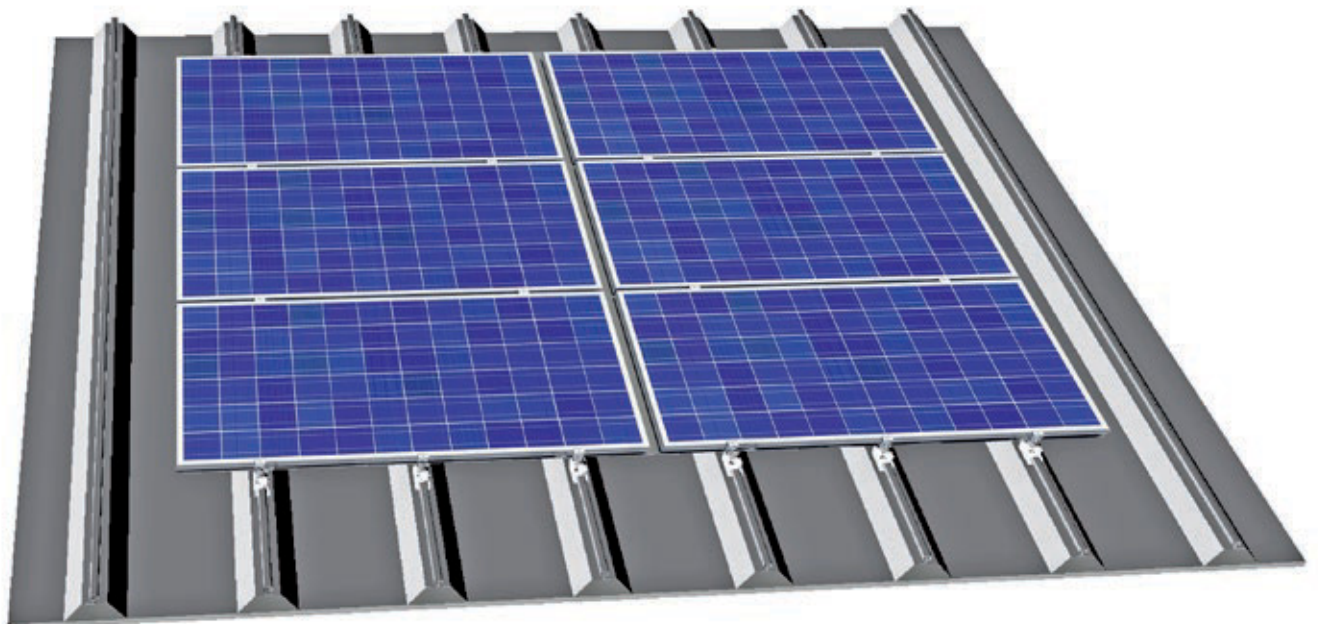
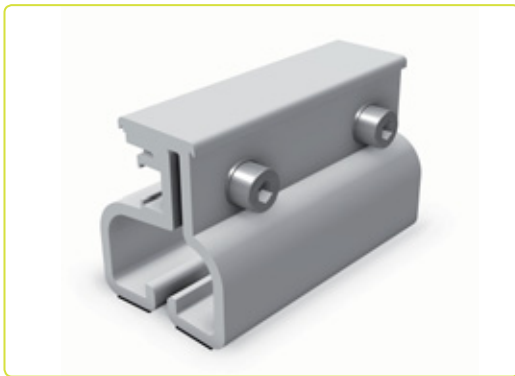




Assembly Instructions

STANDING SEAM CLAMP

Mounting system for roofing with standing seam sheet metal



1 Introduction

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2 Installation – Standing Seam Clamp

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3 Abstract – Installation – Standing Seam Clamp

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The S:FLEX PV mounting system for sheet metal/standing seam roofs is a fastening system for the installation of PV modules. It is possible to both horizontally and vertically mount the modules using the S:FLEX mounting system. Both single layer installation and double layer installation are possible. Furthermore, both framed and frameless PV modules can be mounted.

The S:FLEX PV mounting system for sheet metal/standing seam roofs is characterised by a high degree of pre-assembly. The patented and proven click technology allows a maximum reduction in fitting times. All components are manufactured from aluminium and stainless steel. The high corrosion resistance guarantees a maximum lifespan and provides the possibility of complete recycling.

1.1 Intended use

The S:FLEX PV mounting system for sheet metal/standing seam roofs is a fastening system for the installation of PV modules. It is exclusively designed to accommodate PV modules.

Any use that deviates from this must be regarded as not the intended use. In particular, the observation of the information in these installation guidelines counts as intended use. S:FLEX GmbH is not liable for damages that result from not observing the installation guidelines or from the improper and not intended use of the product.

1.2 About the document

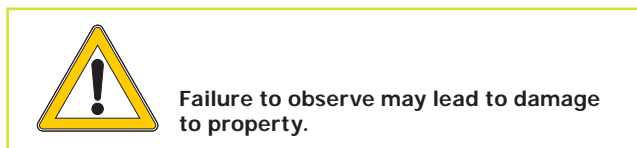
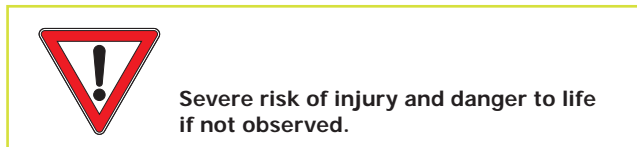
The S:FLEX PV mounting system for sheet metal/standing seam roofs allows the installation of PV systems parallel to the roof. These installation guidelines describe the installation using standing seam clamps and mounting rails. This is possible for:

- Sheet metal/standing seams (if the manufacturer approves)

It is to be ensured that only the current and complete installation guidelines are used for the installation.

1.3 Warnings

The warning notices used in these installation guidelines indicate safety related information. They are:



1.4 General information

Before starting work on the roof, it must be verified that all currently valid accident prevention regulations are observed and that adequate protection is provided against falling parts (e.g. occupational health and safety regulations of the German national association of roofers (ZVDH)).

Before installation, the PV system maker must ensure that the existing roofing and roof substructure are suitable for the occurring additional loads. The condition of the roof substructure is to be examined by the maker (e.g. quality and strength of the purlins, if necessary the rafters and the roof battens, quality of the roofing, sufficient fastening of the roofing to the substructure, maximum load bearing capacity of the roofing).

Installation should only be carried out by skilled workers who work in accordance with the rules of the German national association of roofers (ZVDH).

Before the installation of the substructure, it must be verified that the module manufacturer's specifications regarding module clamps (e.g. width and type of clamp, mounting guidelines for the clamp on the module) are observed. If this is not the case, the customer must obtain a declaration of consent from the module manufacturer before the installation, or the frame must be adjusted according to the module manufacturer's guidelines.

The requirements for the protection of PV mounting systems against lightning and surges are to be met in accordance with the DIN and VDE regulations (e.g. DIN EN 62305-1-4, DIN V V E V 0100 Part 534, VdS guidelines 2010). The specifications of the relevant power supply company are to be observed.

During installation, fire protection regulations are to be observed, e.g. no firewalls are to be overbuilt.

If the roofing is altered, the manufacturer's guidelines are to be observed. During and after the installation, the frame components may not be stepped on or be used as a climbing aid. There is a risk of falling and the roofing underneath it could be damaged.

1.5 Installation

The installation guidelines are for the installation of the S:FLEX PV mounting system on sheet metal/standing seam roofs. The installation guidelines are intended for a group of people with relevant qualifications and who have been instructed by the operator of the PV system.



Please note: The installation should only be carried out by skilled workers who work in accordance with the rules of the German national association of roofers (ZVDH). System components (roof hooks, mounting rails) are not to be used as step ladders; the modules must not be stepped on.



When installing PV systems on roofs with corrugated metal roofing, the admissibility of the installation is to be ensured and, if necessary additional sealing measures in the area of the fastening to the roof membrane are to be implemented.

1.6 Standards and guidelines



These installation guidelines are based on current technology and many years of experience of how our systems can be installed on site. As individual project-related specifics must be considered for every roof, expert advice must always be sought before installation.

Before installation, the maker of the photovoltaic system must ensure that the existing roof substructure is suitable for the occurring additional loads.

To do this, contact structural engineers locally.

Every photovoltaic system must be mounted in accordance with the structural requirements of the location and the installation situation while observing the specifications in these installation guidelines.

It must be ensured that only current and complete installation guidelines are used for the installation and that a printout of the installation guidelines is kept in the immediate vicinity of the system.

Subject to technical modifications.

While installing the PV system, the module manufacturer's mounting instructions, the corresponding standards, accident prevention regulations as well as any further regulations and provisions must always be observed.

The documents listed in the following are information from S:FLEX GmbH and make no claim to be exhaustive. Every person who installs the S:FLEX PV mounting system has to independently inform themselves of all rules and guidelines for the technically correct planning and installation and observe them during the installation. This also includes obtaining the current version of the rules and guidelines.

BGV A2:	Electrical systems and equipment
BGV C22:	Construction work
BGV D36:	Ladders and step stools
BGV A1:	Accident prevention regulations
ZVDH:	Guidelines of the German national association of roofers (ZVDH)
Eurocode 0 (DIN EN 1990):	Basis of structural design
Eurocode 1 (DIN EN 1991):	Actions on structures
Eurocode 5 (DIN EN 1995):	Design of timber structures
Eurocode 9 (DIN EN 1999):	Design of aluminium structures – Execution class according to Eurocode and EN 1090, Part 1 and 3: EXC 2
DIN EN 1090-3:	Execution of steel structures and aluminium structures – part of aluminium structures
DIN EN 62305-1-4:	Protection against lightning
DIN EN 62305-3:	2011 Protection against lightning Part 3: Physical damage to structures and life hazard
DIN 18807-3:	Trapezoidal sheeting in buildings; steel trapezoidal sheeting; structural analysis and design
DIN 18807-9	Trapezoidal sheeting buildings, aluminium trapezoidal sheeting and their connections; application and construction
DIN 18299 VOB Part C:	General technical specifications in construction contracts (ATV) – General rules applying to all types of construction work
DIN 18338 VOB Part C:	General technical specifications in construction contracts (ATV) – Roofing work
DIN 18451 VOB PartC:	General technical specifications in construction contracts (ATV) – Scaffolding work
DIN V VDE V 0100 Part 534:	Devices for protection against overvoltage
VDE 0100 - 712 ; IEC 64/1736:	Low-voltage electrical installations
VDE 0185 Series, IEC 81/335:	Protection against lightning

2.1 System components

① Components for roof fastenings



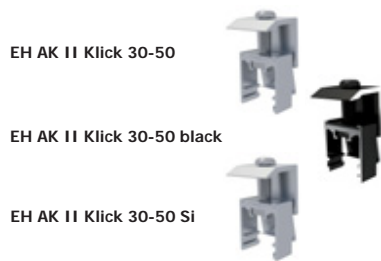
② Mounting rails



③ Splice



④ End clamp



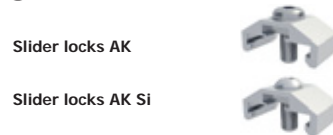
⑤ Mid clamp



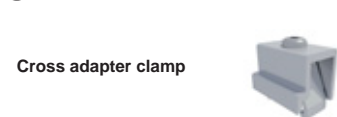
⑥ Slipping protection



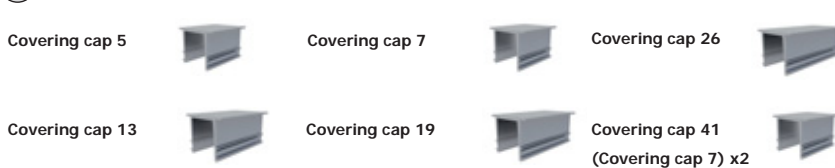
⑦ Slider locks



⑧ Cross adapter clamp



⑨ Covering caps



⑩ Cable clips



2.2 Direct roof fastening using clamps

S:FLEX components which are directly clamped to the roofing can be used for the roof fastening for roofing with standing seam sheet metal (approval from the manufacturer required). These fastenings are possible for pitched roofs with a tilt angle of up to 10°.

When installing the standing seam clamps, it is to be ensured that they are used to in a sufficient number in order to safely transmit the occurring forces to the roofing and the construction under it and to guarantee the impermeability of the roofing.

2.3 Installation for direct module installation

Installation – 1 (positioning as lower layer)

The positioning of the standing seam clamps must be determined according to the structural requirements of the location and the installation situation. In doing so, it must again be checked whether the measurements taken as a basis in the planning match the actual measurements found on the roof (if necessary, adjustments must be made). The position of the standing seam clamps must be checked against the module's prescribed clamping distances. The distance between the standing seam clamps in the direction of tilt is $L = \text{width of module} + 20 \text{ mm}$ (see fig.). The distance between the standing seam clamps parallel to the eaves depends on the distance between the standing seams. Thus, it can happen that the clamping area foreseen as standard by the module manufacturer cannot always be observed. If this is the case, approval from the module manufacturer is required.



Check the basis of the plans. Fastening up to 10° roof tilt is possible. Distance between standing seam clamp in tilt direction is $L = \text{width of module} + 20 \text{ mm}$.



Positioning according to the structural requirements and the installation situation



Align the standing seam clamps using a plumb line

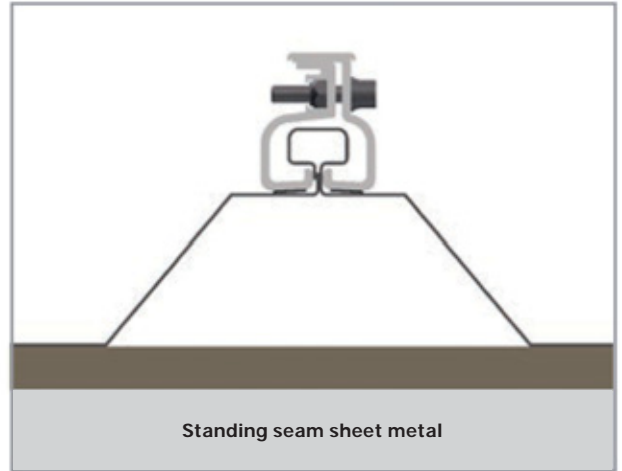
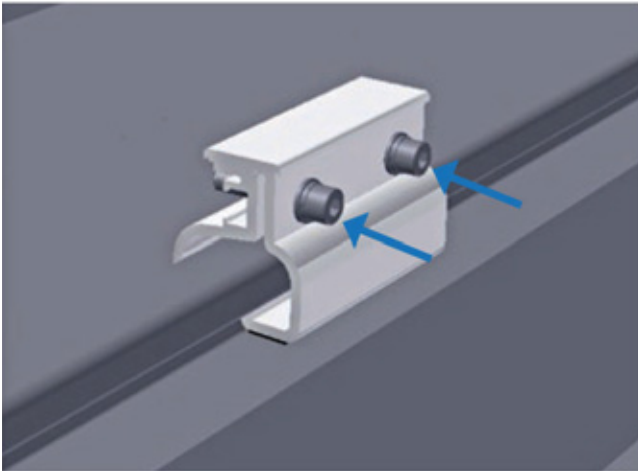


Screw in evenly in final position (torque 15 Nm)

Mount the standing seam clamps. In doing so, ensure the compatibility of the materials of the clamp and roofing. It is to be ensured that the standing seam clamp neatly covers the seam (observe the clamp's inner jaw size) and force fits (clamping area: thickness of seam 3 to 8 mm). Tighten the screws evenly in their final position (torque 15 Nm). An EPDM tape is bonded to the underside of the standing seam clamps in order to avoid scratches to the roofing during the installation.

2 Installation – Standing Seam Clamp

Direct installation with framed PV modules



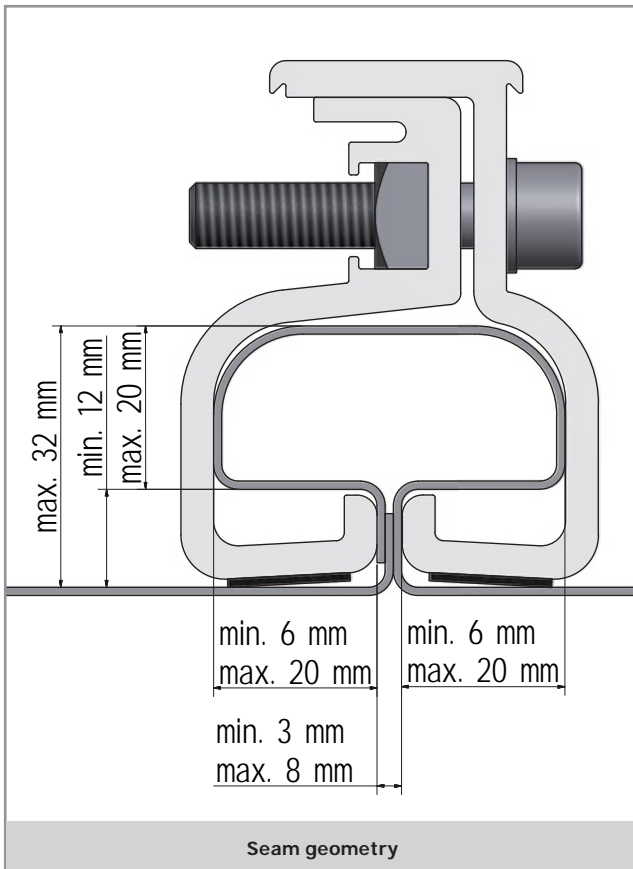
Mount standing seam clamps (torque 15 Nm) – number according to structural requirements



Observe the clamp's inner jaw size – clamping area: 3 – 8 mm



Check the area of application for the standing seam clamp (see fig. for seam geometry)





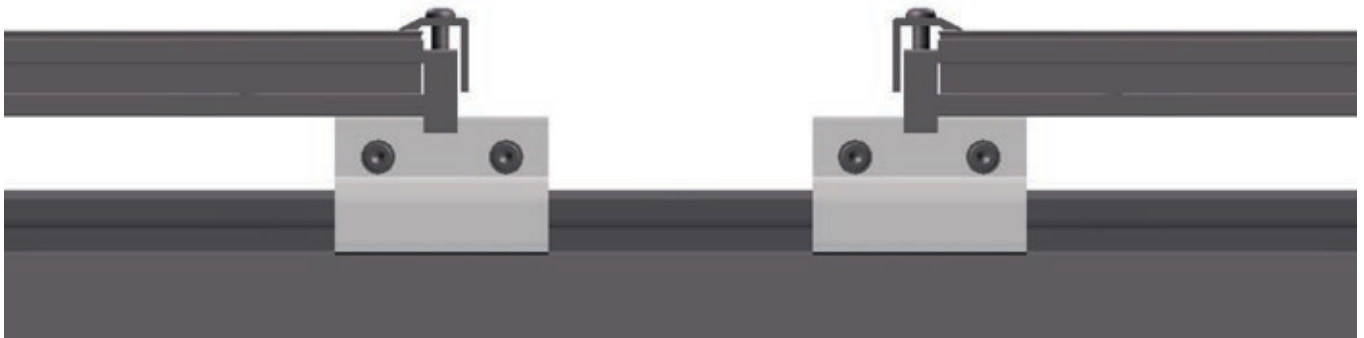
For single layer substructures, if the module array vertical to the eaves is longer than 12.00 m, it is to be separated by placing a standing seam clamp with end clamps.

The alignment of the expansion joints is to be adjusted according to the structural conditions of the roof and the different expansion properties of the materials. Observe the instructions in Section Installation – 2 in these installation guidelines when placing the end clamps.

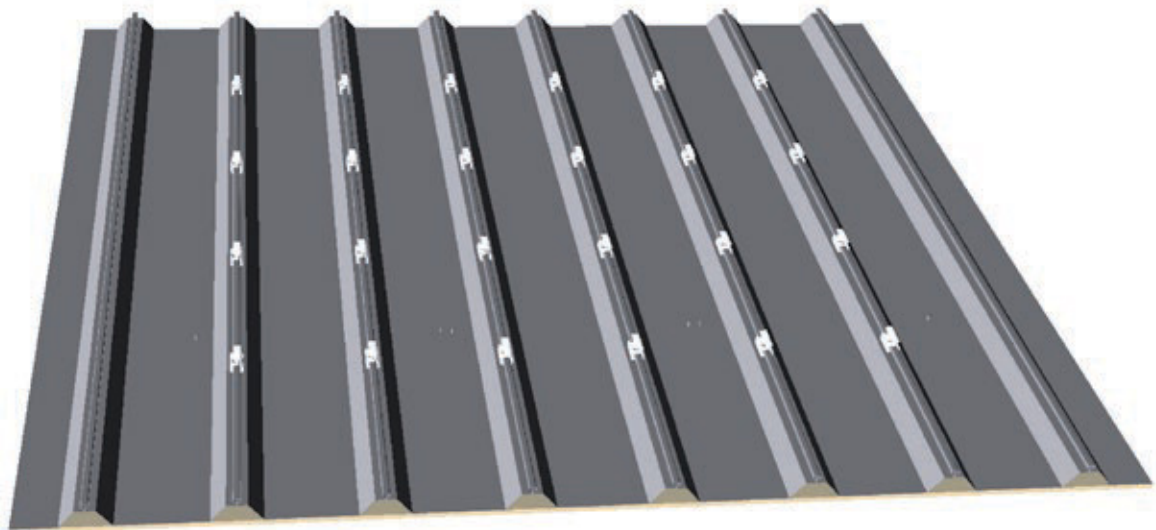


Modules may not be built over expansion joints.

There is no connection to earth. This must be established without limiting the expansion joint's mode of operation.



Completion of the installation of the standing seam clamps.



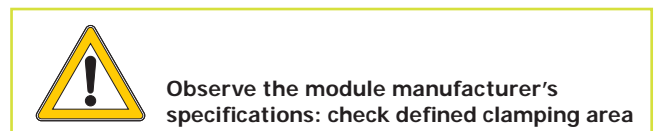
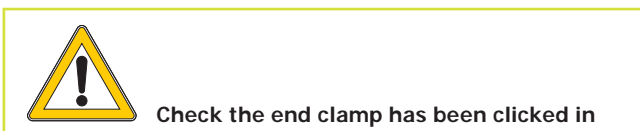
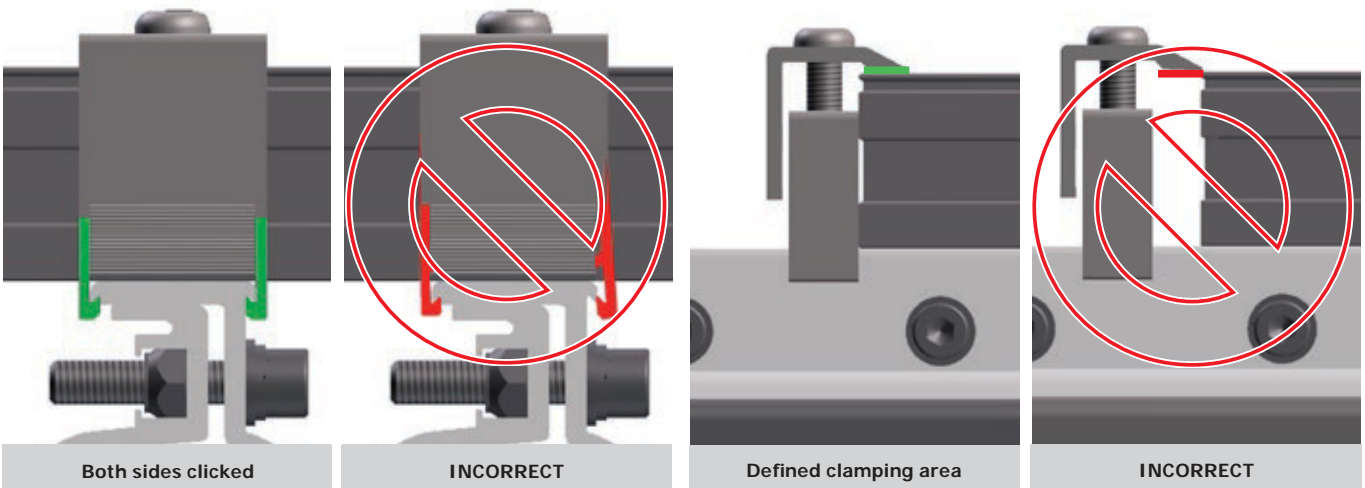
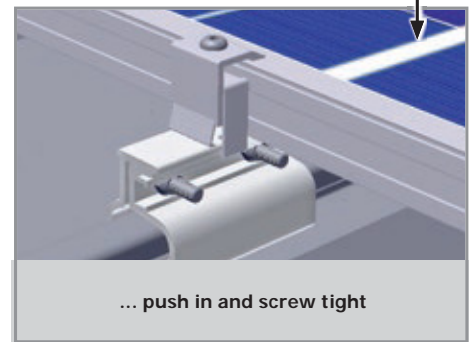
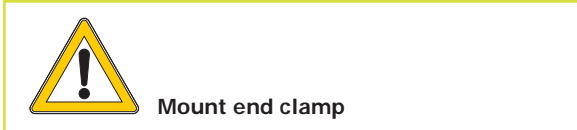
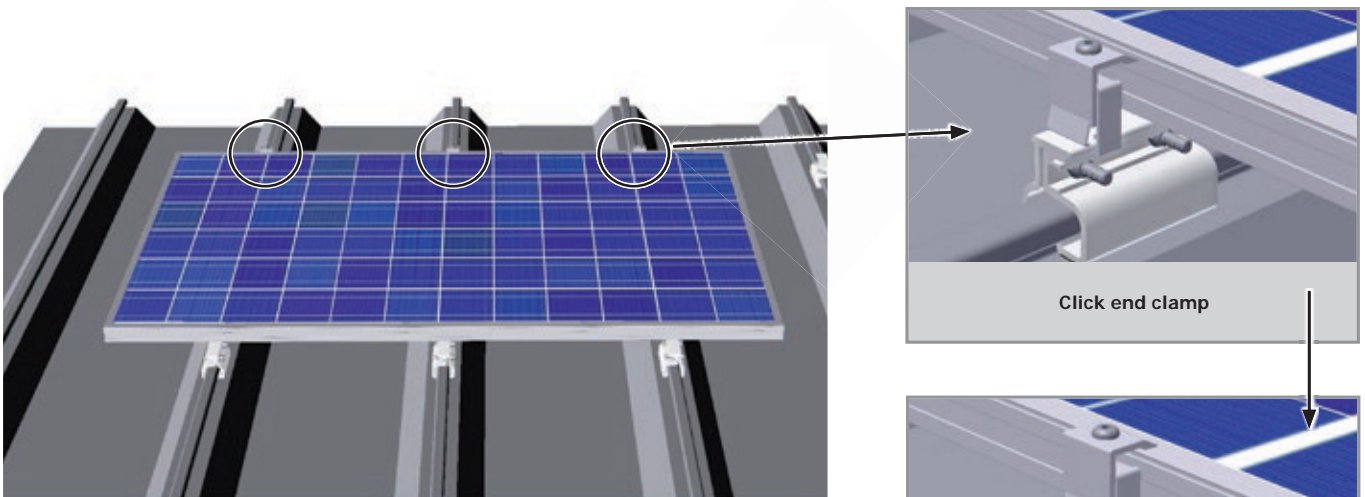
In the following, the column for column installation of the modules from top to bottom is described.

The installation can also be carried out from bottom to top if the location requires it and the installation situation allows for it. In the case of installation from bottom to top, for roof tilts of more than 5°, a slider lock is to be pushed on to each standing seam clamp and tightened (torque 8-10 Nm) before the module installation. Ensure that all slider locks are fixed in a horizontal line. The end clamps are then clicked on to the standing seam clamps and pushed on to the slider locks.

Installation – 2 (module installation, end clamp)

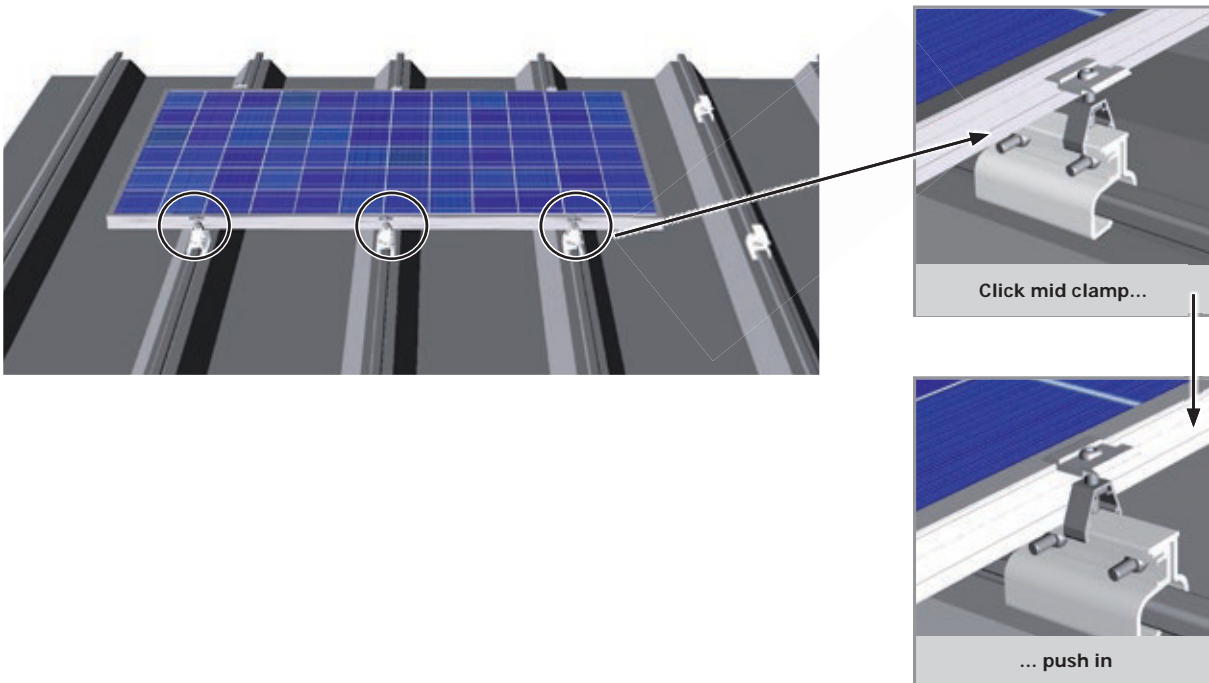
Place the module on the standing seam clamps so that it lies on top of the clamps with the same overhang. Mount the end clamps. To do this, click the end clamp on to the standing seam clamp and push it on to the module. It must be ensured that the end clamp is clicked into both sides of the standing seam clamp. Now adjust the end clamp to the height of the module and tighten the screw (torque 8-10 Nm).

Ensure that the end clamp clamps the module frame at the clamping area defined by the module manufacturer.

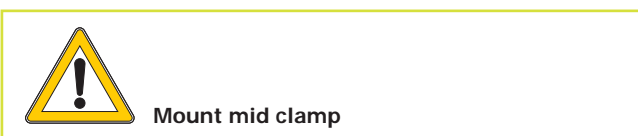
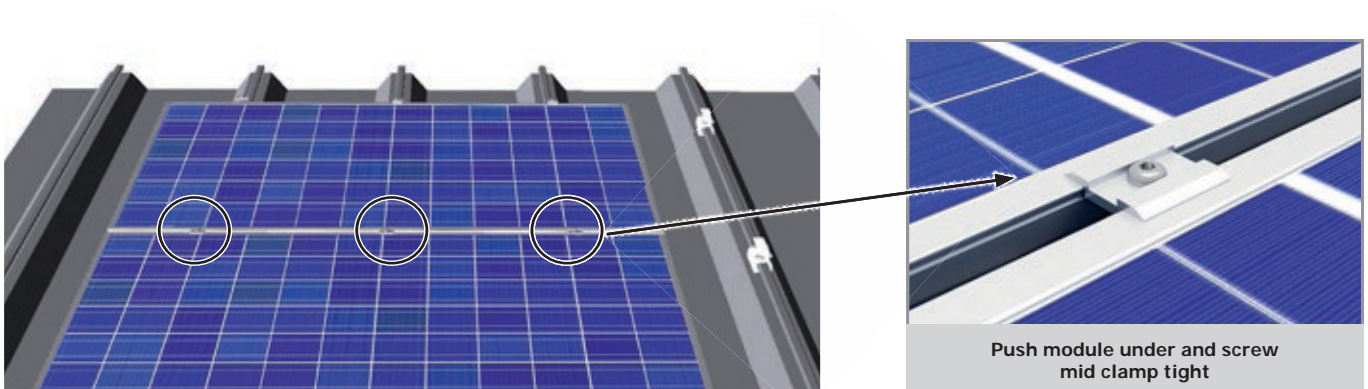


Installation – 3 (module installation, mid clamp)

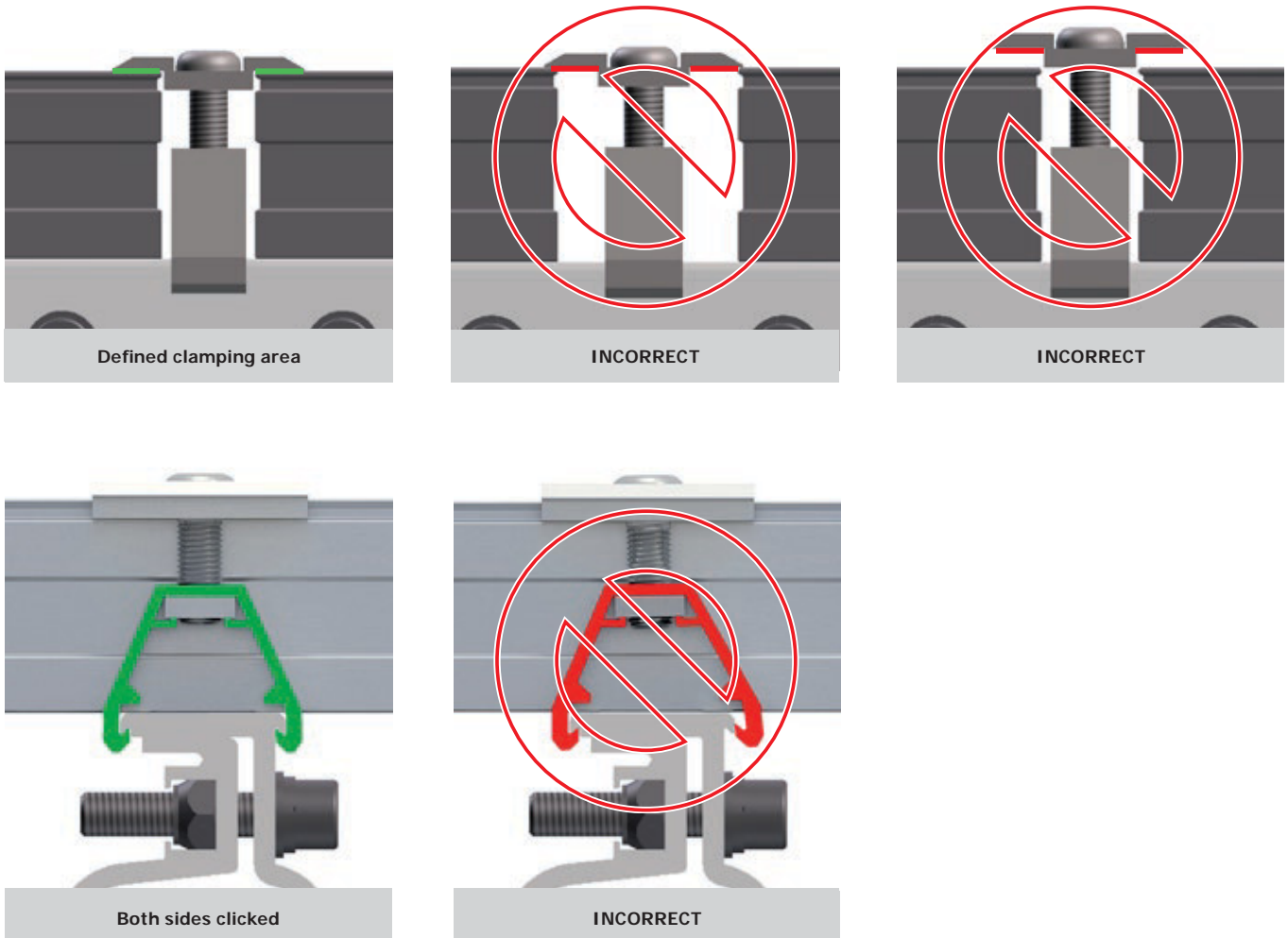
Now mount the mid clamps. To do this, click the mid clamp on to the standing seam clamp and push it on to the module. It must be ensured that the mid clamp is clicked into both sides of the standing seam clamp.



Now push the next module under the mid clamp. Adjust the mid clamp to the height of the module frame and tighten the screw (torque 8-10 Nm).



Ensure that the mid clamp clamps both module frames at the clamping area defined by the module manufacturer.



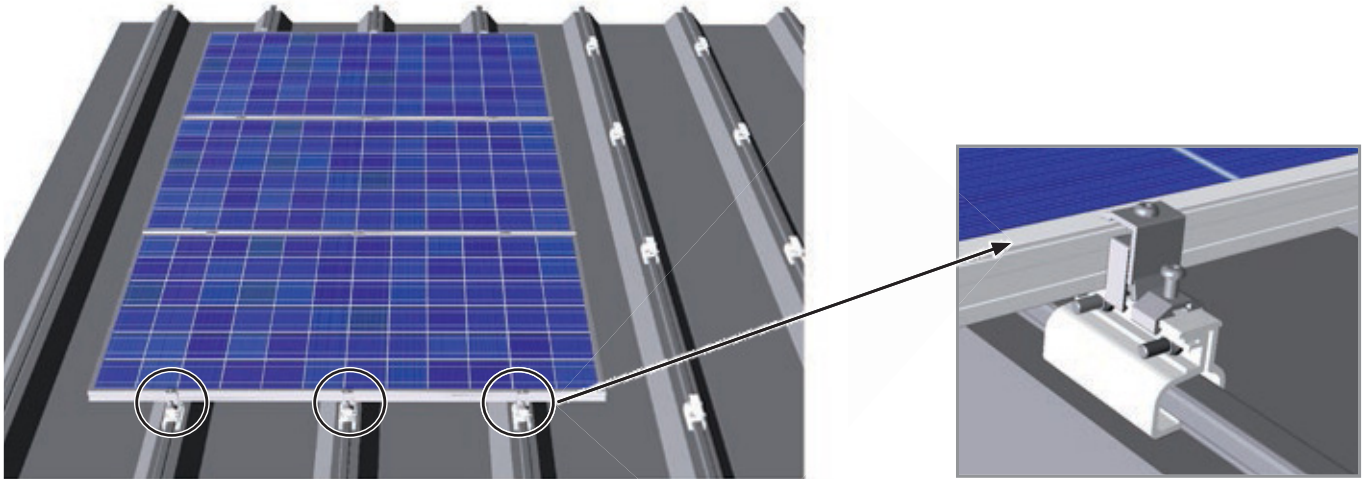
Check that the mid clamp has been clicked in



Observe the module manufacturer's specifications:
check defined clamping area

Installation – 4 (module installation, slipping protection)

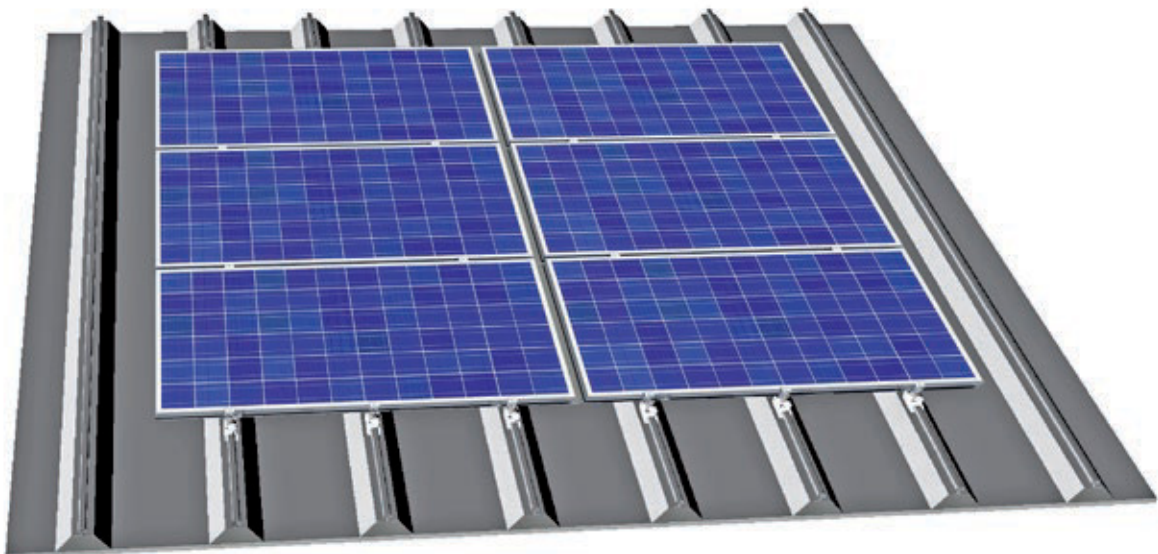
On the last module in the row (if applicable, on expansion joints), end clamps are to be mounted. For roof tilts of more than 5°, additional slider locks are also to be mounted. To do this, click the end clamp on to the standing seam clamp and push it on to the module. It must be ensured that the end clamp is clicked into both sides of the standing seam clamp. Now adjust the end clamp to the height of the module and tighten the screw (torque 8-10 Nm). Ensure that the end clamp clamps the module frame at the clamping area defined by the module manufacturer (see Installation – 2). Push the slider lock from below on to the standing seam clamp up to the end clamp and fasten it (torque 8-10 Nm).



Mount end clamps on last module, and for roof tilts of more than 5°, mount additional slider locks.



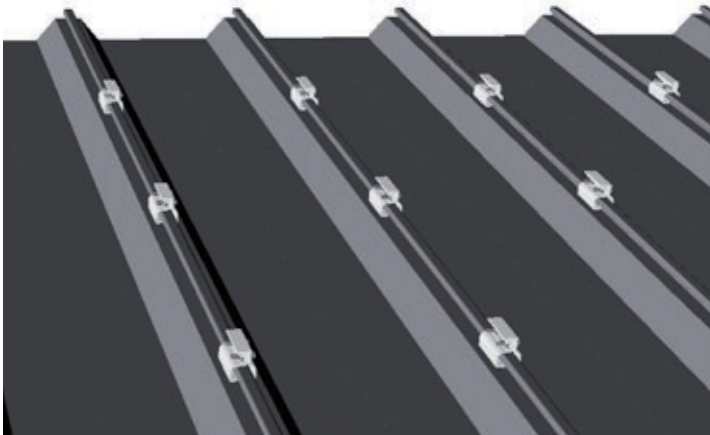
Proceed as described for the following rows.
Ensure that all end clamps are fixed in a horizontal line.



2.4 Installation – single layer substructure

Installation – 1 (positioning of the standing seam clamps)

The positioning of the standing seam clamps must be determined according to the structural requirements of the location and the installation situation. In doing so, it must again be checked whether the measurements taken as a basis in the planning match the actual measurements found on the roof (if necessary, adjustments must be made). The position of the standing seam clamps must be checked against the module's prescribed clamping distances. The distance between the standing seam clamps in the direction of tilt is $L = \text{width of module} + 20 \text{ mm}$ (see fig.).



Check the basis of the plans.
Fastening up to 10° roof tilt is possible.



Positioning according to the structural requirements and the installation situation



Align the standing seam clamps using a plumb line

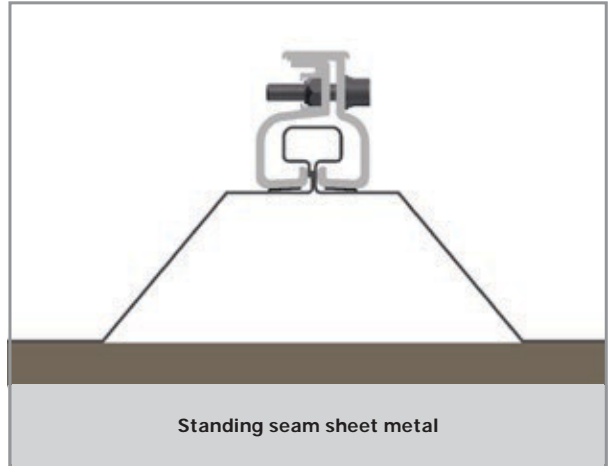
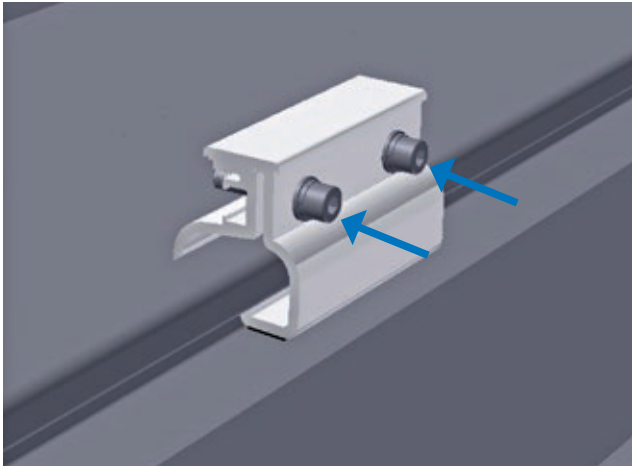


Screw in evenly in final position
(torque 15 Nm)

Mount the standing seam clamps. In doing so, ensure the compatibility of the materials of the clamp and roofing. It is to be ensured that the standing seam clamp neatly covers the seam (observe the clamp's inner jaw size) and force fits (clamping area: thickness of seam 3 to 8 mm). Tighten the screws evenly in their final position (torque 15 Nm). An EPDM tape is bonded to the underside of the standing seam clamps in order to avoid scratches to the roofing during the installation.

2 Installation – Standing Seam Clamp

Single layer installation with framed PV modules, vertically mounted



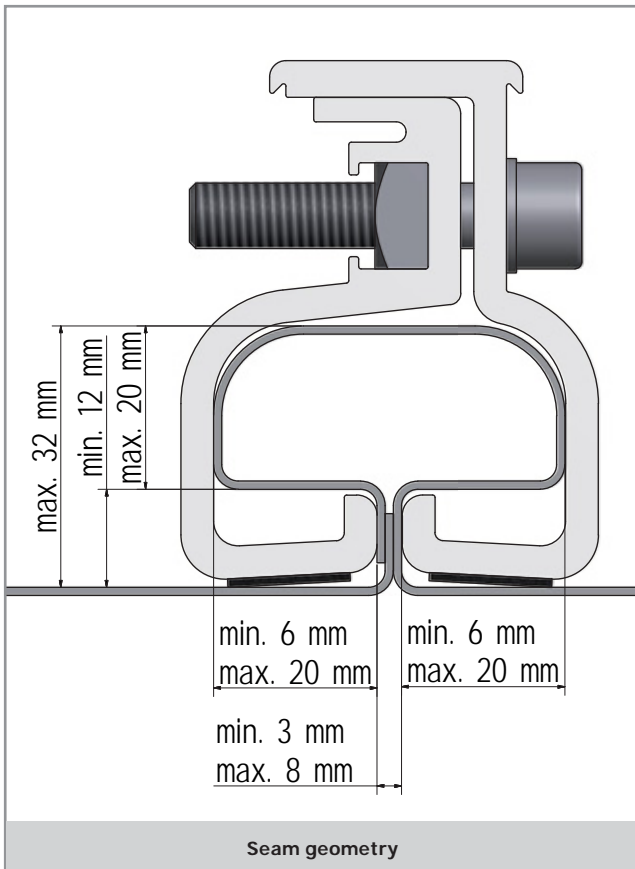
Mount standing seam clamps (torque 15 Nm) – number according to structural requirements



Observe the clamp's inner jaw size – clamping area: 3 – 8 mm

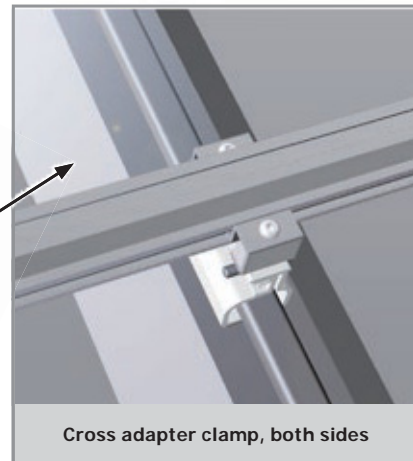
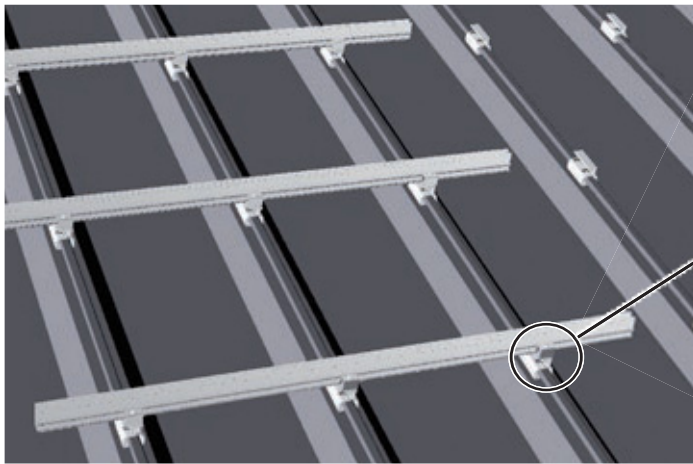


Check the area of application for the standing seam clamps (see fig. for seam geometry)

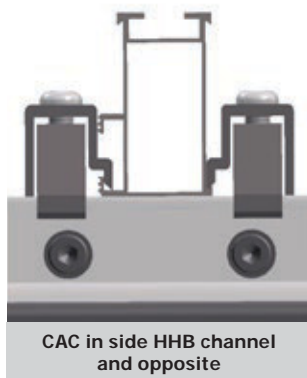


Single layer installation with framed PV modules, vertically mounted

Mount the horizontal mounting rails on to the standing seam clamps for each row of modules using the cross adapter clamps. To do this, click the cross adapter clamp on to the standing seam clamp and fix the horizontal mounting rail with it. Check the distance of the horizontal mounting rails against the module's prescribed clamping distances. Ensure that the cross adapter clamp is clicked in on both sides of the mounting rail and tighten the screw (torque 8-10 Nm).



Cross adapter clamp, both sides



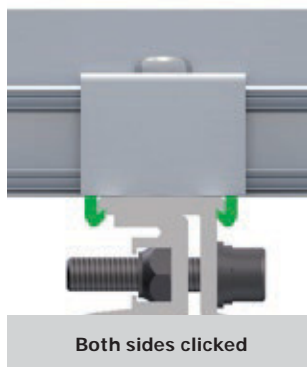
CAC in side HHB channel and opposite



INCORRECT



INCORRECT



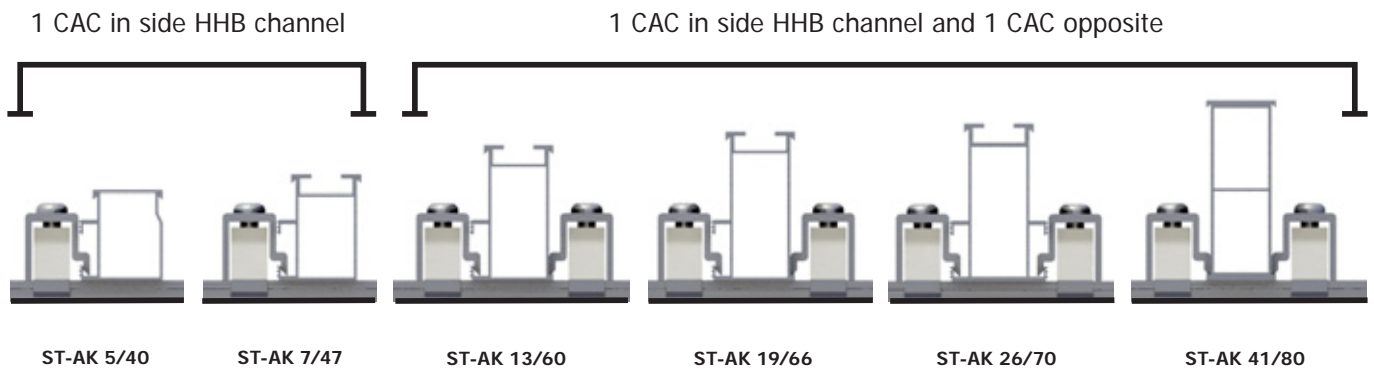
Both sides clicked



INCORRECT

Depending on the structural requirements of the location and the installation situation, several cross adapter clamps may be required per crossing point. If a second cross adapter clamp is required, it is fixed to the opposite side, as described above (torque 8-10 Nm).

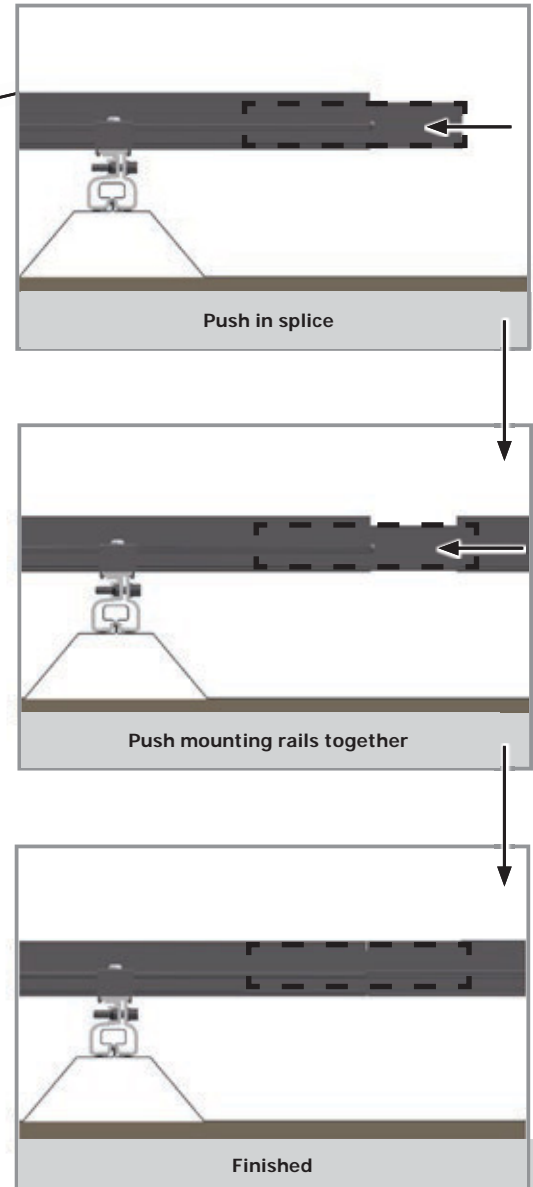
Crossing points:




Observe the module's installation instructions for the distance between the vertical mounting rails.

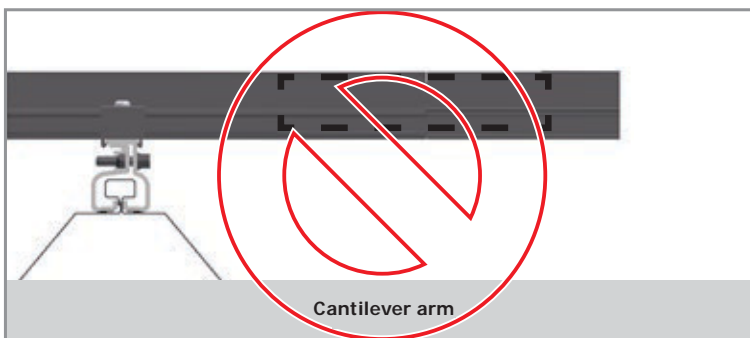
Installation – 3 (splice)

In order to link several mounting rails, half of the splice, which has the same structural values as the mounting rails, is pushed into the already installed mounting rail. Then push the other mounting rail on to the splice. Use pressure to push the mounting rails flush together and check if a connection to earth has been created. The connection is finished. Fix the joined mounting rail on to the standing seam clamp using a cross adapter clamp, as described in Installation – 2.



 **Check connection to earth**

 **No cantilever arms with splices. Position the splices so that they lie between 2 standing seam clamps.**





If the module array along the eaves is longer than 3.15 m, the module array is to be separated by placing two end clamps. In the zone between the end clamps, the mounting rail is to be separated and connected using a splice to allow the rail to move by 2 cm (expansion joint).

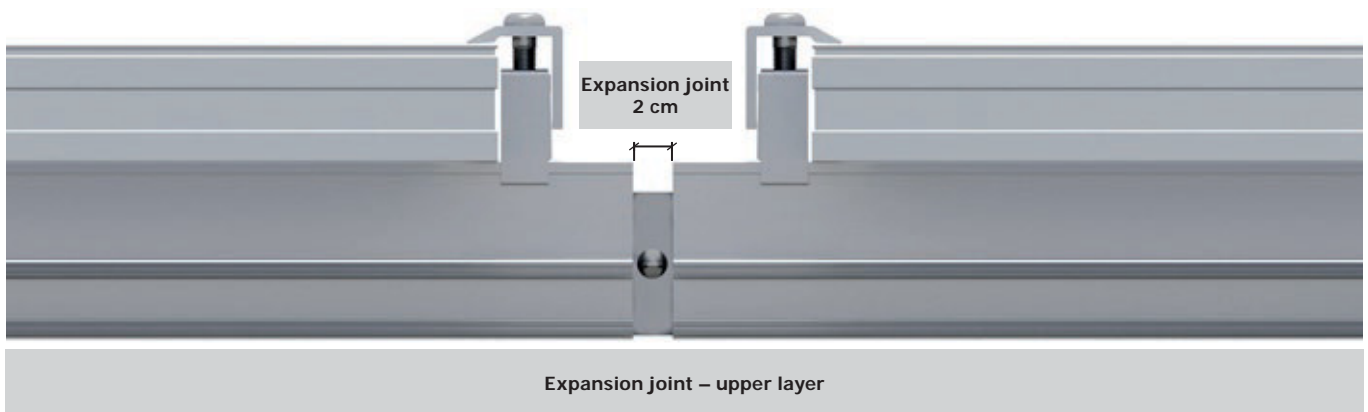
The alignment of the expansion joints is to be adjusted according to the structural conditions of the roof and the different expansion properties of the materials.

Observe the instructions in Installation – 5 in these installation guidelines when placing the end clamps.

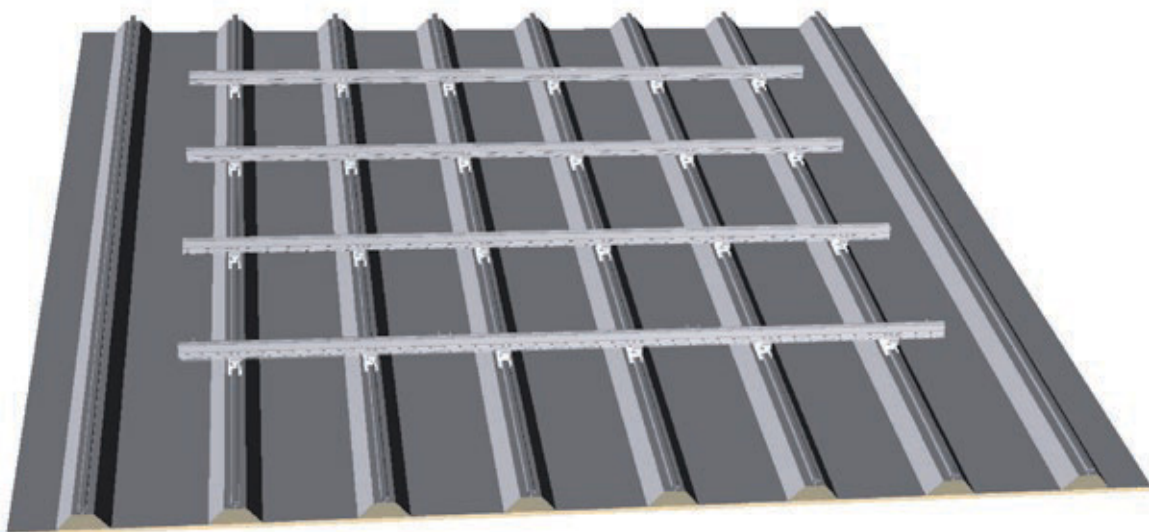


Modules may not be built over expansion joints.

There is no connection to earth. This must be established without limiting the expansion joint's mode of operation.



Completion of the installation of the upper rail layer.

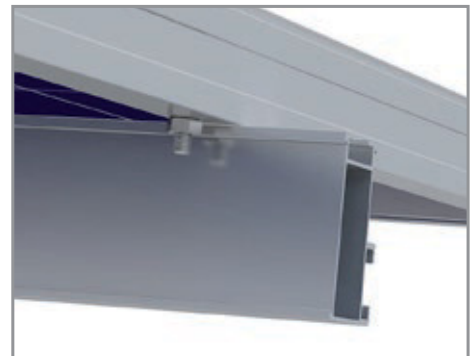
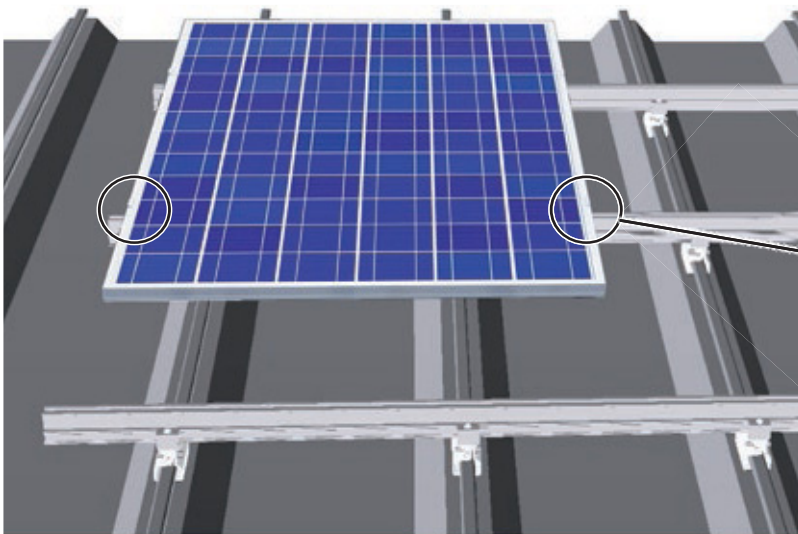


Installation – 4 (module installation, slipping protection for roof tilts of more than 5°)



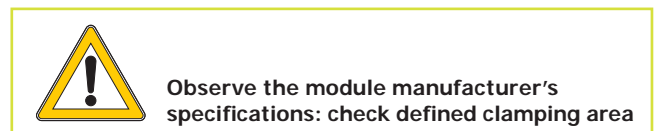
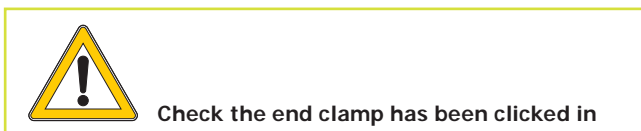
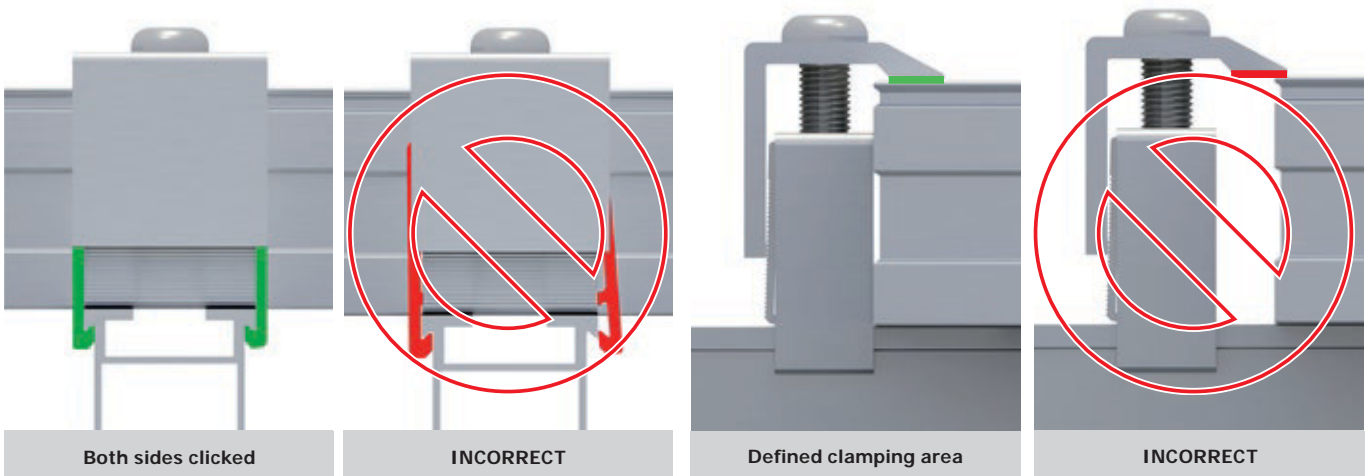
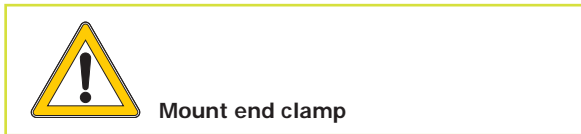
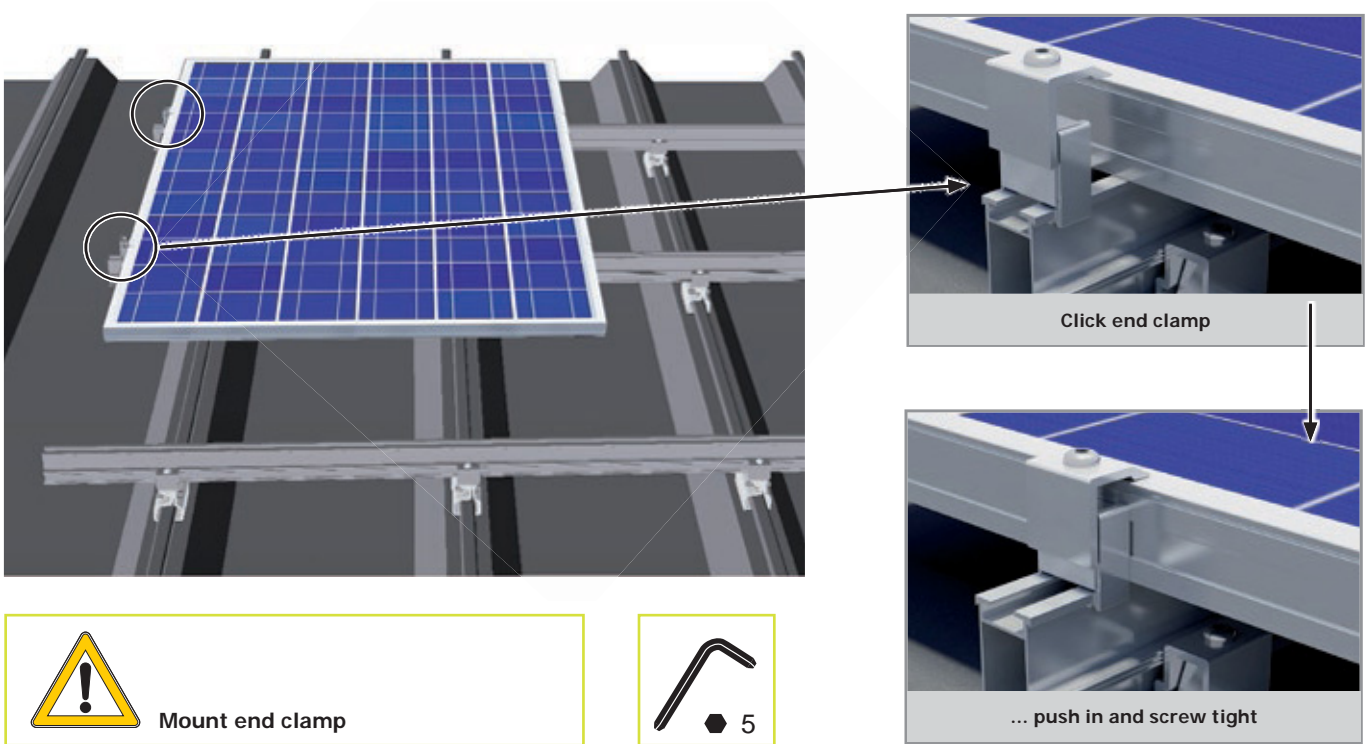
For roof tilts of more than 5°, the modules in the lowest row of modules are to be furnished with slipping protection before installation. The same applies for modules under which no further module directly adjoins (modules above obstructions, e.g. windows, chimneys etc.).

Fix 2 screws M6 x 20 (with the shank downward) with nuts M6 in 2 of the module's frame holes (8 mm) so that the screws are at the same level and that when installed they are above at least one horizontal mounting rail layer, if necessary so that the screws on the underside of the module frame touch the horizontal mounting rails from above. If the lower fastening borehole is larger than 8 mm, please use a screw appropriate for this.



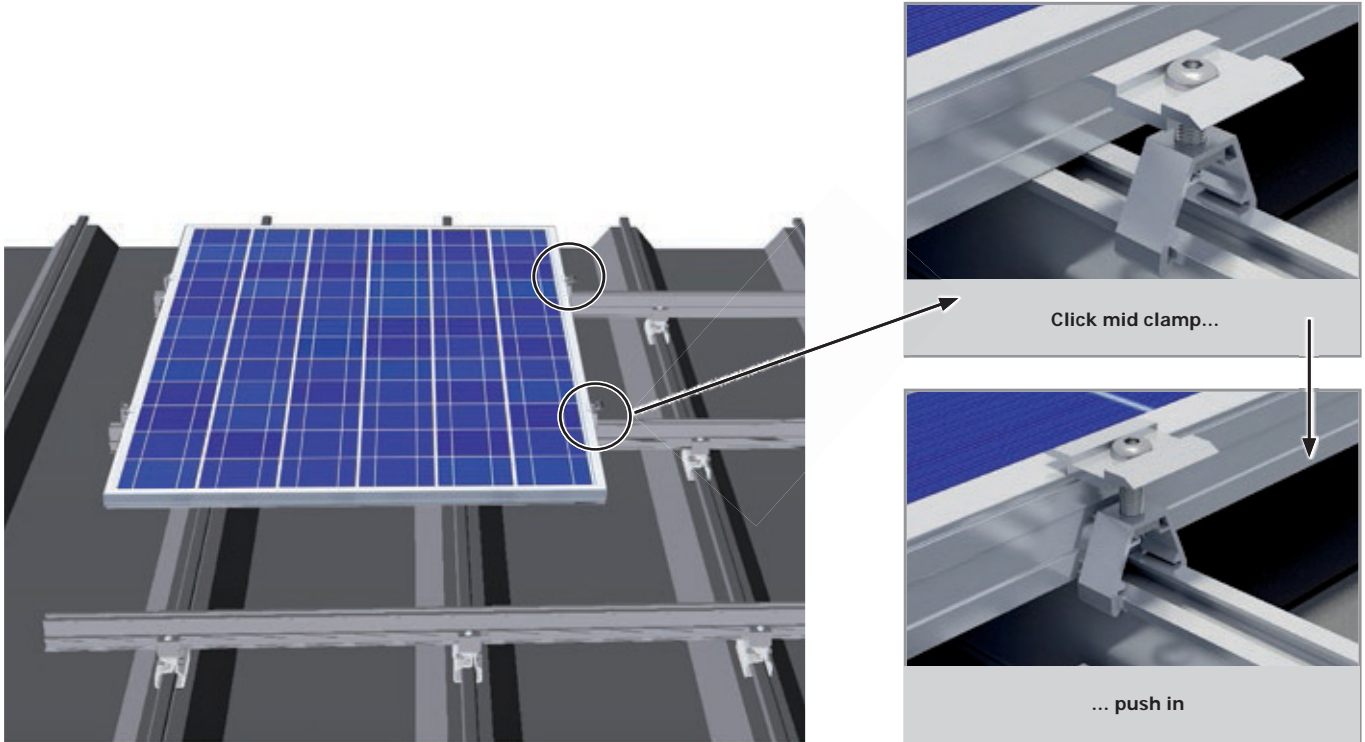
Installation – 5 (module installation, end clamp)

Place the module on the mounting rails. Mount the end clamps. To do this, click the end clamp on to the mounting rail and push it on to the module. It must be ensured that the end clamp is clicked into both sides of the mounting rail. Now adjust the end clamp to the height of the module and tighten the screw (torque 8-10 Nm). Ensure that the end clamp clamps the module frames at the clamping area defined by module manufacturer.

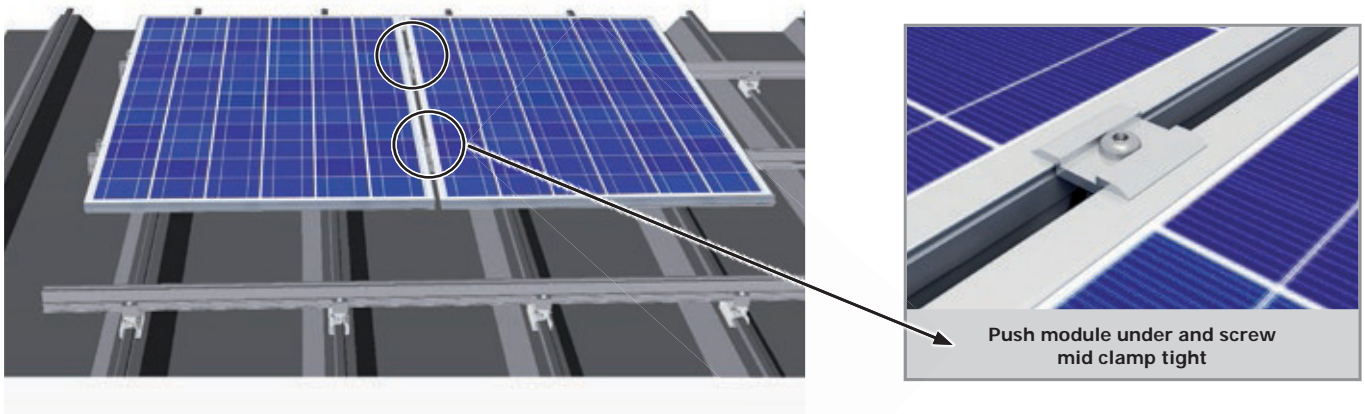


Installation – 6 (module installation, mid clamp)

Now mount the mid clamps. To do this, click the mid clamp on to the mounting rail and push it on to the module. It must be ensured that the mid clamp is clicked into both sides of the mounting rail.



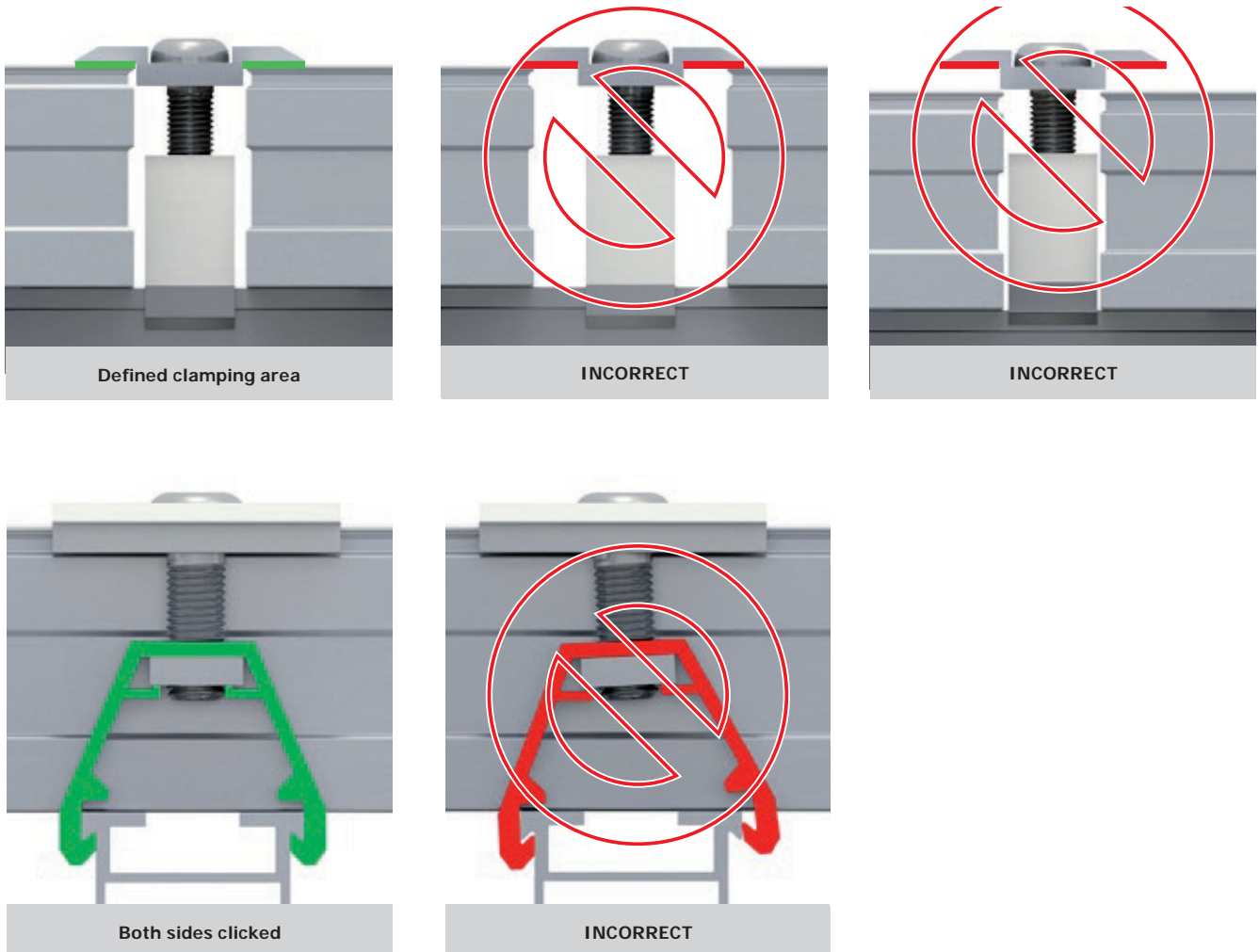
Now push the next module under the mid clamp. Adjust the mid clamp to the height of the module frame and tighten the screw (torque 8-10 Nm).



Mount mid clamp



Ensure that the mid clamp clamps both module frames at the clamping area defined by the module manufacturer.



Check that the mid clamp has been clicked in



Observe the module manufacturer's specifications:
check defined clamping area

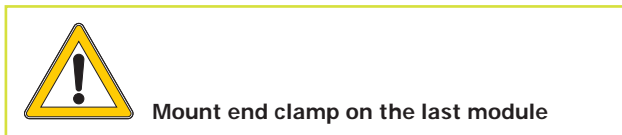
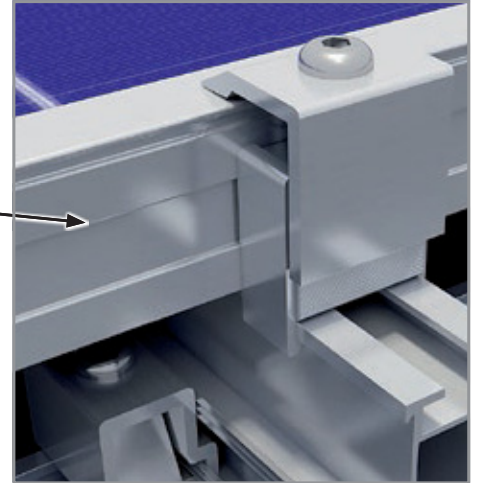
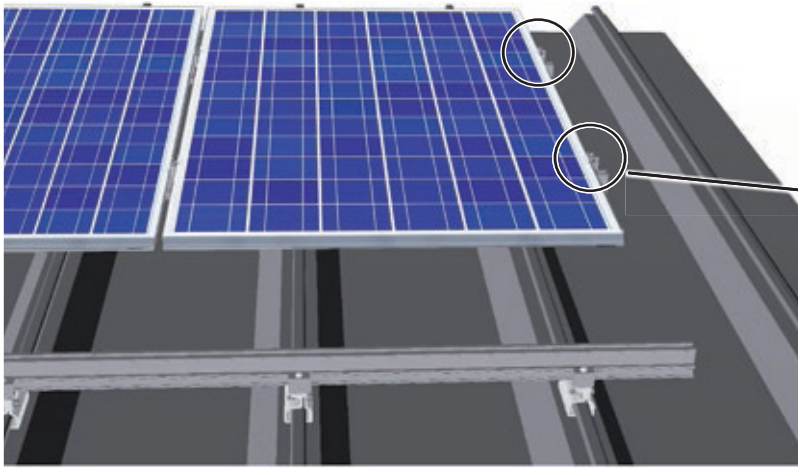


Use MH AK 28-36 for upper mounting rails ST-AK 5/40 or
ST-AK 41/80 for module frame heights up to 36 mm

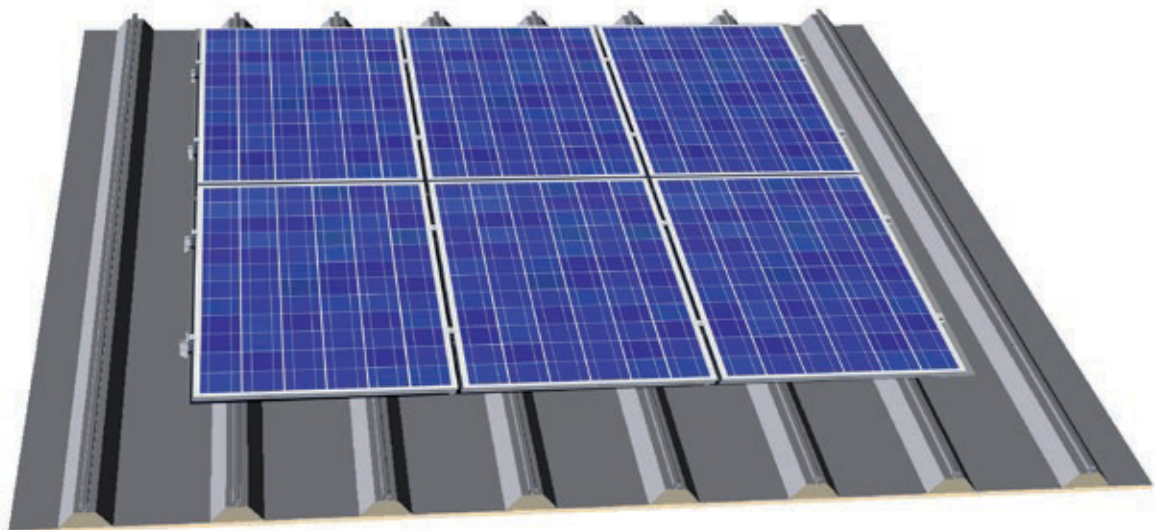
Installation – 7 (module installation, end clamp on row end)

On the last module in the row (if applicable, on expansion joints), end clamps are again to be mounted. To do this, click the end clamp on to the mounting rail and push it on to the module. It must be ensured that the end clamp is clicked into both sides of the mounting rail. Now adjust the end clamp to the height of the module and tighten the screw (torque 8-10 Nm).

Ensure that the end clamp clamps at the clamping area defined by the module manufacturer (see Installation – 5).

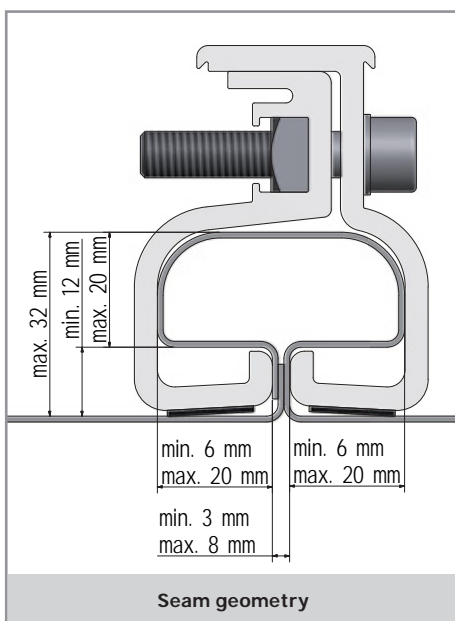
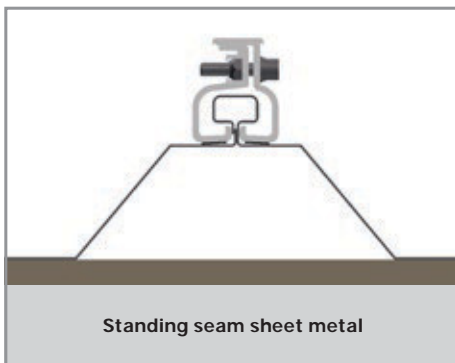
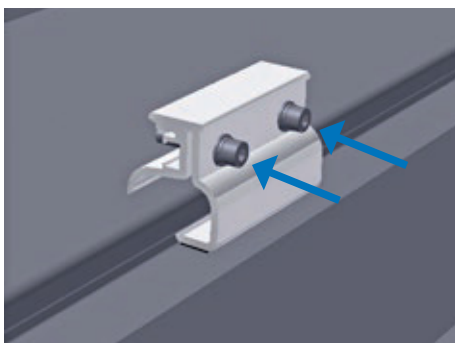


Proceed as described for the following rows.



3.1 Installation for direct module installation

Installation – 1 (positioning of the standing seam clamps)



Check the basis of the plans. Fastening up to 10° roof tilt is possible. Distance between standing seam clamp in tilt direction is $L = \text{width of module} + 20 \text{ mm}$.

Positioning according to the structural requirements and the installation situation

Align the standing seam clamps using a plumb line



Screw in evenly in the final position (torque 15 Nm)



Mount standing seam clamps (torque 15 Nm) – number according to structural requirements

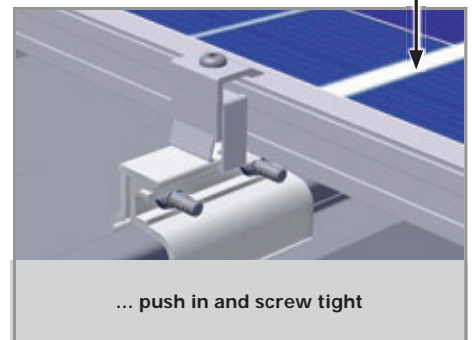
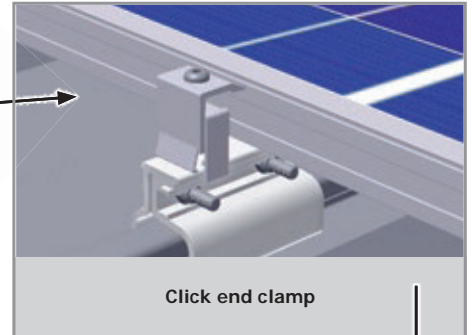
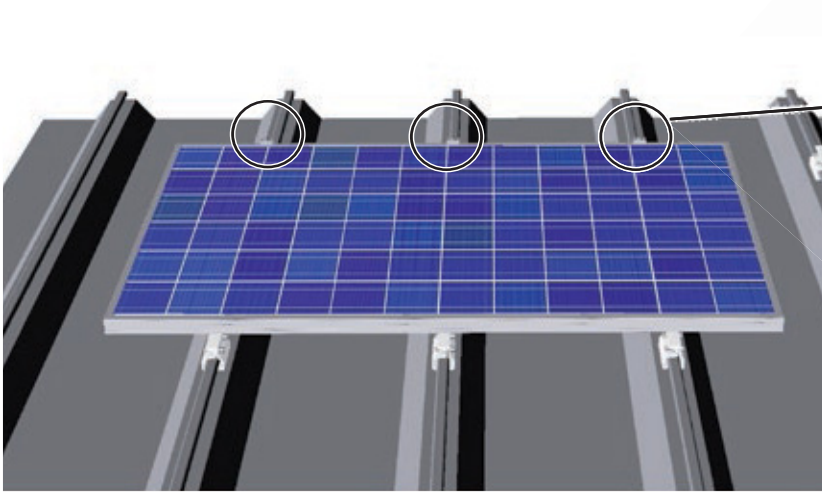



Observe the clamp's inner jaw size – clamping area: 3 – 8 mm



Check the area of application for the standing seam clamps (see fig. for seam geometry)

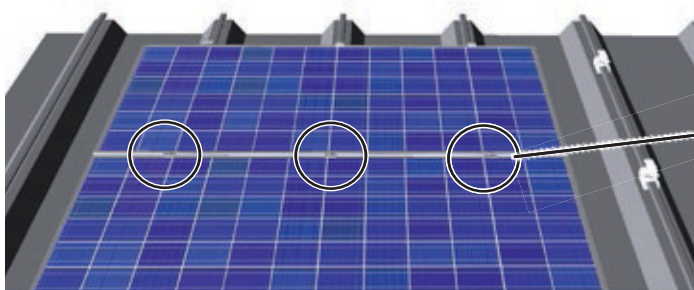
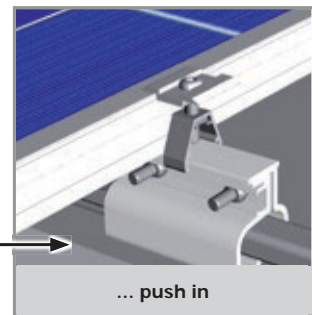
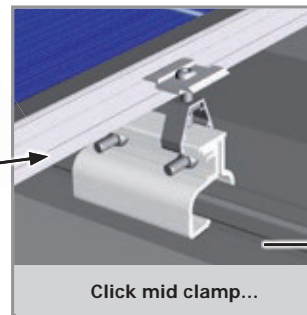
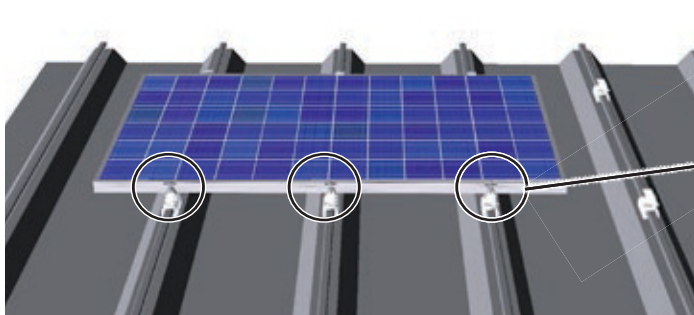

Installation – 2 (module installation, end clamp)

Place the module on the standing seam clamps with the same overhang and mount the end clamp (torque 8 -10 Nm)



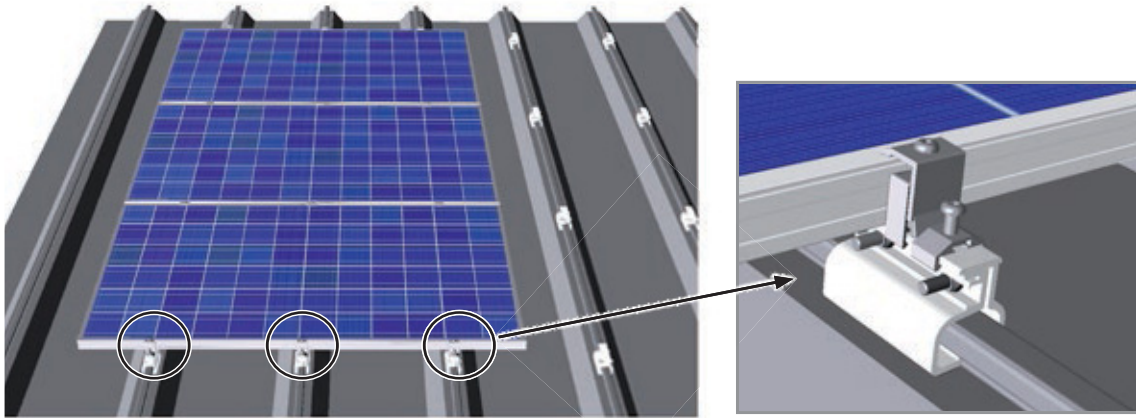
Installation – 3 (module installation, mid clamp)

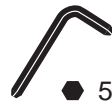
Mount mid clamp (torque 8-10 Nm)



Installation – 4 (module installation, end clamp on row end)

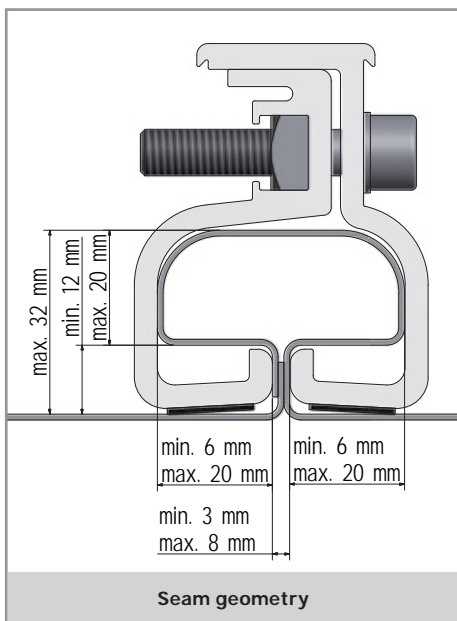
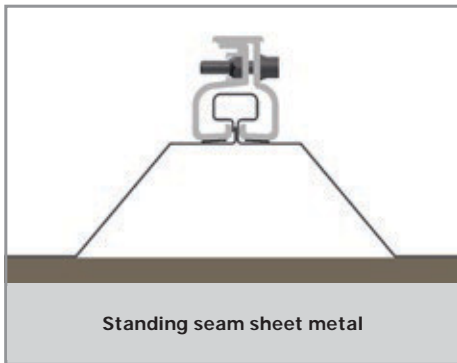
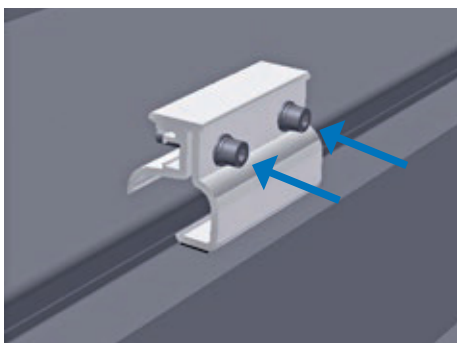


Mount end clamps on last module (torque 8 -10 Nm), and for roof tilts of more than 5°, mount additional slider locks.



3.2 Installation for single layer substructure

Installation – 1 (positioning of the standing seam clamps)



Check the basis of the plans.
Fastening up to 10° roof tilt is possible.

Positioning according to the structural requirements and the installation situation

Align the standing seam clamps using a plumb line



Screw in evenly in the final position
(torque 15 Nm)



Mount standing seam clamps
(torque 15 Nm) – number according to structural requirements

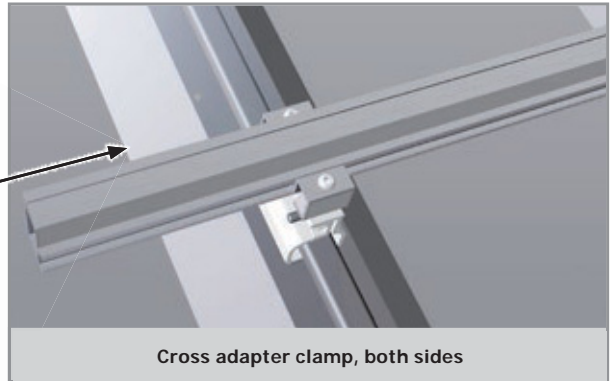
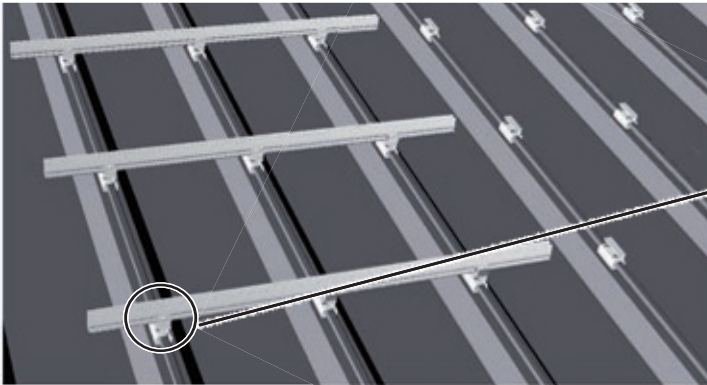


Observe the clamp's inner jaw size – clamping area: 3 – 8 mm



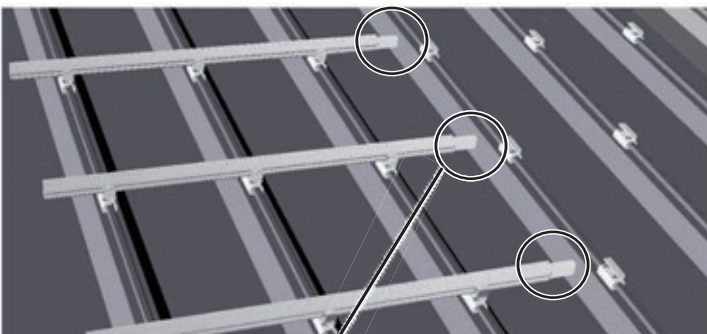
Check the area of application for the standing seam clamps
(see fig. for seam geometry)

Installation – 2 (installation of upper layer of rails)

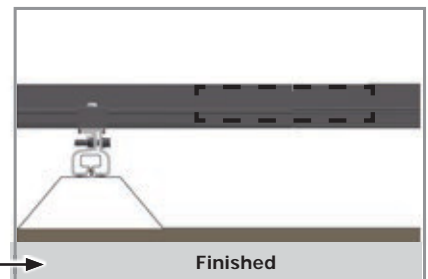
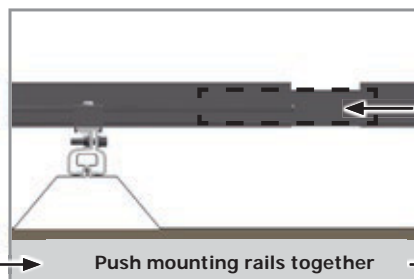
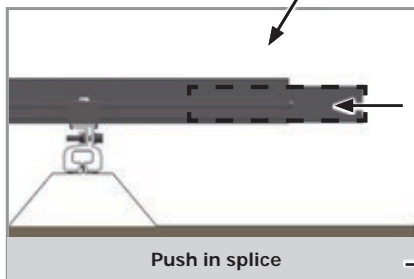


Mount cross adapter clamps on both sides of mounting rails (torque 8-10 Nm)

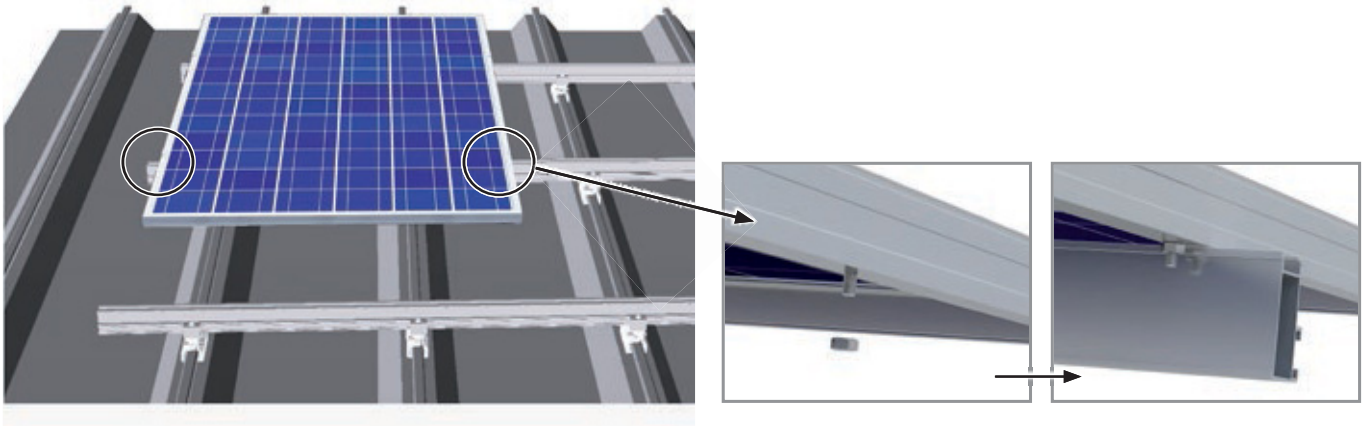
Installation – 3 (splice)



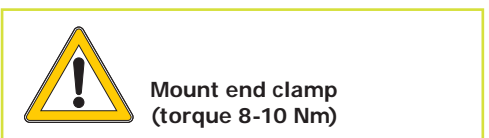
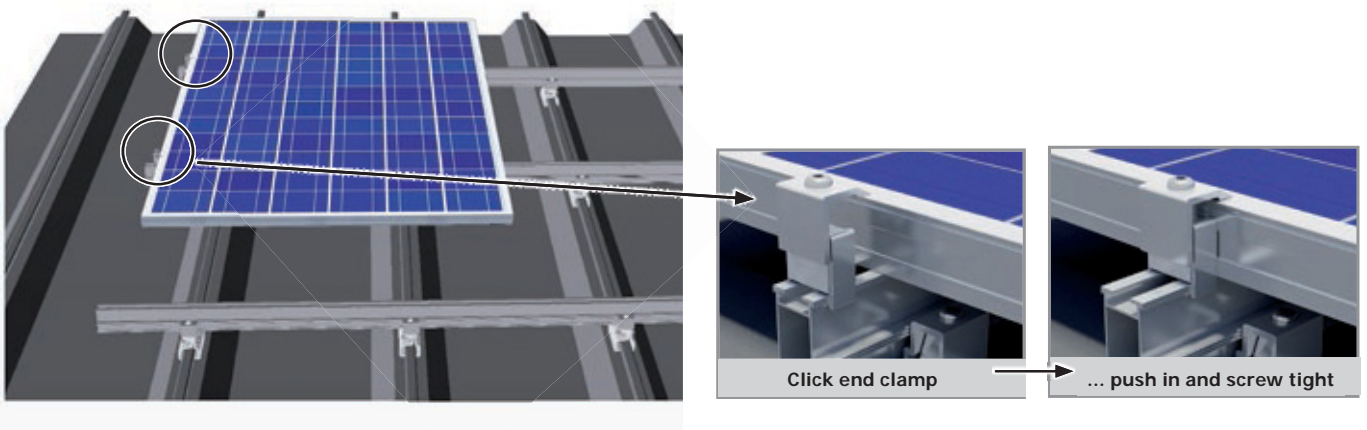
Push in splice, check connection to earth. No cantilever arms with splices!



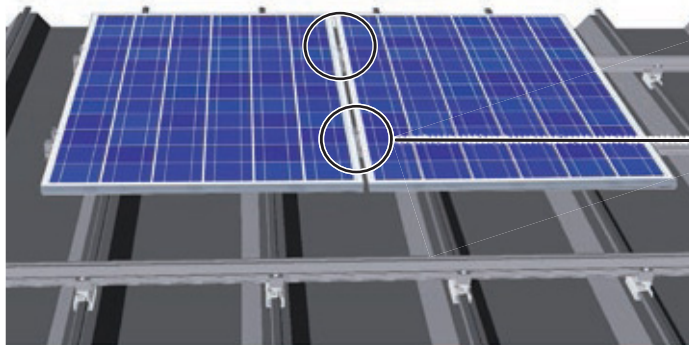
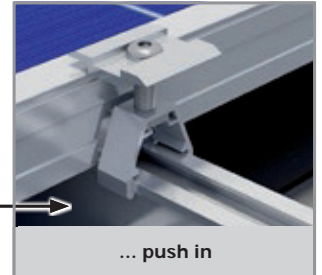
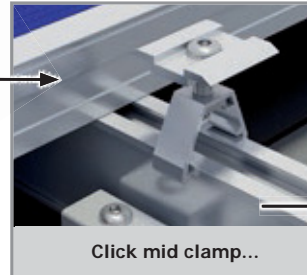
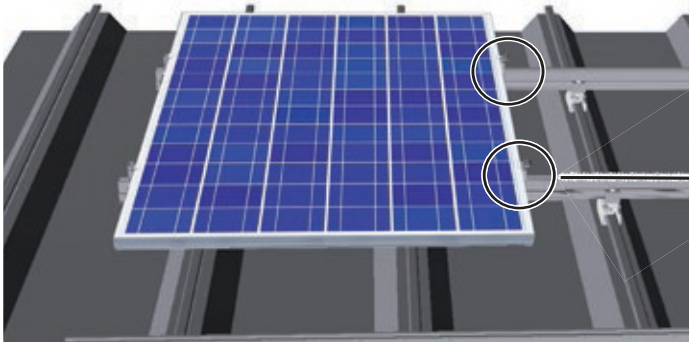
Installation – 4 (module installation, slipping protection for roof tilts of more than 5°)



Installation – 5 (module installation, end clamp)



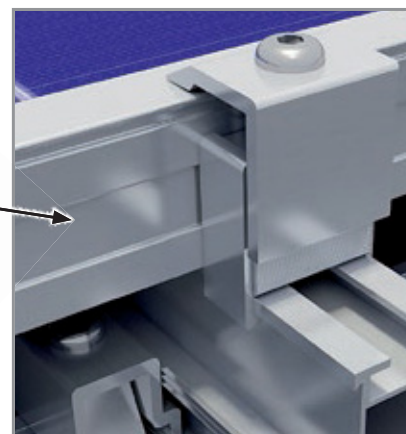
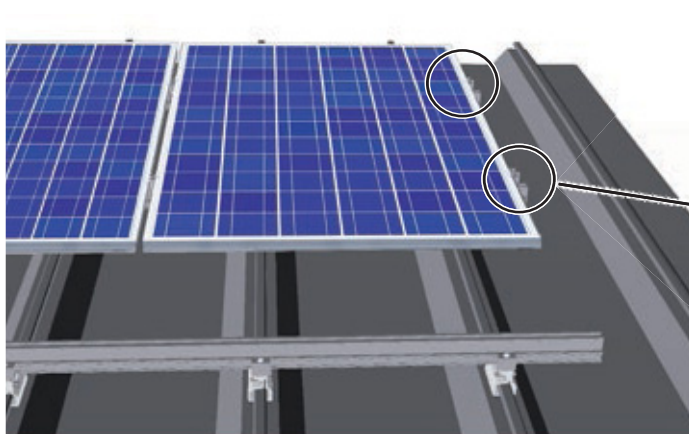
Installation – 6 (module installation, mid clamp)



 **Mount mid clamp (torque 8-10 Nm)**



Installation – 7 (module installation, end clamp on row end)



 **Mount end clamps on last module (torque 8 -10 NM), and for roof tilts of more than 5°, mount additional slider locks (torque 8-10 Nm).**

