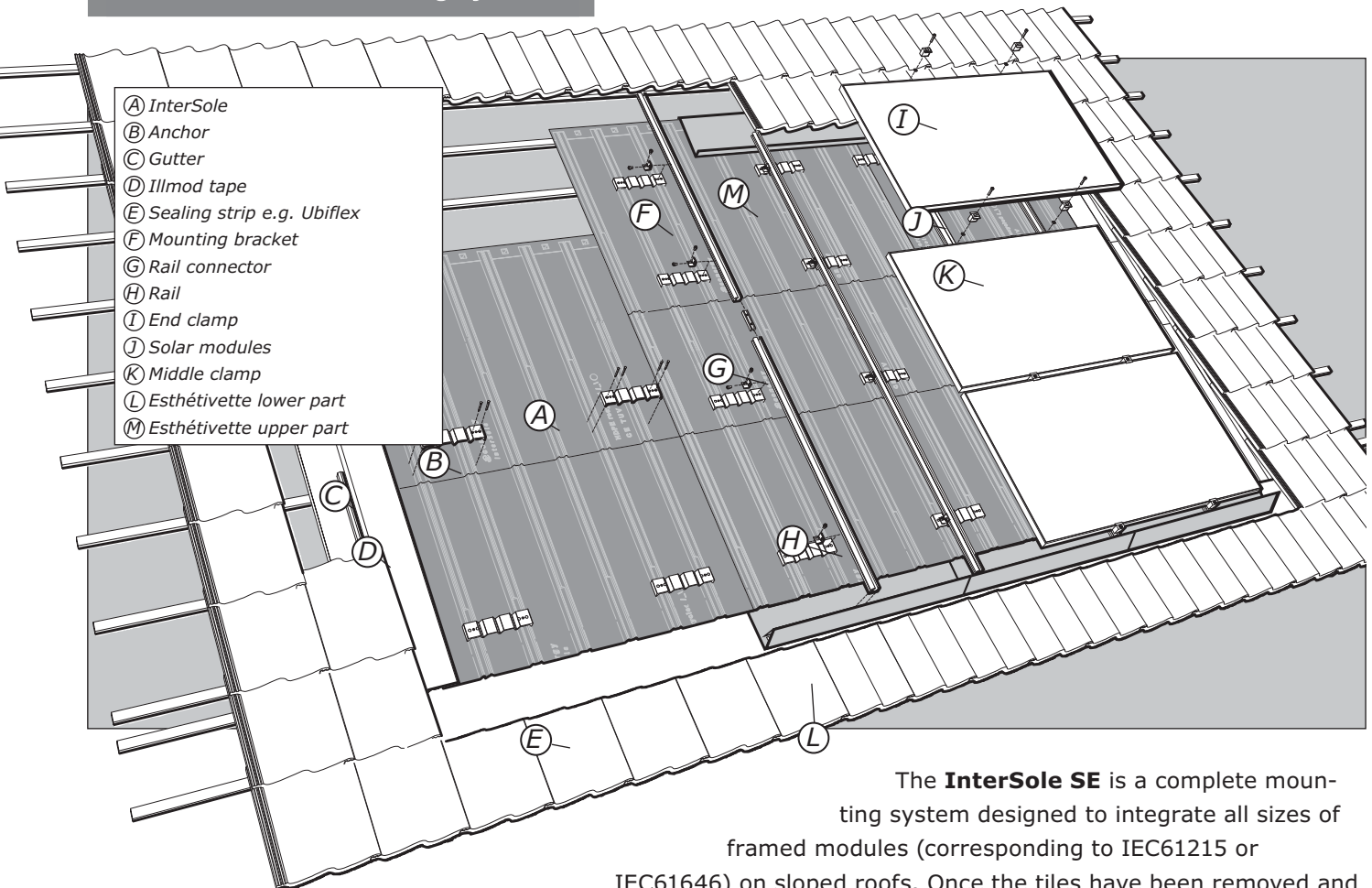


## InterSole SE



The **InterSole SE** is a complete mounting system designed to integrate all sizes of framed modules (corresponding to IEC61215 or IEC61646) on sloped roofs. Once the tiles have been removed and replaced by InterSole plastic plates (high-density polyethylene) the water-tightness of the roof is guaranteed. InterSole plates are hooked onto the battens, like tiles. Specially-designed aluminium anchors are placed at strategic locations on top of the InterSole plates and firmly screwed through them into the battens or the rafters. The anchors support the aluminium rails onto which the solar modules are mounted. They also serve as steps for the installer.

The system has been certified by German TÜV and the Dutch BDA.

The InterSole SE system is particularly well-suited to sloped roofs with an angle of 15° to 70° (without Esthétivette 20° to 70°). We recommend that you have an expert assessment done in order to adapt your system to local conditions and to comply with applicable standards.

**Warranty only applies if a complete, original InterSole system is used.**

Please check for any updated versions of the installation guide on [www.renusol.com](http://www.renusol.com).



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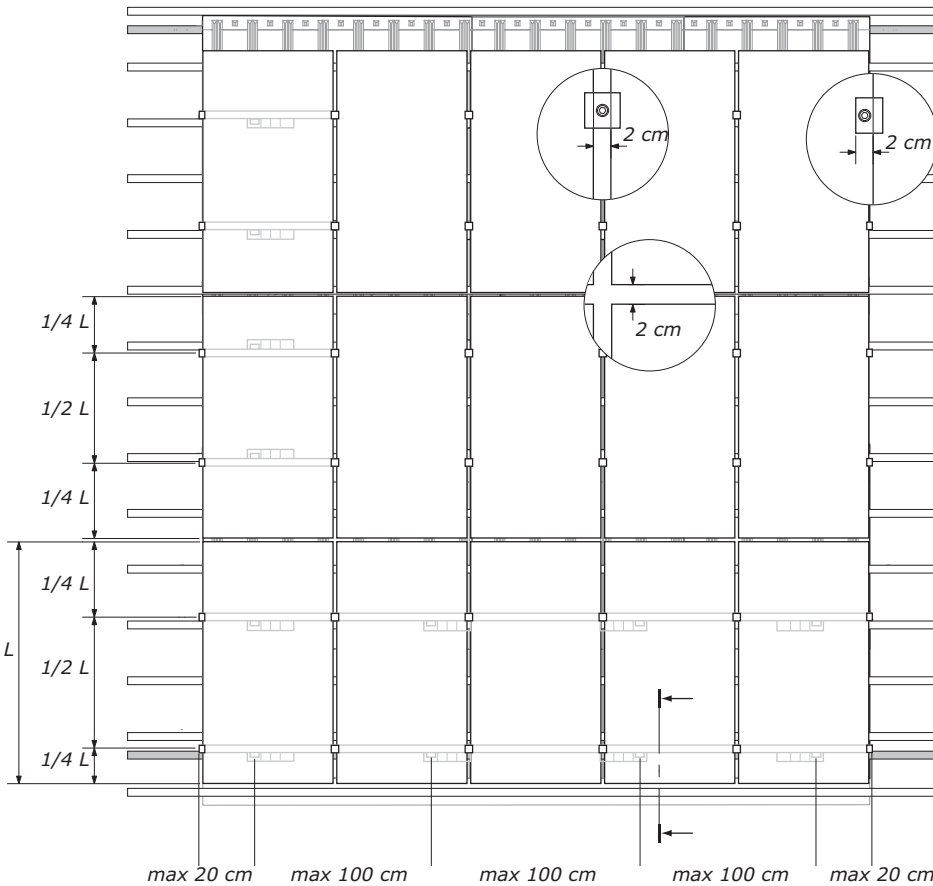
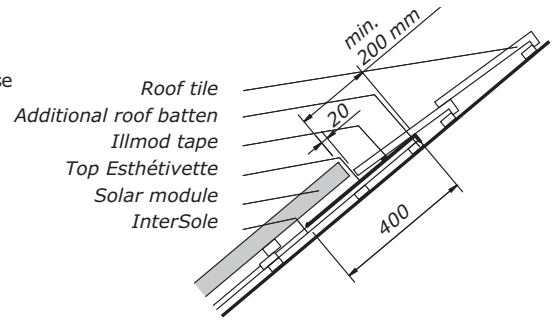
# Mounting procedures – Vertical format

## Mounting procedures for modules installed vertically

The following illustration depicts a sample installation in vertical format. The aluminium rails run horizontally. The position of the anchors determines the position of the rails. Please follow the mounting procedures described below.

### Esthétivette

InterSole SE can be installed without Esthétivette. Esthétivette allows the system to be mounted on roofs with a slope angle of 15° to 70°. Furthermore it improves the appearance of the system. It can be adjusted to the roof tile on the top and better aesthetics on the underside of the module.



### 1. General instructions

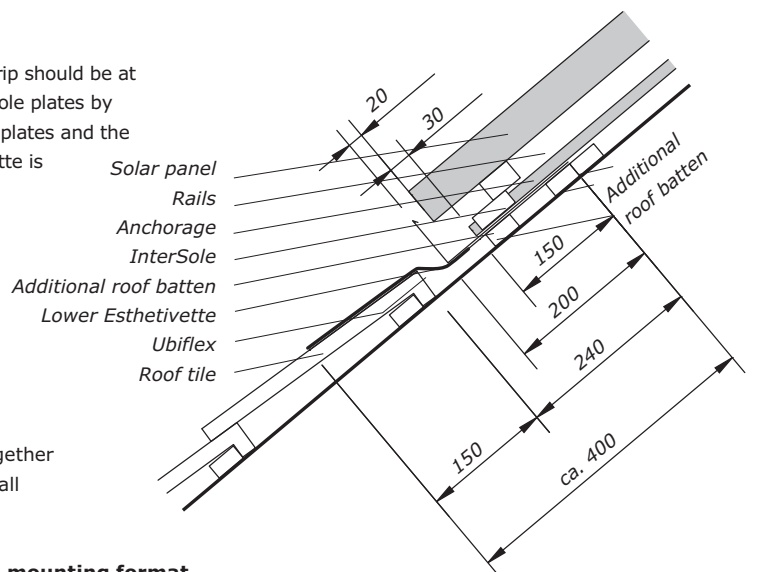
Lower part: The overlap of the InterSole plates with the sealing strip should be at least 15 cm. Upper part: The upper tiles should overlap the InterSole plates by at least 15cm. The upper Esthétivette is placed over the InterSole plates and the flashing, and under the tiles (see illustration). The upper Esthétivette is attached under the tiles using a self-tapping screw.

### 2. Fastening of the anchors

The frames jut out approx. 20 cm on either side of the anchor. The anchors are evenly spaced over the entire length of the rails. The centre-distance between anchors should not exceed 1 metre.

### Note:

The InterSole system is custom-designed to fit your project. Together with your order, you will receive a project-specific drawing with all information required.



**We recommend that, if possible, you choose the vertical mounting format. The mounting rails are installed horizontally, which facilitates moving around on the roof.**

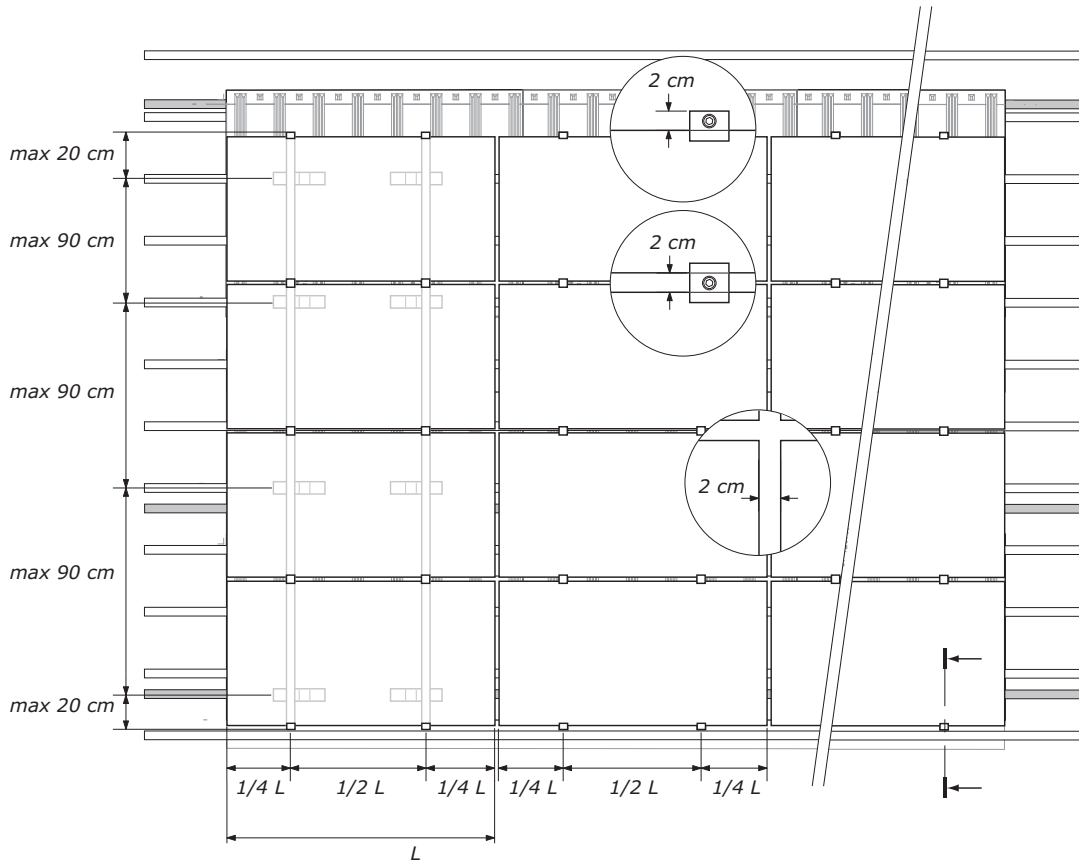
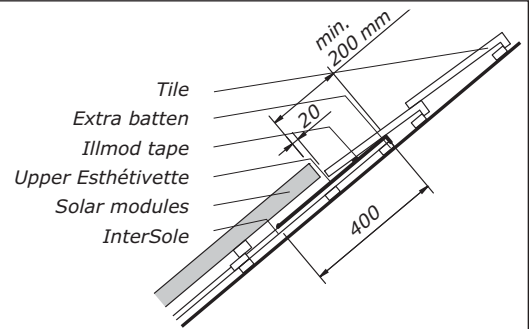
# Mounting procedures – Horizontal format

## Mounting procedures for modules installed horizontally

The following diagram depicts a sample installation in horizontal format. The aluminium rails run vertically. The position of the anchors determines the position of the rails. Please follow the mounting procedures described below.

### Esthétivette

InterSole SE can be installed without Esthétivette. Esthétivette allows the system to be mounted on roofs with a slope angle of 15° to 70°. Furthermore it improves the appearance of the system. It can be adjusted to the roof tile on the top and better aesthetics on the underside of the module.



### 1. General information

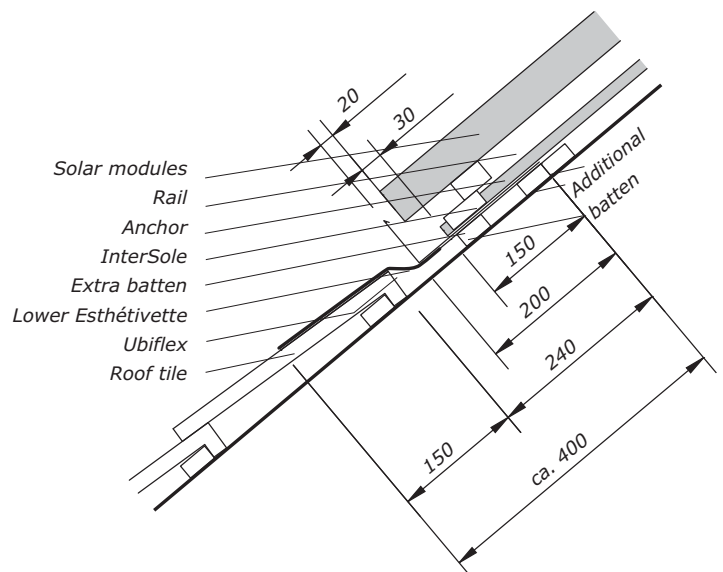
Lower part: The overlap of the InterSole plates with the sealing strip should be at least 15 cm. Upper part: The upper tiles should overlap the InterSole plates by at least 15 cm. The optional upper Esthétivette is placed over the InterSole plates and the gutter and under the tiles (see illustration). The upper Esthétivette is attached under the tiles using a self-tapping screw.

### 2. Fastening the anchors

The frames jut out approx. 20 cm on either side of the anchor. The anchors are evenly spaced over the entire length of the rails. The centre-distance between anchors should not exceed 0.9 metre.

### Note:

The InterSole system is custom-designed to fit your project. Together with your order you will receive a project-specific drawing with all the necessary information.

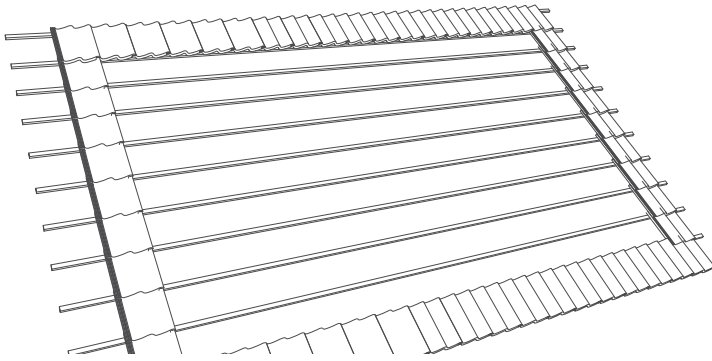


# Step-by-Step installation



**Caution!**  
Safety first. Observe the accident prevention provision for construction work.

## 1 Remove the roof tiles

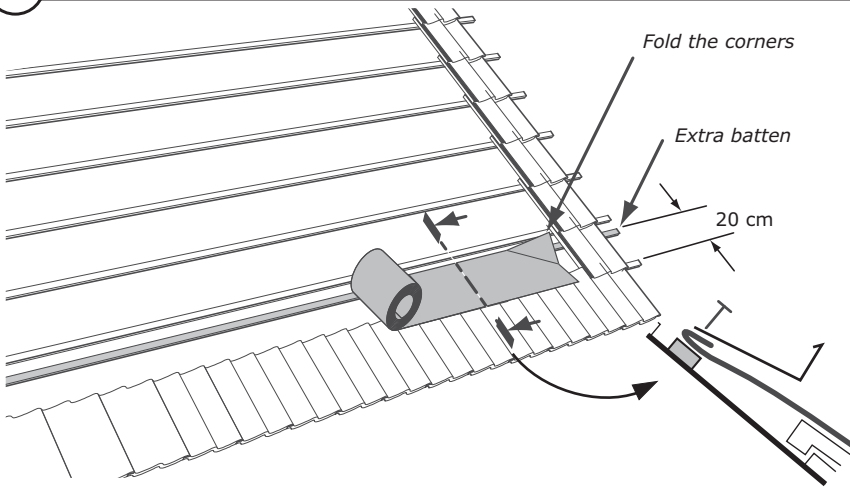


Remove surplus tiles on the top and on both sides to create more room to work.



**Caution!**  
A building inspector should check the quality of the battens and ascertain that they are mounted with screws, and certify that the roof is suitable for mounting the InterSole system while taking into account local wind and snow conditions. Replace any battens in poor condition with new ones that comply with accident prevention provisions.

## 2 Installing the Ubiflex flashing

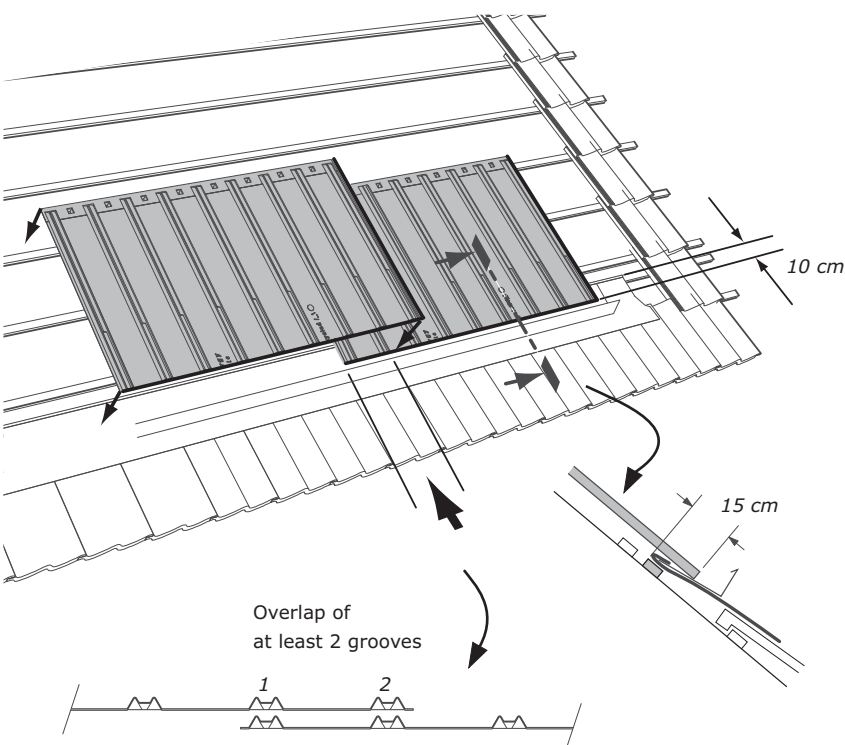


Place an extra batten 20 cm above the lowest batten. Attach the Ubiflex flashing to this batten. First fold back all top outside corners, then refold the entire upper edge inward. Fold the entire length of the top skirting edge (this prevents water penetration when it is windy).

**Note:**

We recommend selecting a wide enough extra batten to avoid any sagging in the Ubiflex. Warning: the use of lead flashing is not universally permitted. We recommend the use of environmentally-friendly lead-free Ubiflex flashing.

## 3 Placing the first InterSole row



Hook the first row of InterSole plates onto the battens. The overlap of the InterSole plates with the flashing should be at least 15 cm. The optional lower Esthétivette is placed between the InterSole plates and the Ubiflex. If necessary cut the bottom edge of the InterSole. Horizontally, the overlap of each InterSole plate with the next one should be at least 2 grooves (19 cm).

**Esthétivette**

InterSole SE can be installed without Esthétivette. Esthétivette allows the system to be mounted on roofs with a slope angle of 15° to 70°. Esthétivette allows to adapt the system to the upper tile row and it improves the appearance of the lower module row.

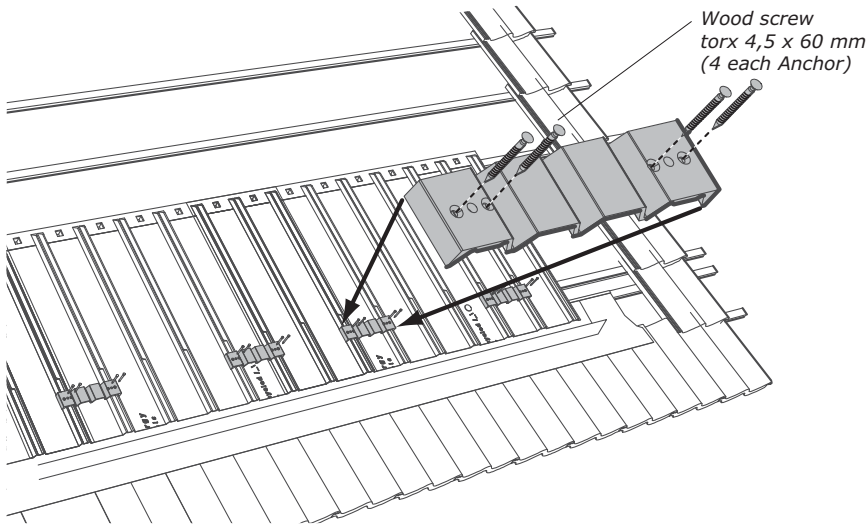
**Note:**

Arrange the rows of InterSole plates so that they line up symmetrically with the free area of the roof. You will find the dimensions on the project-specific drawing. It is possible that the InterSole plates on either side may not reach the next roof tiles. This will be filled in later using a gutter.



# Step-by-Step installation

## 4 Fastening the anchors

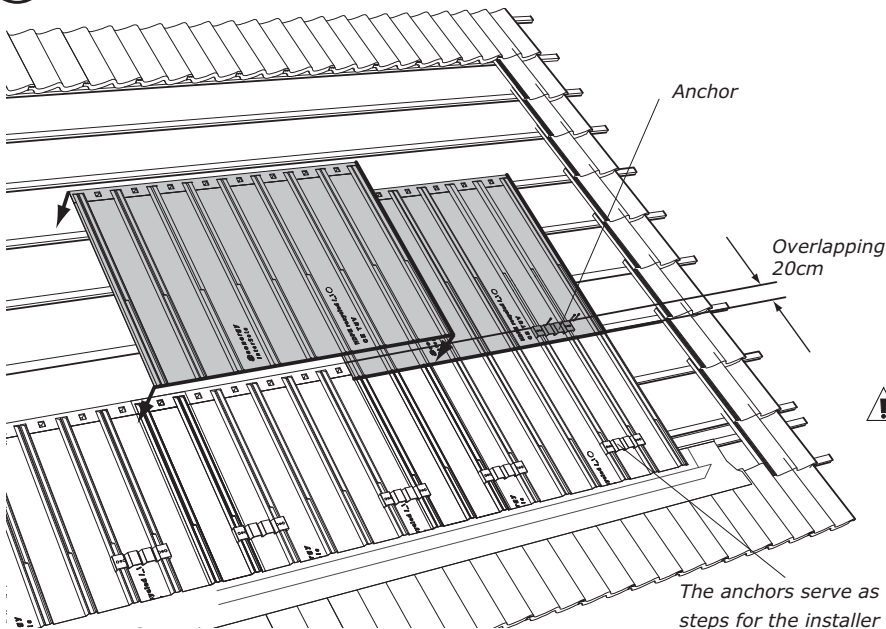


Determine the anchor positions in accordance with the above mentioned criteria or copy them from the project-specific drawing. Be sure to distinguish between horizontal and vertical alignment of the modules. Each anchor is screwed into the battens using four screws (4.5x 60 mm). Always insert the screws on the raised part of the grooves. Tighten the screws slowly so that they do not slide.

### Note:

For roofs with an underlying layer of insulation, ensure that any screws passing through the battens do not damage the insulation layer.

## 5 Placing the second InterSole row

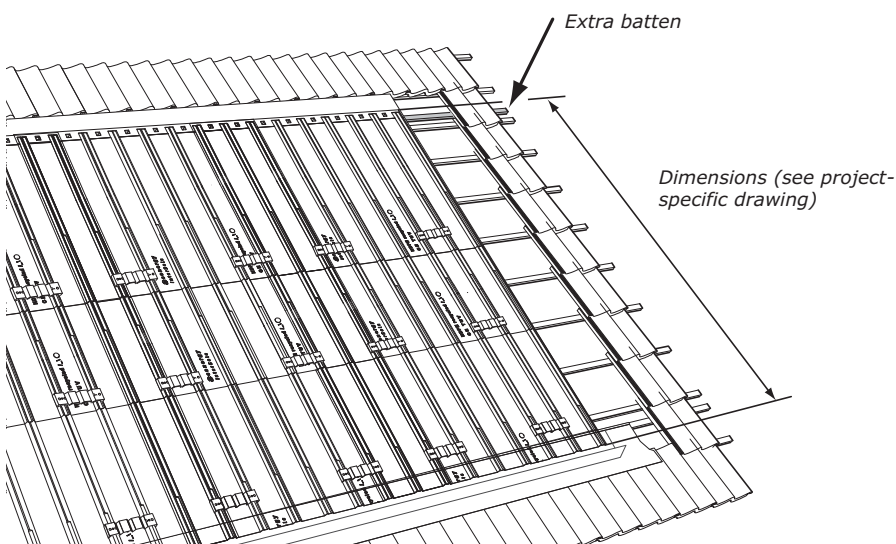


Place the next row of InterSole plates by hooking them onto the battens. The horizontal overlap of the InterSole plates should be at least 20 cm. Avoid setting an anchor at the spot where the 4 InterSole plates meet since that will raise the level of the entire installation. If possible, move the anchors up/down to a spot where only 2 plates overlap.

### Caution!

Under wet conditions, InterSole plates will become slippery. The anchors serve as steps for the installer. Avoid stepping on the InterSole plates.

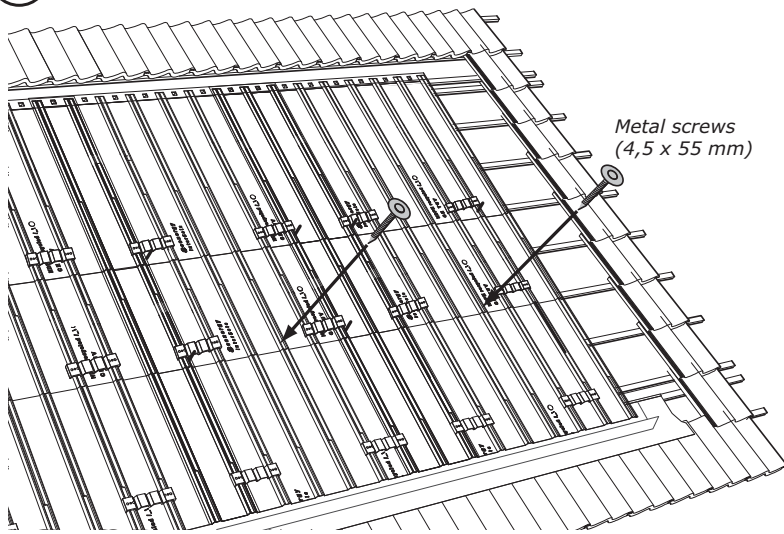
## 6 Adjustment on top



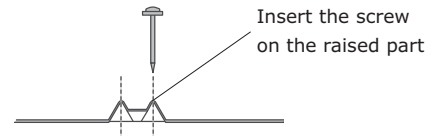
In most cases, an extra batten will be required for hooking on the final top row of InterSole plates. You will find complete dimensions for the vertical positioning of the InterSole plates on the project-specific drawing.

# Step-by-Step installation

## 7 Extra screws (metal screws)

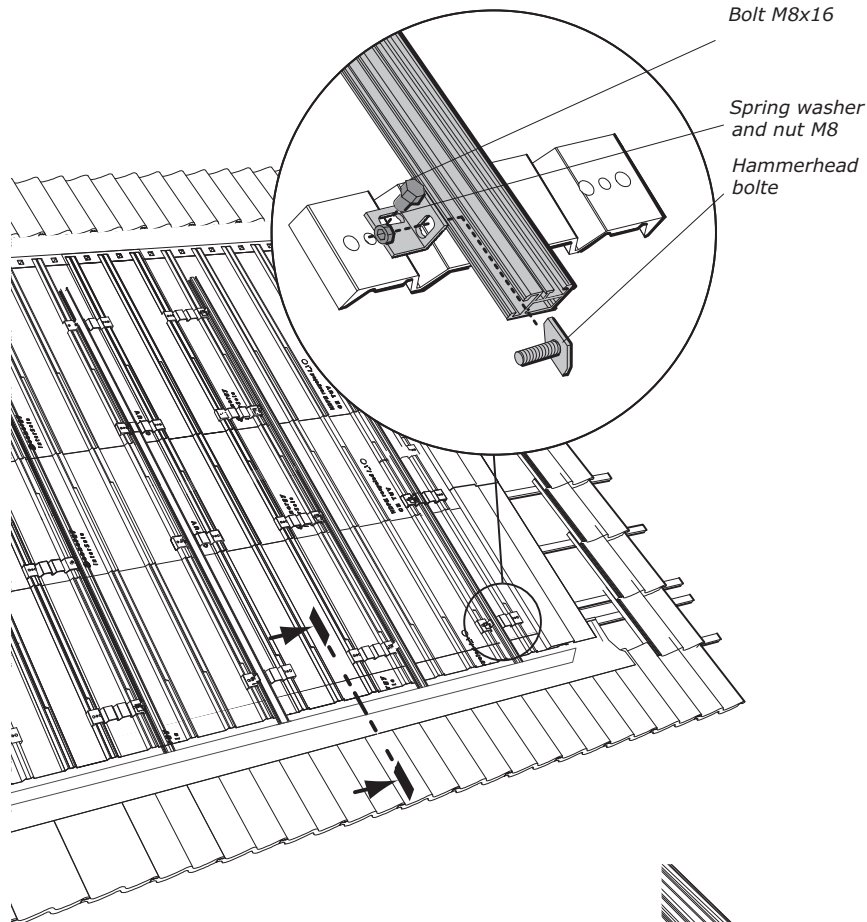


If required, each InterSole plate may also be attached at the bottom using two metal screws (in order to ensure water-tightness). Insert the screws through the raised part of the grooves (see illustration).



**Note:**  
For roofs with an underlying layer of insulation, ensure that any screws passing through the battens do not damage the insulation.

## 8 Mounting the rails using the aluminium mounting brackets



Mount the aluminium mounting brackets on the anchors using screws (M8x16). Use a flat washer and a spring washer with each of the 16 M8 screws. Attach the rails to the mounting brackets using box-head bolts, spring washers and M8 nuts.

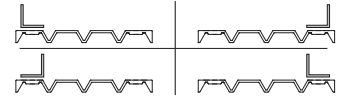
### Positioning of the solar modules: vertical format

- The rails run horizontally (see pg. 2).

### Positioning of the solar modules: horizontal format

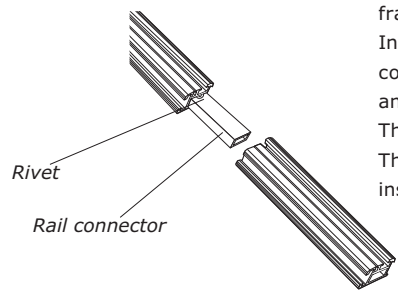
- The rails run vertically (see pg. 3).

Be sure that the modules are always mounted symmetrically on the rails, with a recommended spacing of around half a module length between them. To do so, the brackets and rails may be set at four different positions on the anchor.



Rail connectors are required to join several frames together.

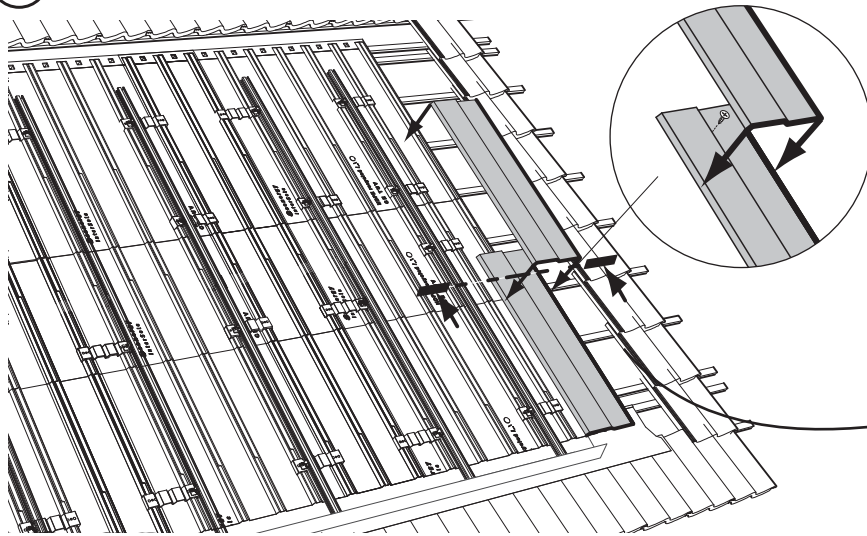
First insert connector in the already mounted frame until it can go no further. Insert the next frame firmly into the connector until the rivet is no longer visible and the frames are touching. The connection is complete. The rivet ensures that the connector is inserted equally in both frames.



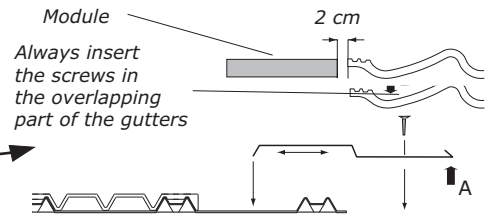
**Note:**  
In the case of an 'ultra-low' mounting, special stainless steel mounting brackets are used (see Appendix).

# Step-by-Step installation

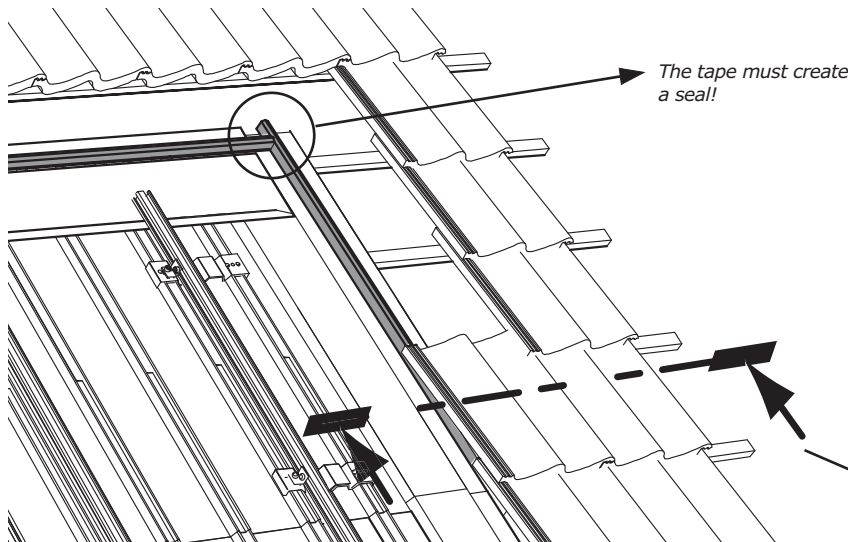
## 9 Installing the gutters



Attach the gutter so that the end (A) is located behind the lowest point of the tiles (B). Fix the gutters to the battens using metal screws, installing the gutters from the bottom up. Always insert the screws in the overlapping part of the gutters.



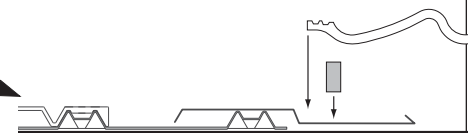
## 10 Attaching the illmod tape



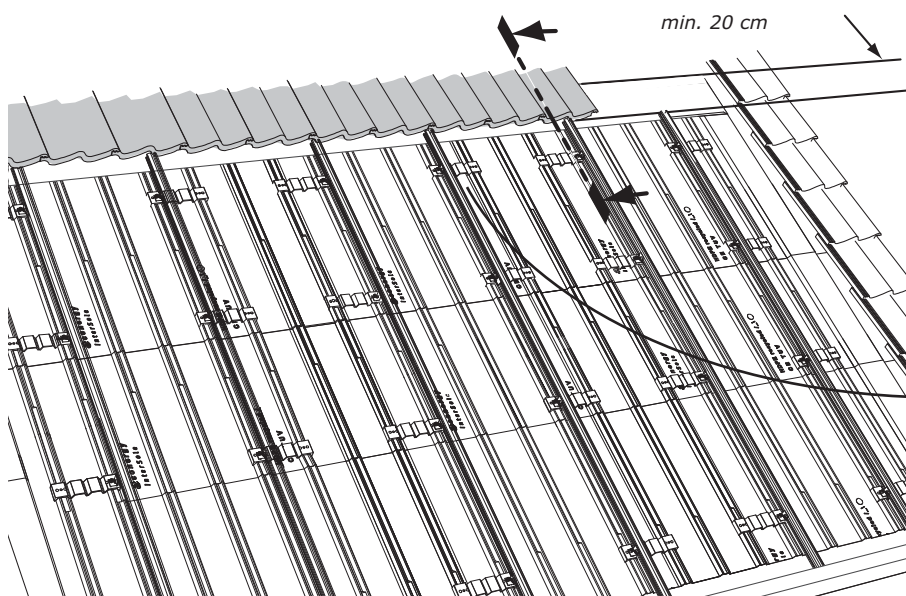
The optional upper Esthétivette is placed over the InterSole plates and the gutter and under the tiles (see illustration). The upper Esthétivette is attached under the tiles using a metal screw. Attach the illmod tape left and right onto the gutters and the upper Esthétivette (see illustration).

### Note:

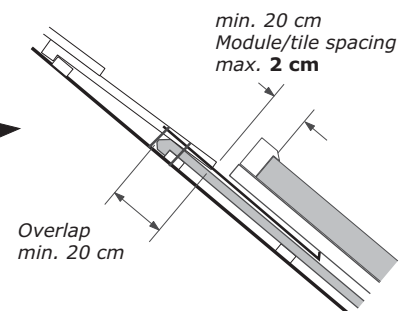
In the corners and under the tiles, the tape must create a seal: do not leave any open space. The tape runs along the edge up to the lower edge of the skirting.



## 11 Adjusting the upper roof tile



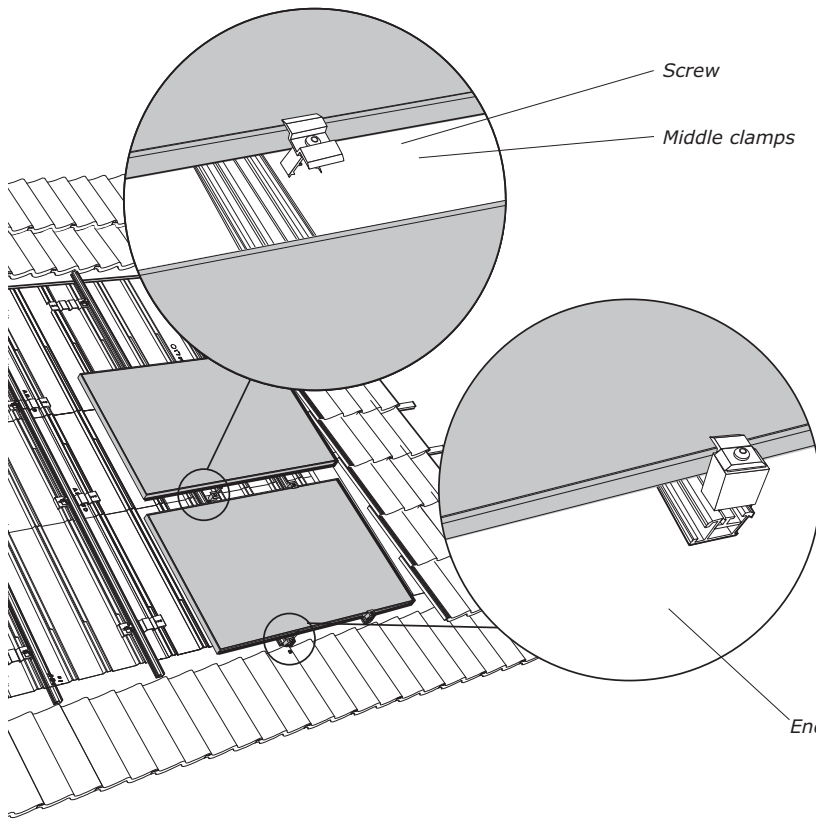
The upper tiles should overlap the InterSole plates by at least 20 cm. Shift or saw off the upper row of tiles to obtain this overlap. The spacing between modules and tiles should not be more than 2 cm.





# Step-by-Step installation

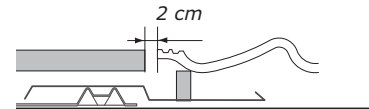
## 12 Attaching the modules



Attach the modules using the clamps as noted on the drawing:

- Insert the end clamps laterally into the rail. The end clamps are attached and then tightened at the height of the module frame by turning the Allen bolts **counter-clockwise** with the Allen key (tightening torque: 9-10 Nm).
- The middle clamps may be snapped in at any point on the rail. Hook one end of the clamp behind the upper edge of the rail and press on the bottom of the clamp until you hear it snap into place. The middle clamps are attached and then tightened at the height of the module frame by turning the Allen bolts **clockwise** with the Allen key (tightening torque: 9-10 Nm).

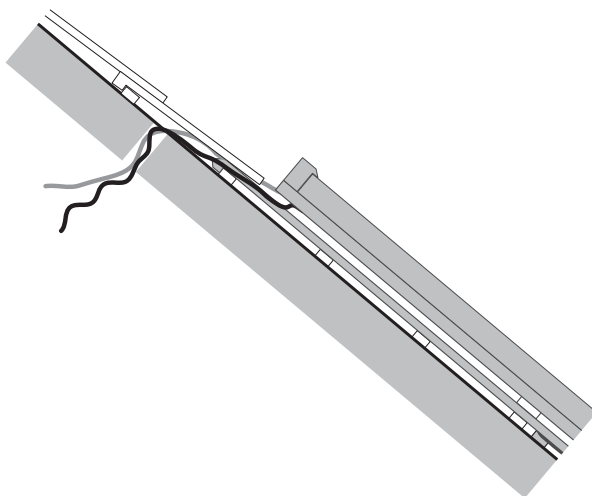
Be sure that the clamps fit tightly on the modules.



### Caution!

- ⚠ Please observe the safety guidelines regarding electrical systems and equipments. The module may only be wired to an electrical connection by an electrical engineer.

## 13 Creating a roof pass-through



- If the roof is insulated, please observe the following instructions:
- Drill a hole through the roof above the top InterSole plate, under the tiles.
  - Run the wires through the hole. Seal the hole.



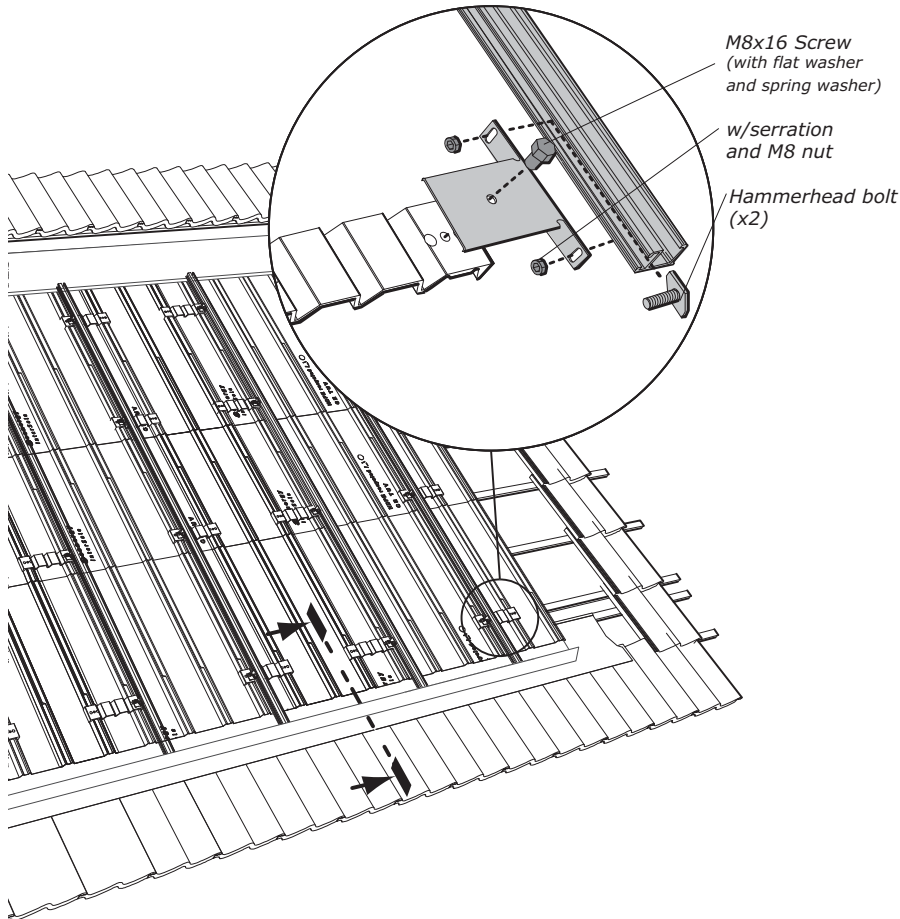
## Mounting rails using special, stainless steel brackets

### Ultra low

In the case of an 'ultra-low' mounting, special stainless steel mounting brackets are used.

### Note:

For this solution, the mounting rails always run vertically and the modules set on those rails are always mounted in the horizontal format.



Mount the aluminium mounting brackets on the anchors using M8x16 screws. Use a flat washer and a spring washer with each of the M8 screws. Attach the rails to the shallow brackets using hammerhead bolts, spring washers and M8 nuts

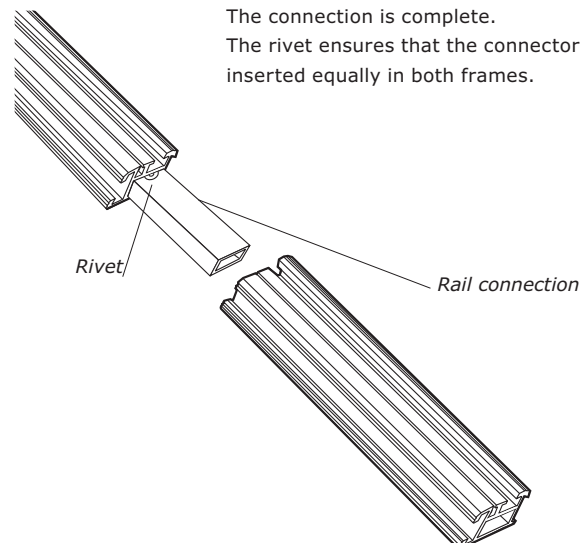
### Positioning of the solar modules: horizontal format

- the rails run vertically
- the end of the rail is aligned with the top of the lowest row of tiles.

Be sure that the modules are always mounted symmetrically on the rails, with a recommended spacing of a quarter-module length between them. To do so, the brackets and rails may be set at two different positions on the anchor.



Rail connectors are required to join several frames together.  
 First insert connector in the already mounted frame until it can go no further.  
 Insert the next frame firmly into the connector until the rivet is no longer visible and the frames are touching.  
 The connection is complete.  
 The rivet ensures that the connector is inserted equally in both frames.



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# Häufig gestellte Fragen

## What material is InterSole made of?

InterSole plates are made of high-density polyethylene (HDPE), a plastic remarkably well-suited for outdoor installations. In addition, it contains UV stabilizers.

## Why does my InterSole system have different dimensions from those indicated in the Installation Manual?

The dimensions of the InterSole system may differ from the hypothetical values since InterSole will expand or contract with temperature changes. The system makes allowance for these tolerances without any effect on its operation.

## Air circulate between the roof and the InterSole system?

Yes, due to InterSole's integrated air vents, sufficient aeration of the roof behind it is guaranteed.

## How is the heat generated behind the PV module dissipated?

The gap between the InterSole and the PV module can circulate enough air to permit the evacuation of heat.

## What should I do if the battens are in poor condition?

The InterSole anchors are screwed onto the battens. If the battens are in poor condition, they must be replaced by new ones corresponding to the valid regulations.

## What is the maximum slope allowable for installing the InterSole system?

The minimum slope for installing the InterSole SE is 20° (15° with Esthétivette). If the slope angle is < 15°, leaks may occur in the construction. The maximum possible roof slope is 70°. For roofs with slopes less than 20° the Esthétivette option is required.

## Can I install InterSole in any type of weather?

Installation should be done preferably in dry weather with no wind and moderate temperatures. Here is why:

- InterSole becomes very slippery when wet.
- In high winds, InterSole reacts like a sail.

## When and where was the first InterSole installed?

The first generation InterSole was installed in July 1999 in the Netherlands.

## How long does it take to install a system of 6 x 3 modules of 120 Wp, for example?

It takes 2 people approx. 4-5 hours (without an inverter).

## Can InterSole be extended to the full dimensions of the roof or must there be some free tiles along the edges?

Yes, InterSole can fully cover a roof but adequate gable ends will then have to be installed on the edge of the roof.

## What is the difference in comparison to other roof integration systems?

With most other roof integration systems, the modules are used as a sealing system. With InterSole, in contrast, the module performs only the function for which it was designed: producing electricity. Everything else is taken care of by the InterSole system. Given that InterSole is not visible, the sealing and mounting functions can be performed using simpler means without worrying about aesthetics.

## For which modules can InterSole be used?

In principle, InterSole is suitable for all current types of modules that comply with IEC61215 or IEC61646.

## Can the modules only be installed horizontally?

No, both orientations are possible.

## In what lengths is the InterSole rail supplied?

The rail can be sawed off and, as needed, assembled in sections using the connecting pieces provided. The maximum length of a rail is 3 m.

## Why should the modules not be attached to the short sides?

A module is a sensitive component. How it is attached should thus be done with care. If it is attached on the short sides, it undergoes a high level of stress. The module frames are not designed for that. In extreme cases, stresses caused by wind load may lead to deterioration of the modules.

## What is the spacing between 2 modules if middle clamps are used?

20 mm.

## If the modules are mounted vertically, can the module slide out of the clamps?

No. This mounting technique has been tested and proven successful.

## What tools will I need?

- A cordless screwdriver with Torx20 bits.
- A 6-mm Allen key
- A 13-mm flat wrench and a 13-mm socket wrench.
- Hammer
- Jig-saw (for cutting InterSole plates)
- Tape measure
- Level

## Is there a particular order of priority to be followed when installing InterSole?

Yes, it is recommended that you always install the system bottom-up (as with the roof tiles).

## How long is the warranty for the InterSole system?

We offer a product warranty of 10 years for the InterSole system. The expected service life of the InterSole system is more than 30 years.

## What does the scope of delivery include?

InterSole is a complete system: in addition to the InterSole plates, we supply the rails, gutters, illmod tape and necessary mounting fixtures (screws, nuts, etc.). Ubiflex flashing and Esthétivette are optional.

## What should the spacing of the battens be?

The normal spacing of 300 to 340 mm for the tiles is ideal. The existing battens can thus continue to be used if they are in good condition. If new roof battens are installed, we recommend a spacing of 300 mm.

## Where can the InterSole systems be used?

Local conditions should always be observed, we thus recommend a structural engineer report in accordance with the valid norms and provisions laid down in the place of installation.

In Germany InterSole can be used in its standard format for mounting in line with provisions under the following conditions:

- Wind load zone 1 and 2 according to wind load map DIN 1055-4 (wind speed reference value 25m/s)
- Terrain category III pursuant to DIN 1055-4 (suburbs, industrial and business areas) and IV (town areas)
- Snow load zone 2 up to 350m above sea level or 1.04kN/m<sup>2</sup> snow load pursuant to DIN 1055-4
- Roofs without roof area F (corner area) and G (edge area) pursuant to DIN 1055-4.
- Ridge height up to 12

The system design may be adapted accordingly under other conditions. The loading capacity against wind pressure and wind suction has been calculated according to DIN 1055-4 (2005-03 and EN 1991-1-4 Eurocode.

The calculations are a guideline and do not replace the project-specific calculation made by a structural engineer.

## For your notes

**Renusol.**  
From visions to solutions