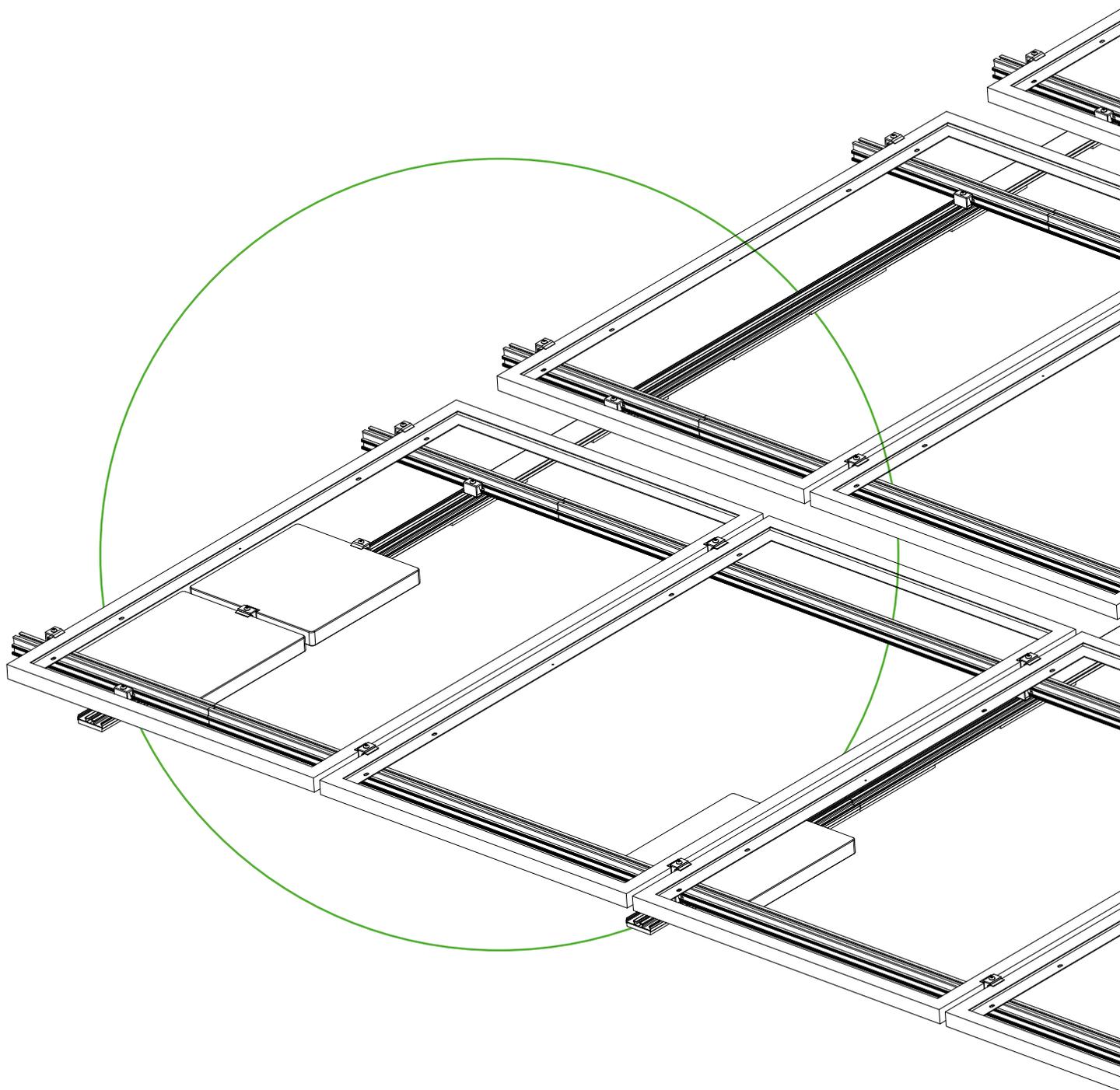


PMT FLAT DIRECT

INSTALLATION INSTRUCTIONS



A FINISHED SYSEM
IN JUST **SIX STEPS**

Contents

PMT FLAT DIRECT

General safety instructions	3
General system instructions	4
Installation instructions and maintenance	8
Tools needed	9
Basic components	10
Component types	10
Installation	12
Optional components	20
Component types	20
Installation	23
Final inspection	27
Warranty and product liability	28



**INTERACTIVE INSTALLATION
INSTRUCTIONS**

Click to select page

General safety instructions



Please note that our general safety instructions must be followed.

Installation by specialists only

PMT photovoltaic substructures may only be installed and brought into operation by specialists. Such persons must be able to ensure the proper and professional installation of our products based on their professional qualifications, acquired, for example, as a result of their training or professional experience.

Before starting installation:

1. Check the structural requirements of the roof and the building:

Before installing the PMT photovoltaic substructure, it is imperative that the customer checks whether the roof and building structure permits the safe installation and operation of the photovoltaic system. This must be checked on site by a qualified person, e.g. a structural engineer, before installation. The information in the project report is based solely on planning assumptions that do not necessarily correspond to the conditions on site. The structural requirements must therefore be clarified by the customer in advance of installation. To do this, obtain confirmation from a specialist and do not start installation without such a document.

2. Compliance with building and accident prevention regulations:

National and local building regulations, standards and environmental protection regulations must be strictly observed.

Occupational safety and accident prevention regulations as well as the regulations of professional associations must be observed.

In particular, it should be noted:

- Safety clothing must be worn (especially hard hat, work shoes and gloves).
- For roof work, the regulations for work on roofs must be observed (e.g. use of guardrails, scaffolding with safety gear from an eaves height of 3 m, etc.).
- Two people must be present during the entire installation process to ensure prompt assistance in the event of an accident.

3. Check installation instructions for updates:

PMT assembly systems are subject to continuous further development. Installation procedures can change as a result. It is therefore essential that you check the installation instructions for updates before installation. They can be found at <https://pmt.solutions/downloads/>. We will also be happy to send you the current version of the installation instructions on request.

During the entire installation process, it must be ensured that a copy of the installation instructions is available to each person carrying out the installation.

4. The installation instructions of the module manufacturers must also be observed.

5. Equipotential bonding between the individual system parts must be carried out in accordance with the relevant country-specific regulations.

PMT accepts no liability for damage resulting from non-compliance with the general safety instructions.

General system instructions

a. Basic information about planning with PMT PLAN

What is the purpose of PMT PLAN?

PMT PLAN is used to plan the substructures on roofs marketed by PMT based on the data entered by the user and the planning assumptions based on this data, which are stored in PMT PLAN.

Who can use PMT PLAN to make plans?

Expertise required for planning with PMT PLAN

The proper and correct use of PMT PLAN requires expertise and experience not only in the field of substructures for photovoltaic systems, but also in the building industry regarding the roofs on which the complete system is to be used by the end customer.

How does PMT PLAN make plans?

1. Data input by the user as the basis for planning

The starting point and basis for planning with PMT PLAN is always exclusively the project data entered by the user. PMT does not check the accuracy of these data. Instead, the user is solely responsible for the correct recording and entry of data in PMT PLAN.

Note: If the user does not record and/or enter the data correctly, this will have an impact on the planning. Changes can result in deviating material quantities and deviating structural requirements, among other things. This can lead to damage to life and limb as well as financial losses, for which PMT accepts no liability.

2. Planning assumptions in PMT PLAN

PMT PLAN processes the data entered by the user and makes use of certain planning assumptions. These planning assumptions are themselves derived from technical regulations on which PMT PLAN's calculations are based.

You can find out which planning assumptions the specific planning is based on in the project report.

PMT PLAN takes into account the Eurocodes, i.e. the Europe-wide standardised rules for design in the construction industry, including the national annexes, as well as national building regulations.

PMT strives to ensure that the Eurocodes taken into account are kept current by taking into account any updates. However, we would like to point out that after new rules have been published, a certain amount of time is always required to implement them in the software; for this reason the user is not entitled to corresponding updates and is always responsible for observing the latest version of the rules and regulations on which the programme is based.

The rules and regulations are applied on the basis of the specified location. The user is responsible for checking the correctness of the planning assumptions.

Note: If the user does not check the planning assumptions for correctness, this will have an impact on the planning. Changes can result in deviating material quantities and deviating structural requirements, among other things. This can lead to damage to life and limb as well as financial losses, for which PMT accepts no liability.

3. What is the purpose of the project report?

What does "What's important is what's on the roof" mean?

PMT PLAN creates a project report based on the user's input. But this plan report cannot and should not replace professional planning based on the specific conditions on site.

The project report is therefore not the end of your project planning, but the beginning.

The only appropriate professional approach is the following, which is the sole responsibility of the user:

First step: Before ordering the photovoltaic substructure and especially before installing it on the roof, the user must check the data, planning assumptions and results in the project report for correctness and plausibility.

Second step: ("What's important is what's on the roof") It is imperative that the user also checks the project report against the specific conditions on the roof. In our experience, project-specific features have to be taken into account for every roof, which usually only become apparent on site on the roof.

If users themselves do not have the necessary expertise to review the project report, they must call in a specialist to do so.

If these mandatory verification steps result in changes compared to the project report, a new planning with the changed data must be carried out in PMT PLAN.

Note: If the user does not verify the data and/or does not verify them correctly against the actual conditions, this will have an impact on the planning. Changes can result in deviating material quantities and deviating structural requirements, among other things. This can lead to damage to life and limb as well as financial losses, for which PMT accepts no liability.

4. What other technical requirements do customers always have to take into account and check independently?

a. Technical requirements for the roof and its components
PMT PLAN assumes that the roof and its components are suitable for the installation of a photovoltaic system and that the client has had this verified by an expert prior to planning.

PMT PLAN does not guarantee the compatibility of the PMT photovoltaic substructure with the roof in terms of roof covering, roof substructure and roof construction. Users must ensure compatibility themselves.

Before installation, users must ensure that the functional layers of the roof structure (e.g. waterproofing layer, thermal insulation layer) are suitable and designed for the installation of photovoltaic systems. In particular, users must ensure that

the thermal insulation layer remains functional despite the additional load caused by the installation of the photovoltaic system (substructure and solar modules).

Tip: Obtain approval from the manufacturer of the individual components and verify the manufacturer's specifications with the conditions on site on the roof.

Users must check the suitability, load-bearing capacity and functionality of the entire roof structure for the installation of the photovoltaic system as a whole.

A structural engineer must be consulted to check the load-bearing capacity. Under no circumstances does PMT PLAN replace this review.

Note: If the user does not check the compatibility of the photovoltaic substructure with the roof and/or does not check it correctly, this will have an impact on the planning. Changes can result in deviating material quantities and deviating structural requirements, among other things. This can lead to damage to life and limb as well as financial losses, for which PMT accepts no liability.

b. Structural requirements

PMT PLAN does not take into account the structural requirements of the building on whose roof the photovoltaic system is to be installed.

The building and roof structures must therefore be checked professionally by users on their own responsibility before installation.

A structural engineer must be consulted for this. Under no circumstances does PMT PLAN replace this review.

Note: If the user does not check the building structure and/or does not check it correctly, this will have an impact on the planning. Changes can lead to deviating material quantities and deviating structural requirements, among other things. This can lead to damage to life and limb as well as financial losses, for which PMT accepts no liability.

c. Photovoltaic modules

PMT PLAN makes it possible to plan with a wide range of photovoltaic modules. However, due to the large number of photovoltaic modules available on the market, not all modules are stored in the database. Modules not included will be added to the database upon separate request based on the module manufacturer's data specification sheet.

PMT does not guarantee that the module data is current. The parameters dimensions and weight in particular must be verified by the customer before planning.

PMT PLAN only takes into account the dimensions and weight of the modules. Other parameters are not taken into account.

This makes it necessary to check the compatibility of the module with the substructure using the module manufacturer's installation guidelines before installation.

PMT PLAN assumes that the modules may also be installed with clamps on the short module sides. This makes it necessary to check whether the clamping points of the module correspond to the manufacturer's specifications before installation. If the connection points do not match the module manufacturer's specifications, we recommend contacting the module manufacturer for approval of the planning.

This approval can either be generally given within the scope of the module certification or, under certain circumstances, can also be given on a project-specific basis by the module manufacturer.

Note: If the user does not clarify the compatibility of the substructure with the solar modules, this can lead to financial losses for which PMT accepts no liability.

d. Securing the photovoltaic system against displacement due to thermal expansion (so-called "caterpillar effect")

On the roof, the photovoltaic system is exposed to constant temperature fluctuations. This can lead to very slow

downward movements of the substructure on the roof sealing over the course of the service life of the photovoltaic system, even with a very flat roof pitch. This process is also called "temperature migration" or, more vividly, the "caterpillar effect".

The gradual shifting of the photovoltaic system on the roof can cause damage to the cabling, the roof covering (such as foil, bitumen, gravel, substrate, etc.), the other functional layers and any existing structural components (such as skylights, ventilation systems, drainage systems, chimneys, etc.). In the worst case, the photovoltaic system can gradually slide over the edge of the roof over time.

In order to prevent this, we have decided to give a general recommendation of a connection starting at a roof pitch of 1.0°.

This is based on a recommendation by the German Solar Industry Association – BSW-Solar, entitled: "Positional stability due to thermal expansion ("temperature migration")".

Suitable measures to secure the photovoltaic system against displacement due to thermal expansion include coupling module arrays across the roof ridge or attaching the system to the roof structure at specific points.

With the introduction of the new expansion stage of the EVO 2.1 system with ProPlate and its mechanical fastening to the main ground profiles we are amending our recommendation for connecting the EVO 2.1 system to flat roofs. However, this amended recommendation applies exclusively to the EVO 2.1 system. The connection to the roof must only be made from a slope of approx. 2 % (roof pitch approx. 1.15 °), provided that the following requirements are met:

- The **PMT checklist** must be completed in full and taken into account in the planning.
- Compliance with the following **maintenance routine** by PMT customers:

Maintenance interval	Displacement	Measure
annual maintenance	no displacement	no action required
annual maintenance	up to approx. 2 cm	Special attention should be paid to inspecting this condition during the next maintenance
annual maintenance	2 – 3 cm	Interim inspection after approx. 6 months
Interim inspection (6 months)	further displacement of 1.5 cm or more	subsequent mechanical connection

Note: Failure to secure the photovoltaic system against displacement due to thermal expansion can lead to damage to life and limb as well as property and financial losses, for which PMT accepts no liability.

Installation instructions and maintenance

Installation instructions

Installation should not begin until the construction manager's written instructions have been received.

The components of PMT's installation system are used exclusively for fastening PV modules. Depending on the type of roof on the building and the characteristics of the roof, the components intended for this purpose should be used. The exact item details can be found in the project documents, consisting of the project report and the CAD plan.

When using the installation system, compliance with the installation instructions, safety instructions and system instructions is mandatory.

If the components are used for purposes other than those for which they are intended, if the instructions are not followed or if components that are not part of the system are used, all claims under guarantee, warranty and liability vis-à-vis PMT are invalidated. The user is liable for damage and resulting damage to other components, PV modules or the building, as well as for personal injury.

Before starting the installation, the compatibility between the roof cladding and the installation system must be tested and ensured and the roof must be checked for damage of any kind. These are to be recorded in the **roof inspection report**. Remedial work may be required.

In the case of very uneven roofs or roof sealing, compensatory measures may need to be taken to ensure even load distribution. In order to ensure that the main floor profiles lie flat on the roof cladding, the roof surface must be cleaned and impurities such as moss, leaves, dirt, stones, etc. removed before construction begins.

The necessary distances to the edges of the roof specified in the project documents must be observed. The maximum module field size depends on the type of roof. For roofs with substrate or gravel fill, ensure that a sufficiently slip-resistant connection is made.

The surface load must not exceed the residual load-bearing capacity of the building. Care must be taken to ensure that the drainage of rainwater is not impeded. The roof drainage must be included in the system planning.

A check must be made to see whether the lightning protection regulations change as a result of the installation of the PV system and need to be modified. Thermal separation (distance between module fields) must be maintained according to the PMT PLAN project documents.

Note: If the actual module sizes exceed the module widths given in the table, do not begin installation.

The tightening torques specified in the installation instructions must be strictly observed.

After events such as storms, heavy rain, earth movements, etc., the system must be checked for damage by a specialist. If damage is found during the inspection, it must be repaired immediately. Defective components must be replaced with new components.

Maintenance

Photovoltaic substructures are not maintenance-free. Maintenance, especially the correct positioning of the ballast stones and the building protection mats or ProPlates, must be carried out annually and documented in a maintenance protocol. Furthermore, all components of the PMT assembly system must be checked at regular intervals and documented accordingly. In our **maintenance protocol** we recommend annual maintenance.

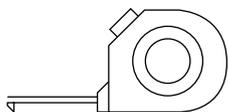
The recommendations on the maintenance routines of the EVO 2.1 system due to thermal expansion must be observed.

After unusually strong wind events, we recommend maintenance immediately after the strong wind event.

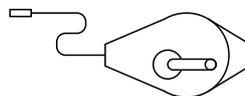
Note: Failure to maintain the system can lead to damage to life and limb as well as financial losses, for which PMT accepts no liability.

Tools needed

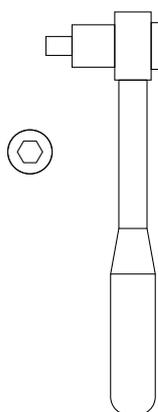
1 Tape measure



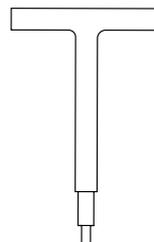
2 Chalk line



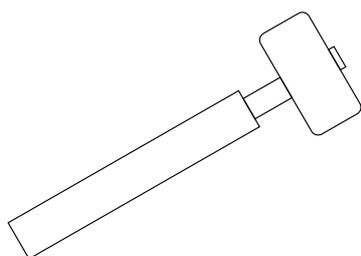
3 Torque spanner with attachment Hexagon socket SW5mm



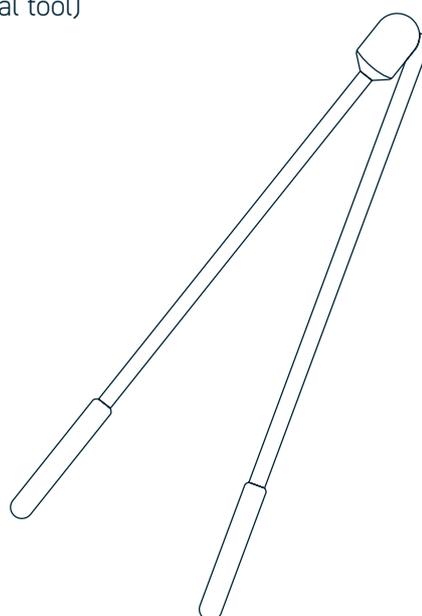
4 T-handle (or impact spanner) with attachment Hexagon socket SW5 mm



5 Rubber mallet (optional tool)



6 Bending tool (optional tool)



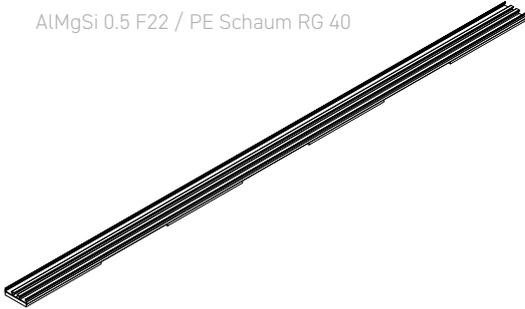


Note: Some components are available in different lengths and versions.
The exact lengths of components that need to be cut can be found
in the corresponding plan in the project report

Component types

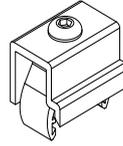
A Ground profile

AlMgSi 0.5 F22 / PE Schaum RG 40



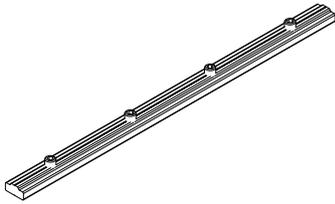
E Crossbar connectors

3.3206 - EN AW 6063 T6



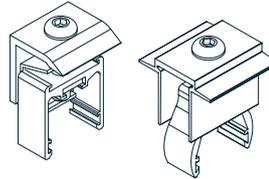
B Ground profile connector

Al 6061



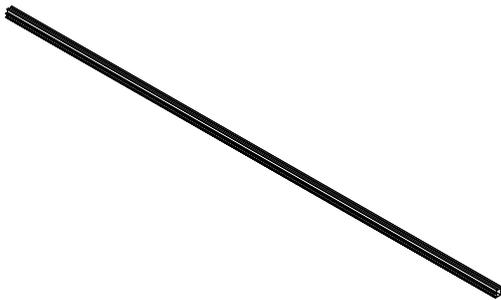
F Centre and end clamp

AlMgSi 0.5 F22 / 1.4301

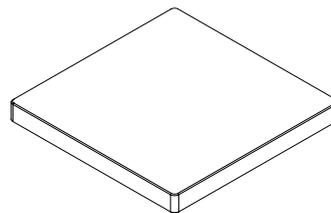


C Assembly rail

Aluminium EN-AW-6063 T6

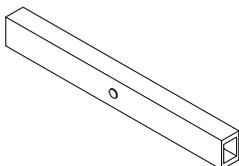


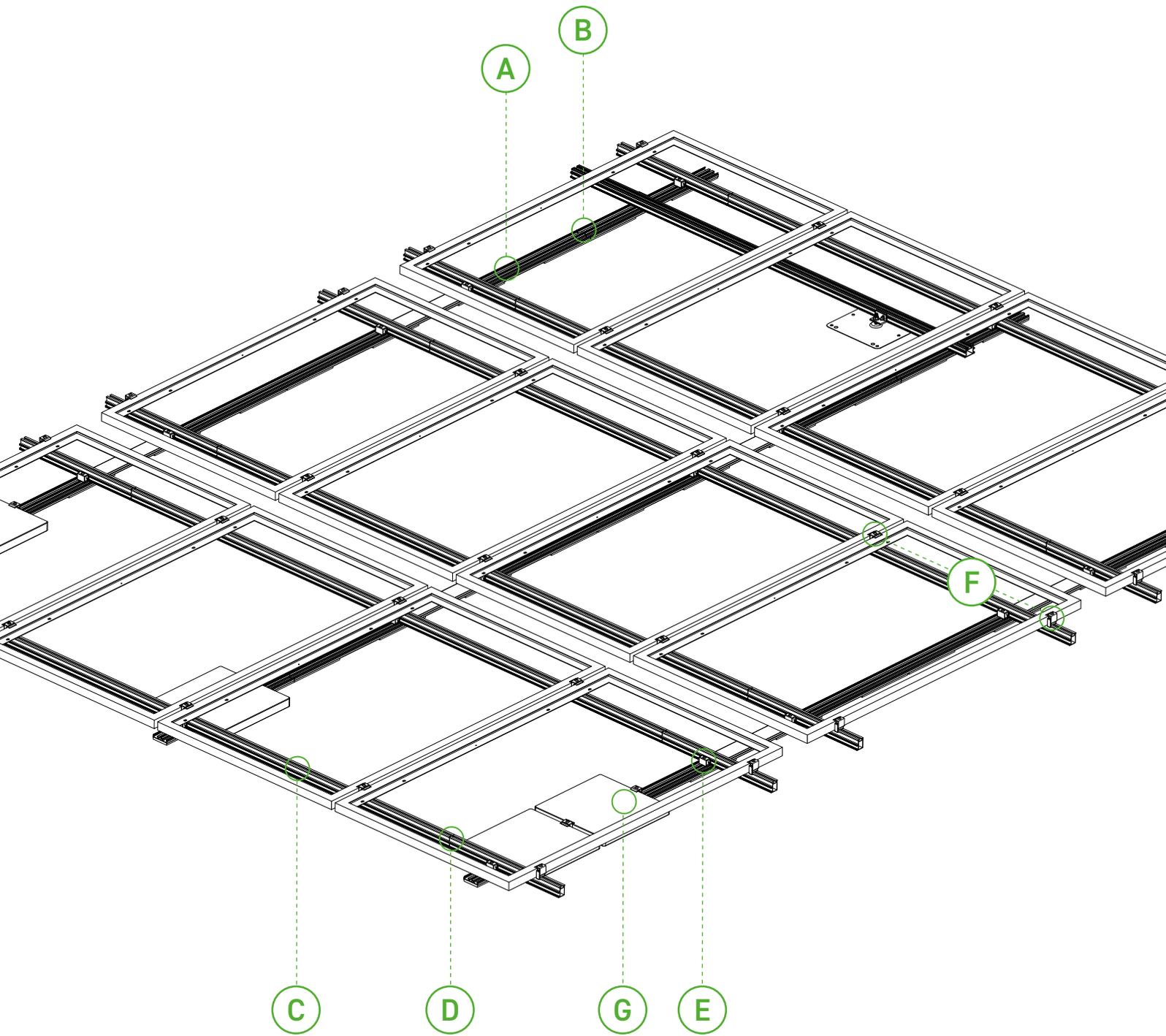
G Ballast stone with the standard dimensions 40 × 40 × 4 cm (not included in delivery)



D Assembly rail connectors

3.3211 - EN AW 6061 T6 (EP)





A Ground profile

B Ground profile connector

C Assembly rail

D Assembly rail connectors

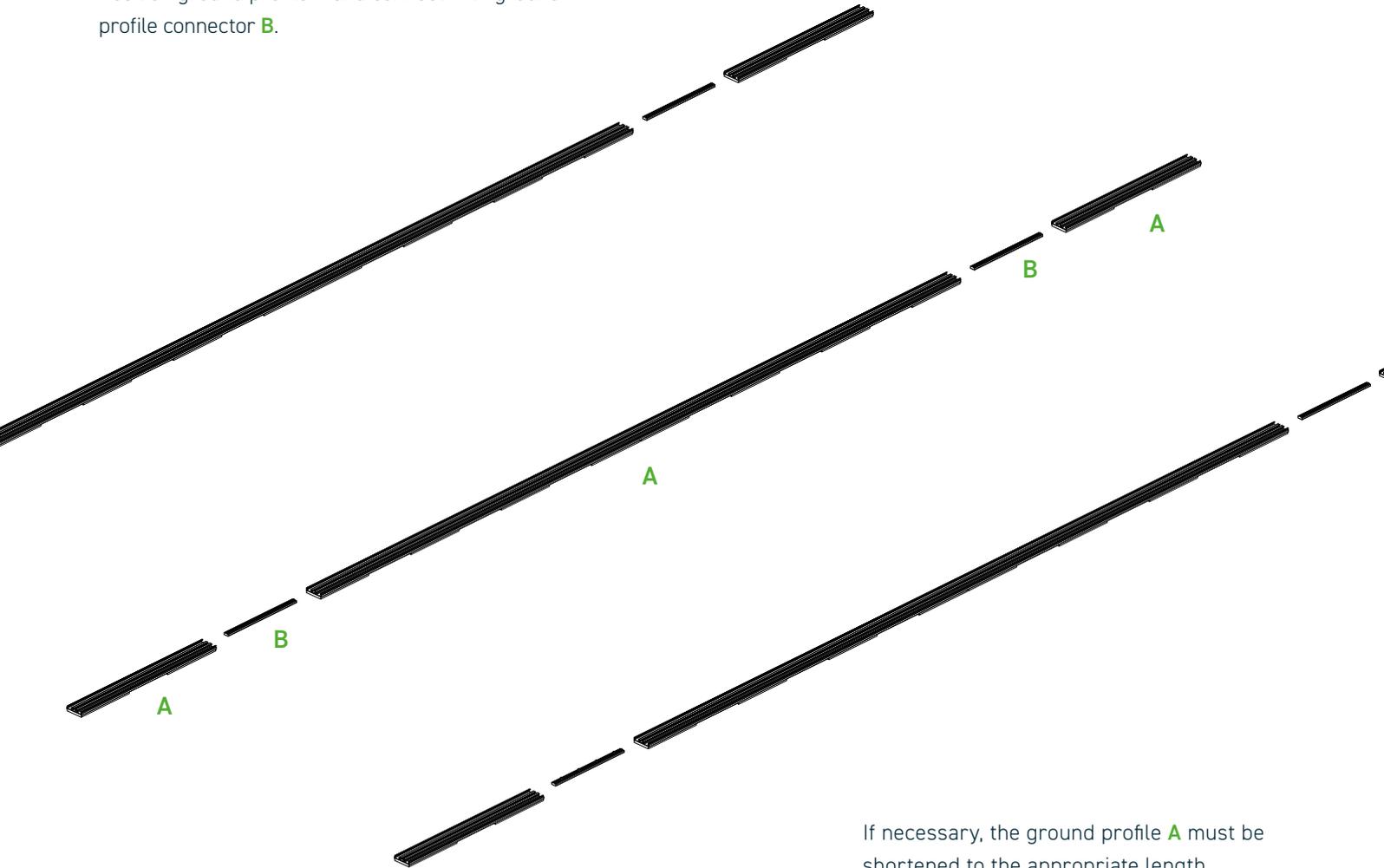
E Crossbar connectors

F Centre and end clamp

G Standard ballast stone

1

Position ground profile **A** and connect with ground profile connector **B**.



If necessary, the ground profile **A** must be shortened to the appropriate length according to the planning documents before installation. The end of the ground profile **A** must always be covered with a protective mat.



Note:

Failure to do so may result in damage to the roof cladding.

Ground profile **A** and ground profile connector **B** must be positioned one behind the other in accordance with the planning documents.

The ground profiles must be installed from the high point to the low point.

1.1

Push the ground profile connector **B** halfway into the ground profile **A** and tighten the two set screws.

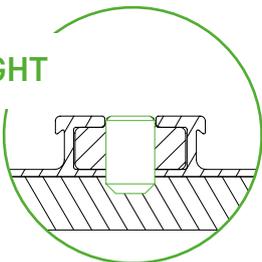


Note:

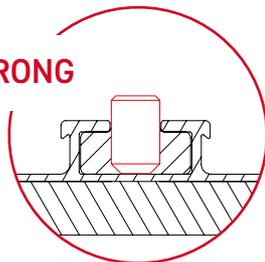
Do not screw in the set screw too deeply.

The set screw must be countersunk at least flush with the connector.

RIGHT

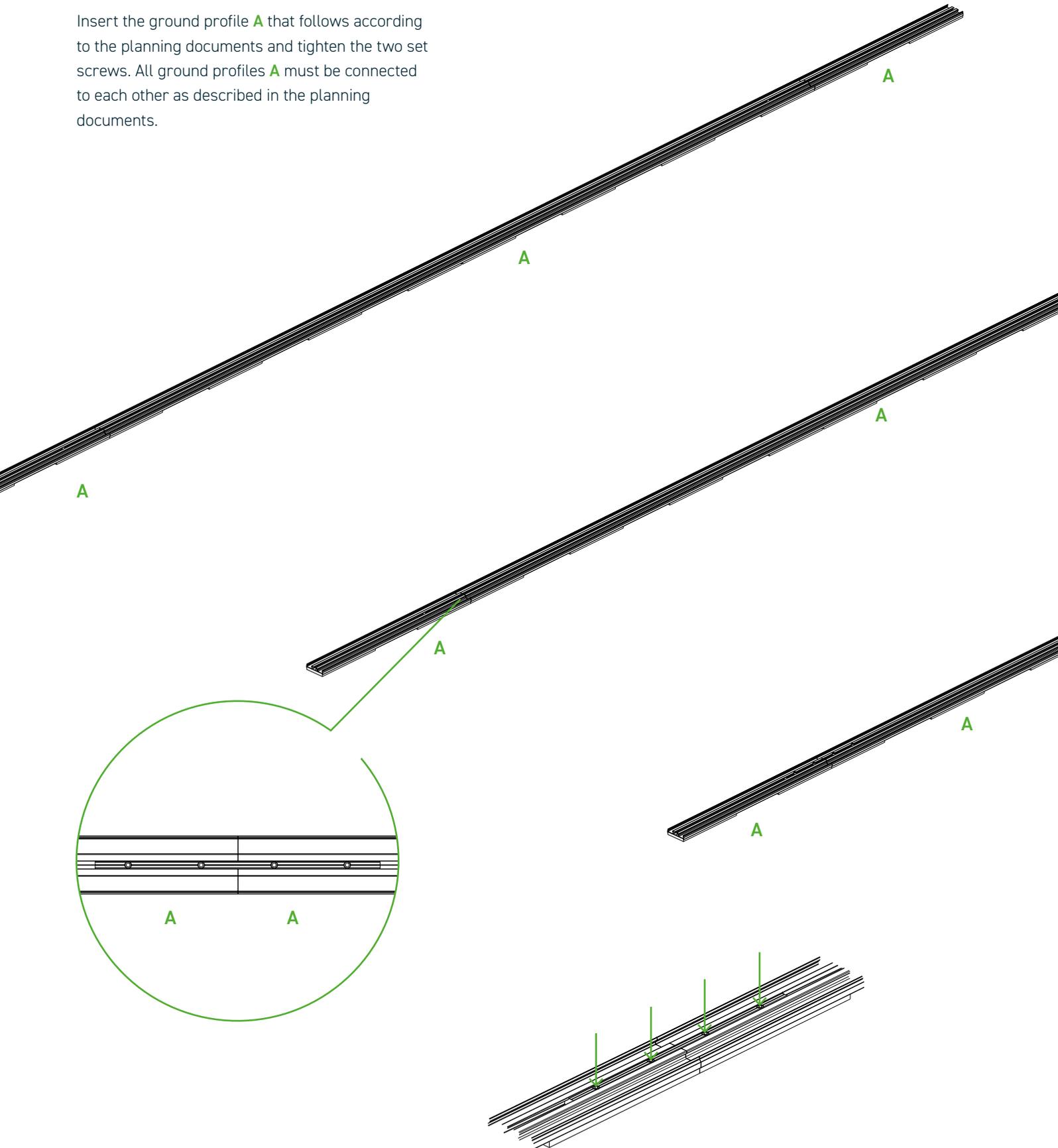


WRONG



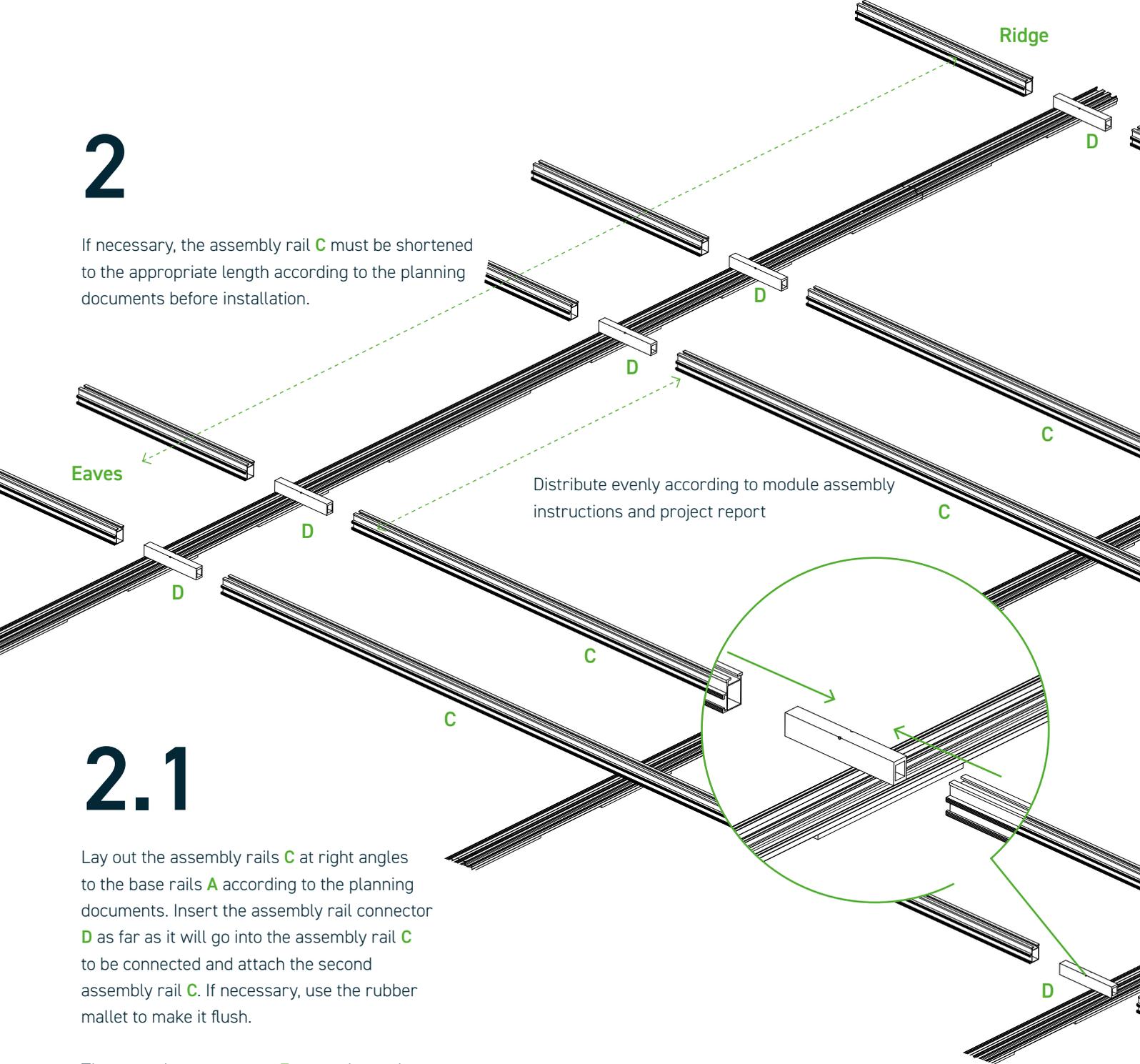
1.2

Insert the ground profile **A** that follows according to the planning documents and tighten the two set screws. All ground profiles **A** must be connected to each other as described in the planning documents.



2

If necessary, the assembly rail **C** must be shortened to the appropriate length according to the planning documents before installation.



2.1

Lay out the assembly rails **C** at right angles to the base rails **A** according to the planning documents. Insert the assembly rail connector **D** as far as it will go into the assembly rail **C** to be connected and attach the second assembly rail **C**. If necessary, use the rubber mallet to make it flush.

The cross bar connector **E** must always be attached to the side of the assembly rail **C** facing the low point of the roof. To do this, ensure that the assembly rail **C** is correctly positioned on the ground profile **A**.



Note:

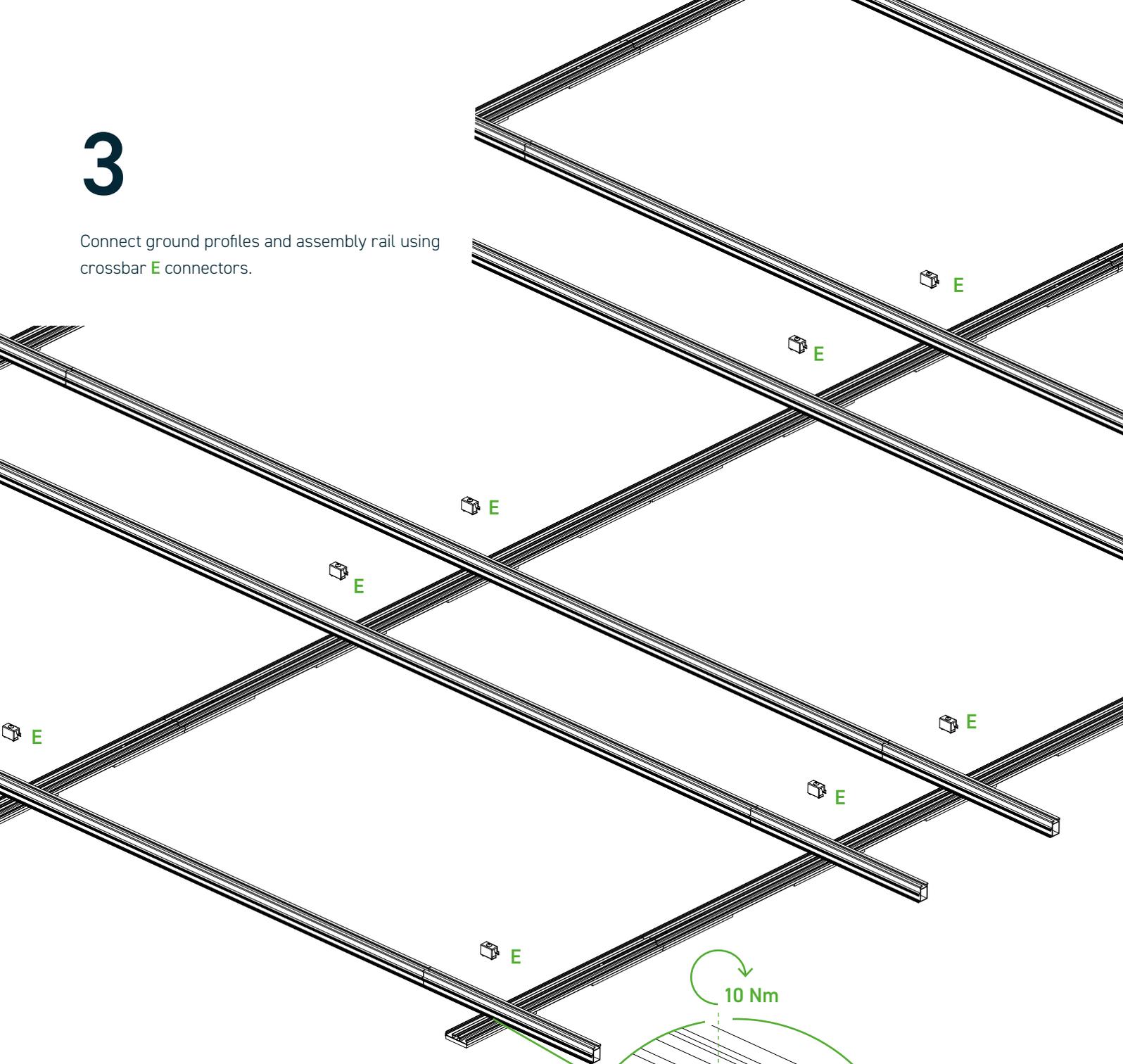
There must be enough space for the ballast stones as specified in the project report.

Maintain the distance between clamps in accordance with the module's installation instructions.

The first two requirements may be in conflict with each other; this makes an on-site check of the module mounting dimensions (as described above) necessary.

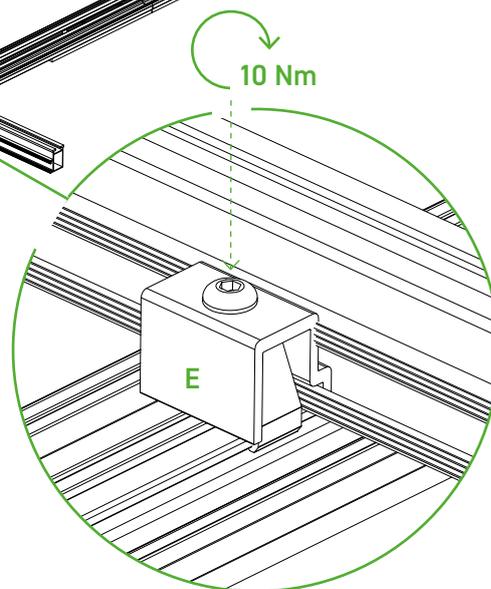
3

Connect ground profiles and assembly rail using crossbar **E** connectors.



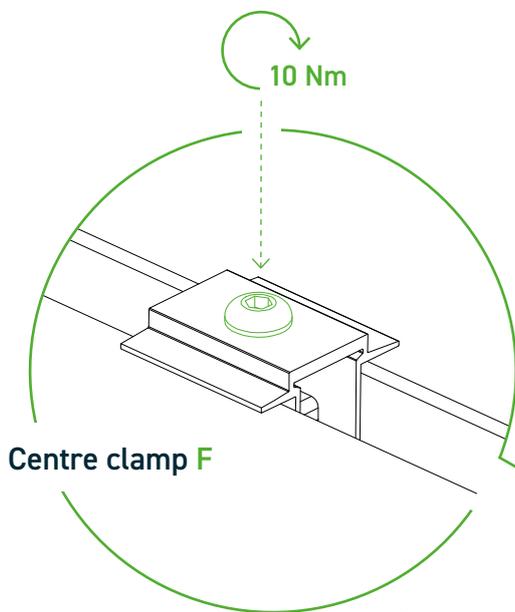
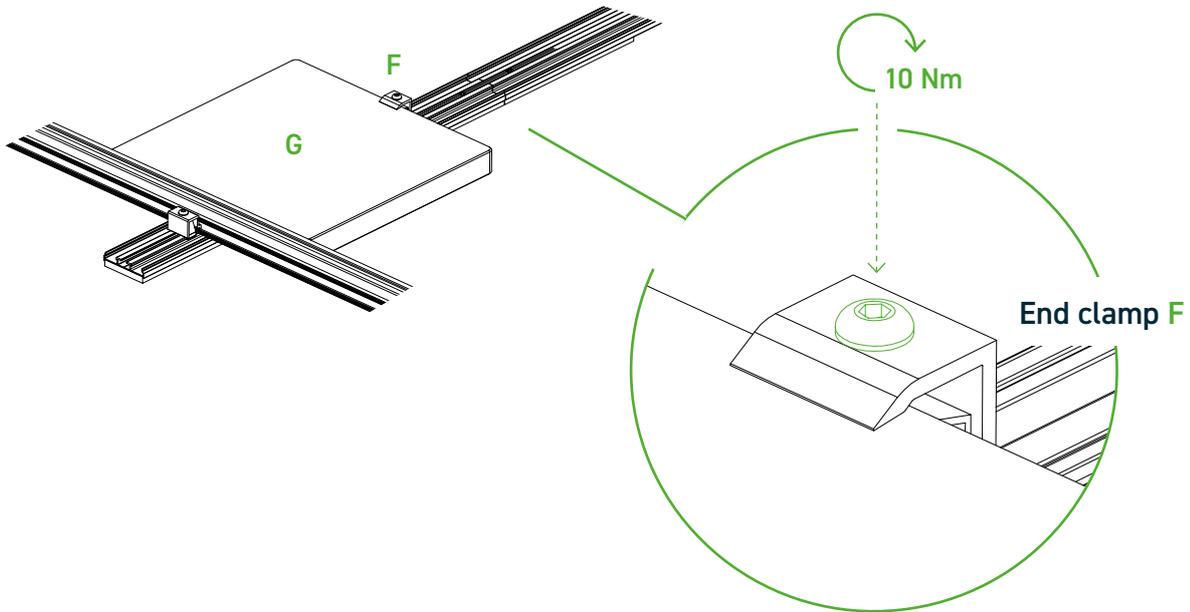
Install the assembly rail strips on the ground profile **A** using crossbar **E** connectors. To do so, click the crossbar connector **E** onto the ground profile **A** and connect it via the lateral mounting channel of the assembly rail **C**. Crossbar connectors must always be installed on the eaves side of the assembly rails.

Note that the tightening torque of 10 Nm is used for locking.

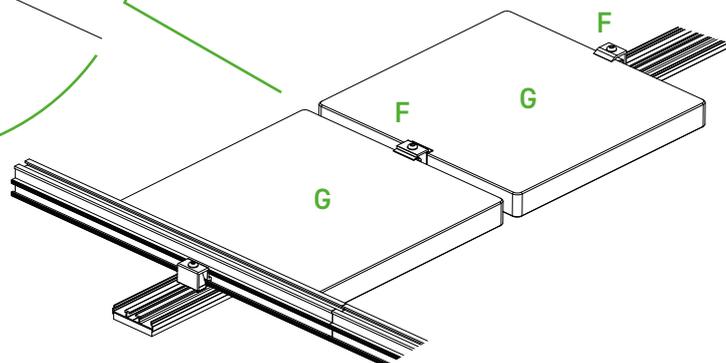


4

Position ballast stones **G** and secure with centre and end clamps **F**.



Place ballast on the ground profile according to the planning documents **A**. Ballast clamps **F** must be used to secure ballast against slipping and shifting. To do this, place the first ballast stone **G** on the assembly rail **C** on the eaves side and secure it using an end clamp **F** (for one ballast stone) or a centre clamp **F** (for several ballast stones). The last ballast stone of the configuration is always secured with an end clamp **F**.



5

Position the modules.

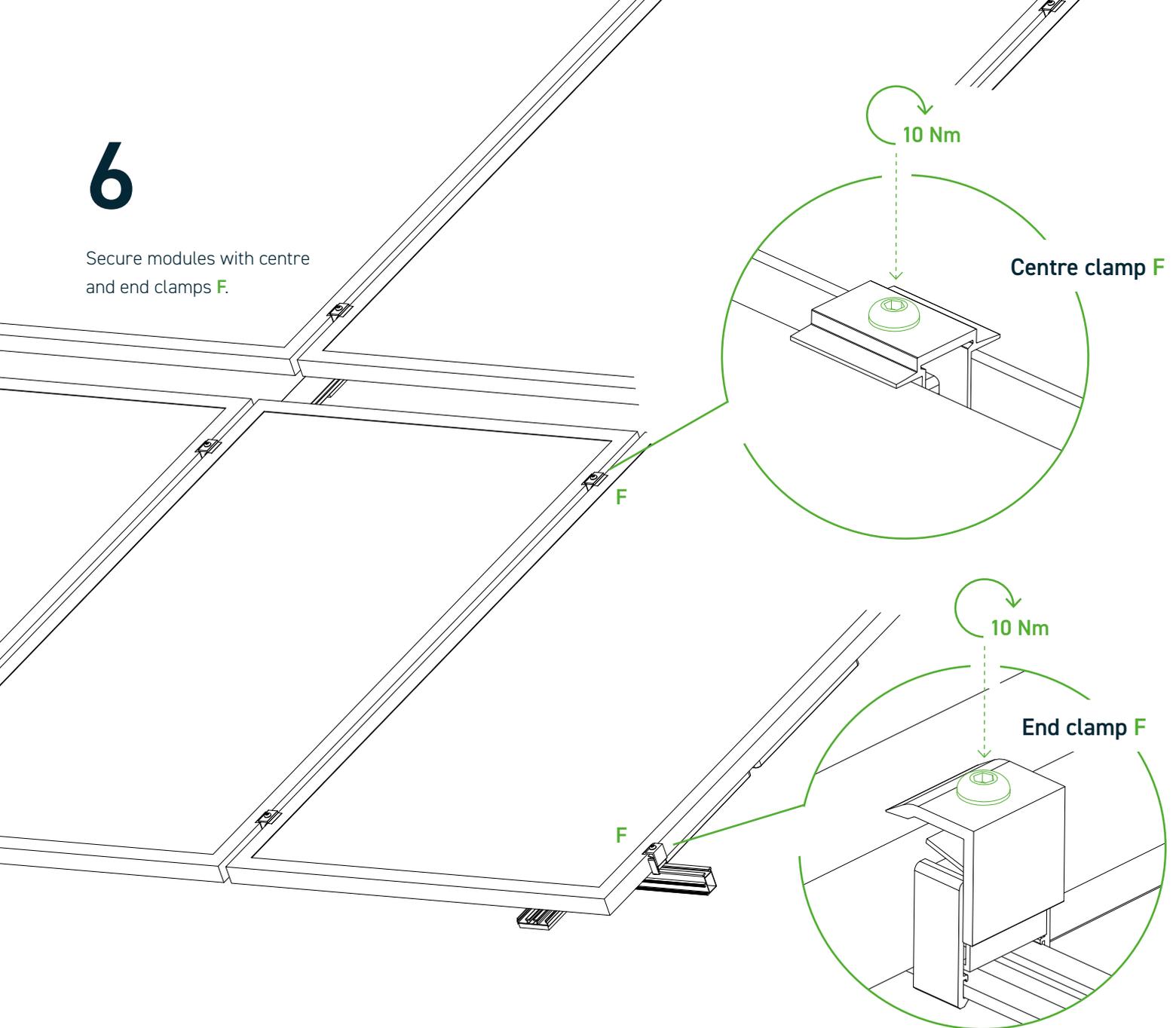
Place the modules on the mounting rails **C** in accordance with the planning documents and ensure that they are positioned correctly.



Ensure that there is a module gap according to the planning documents. It is essential to comply with the vertical module distances from the project report.

6

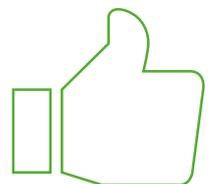
Secure modules with centre and end clamps **F**.



Place the centre and end clamps **F** on the guide groove of the assembly rails **C** and press them onto the opposite guide groove until you hear the snap lock engage. Ensure that the clamps are seated securely and flush in the guide grooves.

Make sure that the centre and end clamps **F** are positioned flush and correctly on the module. Then tighten the locking screws. The installation instructions of the module manufacturers must be observed. Note that the tightening torque is 10 Nm.

**DONE WITH
THE BASIC
SYSTEM!**



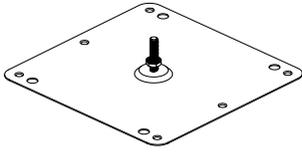


Note: Some components are available in different lengths and versions.
The exact lengths of components that need to be cut can be found
in the corresponding plan in the project report

Optional component types

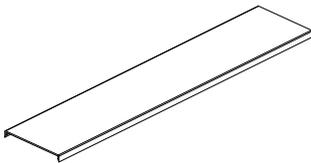
1 Connection set

Al 6061



2 Cable duct cover

Al 6061



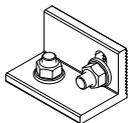
3 Ridge connector

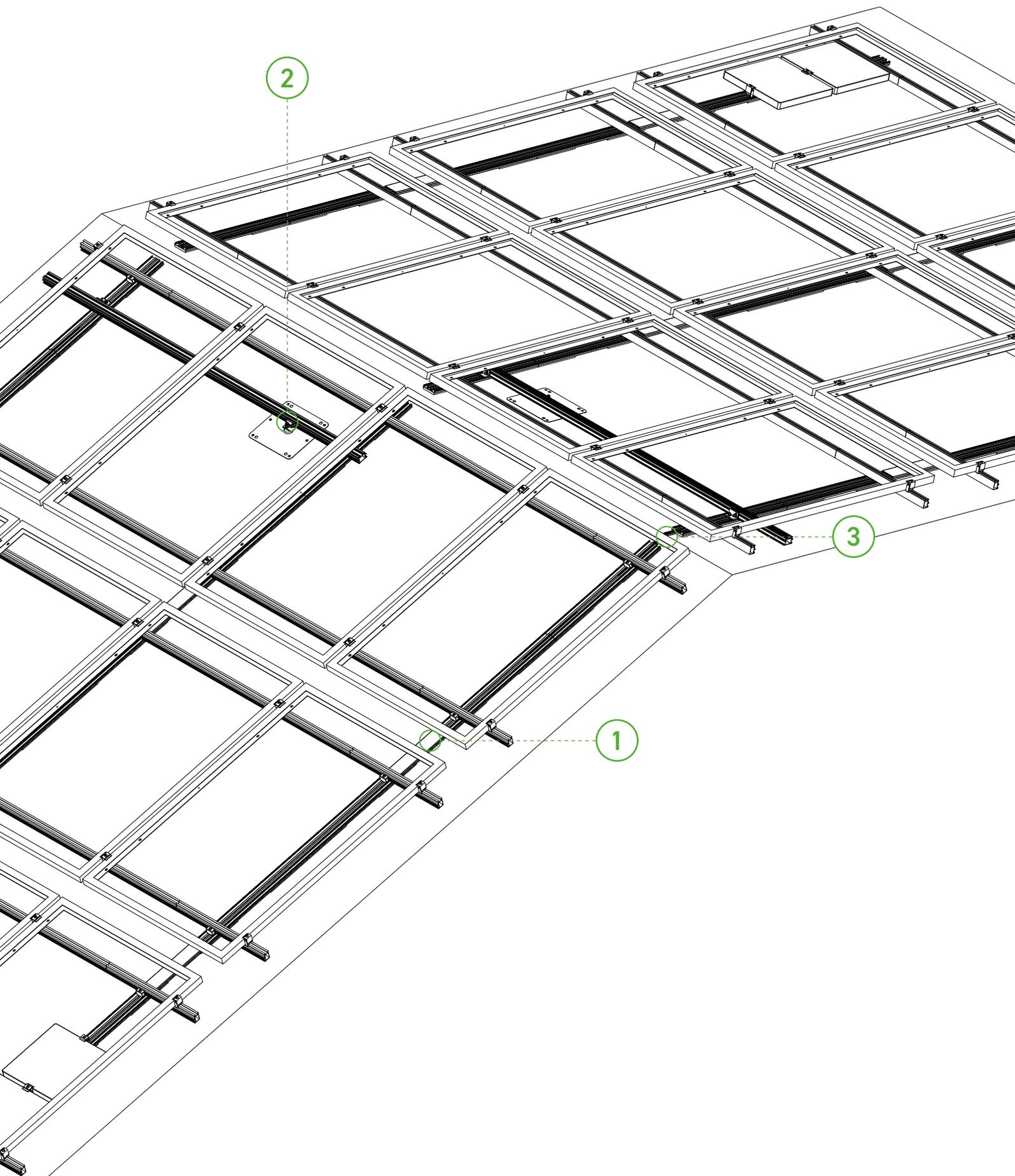
3.206 - EN AW 6060 T66



4 Angle 40 mm, M8 fastening

Aluminium EN-AW-6063 T6





1 Cable duct cover

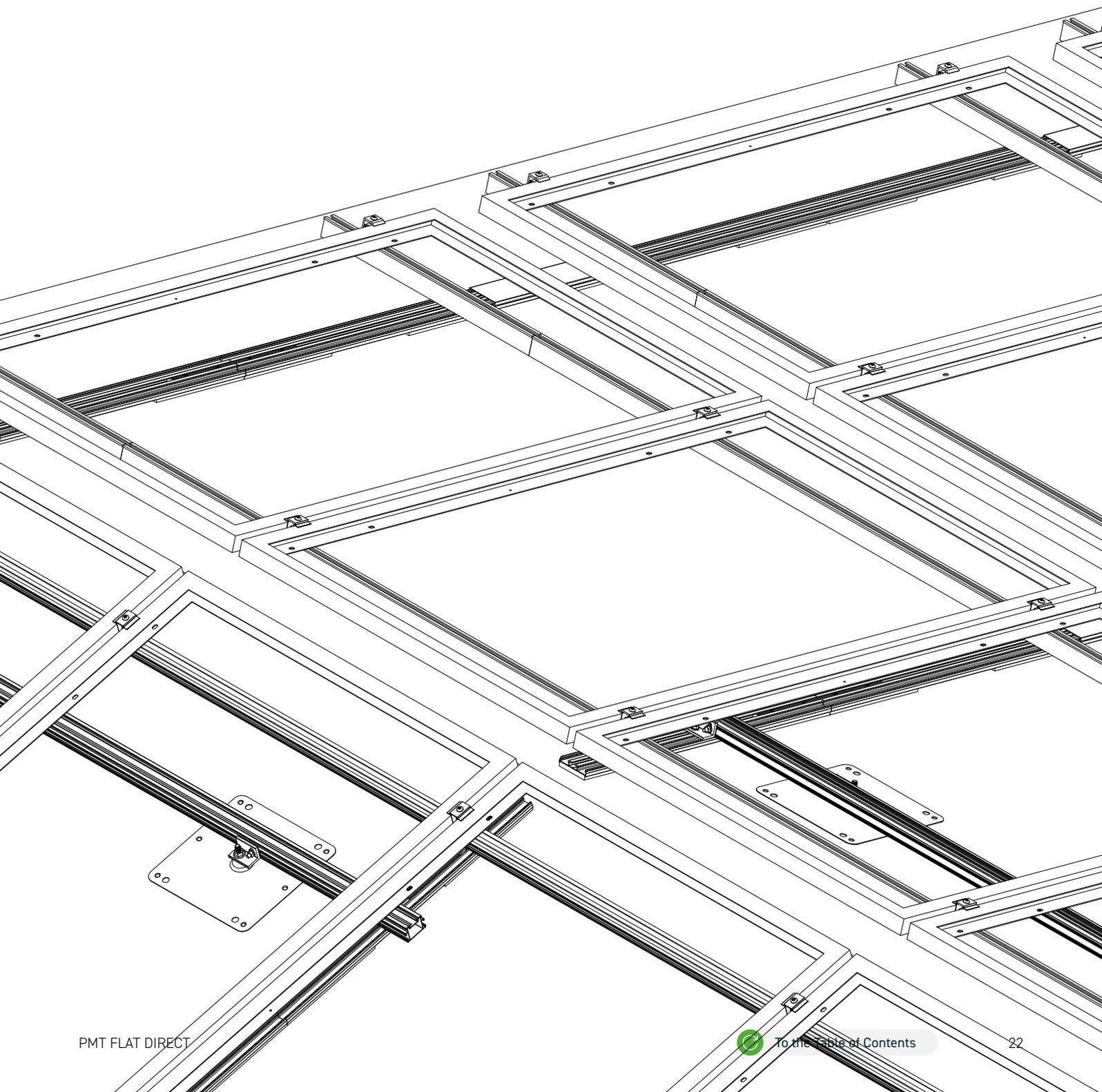
2 Connection set

3 Ridge connector

Assembly of special components

Optional assembly steps:

- 1 Connection set
- 2 Cable duct cover
- 3 Ridge connector

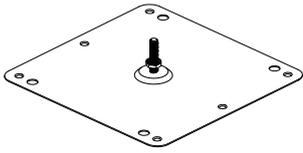


1

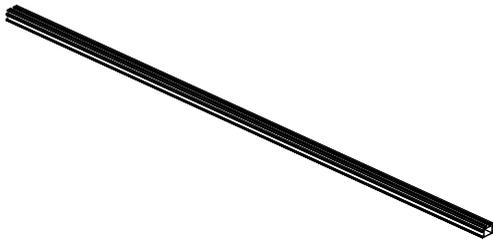
OPTIONAL ASSEMBLY STEP FASTENING THE CONNECTION SET

Component

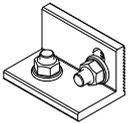
Connection set



Assembly rail connection point

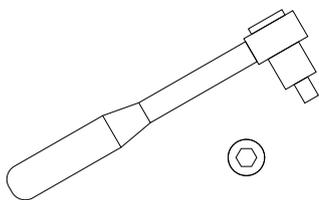


Bracket plate

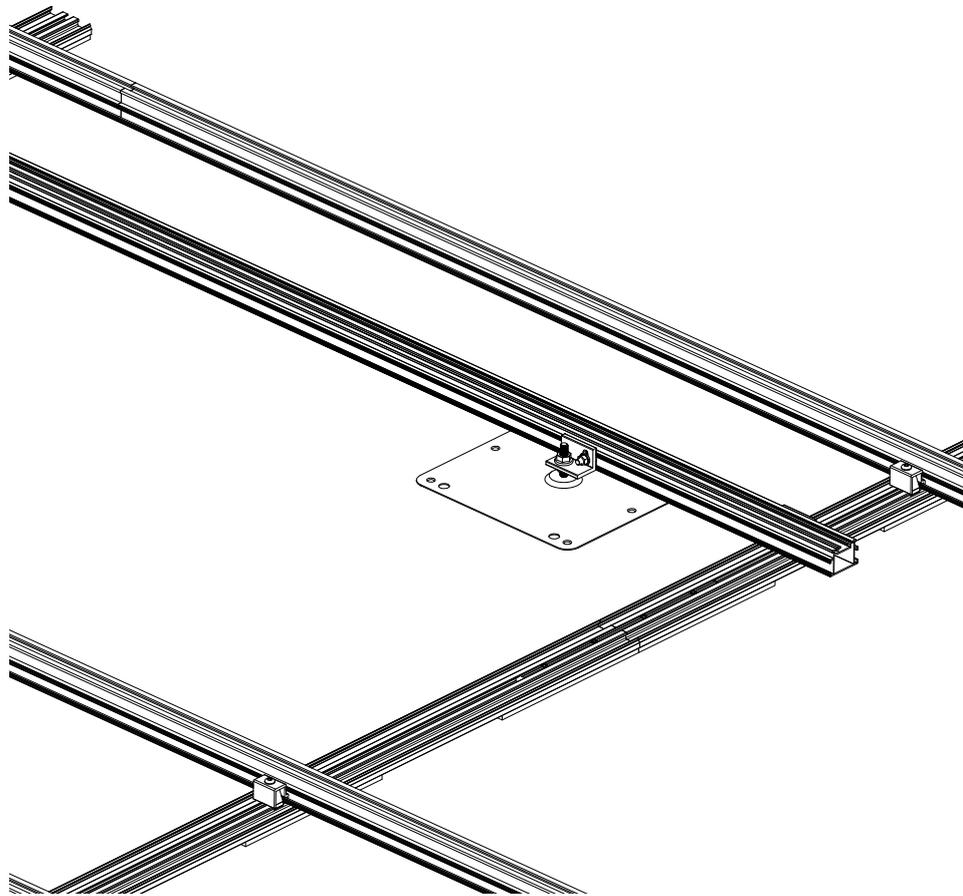


Tools needed

Torque spanner with attachment
Hexagon socket SW5mm

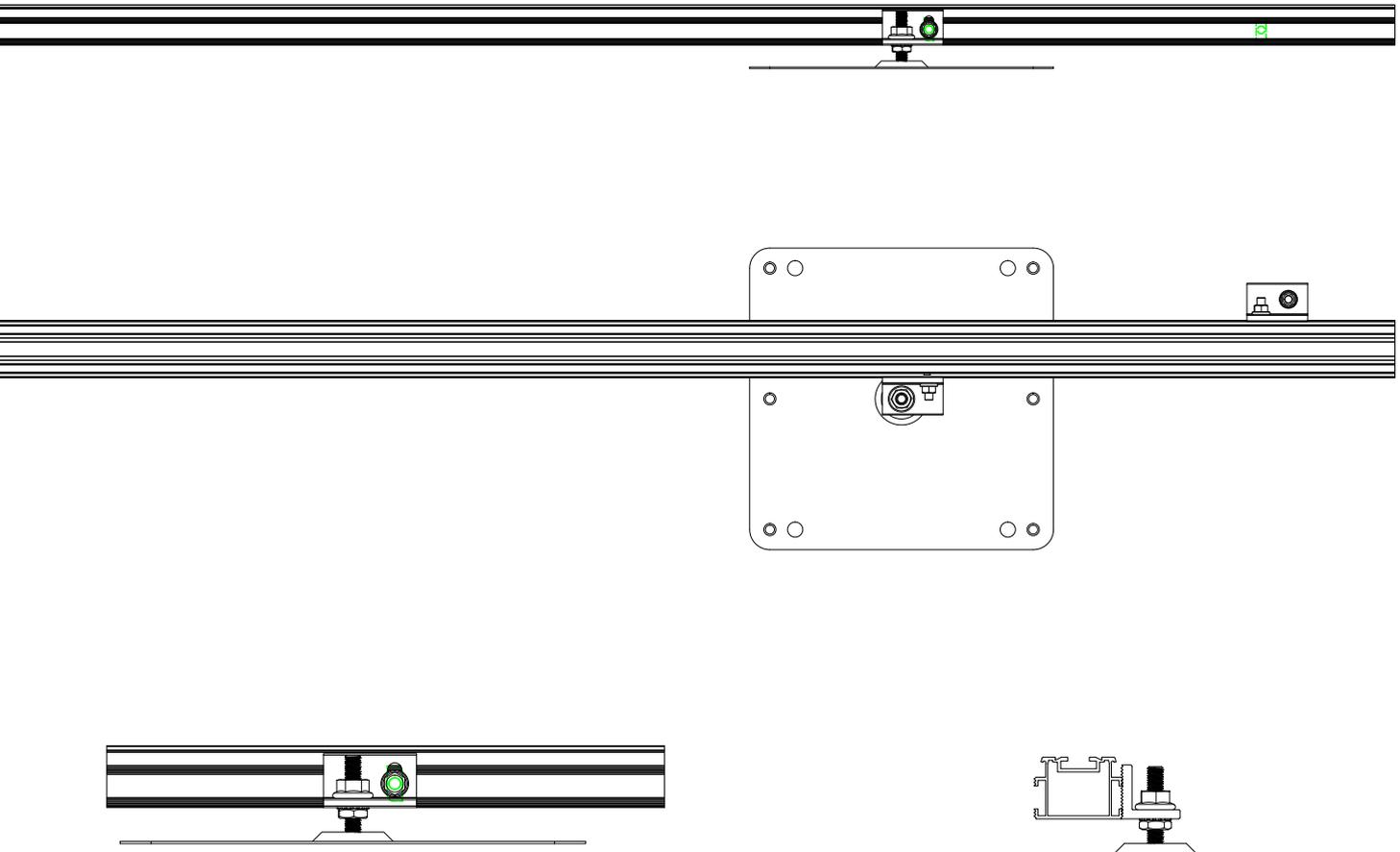


The connection between the Flat Direct installation system and the roof connection points is made via the horizontal ridge rails. This is attached with brackets to the vertical ground profiles and the roof connection points.



Screw the first locking nut M12 with the flange facing upwards onto the threads of the fastening point and turn the nut downwards, but do not tighten it. Place the 60 mm M12 bracket with the round hole on the thread. Screw the second locking nut M12 with the flange facing downwards onto the threads of the fastening point and turn the nut downwards, but do not tighten it. Repeat the process for all roof connection points.

Mount the Solmont assembly rail to the brackets using the M8 x 25 hammerhead screw and the locking nuts in the slotted holes of the brackets. Make sure that the hammer head screw is facing in the correct direction. Note that the tightening torque is 10 Nm.



Once all the brackets have been fastened to the Solmont assembly rail, the Solmont assembly rail must be aligned in height and the M12 locking nuts tightened. The bracket must always be fastened to the bottom of the Solmont assembly rail.

Mount the 60 mm M10 bracket on the ground profile using the M8 x 25 hammerhead screw and the locking nut. It is important to ensure that the hammer head screw is correctly aligned in the channel of the ground profile A. (Note the tightening torque of 10 Nm!)

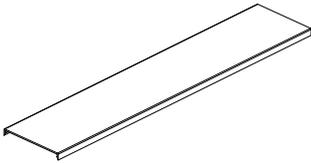
Mount the Solmont assembly rail to the brackets using the M8 x 25 hammerhead screw and the locking nut. It is important to ensure that the hammer head screw is correctly aligned in the channel of the Solmont assembly rail and that the assembly is carried out without tension. (Note the tightening torque of 10 Nm!) Ensure a frictional and keyed connection is made. The bracket must always be fastened to the top of the Solmont assembly rail.

2

OPTIONAL ASSEMBLY STEPS **CABLE DUCT COVER**

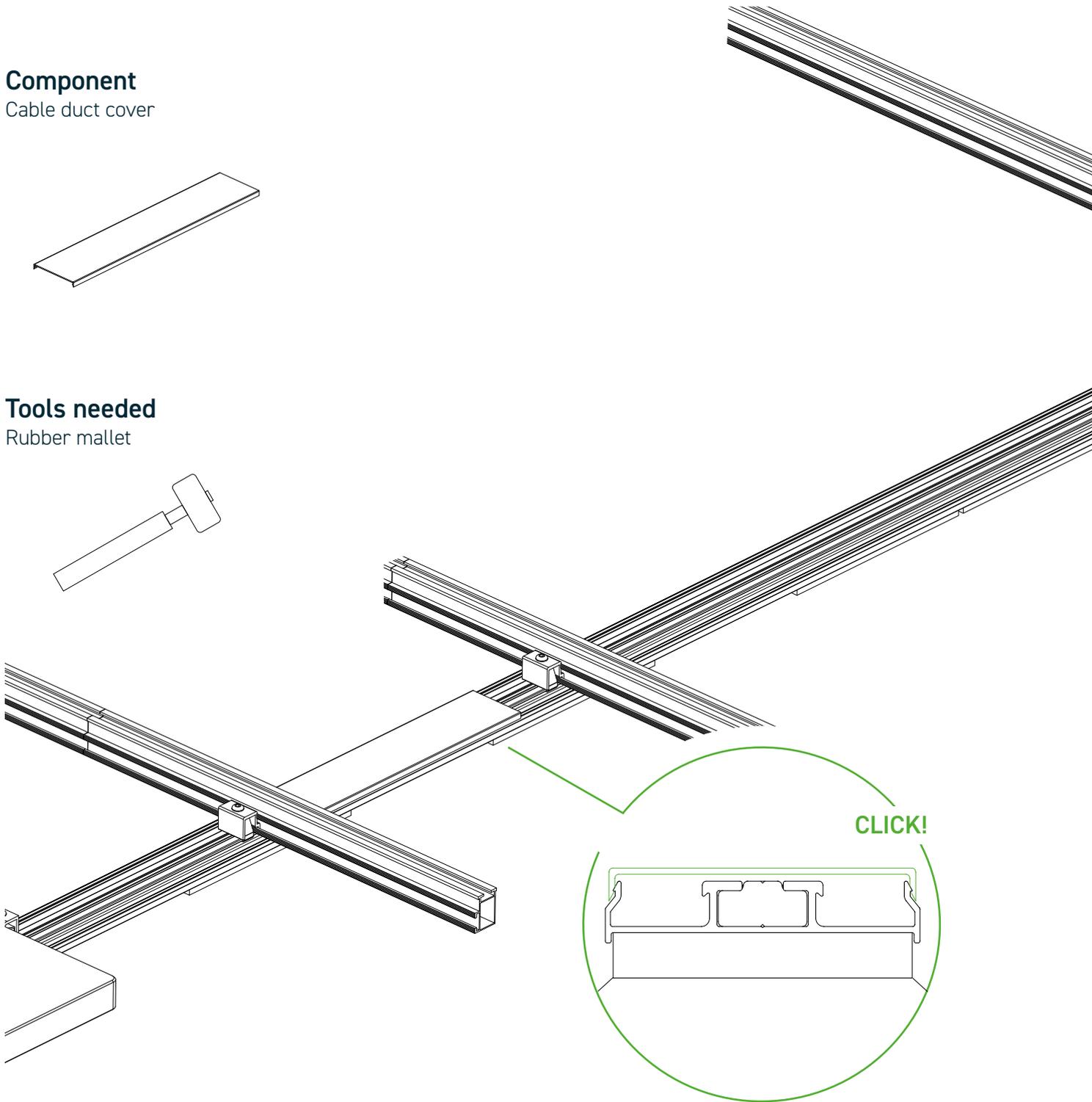
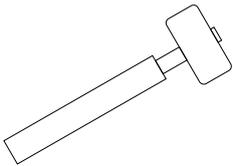
Component

Cable duct cover



Tools needed

Rubber mallet



The cable duct cover is fitted after the cable has been laid.

Place the cable duct cover on the ground profile between the modules and press down on the centre until you hear the snap lock engage.



Note:

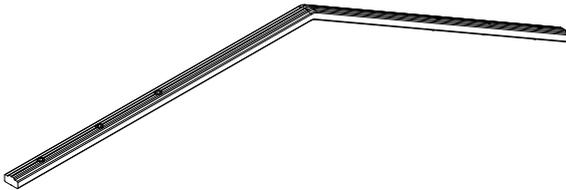
Ensure that the cables are not damaged when the cable duct cover is fitted.

3

OPTIONAL ASSEMBLY STEPS RIDGE CONNECTOR

Component

Ridge connector
in the direction of the rails

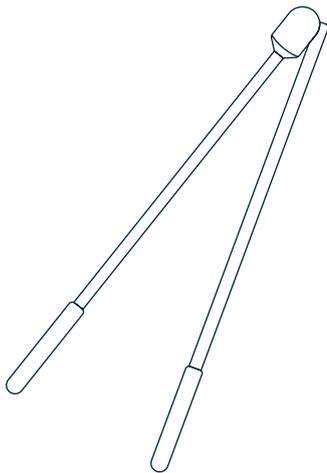


The ridge line must be checked to ensure that it is even and level. Contact of the ridge connector with the roof cladding must be strictly avoided. If necessary, additional building protection mats must be placed between them.

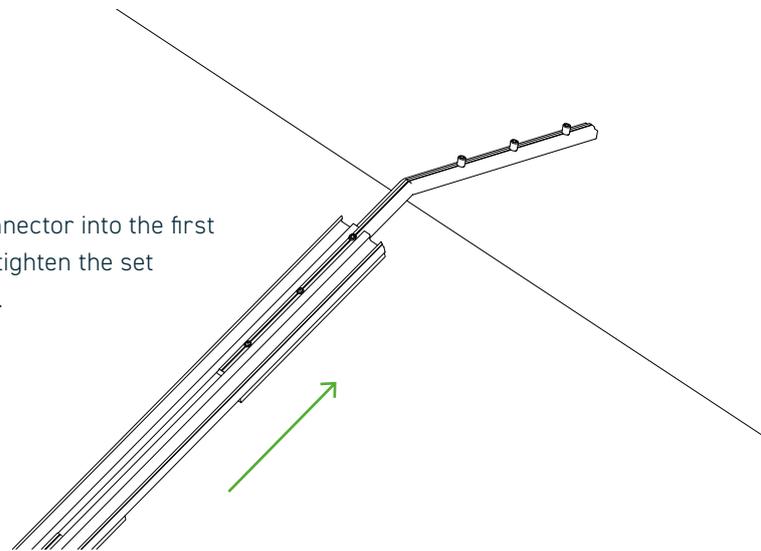
Bend the ridge connector to the roof-specific pitch angle using the bending tool.

Tools needed

Bending tool



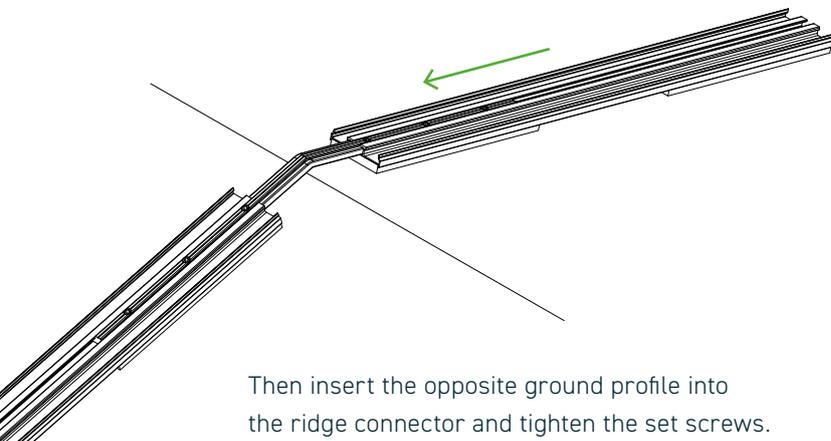
Insert the ridge connector into the first ground profile and tighten the set screws accordingly.



Note:

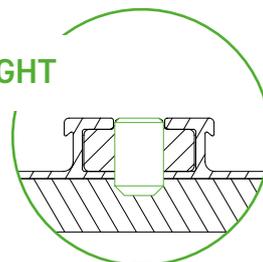
Do not screw in the set screw too deeply.

The set screw must be countersunk at least flush with the connector.

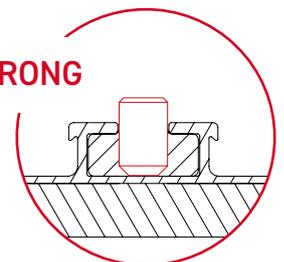


Then insert the opposite ground profile into the ridge connector and tighten the set screws.

RIGHT



WRONG



Final inspection



Final inspection

- Check whether the entire system and all components have been installed in accordance with the current project report.
- Check that all screws are inserted in the correct positions and tightened to the specified torque.
- Information on the tightening torque can be found in the installation instructions or on the packaging. Note: This is important for safety reasons and can lead to considerable damage if not adhered to.
- Check that all ballasting has been done with the specified weights. This information can be found in the current project report. Make sure that the ballast elements are completely prevented from sliding down, tilting or rocking. Note: This is important for safety reasons and can lead to considerable damage if not adhered to.
- Check that all click connections are properly engaged.

Maintenance

- The upper and lower limits of the tightening torque of the screw connections must be checked regularly as part of the maintenance (maintenance interval at least once a year; observe the maintenance protocol).
- The recommendations on the maintenance routines of the EVO 2.1 system due to thermal expansion must be observed.

Warranty and product liability

Please note that a product warranty is only granted in accordance with our warranty conditions if all safety and system instructions have been complied with and the system has been installed properly.

You can access the warranty conditions at pmt.solutions/downloads/.

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