RAULI

BLACK

INSTALLATION INSTRUCTIONS 2023

EASY CLICK - ALL BLACK - TELESCOPIC - MADE IN FINLAND - QUICK INSTALL - 30 YEARS WARRANTY - EU CERTIFICATE

RAULI

RAULI APP:

Before your first installation, sign in to the RAULI APP. The RAULI APP makes it easy to determine the components required for the installation, the panelfield sizing, and the mounting distance for the roof brackets. Installation instructions, product cards, and product images can also be found in the RAULI APP. app.raulibrackets.fi

GENERAL INFORMATION ABOUT THE RAULI BLACK SYSTEM:

The products are made of hot-dip galvanized high-strength steel. The coating is done with impact-resistant powder paint. The products have a 30-year warranty under normal conditions. The attachment method to the roof is the same as that used in roof safety products, backed by over 40 years of experience.

GENERAL ABOUT THE RAIL SYSTEM:

Telescoping. The rails can be used telescopically, they should not be shortened by sawing. The rails are locked to each other either with an intermediate bracket, bolt and nut, or to the roof bracket with a "double lock" mechanism. If you must saw the rail or connect the rails together with self-drilling screws, the rail system has been installed incorrectly.

Easy Click. The rail is attached to the roof bracket by pushing it in the slot: "Easy Click". T-bolts or nuts are not needed.

Always remember to ground the installation system according to the local rules!

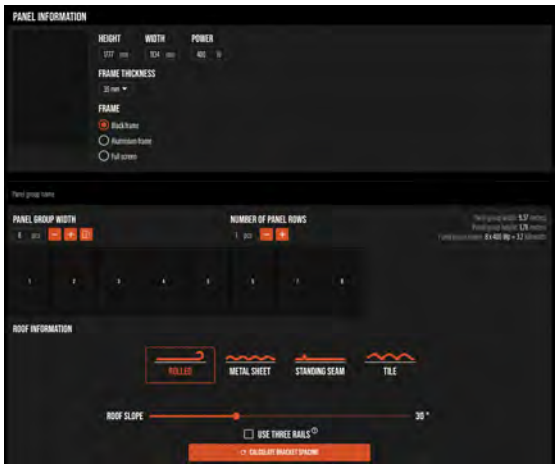
THANK YOU FOR CHOOSING THE RAULI BLACK SYSTEM!

TABLE OF CONTENTS

1. INSTALLATION IN BRIEF

Use the RAULI APP for planning the system. app.raulibrackets.fi. Solar panels can be installed with the RAULI Black system either vertically or horizontally. Determine the outermost dimensions of the assembly and place it on the roof. -> RAULI APP. Attach the roof brackets in place with correct bracket spacing -> RAULI APP. Attach the rail system in the brackets by pushing it them in the slot. Bring cables into the assembly and construct grounding according to the current regulations. Install the solar panels

2. DIMENSIONING AND PLACEMENT ON THE ROOF

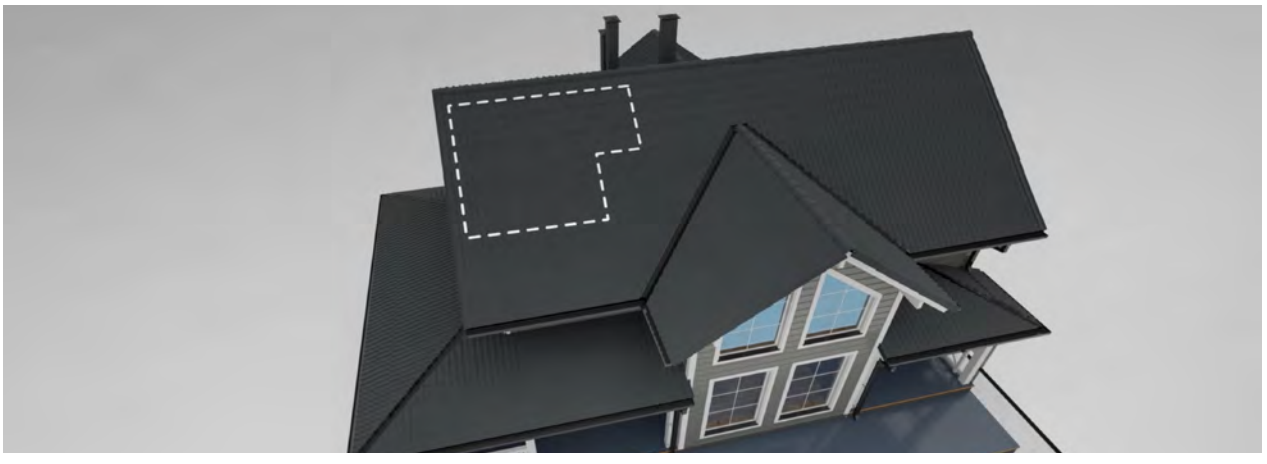


Use the RAULI APP for dimensioning. You will get all the information quickly and easily.

Panel row length: Panel + intermediate bracket + end bracket (x2)
RAULI Black: Intermediate bracket 30mm, end bracket 45mm

2.1 Placement of the Panel Field on the Roof

The distance from the top edge of the panels to the ridge is a maximum of 100cm. At over 100cm, a snow guard must be installed above the panels, to prevent damage from the snow load above. The distance between the side of the panel field and the edge of the roof is a minimum of 10cm. The panels must not exceed the edges of the roof. The distance between the bottom of the panel field and the snow guard is a minimum of 50cm. If this limit is exceeded, we recommend replacing the snow guard with a higher model. The building owner should always be informed if the operation of the snow guard is obstructed, to avoid damages.



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3. INSTALLATION

3.1 Install the Roof Brackets

Use the RAULI APP to determine the correct attachment interval. The method of installing the brackets can be found in this manual.

3.2 Installation of the Rails

3.2.1 The rail rows are placed under the panel in the area indicated by the solar panel manufacturer, to maximize snow load resistance. Often a suitable place for the rail is about 1/4 distance from the edge of the panel (+/-5cm). The placement is affected by the panel dimensions and the panel manufacturer's own instructions.

3.2.2 The rail is attached to the roof bracket by pushing it in the slot: "Easy Click".

3.2.3 The rail overlap to the first or last roof bracket in the row is a maximum of 40cm.

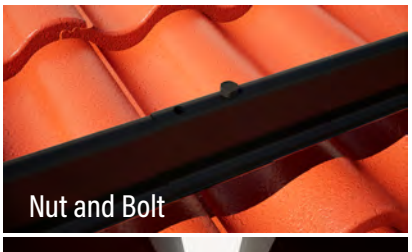
3.2.4 The rail rows must be double-locked. Two rails are pressed together into one roof bracket.
30cm rail can be used for double locking. (At least 1 double lock per panel row)

3.2.5 Extending the Rails:
Middle Clamp connection. Primary connection method.
Install the rails overlapping so that both rails are inside the middle clamp when tightening the middle clamp. This way you do not need a bolt or nut to connect the rails together. If you cannot use the middle clamp connection (e.g. horizontal paneling), choose an alternative connection method
Bolt and nut connection. Install the rails so that both holes are aligned. Secure with one bolt and nut from the inner hole of the top rail.
Double locking to the roof bracket. Overlap the rails by at least 20mm at the roof bracket and press both rails into the slot.

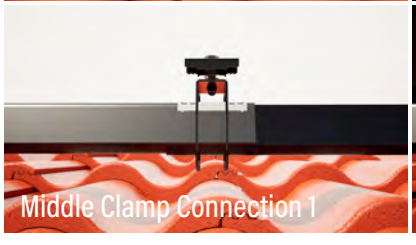
3.2.6 The last rail of the row is adjusted in place before installing the last- or last two panels.

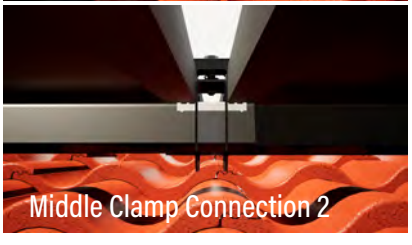

30cm Rail Placement


Max Overlap 40cm


Nut and Bolt


Bracket Connection


Middle Clamp Connection 1


Middle Clamp Connection 2

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3.3 Grounding

Before installing the panels, ensure the rail system is grounded following all applicable regulations. We recommend using a cable lug to ground the RAULI BLACK rail system, which should be attached to the rail system with a stainless steel M5 bolt and M5 nut. Create a hole in the rail using a 6mm drill bit and be sure to remove any paint from the area where the cable lug will be affixed. The panels should be grounded to the rail system and to each other using a stainless steel grounding plate. Refer to the panel installation instructions for more details.

3.4 End Bracket Installation

End Clamp Aluminum Frame

End Clamp Fullscreen

3.4.1 Insert the end bracket into the last hole of the rail and secure it using an M8x20 bolt and M8 nut. Tighten the end bracket firmly when installing the panel.

3.4.2 The end brackets have a 30mm adjustment range. The end bracket takes up an average of 4,5cm of space.

3.4.3 Select the correct end bracket based on the height of the panel.

3.4.4 11153 End Bracket is suitable for "Fullscreen" type glass panels, where the aluminum frame does not extend over the glass at all.

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3.5 Solar Panel Installation

3.5.1 Position the rail rows under the panels as indicated by the solar panel manufacturer, to maximize snow load resistance. Often, an appropriate position for the rail is about 1/4 of the distance from the panel edge (+/- 5cm). The placement is influenced by the panel's dimensions and the manu facturer's own guidelines. Large-sized panels may require a third rail row beneath the panel.

3.5.2 Bring the first panel. Place it under the end brackets and tighten the end brackets

3.5.3 Adjust the panel straight by rotating the panel

3.5.4 Place a grounding plate between the panel and the rail to ensure grounding continuity between the panels and the rail system

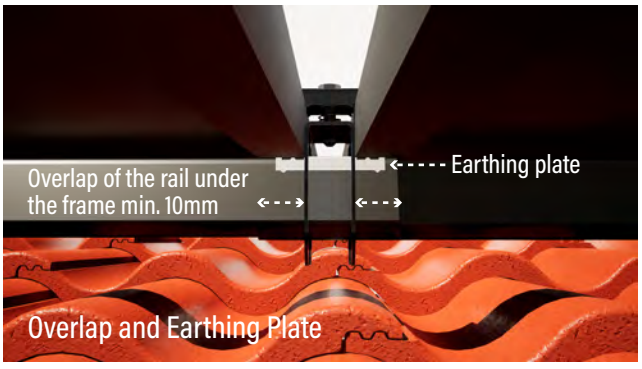
3.5.5 Place the mid clamps by pushing them from the front around the rail and turning them upright. Lift the mid clamp so that it locks onto the rail

3.5.6 Bring the next panel. Put it under the mid clamps and tighten them. Check the overlap of the rails under the panel if you are using the mid clamp connection to extend the rails

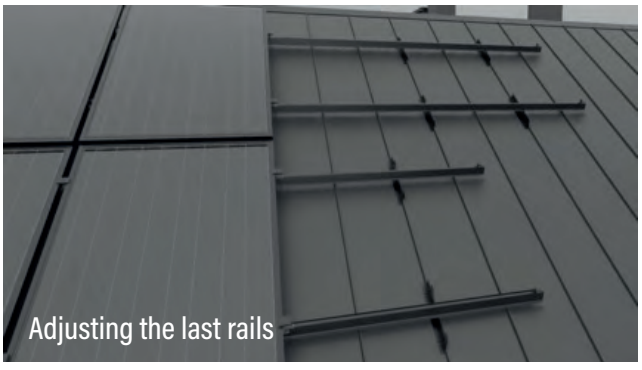
3.5.7 If the last rail of the row is the length of two panels, measure the last rail to the correct position before installing the last two panels. If the last rail is the length of one panel, measure the last rail to the correct place before installing the last panel. Push the "excess" out of the rail telescopically. The rail should not be shortened by sawing

3.5.8 Install the last panels and tighten the end brackets

3.5.9 The next panel rows are installed directly on top of the lower row



Overlap and Earthing Plate


Adjusting the last rails

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4. ROOF BRACKETS

4.1 General about Roof Brackets

Always check the correct bracket distance from the RAULI APP before installation! You save on the number of roof brackets and make sure what is the correct attachment distance for the specific installation site.

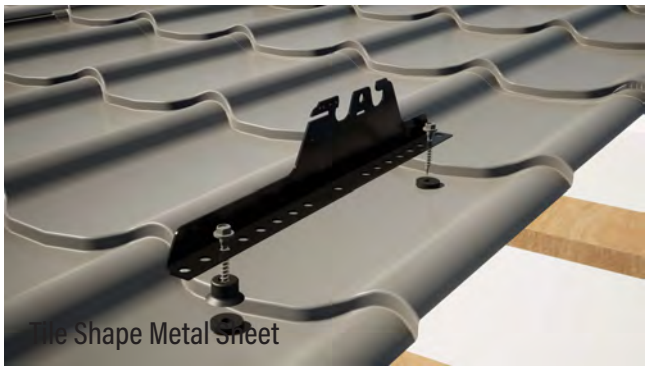
Profiled metal and Bitumen: General guideline, bracket spacing less than 120cm.
Tile roof: General guideline, bracket spacing less than 105cm.
Seamed roof: Brackets can be installed so that the edge areas (first and last) have a bracket distance of about 100cm, the next distance about 150-160cm, the next 100cm, etc. In practice, one empty seam is left between the first brackets, two empty seams between the next, one to the next, etc.

4.2 Metal Sheet


Metal Sheet

Profiled metal roof (rectangular and wavy), max 40cm batten spacing. All In One Bracket, 2 screws, 2 sealing rubber rings. The bracket is placed at the bottom of the metal profile and attached into two wooden battens. A sealing rubber ring goes between the roof panel and the bracket

4.3 Tile Shape Metal Sheet


Tile Shape Metal Sheet

Tile patterned metal roof, max 40cm batten spacing. All In One Bracket, 2 screws, 2 sealing rubber rings, 1 spacer. The top of the bracket is placed against the tile pattern's step. A screw and a sealing rubber at the top, and a screw, a spacer ring, a sealing rubber at the bottom. A sealing rubber ring goes between the roof panel and the bracket. Attachment in two wooden battens

For a longer rafter distance, a 65cm version of the bracket is available

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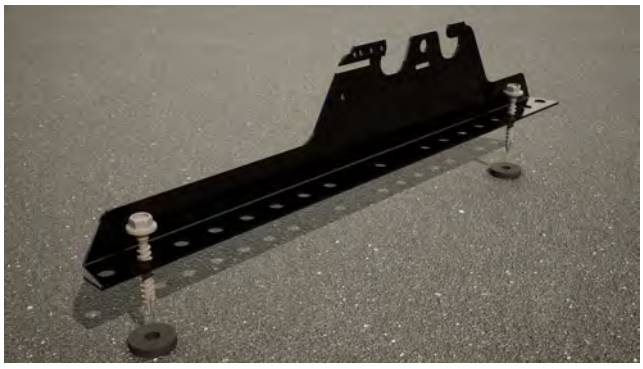
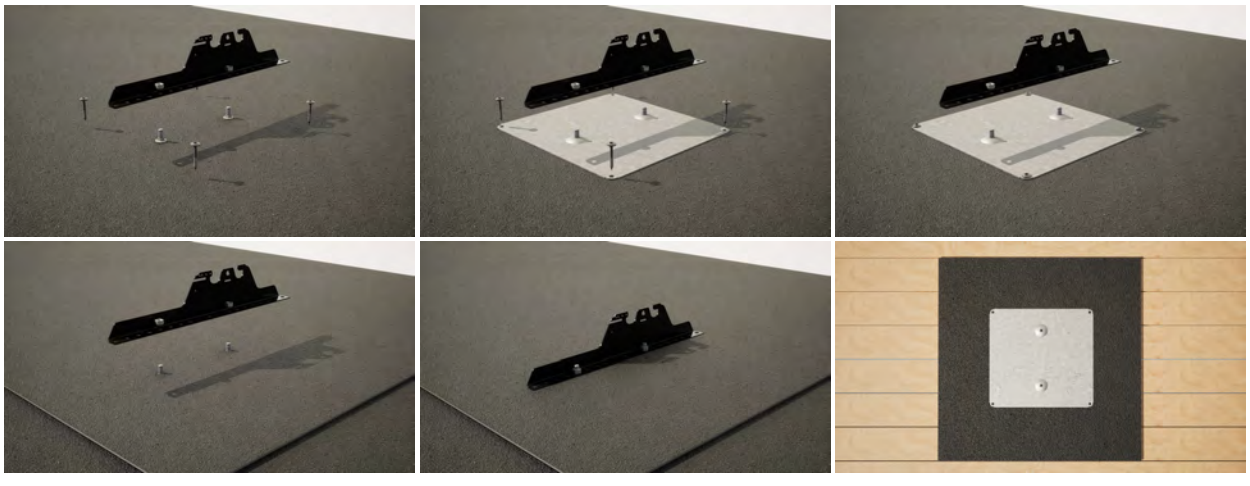
4.4 Bitumen Roof



Bitumen roof, All An One Bracket, 2 screws, 2 sealing rubber ringsA The bracket is placed at an appropriate spot on the bitumen roof and attachedA A sealing rubber ring goes between the roof and the bracket

Bitumen roof Plate attachment. A Plate is attached to the bitumen roof by screwing. A bitumen membrane is burned onto the Plate. The All In One Bracket is attached to the bolts going through the Plate. The general guideline for the size of the membrane is that it should extend beyond the edge of the plate by 15 cm on each side. If needed, this guideline can be confirmed with the manufacturer of the bitumen membrane used at the installation site



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4.5 Self-supporting Profiled Metal Roof and Sandwich Metal Roof

T20 Bracket

The T20 bracket, which is attached from the side, is suitable for profiled metal with a long batten interval. 4 screws and an EPDM strip. The EPDM strip is glued to the bracket, in the place of the screw holes, after which the bracket is attached to the roof with screws. If the profile of the roofing material differs from that of the bracket, additional fastening from the top is required.

4.6 Decra Roof

Decra Bracket

Decra Windhook

Attachment with Decra Roofing Bracket. The sheet metal is detached from its fastening screws and turned upwards. The upper end of the bracket is placed under the sheet and screwed in from top to bottom. The sheet metal is then reattached to its original position. The wind support is screwed into the lower end of the tile pattern from the front.

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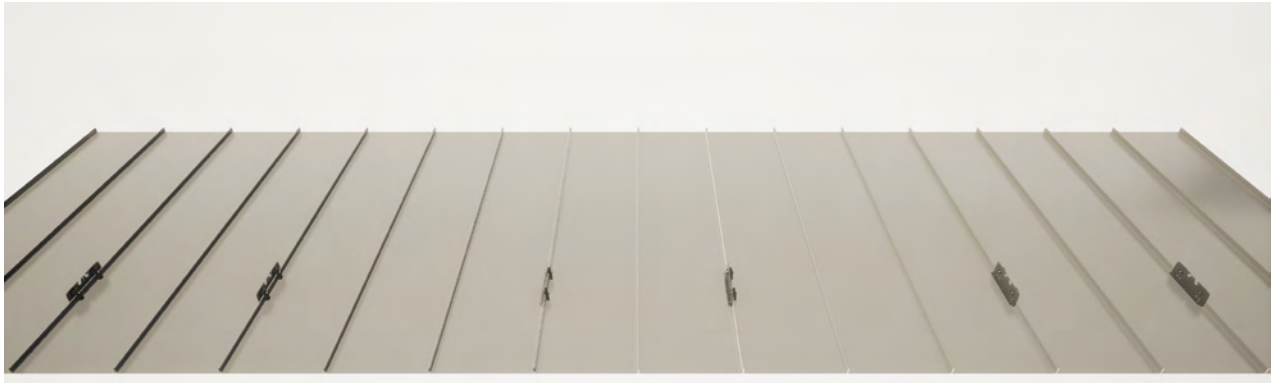
4.7 Standing Seam Roofs

Standing seam roofs. Standing seam roof bracket. The claws of the bracket are placed on the "seam side" of the seam and tightened. The tightening is sufficient when the metal parts of the bracket begin to yield when tightened. Beware of overtightening to prevent the bracket from puncturing the roofing sheet.

Machined Seam

Lock Seam

The brackets can be installed in such a way that the edge areas (first and last) have a bracket spacing of about 100cm, the next gap about 150cm, the next 100cm, etc. In practice, one empty seam is left between the first brackets, two empty seams to the next gap, one to the next, etc.



Seam Spacing Example

For very old Handcrafted seam roofs, the brackets will be tailor made as a special order

4.8 Copper Roofs

Copper roof brackets are made from stainless steel. These brackets are delivered as special order.

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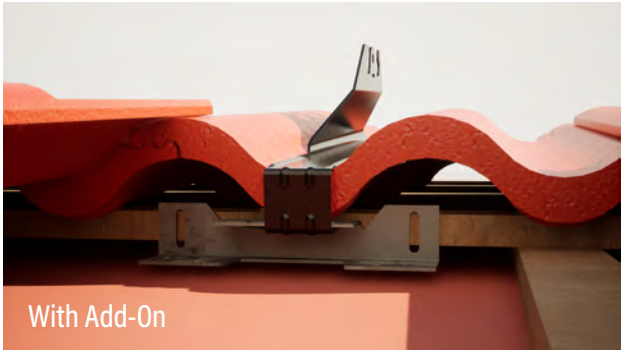
4.9 Tile Roofs

For certain tile types, it might be necessary to notch the tile at the bracket location to ensure proper fit. However, the general guideline is that the tile should not require modification.

4.9.1 Nordic Bracket

It is attached with at least one screw. The Nordic bracket fits most tile roofs. One tile is pushed up, the bracket is placed on the lower tile and screwed into the batten. The tile is pulled back down. With the add-on, the bracket is easily attached in very thin rafters.


Without Add-On


With Add-On

4.9.2 Using a wind hook

The lower part of the front support is installed before the actual bracket, one tile lower. The upper part of the front support is installed on top of the actual bracket and attached to the lower part of the wind hook with an M8x20mm bolt.



Install the windhook in the lowest row of the brackets, in every other bracket, starting from the outermost brackets.

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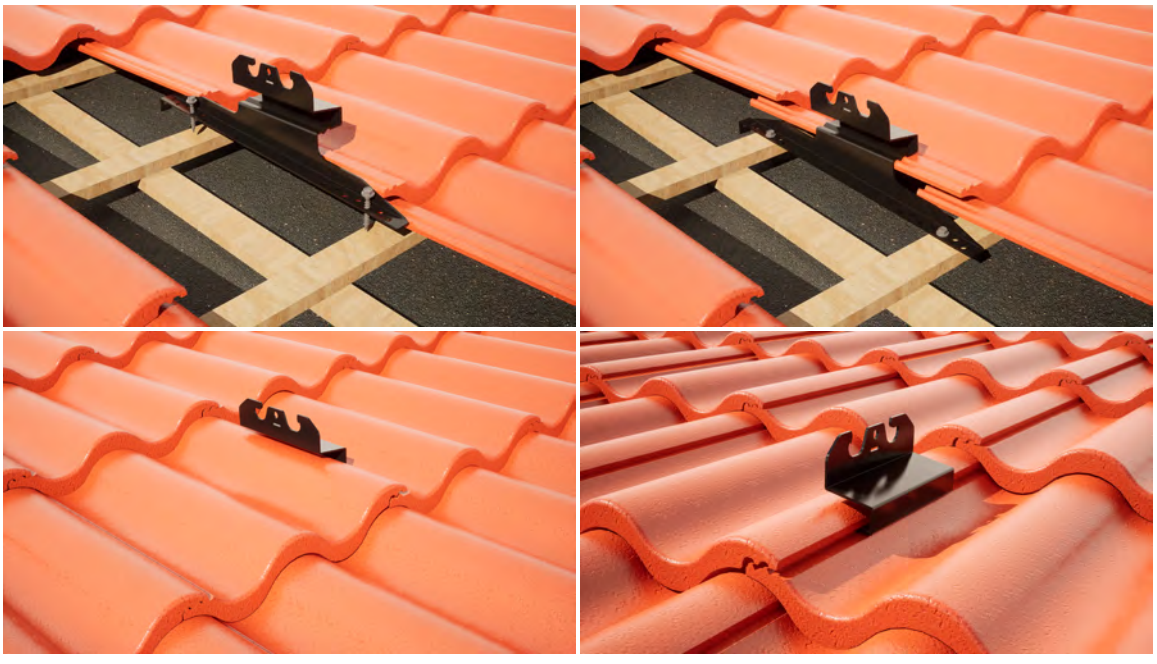
4.9.3 Strong Bracket

Attached with two screws to the battens. Suitable for gentle wave patterned concrete tiles. Attaching the bracket is more laborious than with the Nordic bracket (see installation video on RAULI APP), the advantage is that wind hooks are not needed.

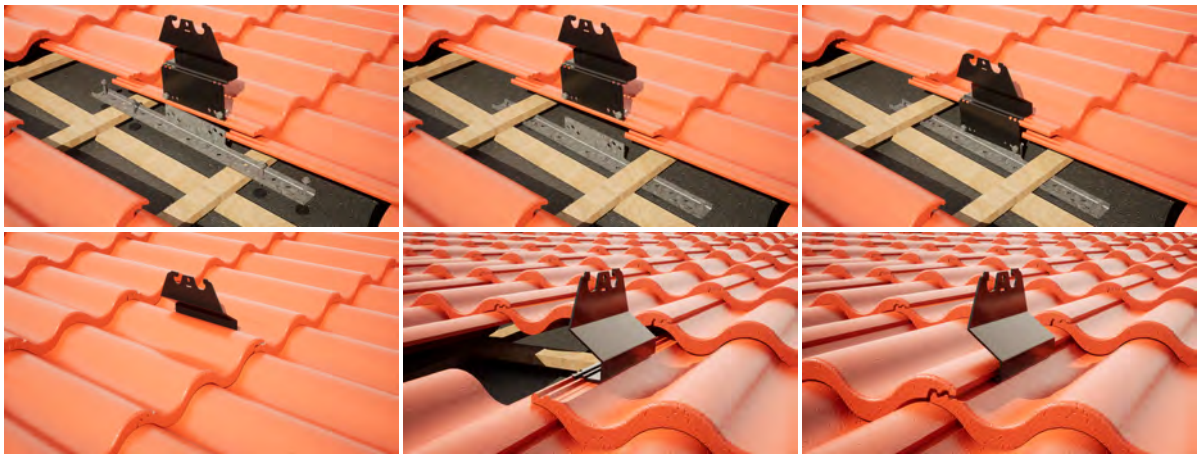


4.9.4 Beaver Tail Tile (BTT)

It is attached with at least one screw. Not suitable for Nordic countries, where high snow load is a factor

4.9.5 RAULI Råspont

If the underlay for a tile roof is a load-bearing solid boarding or paneling, Råspont brackets can be used for the installation



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5. RAILS

The shape of the RAULI Black rail enables features not found in other systems. With RAULI brackets, a shorter installation time can be achieved compared to traditional installation systems, but using the rail system requires familiarity.

5.1 Telescoping

Rails can be used telescopically, the rails should not be shortened by sawing. The rails are locked to each other either with an intermediate bracket, a bolt and a nut or to the roof bracket with a "double lock". If you have to saw the rail or join the rails together with drill tip screws, the rail system has been installed incorrectly

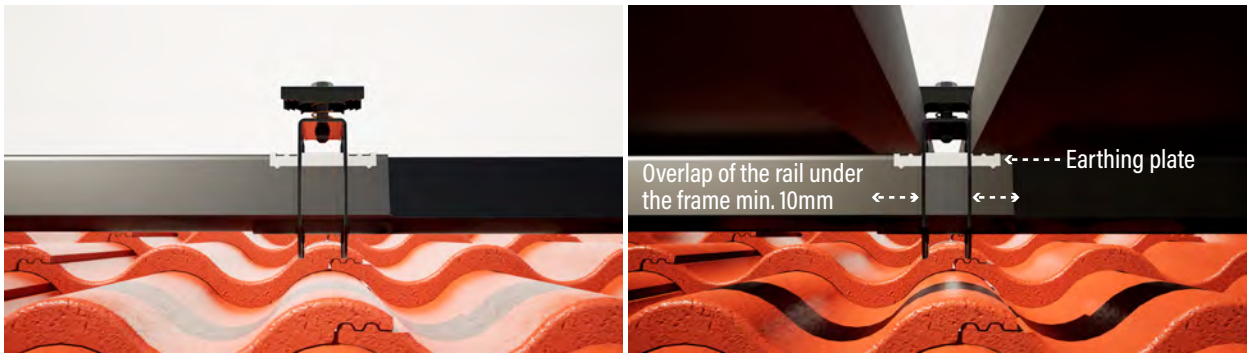
5.2 Easy Click

The rail is attached to the roof bracket by pressing the "Easy Click". T-bolts or nuts are not needed. It is also possible to press two rails into one roof bracket - "Double lock".

5.3 Extending the Rails

5.3.1 Extending the Rails MIDDLE CLAMP

The rails are pushed into the roof brackets according to the panel field dimensioning. The rails are placed on top of each other so that when installing the panels, the rails overlap under the panel at the point of the intermediate bracket. During panel installation, the intermediate bracket binds the rail system into a solid package. The rails must overlap by **at least 10mm under the frame of the panel.**
The last rail of the row is measured in place before the installation of the last (or two last) panel(s).
The "extra" rail measurement is pushed telescopically onto the previous rail



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5.3.2 Extending the Rails BOLT AND NUT

The rails are pressed into the roof brackets according to the panel field dimensioning. The rails are placed on top of each other with holes aligned. The bolt and nut connection is made in the inner (second) hole of the top rail. The last rail of the row is measured in place before the installation of the last (or two last) panel(s). The "extra" rail measurement is pushed telescopically onto the previous rail. The last rail always locks to the previous one with an Middle Clamp

5.3.3 Extending the Rails ROOF BRACKET

Double lock. If the rail extension point falls on the roof bracket, the rails can be attached to each other by pressing the rail double into the roof bracket. This rarely occurs unless the locations of the roof brackets have been chosen with this attachment method in mind

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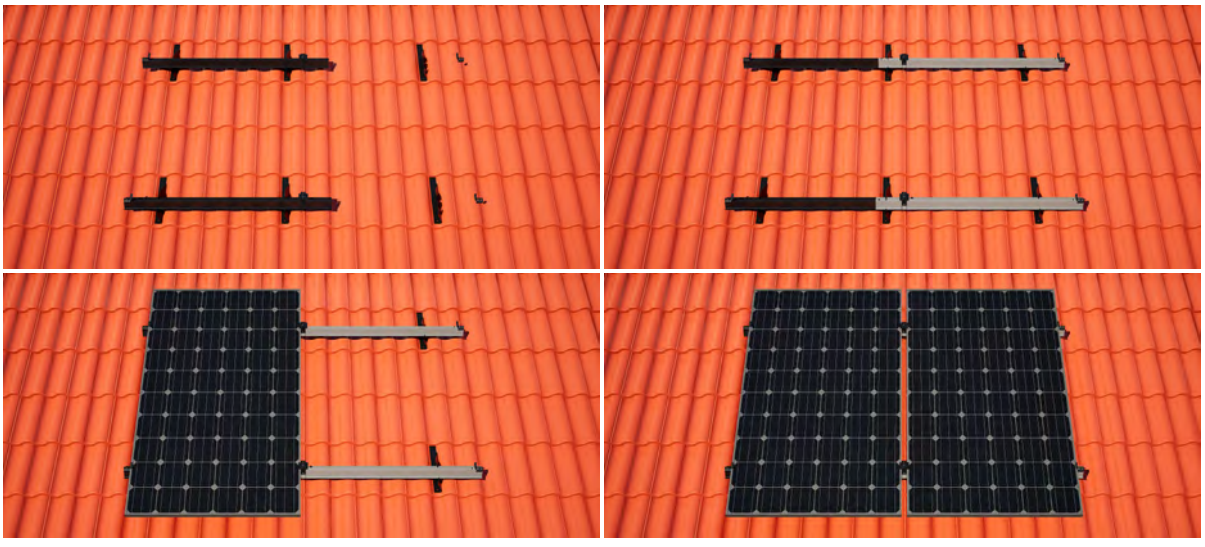
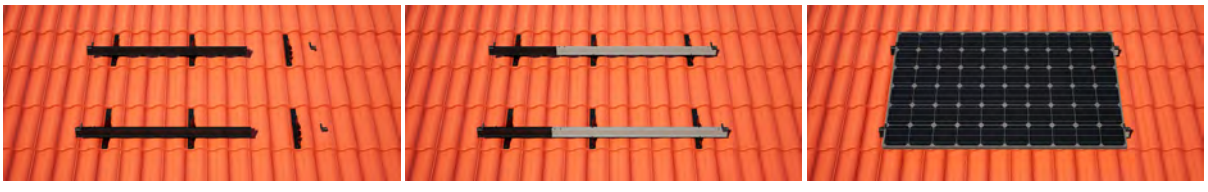
5.4 Installation of Individual Panels and Horizontal Installations

Always verify from the panel manufacturer's instructions whether horizontal installation is allowed in the specific load area. In most cases, panels cannot be installed horizontally in Nordic conditions.
For the vertical installation of a single panel, you can use a "meter-long" rail (122cm).

For the vertical installation of two panels, place two "meter-long" rails consecutively. Push the excess measurement onto the previous rail before tightening the middle clamp.

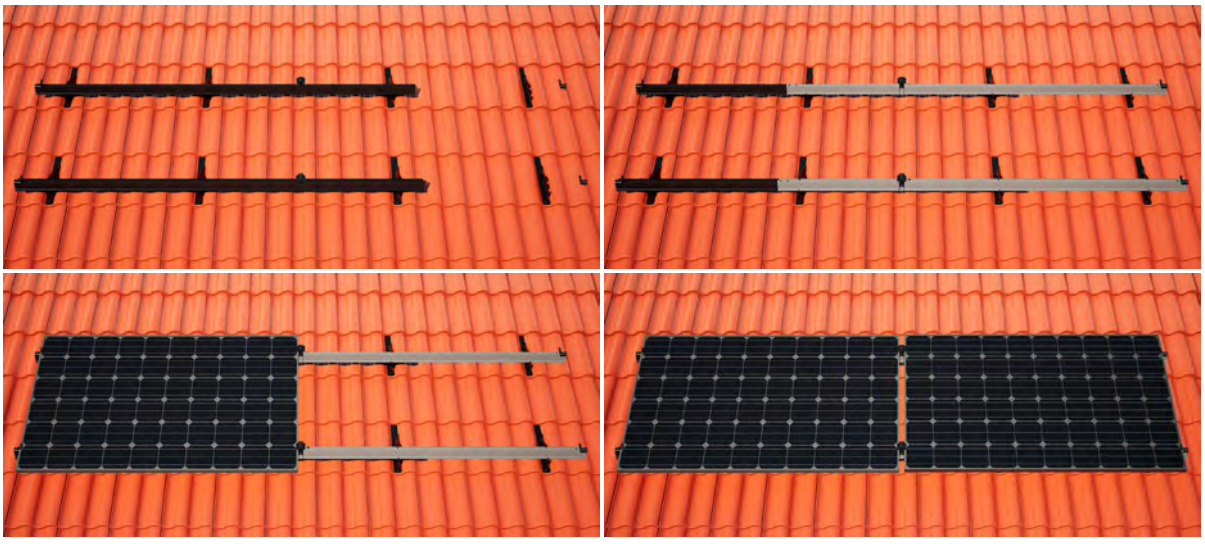


For the horizontal installation of a single panel, you need two "meter-long" rails placed consecutively, which should be locked together with a roof bracket underneath the panels.



For two horizontally installed panels, you'll need two "two-meter-long" rails placed consecutively (245cm per rail). Push the excess measurement under the panel before tightening the Middle Clamp.

For longer horizontal rows, use bolt-and-nut connections at each joint except the last one. The excess of the last rail should be pushed onto the previous rail and locked with a Middle Clamp.



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6. MIDDLE- AND END CLAMPS

6.1 End Clamp


End Clamp Aluminum Frame


End Clamp Fullscreen

Installation. Place the end bracket in the last hole of the rail and secure with an M8x20 bolt and M8 nut

End brackets have a 30mm adjustment range. On average, the end bracket occupies about 4.5cm of space

The height of the end bracket should be chosen according to the height of the panel

The 11153 End Bracket is suitable for "Fullscreen" type glass panels

6.2 Middle Clamp


Middle Clamp Aluminum Frame


Middle Clamp Fullscreen

Before installing the middle clamp, install a grounding plate under the panel. After this, install the middle clamp in place.

The intermediate bracket is installed by pushing it onto the rail from the front and turning the intermediate bracket into a vertical position

The 11146 Middle Bracket is suitable for aluminum-framed panels 30-40mm thick

The 11154 Middle Bracket is suitable for "Fullscreen" type glass panels

For 25mm thick panels, intermediate brackets are available as a special order

The tightening torque is sufficient when the hat of the Middle Clamp starts to yield to the tightening force. The hat of the intermediate bracket does not need to be bent against the surface of the panel

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