrication (if needed)



Circular Saw



Circular Saw Blades
trapezoidal / flat tooth
(D = 250-300mm,
Speed 2000-5200 rpm)



Jigsaw



Jigsaw Blades
(2mm tooth pitch)

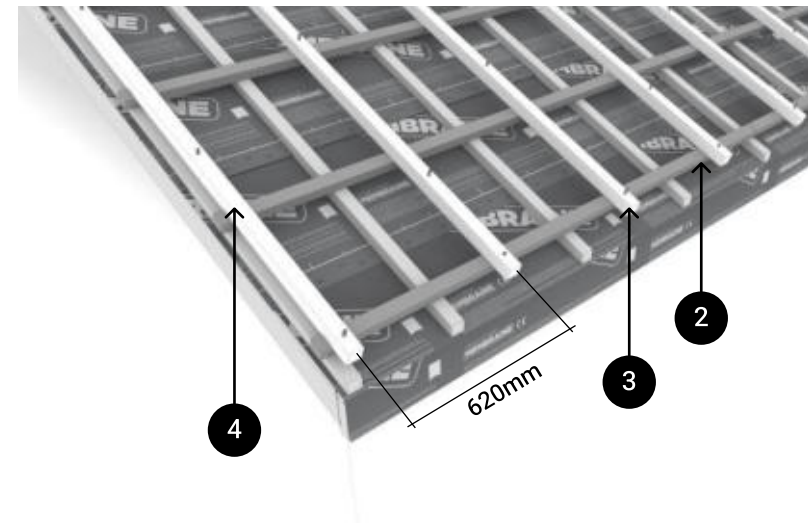
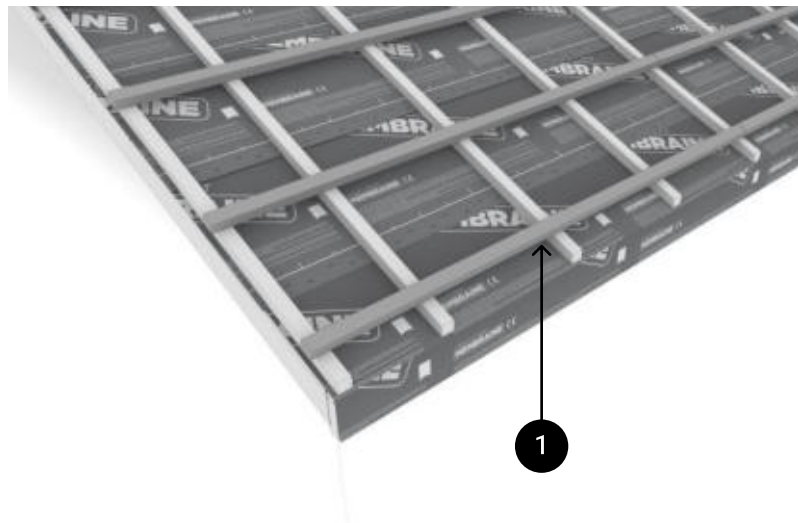


Hole Saw or Forstner Bit
(D = 16mm, 24mm)



Metal File

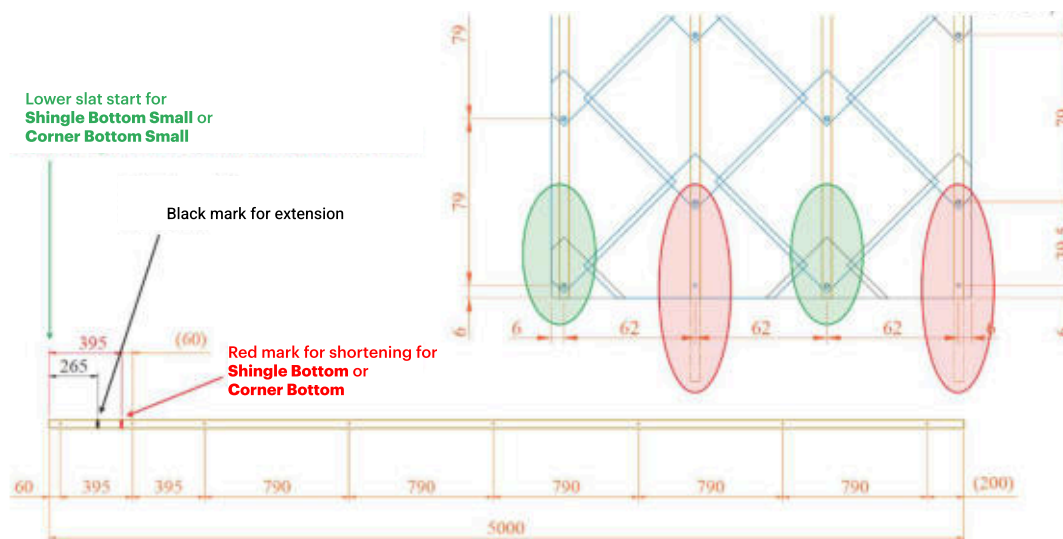
Solar Slats



- 1 Install Counter Slats and Horizontal Slats prior to installing Solar Slats.
- 2 Check how planar the roof is and use shims as needed to ensure the solar slats will be level. 1 cm/m deviation from the plane is allowed.
- 3 Screw on the solar slats. Use a suitable piece of slat as a spacer and a tape measure to ensure that the slats are 620 mm apart from center to center.
- 4 Use $\varnothing 5\text{mm}$ screws at each slat cross point, at a length that does not protrude from the lower slat (e.g. for 30mm high horizontal slats $\varnothing 5 \times 70\text{mm}$).

Note: Screws for attaching the slats to each other are NOT supplied by SunStyle.

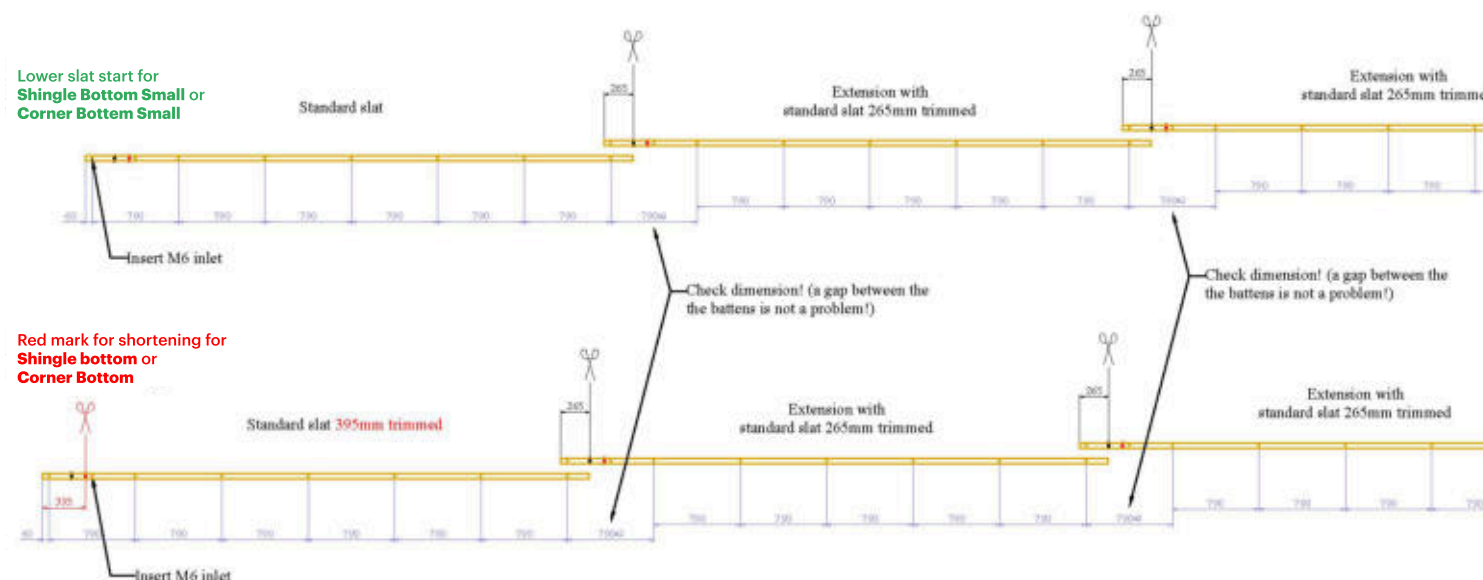
Adaptation of Standard Slats



IMPORTANT :

this roof arrangement is only an example.

It must be carried out in accordance with the project assembly plan!



- 1 Follow your Assembly Plan for the placement of the Slats, alternating the position of the hardware as shown.

Alpine Support Slats

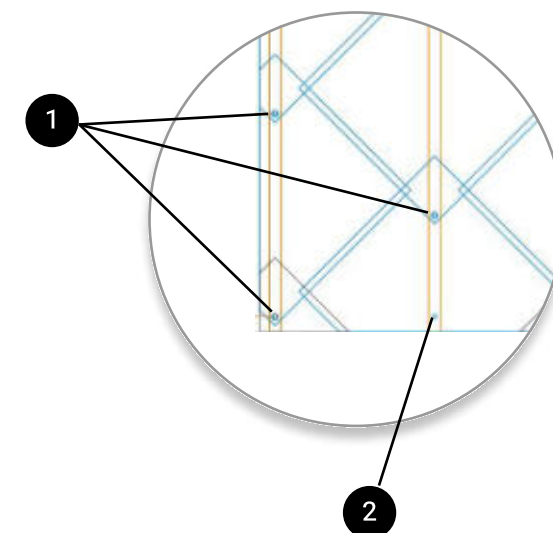
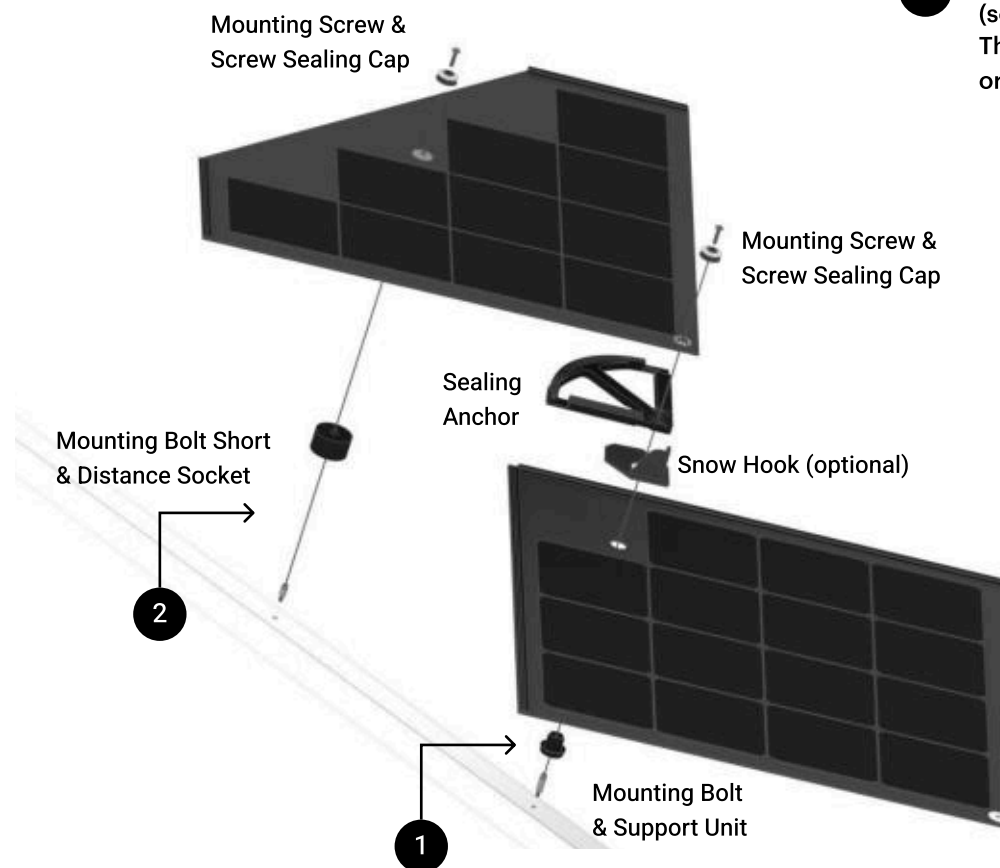


- 1 For snow loads above 3600 Pa, install an additional 55 mm x 55 mm support batten (without thread inserts), centered between the solar slats, to support the higher load.

Single vs. Double Shingle Mount

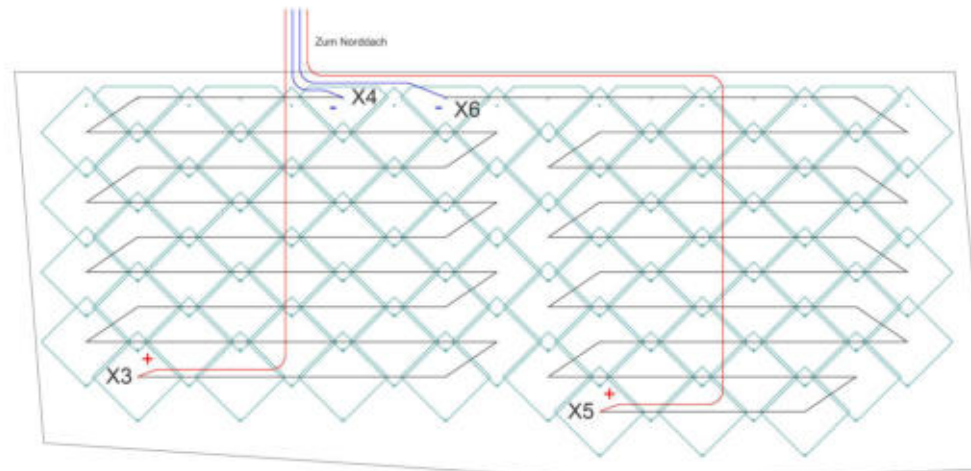
There are two mounting scenarios which you will need to review prior to the next installation steps. Refer to your Assembly Plan for your specific single and double shingle mount locations.

- 1 Double Shingle Mount - the screw passes through 2 (solar) shingles
- 2 Single Shingle Mount - the screw only passes through 1 (solar) shingle.
This only occurs with a (solar) **Shingle Bottom** (on the eaves) or a (solar) **Shingle top** (on the ridge).

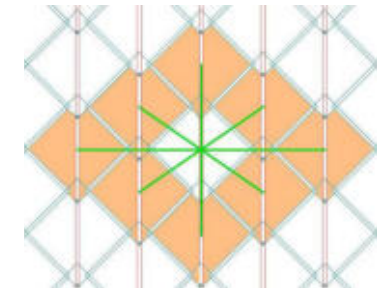


Examples of String Plans

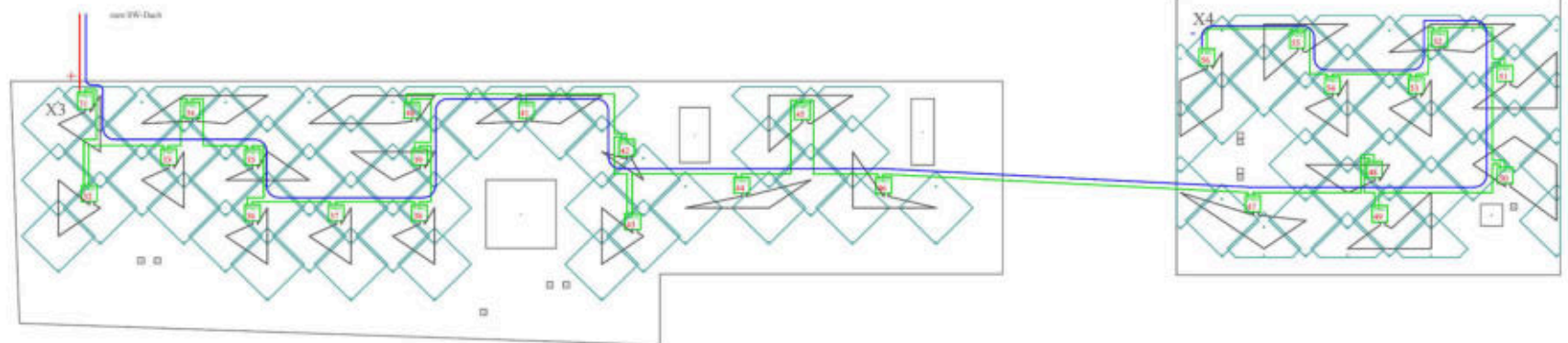
The installer usually creates the string plan. Optionally, SunStyle can provide string planning. SunStyle solar shingles can be combined with most inverters and some optimiser types. The installer is responsible for proper interconnection as well as minimizing induction loops through appropriate placement of cables between strings or optimisers and inverters.



Example with string Inverter

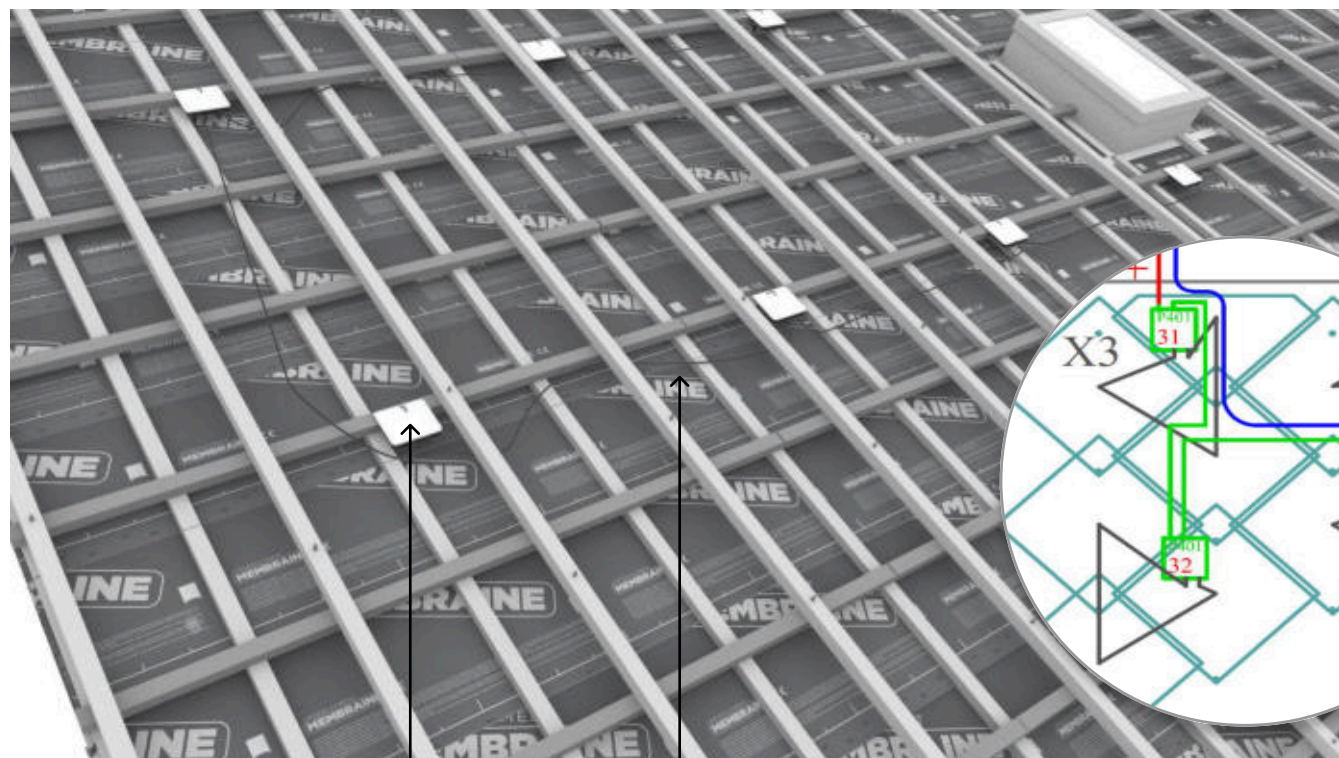


The cable lengths range up to the 8 surrounding solar shingles



Example with optimizers

Optimiser Installation & Wiring



Example Assembly Plan detail showing the optimiser placement

2

1



Cables must NEVER be laid above the solar slats, but as shown: below the solar slats and above the horizontal cross slats.

1

If only one thick slat is mounted instead of 3 layers of slats, holes or notches must be provided through which the plugs can easily fit.

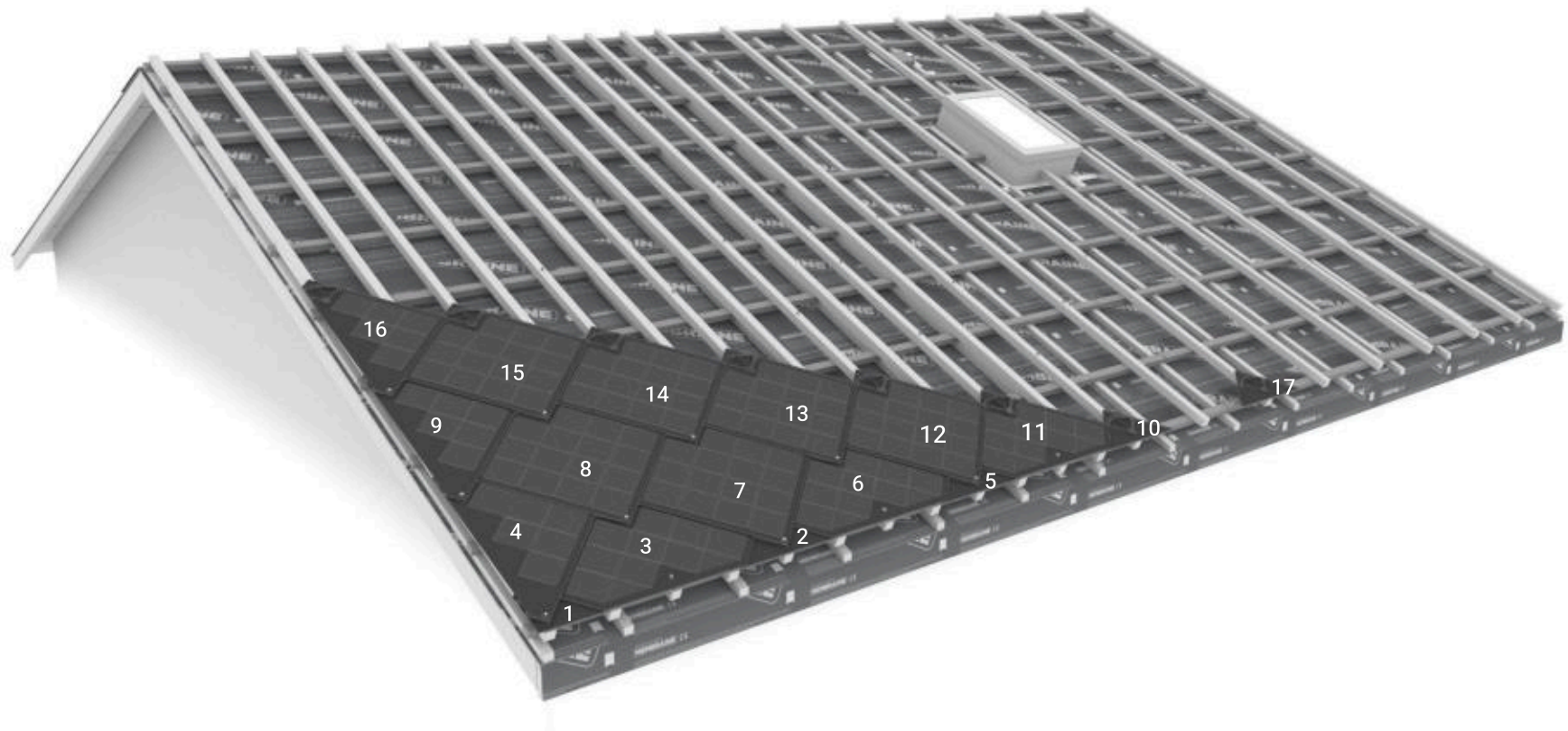
2

Screw the optimizer onto the cross slats before installing the solar shingles.

Suggested installation sequence for steep roofs (> approx. 30°) or wet surface



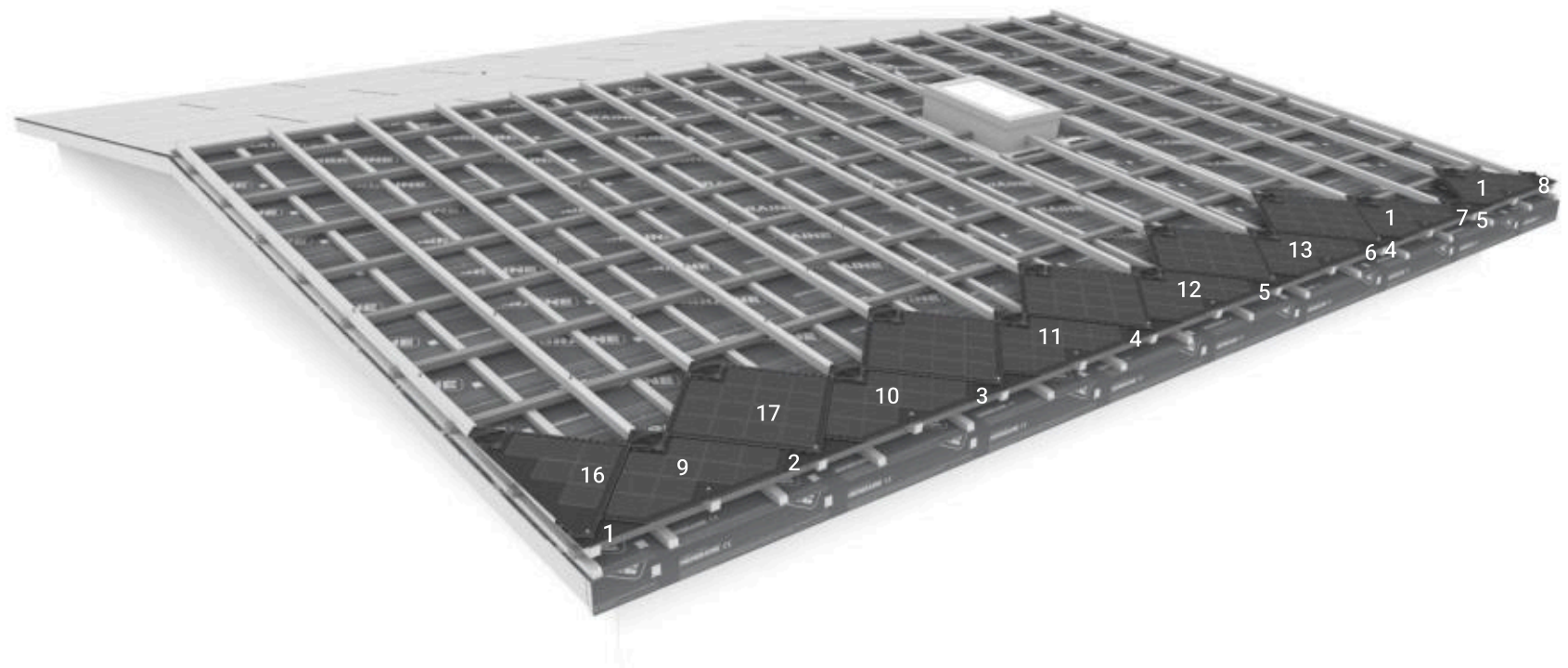
WARNING: Only walk on dry (solar) shingles!
And only with clean (brushed) shoes to avoid scratching the glass!



Suggested installation sequence for small roof pitches (< approx. 30°) and dry surface



WARNING: Only walk on dry (solar) shingles!
And only with clean (brushed) shoes to avoid scratching the glass!

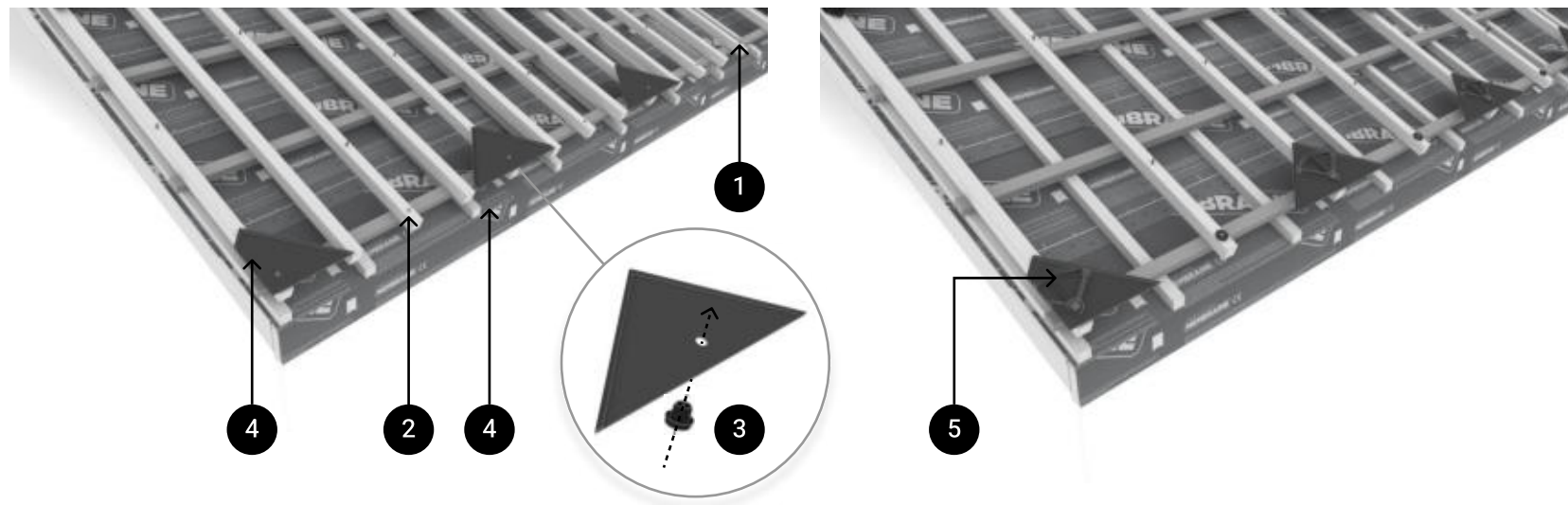


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Begin Shingle Installation

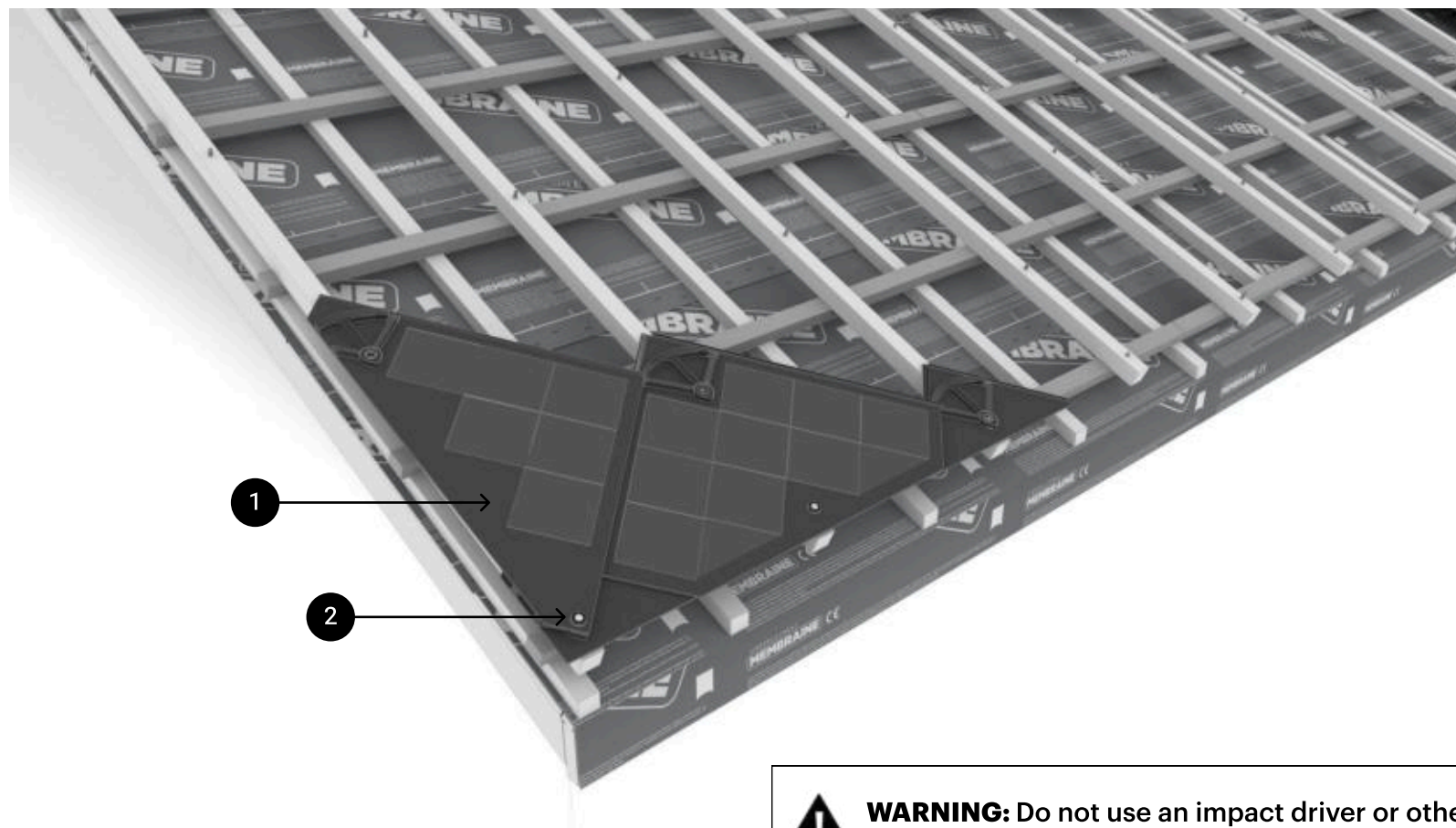


- 1 Screw in a **Mounting Bolt** for each double shingle mount
- 2 For each single shingle mount, screw in a **Mounting Bolt Sshort** and stick on a **Distance Socket**
- 3 Press a **Support Unit** into each large hole (24 mm) of the shingle from the back
- 4 Place **Corners Small** and **Shingles Bottom Small** according to installation plan
- 5 Place a **Sealing Anchor** on each **Support Unit**
Cut off protruding **Sealing Anchors** at the edge of the roof (verge) after all shingles have been installed



Note: **Sealing Anchor** will not lay flat until the next shingle is mounted on top of it. Do not cut **Sealing Anchors**, except at the verge.

Mounting Edge Shingles



WARNING: Do not use an impact driver or other power tools, only a non-impact cordless screwdriver for shingle installation.

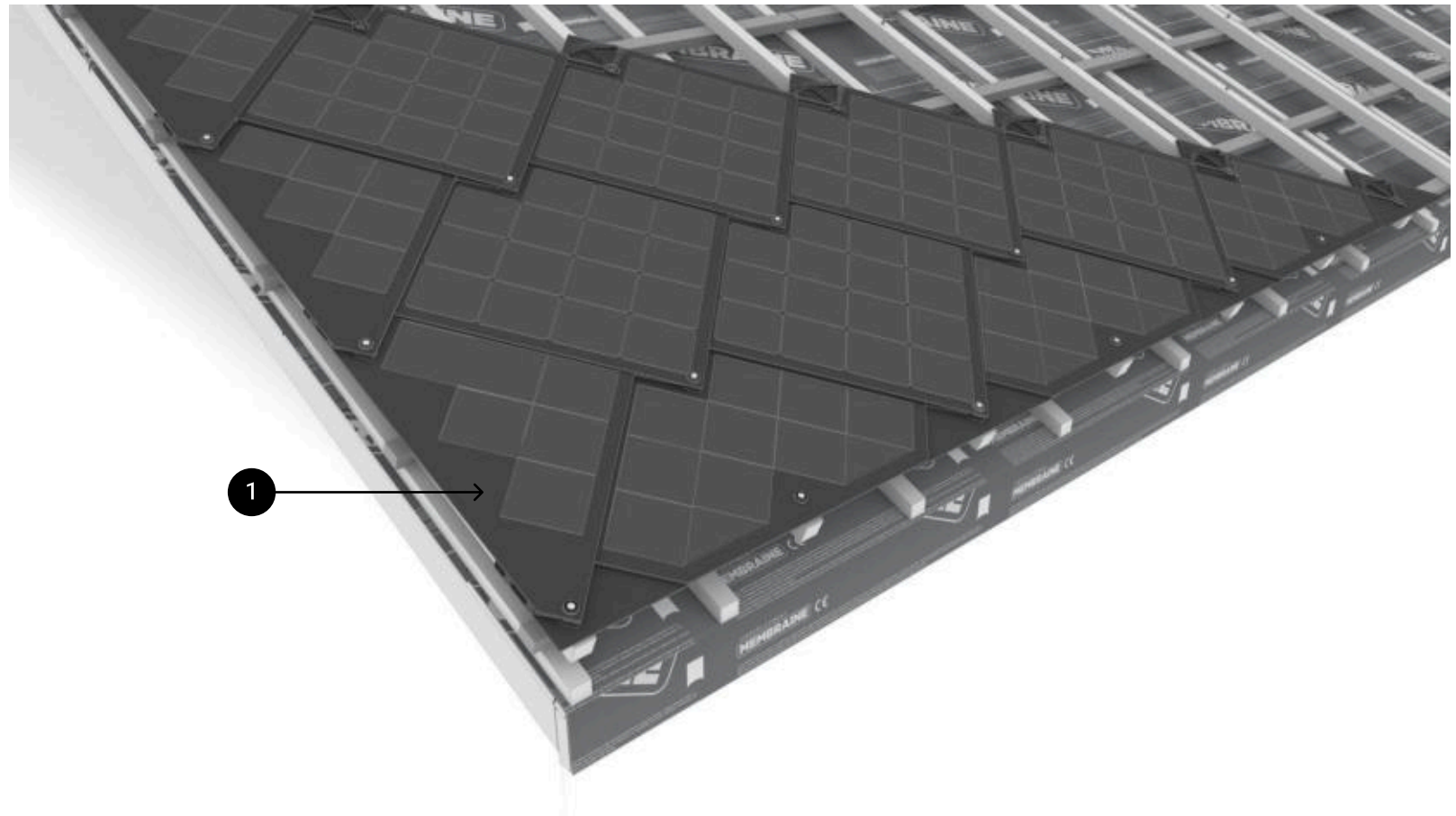
1

Install (solar) shingles according to the installation plan and the shingle type list

2

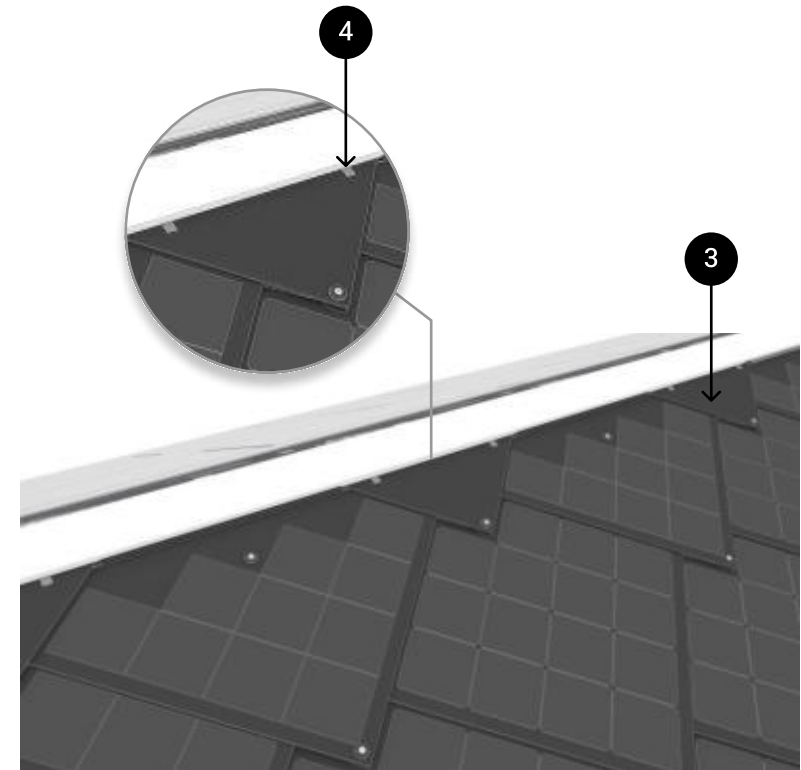
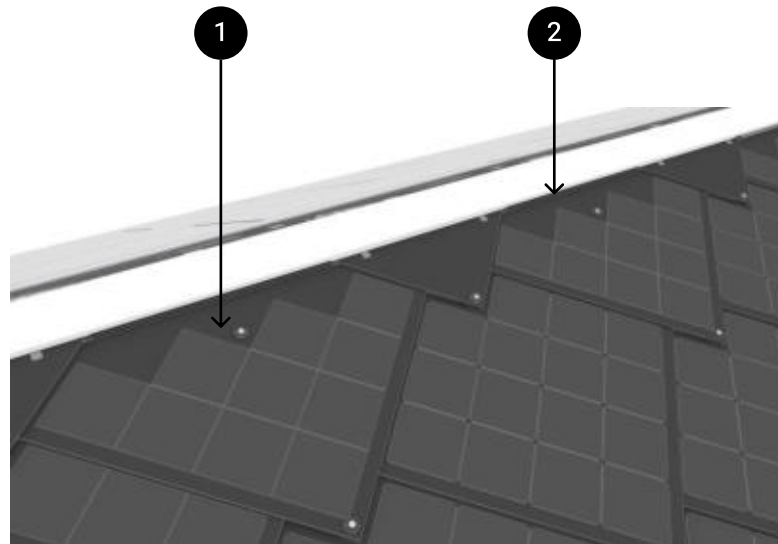
Insert the mounting screw with screw seal manually and tighten with 2 Nm (+/-0.5 Nm).

Mounting Shingles



1 Install (Solar) Shingles according to your Assembly Plan.

Ridge Finish



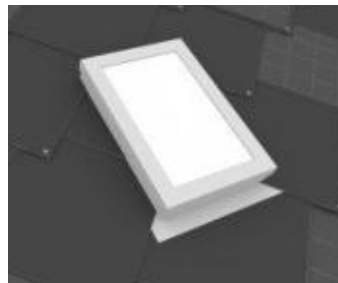
- 1** Install the (Solar) **Shingles Top** or the **Corners Top Big** according to the assembly plan. The top screw is only a single shingle mount.
- 2** Clamp **Ridge Seal** with gasket upwards.
- 3** Install **Shingles Top Small** based on your assembly plan. They overlap the **Ridge Seal** a little respectively.
- 4** Slide on the **Solar Clips** by pressing the two shingles above and below the **Ridge Seal** together.

Customisable Shingles

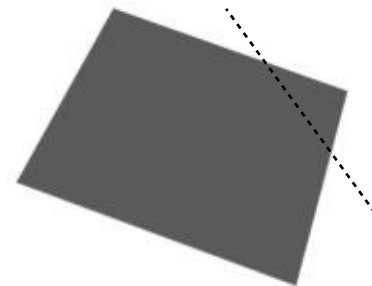
This page includes instructions for customising full size shingles.



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



- 1 Identify where customisable shingles are needed.



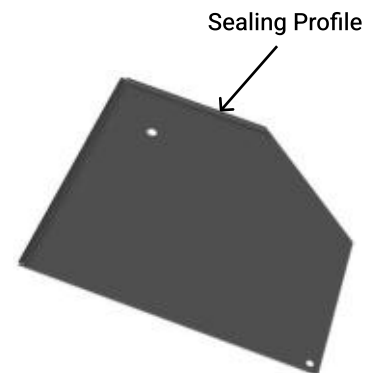
- 2 Measure and mark cut line.



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



- 4 Determine hole locations by overlaying a pre-cut shingle, then drill 24mm and 16mm holes, using the pre-cut shingle as a template. Holes must be more than 13mm from edge of shingle.



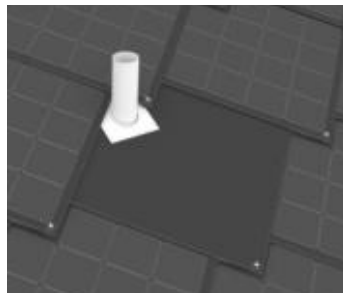
- 5 Glue the sealing profile to the diagonal upper edges.
IMPORTANT: Do not stretch the sealing profile when gluing it on, otherwise it will contract again over time, making it too short.

Customisable Shingles

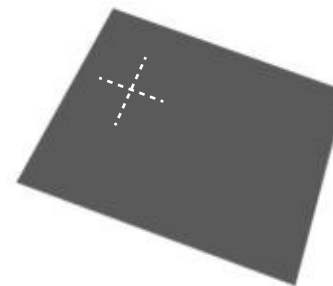
This page shows how to adapt customisable shingles.



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



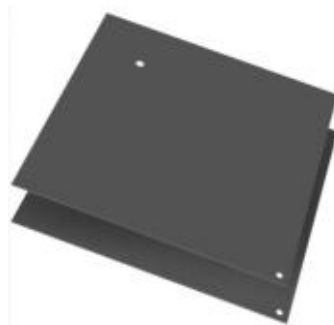
- 1 Identify where customisable shingles are needed.



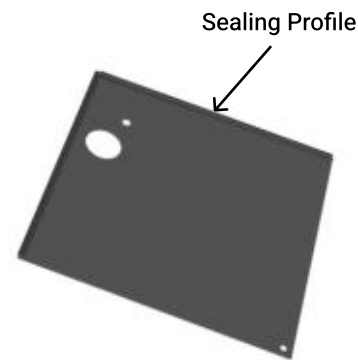
- 2 Measure and mark cut line.



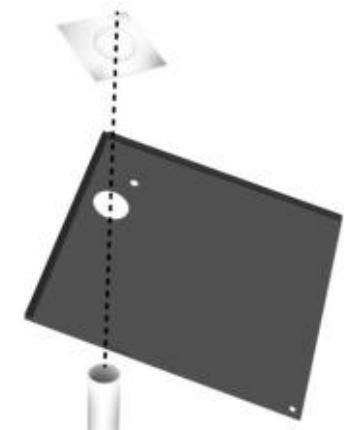
- 3 Cut composite shingle with jigsaw. File cut edges for safety.



- 4 Determine hole locations by overlaying a pre-cut shingle, then drill 24mm and 16mm holes, using the pre-cut shingle as a template. Holes must be more than 13mm from edge of shingle.



- 5 Glue the sealing profile to the diagonal upper edges. **Important:** Do not stretch the sealing profile when gluing it on, otherwise it will contract again over time, making it too short.



- 6 Install flashing.

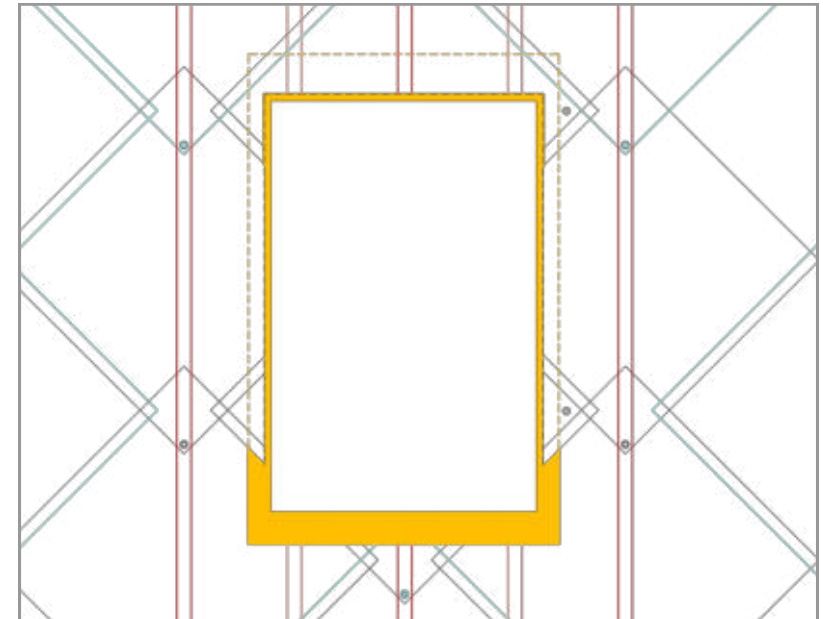
Customisable Shingles Around Skylights

Install flashing and customisable shingles at skylights.



1

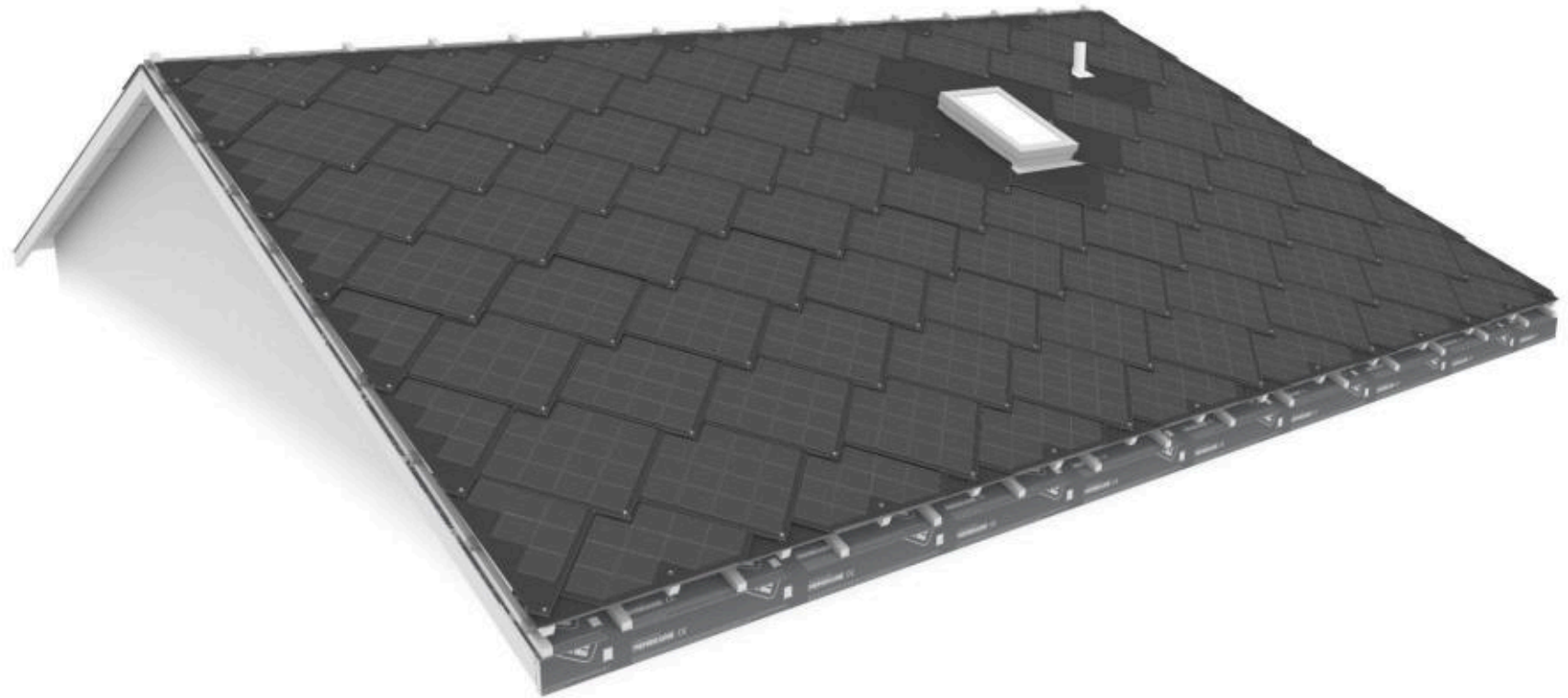
2



1 Up slope of the window, ensure shingles cover flashing.

2 In the lowest part of the window, the shingles lie under the flashing.

Full Shingle Installation



Introduction
Shingle Specifications
Safety Instructions

Project Materials
SunStyle System
Shingle Types
Hardware & Gasketing
Required Tools

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Solar Slats
Single vs. Double Shingle Mount
Examples of String Plan
Optimiser Installation & Wiring
Shingle Order - Steep Slope and Wet Surface
Shingle Order - Gentle Slope
Begin Shingle Installation
Edge Shingles
Shingles
Ridge Shingles
Customisable Shingles
Full Shingle Installation

