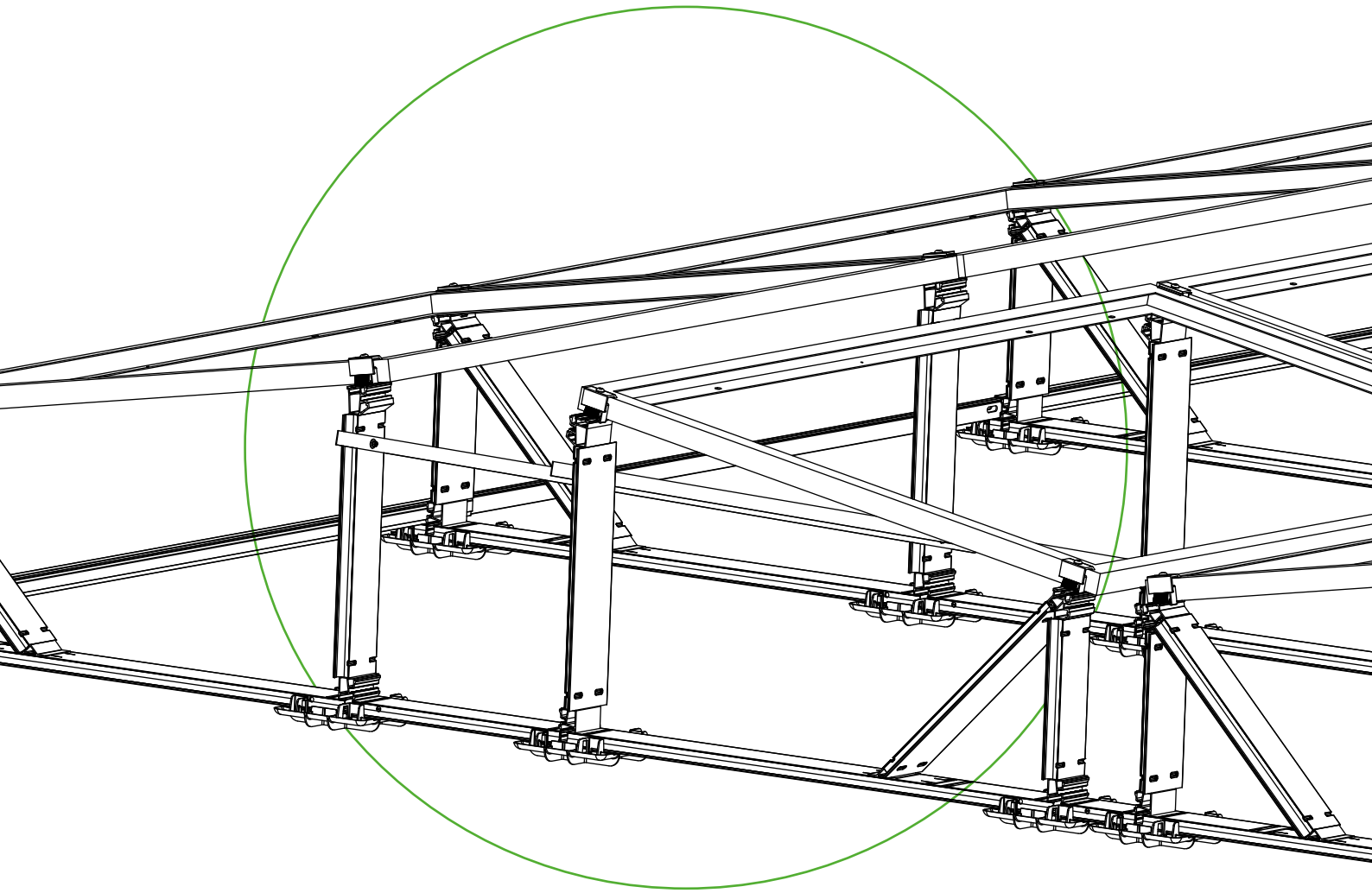
PMT EVO GREEN

ASSEMBLY INSTRUCTIONS



TO A FINISHED SYSTEM
IN JUST **SEVEN STEPS**

Contents

PMT EVO GREEN

INTERACTIVE ASSEMBLY INSTRUCTIONS

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General safety instructions

Please note that our general safety instructions must be observed.

Installation by specialists only

PMT photovoltaic substructures may only be assembled and commissioned by qualified personnel. These persons must be able to ensure the proper and professional assembly of our products on the basis of their professional aptitude, which they have acquired, for example, through training or professional experience.

Before assembly starts:

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 facility. 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 only on planning assumptions, which do not necessarily have to correspond to the conditions on site. Static requirements must therefore be clarified on site and in advance of assembly. Before proceeding, ensure you have confirmation from a qualified person and do not begin assembly 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, the following must be taken into account:

- It is necessary to wear safety clothing [esp. safety helmet, work shoes and gloves].
- For roof work, the regulations for work on the roof must be observed [e.g. use of fall protection, scaffolding with safety gear from an eaves height of 3 m etc.].
- The presence of two people is mandatory for the entire assembly process in order to be able to provide rapid assistance in the event of an accident.

3. Check assembly instructions for updates:
PMT assembly systems are subject to continuous further development. Assembly procedures can change as a result. Therefore, be sure to check the assembly instructions for updates before assembly. They can be found at **https://pmt.solutions/downloads/.** On request, we will also be happy to send you the current version of the assembly instructions.

During the entire assembly time, it must be ensured that a copy of the assembly instructions is available to each installer.

4. The module manufacturer's assembly instructions 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 assumes no liability for damages resulting from non-compliance with general safety instructions.

General System Notes

a. Basics of planning with PMT PLAN

What is PMT PLAN for?

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

Who can use PMT PLAN to make plans?

Requirement of expertise 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 solar power systems, but also in the construction industry with regard to the roofs on which the entire 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 and exclusively the project data entered by the user. PMT does not check the accuracy of these data. Rather, the user is solely responsible for correct data collection and entry in PMT PLAN.

Attention: If the data is not collected and/or entered correctly by the user, this will have an impact on planning. Changes may lead, among other things, to deviating quantities of material and deviating static requirements. This may lead to personal injury as well as financial losses for which PMT assumes no liability.

2. Planning assumptions in PMT PLAN
PMT PLAN processes data entered by the user and uses certain planning assumptions in the process. These planning assumptions in turn result from technical regulations that underlie the calculations of PMT PLAN.

Which planning assumptions underlie the concrete planning can be taken from the project report?

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

PMT endeavours to ensure the up-to-dateness of the Eurocodes taken into account by means of updates. However, we would like to point out that after the publication of new rules, a certain period of time is always required to implement them in the software, which is why there is no entitlement to appropriate updates and the user is always responsible for observing the latest state of the rules on which the program is based.

The rules are applied on the basis of the specified location. It is the responsibility of the user to check planning assumptions for their correctness.

Attention: If planning assumptions are not checked by the user for correctness, this has an impact on the planning. Changes may lead, among other things, to deviating quantities of material and deviating static requirements. This may lead to personal injury as well as financial losses for which PMT assumes 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. However, this planning report cannot and should not replace the expert planning based on actual 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 substructures and even more so before assembling them on the roof, the user must check the correctness and plausibility of the data, planning assumptions and results in the project report.

Second step: ("What's important is what's on the roof!") It is imperative that the user verifies the project report also on the basis of the actual conditions on the roof. In our experience, project-specific features must be taken into account for each roof, which usually only arise on the roof on site.

If the user does not have the necessary expertise to review the project report, they must consult an expert for this purpose.

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

Attention: If the data is not verified or is not correctly verified by the user based on the actual circumstances, this has an impact on the planning. Changes may lead, among other things, to deviating quantities of material and deviating static requirements. This may lead to personal injury as well as financial losses for which PMT assumes no liability.

4. In addition, which other technical requirements must always be observed by the customer and checked independently?

a. Technical requirements for the roof and its components
PPMT PLAN assumes that the roof and its components are suitable for the installation of a photovoltaic system and that the customer 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. Rather, this is to be checked by the user 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 solar power systems. In particular, it must be ensured by the user that the suitability for use of the thermal insulation layer continues to exist despite the additional loads which arise as a result of the assembly of the solar power system (substructure and solar modules).

Tip: To do this, obtain the approval of the manufacturer of the individual components and verify the manufacturer's specifications with the conditions on site on the roof.

The user must check the suitability, load-bearing capacity and serviceability of the entire roof structure for the assembly of the solar power system as a whole.

A structural engineer must be consulted to check the loadbearing capacity. PMT-PLAN does not replace this check under any circumstances.

Attention: If the user does not check the compatibility of the photovoltaic substructure with the roof and/or does not check it properly, this will have an impact on the planning. Changes may lead, among other things, to deviating quantities of material and deviating static requirements. This may lead to personal injury as well as financial losses for which PMT assumes no liability.

b. Static requirements
PMT PLAN does not take into account the static requirements of the building on the roof of which the solar power system is to be built.

Building and roof statics must therefore be professionally checked by the user before assembly on his own responsibility.

A structural engineer must be consulted for this purpose. PMT-PLAN does not replace this check under any circumstances.

Attention: If the building statics are not checked or not checked correctly by the user, this has an impact on the planning. Changes can lead, among other things, to deviating quantities of material and deviating static requirements. This may lead to personal injury as well as financial losses for which PMT assumes no liability.

c. Photovoltaic modules

PMT-PLAN enables planning with a variety of photovoltaic modules. However, due to the large number of photovoltaic modules available on the market, not all modules are stored in the database. Missing modules are added to the database on a separate request based on the module manufacturer's data sheet.

PMT does not guarantee that the module data is up to date. In particular, dimensions and weight parameters 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.

Therefore, please check the compatibility of the module with the substructure before assembly on the basis of the assembly guidelines of the module manufacturer.

PMT-PLAN requires that the module may also be used in the mounting form clamping on the short module sides. Therefore, please check whether the clamping points of the module comply with the manufacturer's specifications before assembly. If the connection points do not correspond to the specifications of the module manufacturer, it is recommended that the module manufacturer be contacted in order to obtain approval of the planning.

This approval can either be generally available as part of the module certification or possibly also be granted by the module manufacturer on a project-specific basis.

Attention: 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 solar power system against shifts due to thermal expansion (so-called "caterpillar effect")

The solar power system is exposed to constant temperature fluctuations on the roof. This can lead to very slow downward movements of the substructure on the roof sealing over the course of the service life of the solar power system, even with a very flat roof pitch. This process is also referred to as "temperature migration" or more vividly as the "caterpillar effect".

The gradual displacement of the solar power system on the roof can lead to damage to the cabling, the roof covering (such as, for example, foil, bitumen, gravel, substrate, etc.) of the further functional layers and any rising components present (such as, for example, skylights, aeration and ventilation systems, drainage systems, chimneys etc.). In the worst case, the solar power system can gradually move beyond the roof edge over time.

To prevent this damage, we have worked with other industry participants to develop an advisory paper specifically on the topic of thermal migration effects of PV facilities. This issue is complex and, in addition to unknown parameters of the roofs (bonded foils, mechanically fastened foils, different types of insulation, use of the building...), the facility characteristics and the facility layout (length of the assembled module arrays, orientation of the module's longitudinal side to the roof pitch...) are also relevant. We have carried out extensive tests of our own to determine the behaviour during temperature changes and the resulting adhesion forces. In addition, we have equipped facilities with load cells and GSM modems to measure and document the effect of "facility migration" in practice. Furthermore, we inspect many facilities on a regular basis.

Conclusion: There are a few facilities that show movement effects on roof surfaces with steeper slopes, and a much larger number of facilities, some with steeper roof slopes, that do not show this effect. For this reason, we have decided - based on the BSW advisory paper - to give a general recommendation of a connection starting at a roof pitch of 1.0°.

The introduction of the EVO GREEN system with ProPlates/ProPlates Gravel and their mechanical fastening to the main floor profiles extends our recommendation for a connection to a flat roof from a gradient of approx. 5.24% (roof pitch approx. 3°), provided that the **PMT checklist** has been completed accordingly and taken into consideration when planning the facility. In addition, the unevenness of the green roof must not exceed +/- 3 cm over the length of two modules. As each roof must be considered on a case-by-case basis due to individual, unknown parameters, we recommend the following procedure for the **maintenance routine**:

Maintenance interval	Shift	Measure
Annual maintenance	No shift	No need for action
annual maintenance	up to approx. 2 cm	Inspect the situation with special attention during the next maintenance
annual maintenance	2-3 cm	Intermediate inspection after approx. 6 months
Intermediate inspection (6 months)	further shift of 1.5 cm or more	subsequent mechanical connection

Attention: Failure to secure the solar power system against displacement due to thermal expansion may lead to personal injury as well as property and financial losses for which PMT assumes no liability.
Attention: For roof pitches of 3° or more, the green roof mounting system must be securely anchored or fastened on site. Failure to do so may result in injury or loss of life, as well as damage to property and assets, for which PMT assumes no liability.

Assembly Instructions and Maintenance

Assembly instructions

Assembly 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 assembly system, it is essential to observe the assembly instructions, safety instructions and system instructions.

In the event of improper use of the components, noncompliance with the notes and the use of components not belonging to the system, all warranty, guarantee and liability claims against PMT are void. The user is liable for damage and consequential damage to other components, PV modules or the building, as well as for personal injury.

Before starting the assembly, the compatibility between the roof skin and the assembly system must be tested and ensured and the roof checked for damage of any kind. These must be recorded in the **Roof Inspection Protocol**. Repair work may be necessary.

In the case of very uneven roofs or roof seals, compensation measures must be taken if necessary to ensure uniform load introduction. In order to ensure a flat support of the main bottom profiles on the roof skin, the roof surface must be cleaned before construction begins and impurities, such as moss, leaves, dirt, stones, etc. removed.

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

The surface load must not exceed the residual load-bearing capacity of the building. It must be ensured that the runoff of rainwater is not hindered. Roof drainage must be included in the assembly planning.

It must be checked whether lightning protection provisions have to be changed and reworked as a result of the assembly of the PV facility. A thermal separation (distance between module fields) must be maintained in accordance with the PMT PLAN project documents.

Attention: If the actual module dimensions exceed the module widths specified in the table, assembly must not be started.

The specified tightening torques in these assembly instructions must be strictly observed.

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

Maintenance

Photovoltaic substructures are not maintenance-free. Maintenance, in particular of the correct positioning of the ballast stones and the building protection mats, must be carried out annually and documented in a maintenance log. Furthermore, all components of the PMT mounting system must be checked at regular intervals and documented accordingly. We recommend annual maintenance as per our **Maintenance Protocol**.

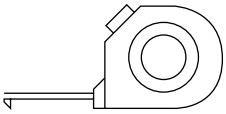
The recommendations for maintenance routines of the PMT EVO GREEN system due to thermal expansion must be observed.

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

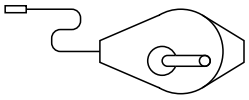
Attention: Failure to maintain the facility may lead to personal injury as well as financial losses for which PMT assumes no liability.

Required Tools

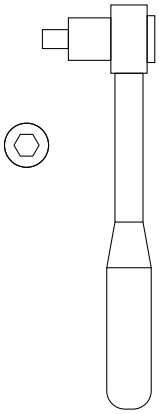
1 Tape measure



2 Chalk line

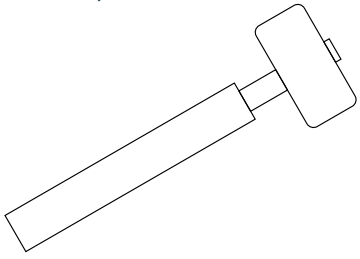


3 Torque-wrench with attachment Hexagon socket
SW 5 mm

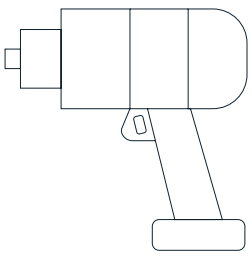


4 Assembly Aid (optional tool)

5 Rubber hammer (optional tool)



6 Cordless drill

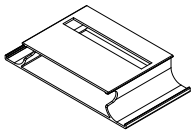


Attention! Some components are available in different lengths and versions.
The exact article versions can be found in the project documents.

Component Types

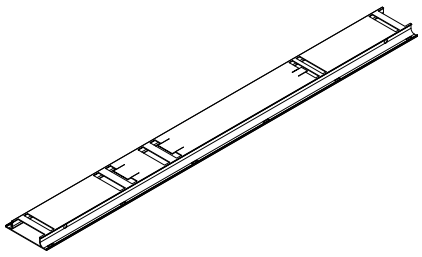
A Start and end base profile

3.3206 - EN AW 6060 T66 (EP)



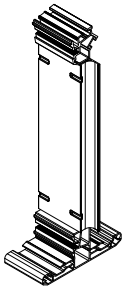
B Main base profile

3.3206 - EN AW 6060 T66 (EP)



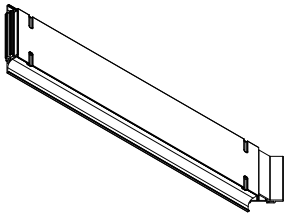
C Base

3.3206 - EN AW 6060 T66 (EP)



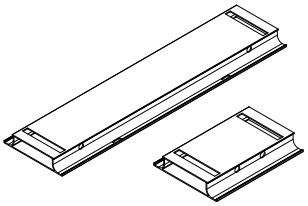
D Base Support

3.3206 - EN AW 6060 T66 (EP)



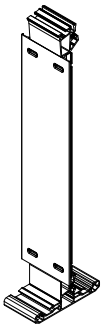
E Connecting base profile

AlMgSi 0,5 F22



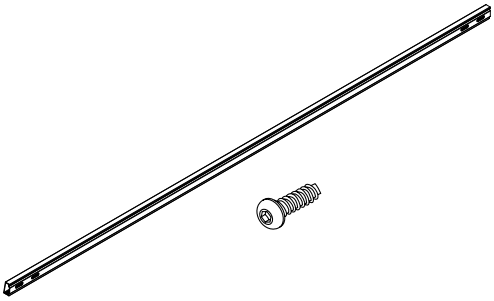
F Tower

3.3206 - EN AW 6060 T66 (EP)



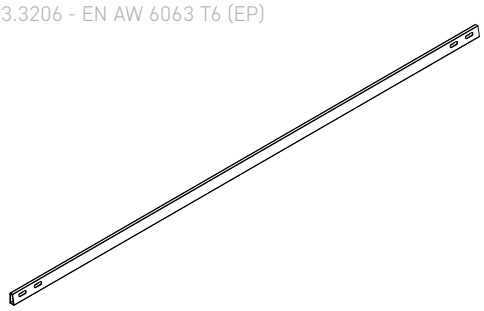
G Cross and ballast strut, Screw M8 x 30

3.3206 - EN AW 6060 T66 (EP) / 1.4301



H Cross strut connector

3.3206 - EN AW 6063 T6 (EP)

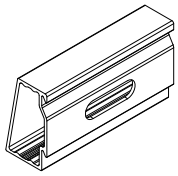


Attention! Some components are available in different lengths and versions.
The exact article versions can be found in the project documents.

Component Types

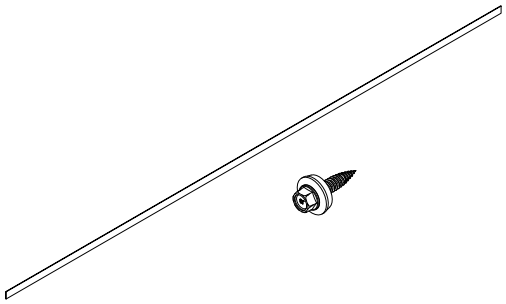
I Cross and ballast strut end piece

3.3206 - EN AW 6063 T6 (EP)

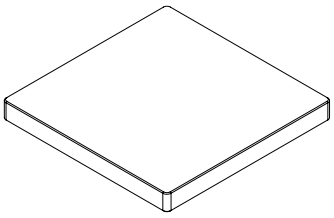


J Diagonal, DBS 4.5x25

AlMgSi 0.5 F2

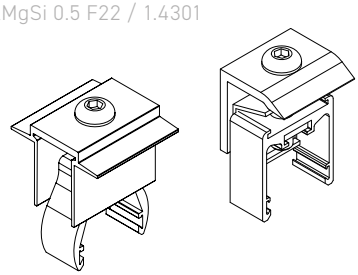


K Ballast stone with the standard dimensions 40 × 40 × 4 cm (not included in delivery)



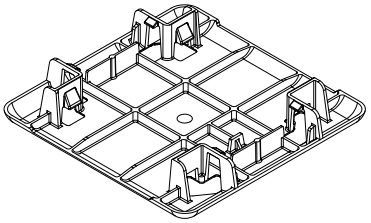
L Middle and end clamp

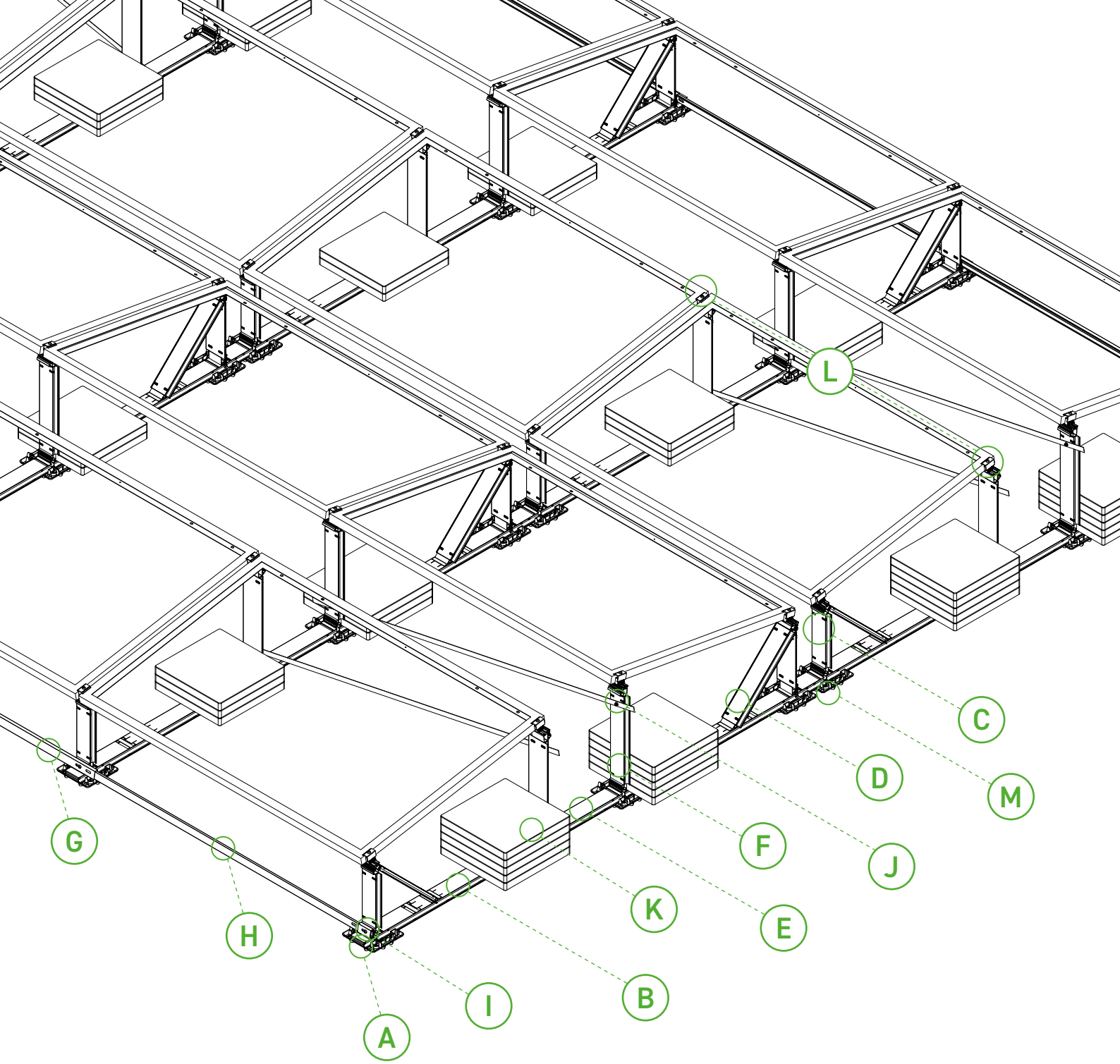
AlMgSi 0.5 F22 / 1.4301



M ProPlate/ProPlate Gravel

PE-HD





A Start and end base profile

B Main base profile

C Base

D Base support

E Connecting base profile

F Tower

G Cross and ballast bar

H Cross strut connector

I Cross and ballast strut end piece

J Diagonal

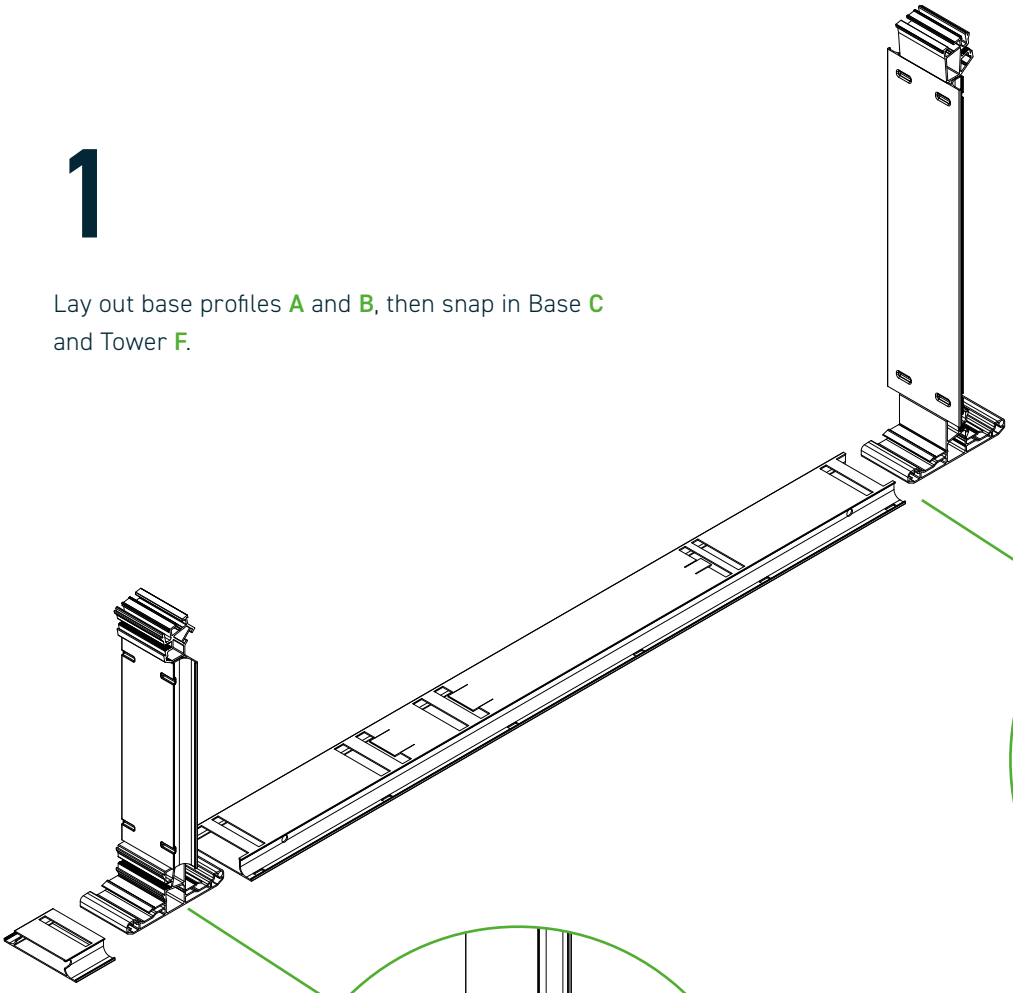
K Ballast stone

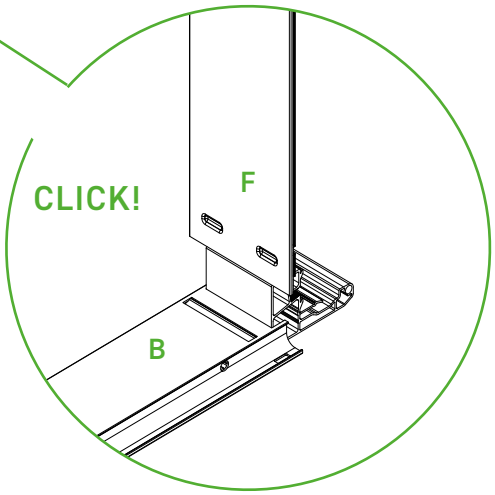
L Middle and end clamp

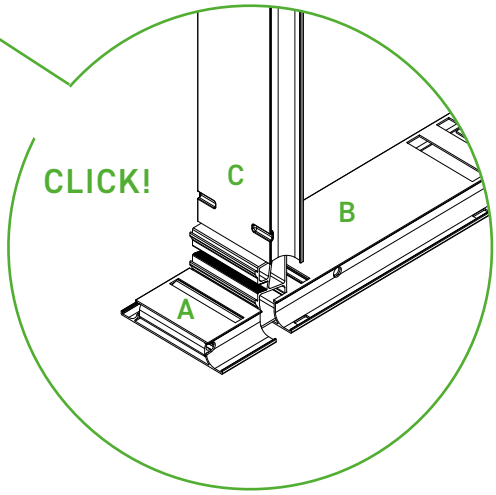
M ProPlate / ProPlate Gravel

1

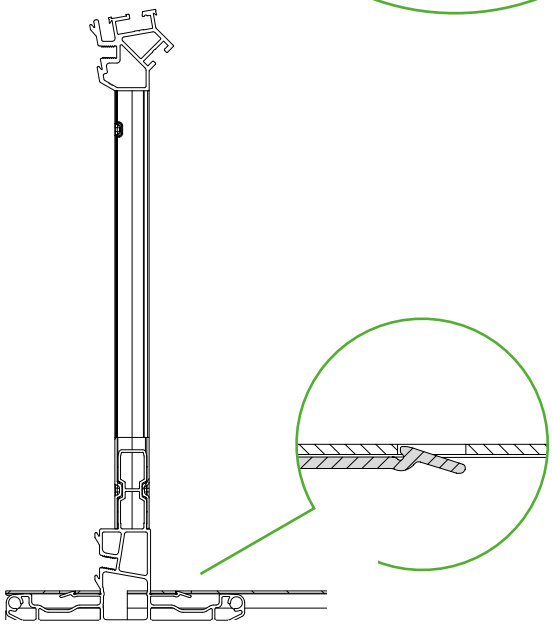
Lay out base profiles **A** and **B**, then snap in Base **C** and Tower **F**.



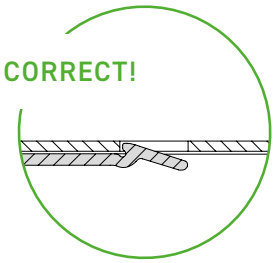


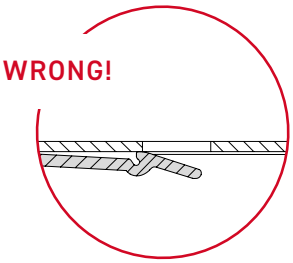


Slide Base **C** and Tower **F** into the main base profile **B** until you hear the snap lock engage. One Base **C** and one Tower **F** must be mounted per main base profile. At both the beginning and end of a main base string, an additional start and end base profile **A** must be clicked onto the Base **C** or the Tower **F**.



Attention!
Check the snap-lock joint for strength and to ensure it fits perfectly.

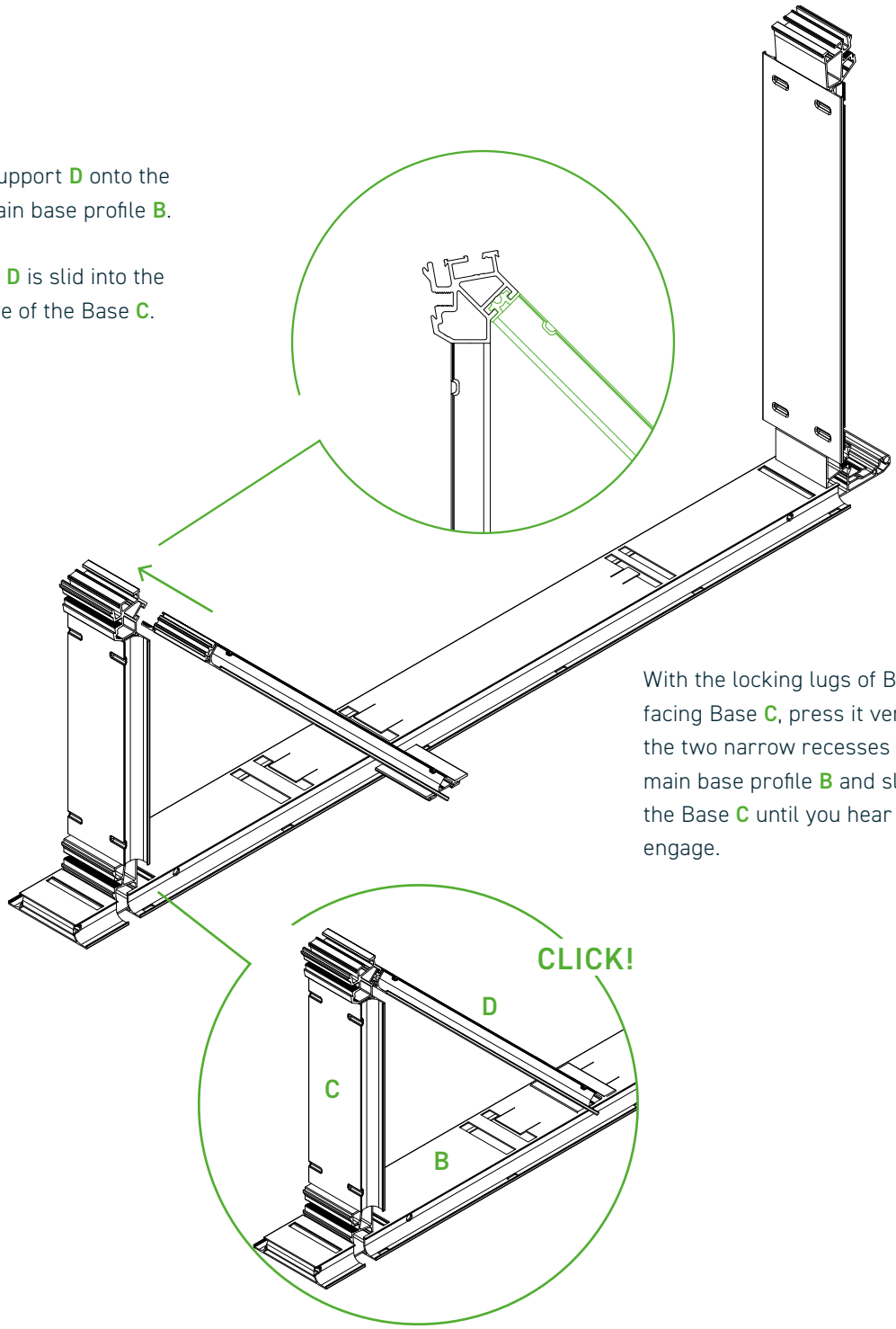




2

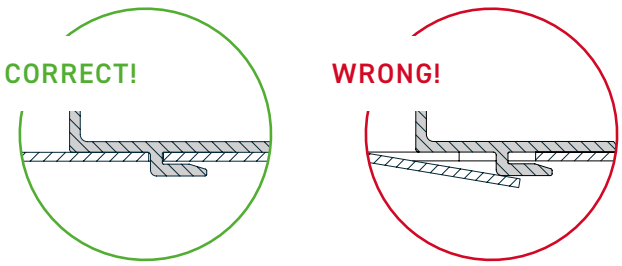
Mount the Base Support **D** onto the Base **C** and the main base profile **B**.

The Base Support **D** is slid into the appropriate groove of the Base **C**.



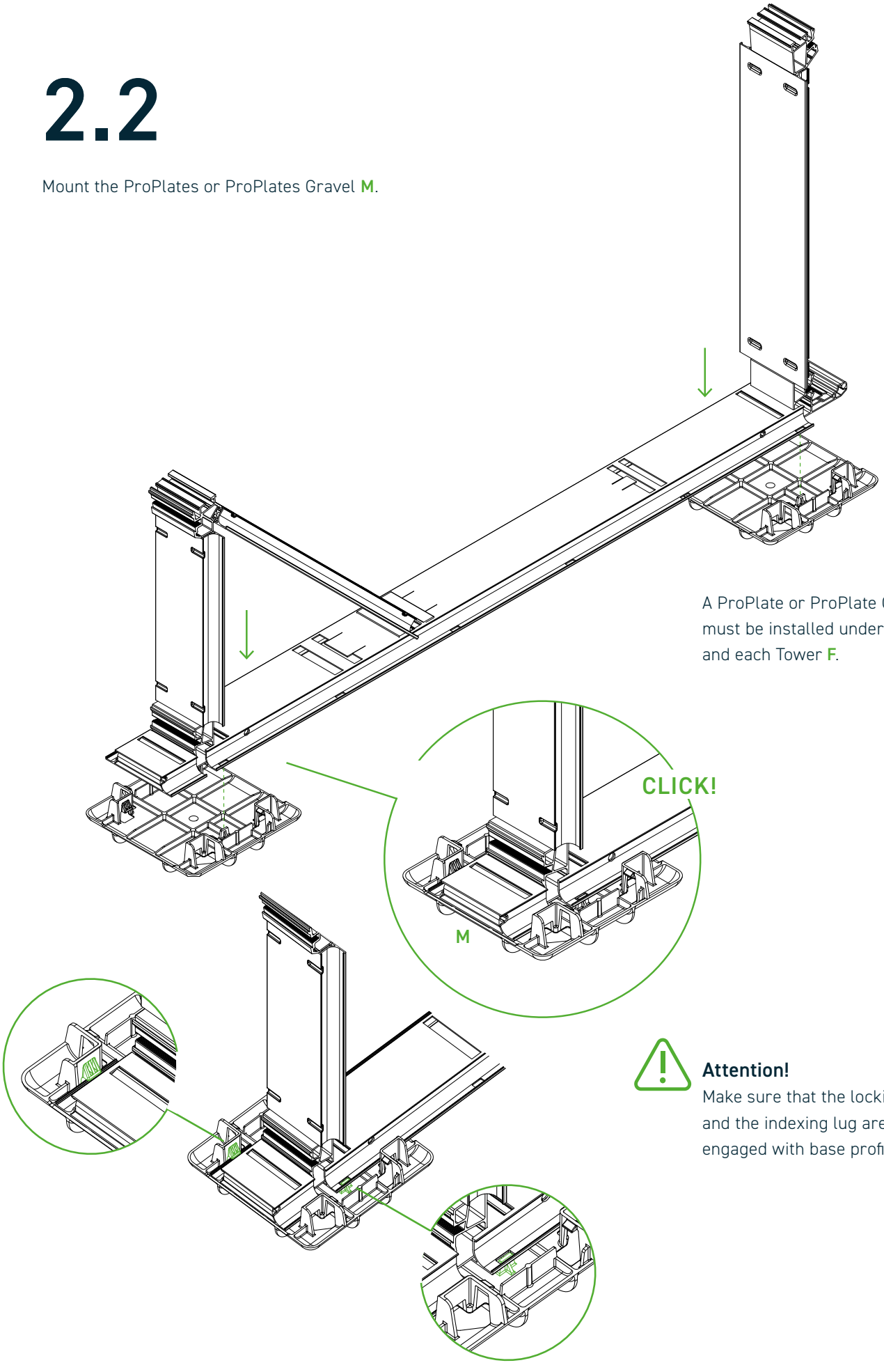
With the locking lugs of Base Support **D** facing Base **C**, press it vertically into the two narrow recesses of the main base profile **B** and slide it toward the Base **C** until you hear the snap lock engage.

Attention!
Check the snap-lock joint to ensure it fits perfectly.



2.2

Mount the ProPlates or ProPlates Gravel **M**.

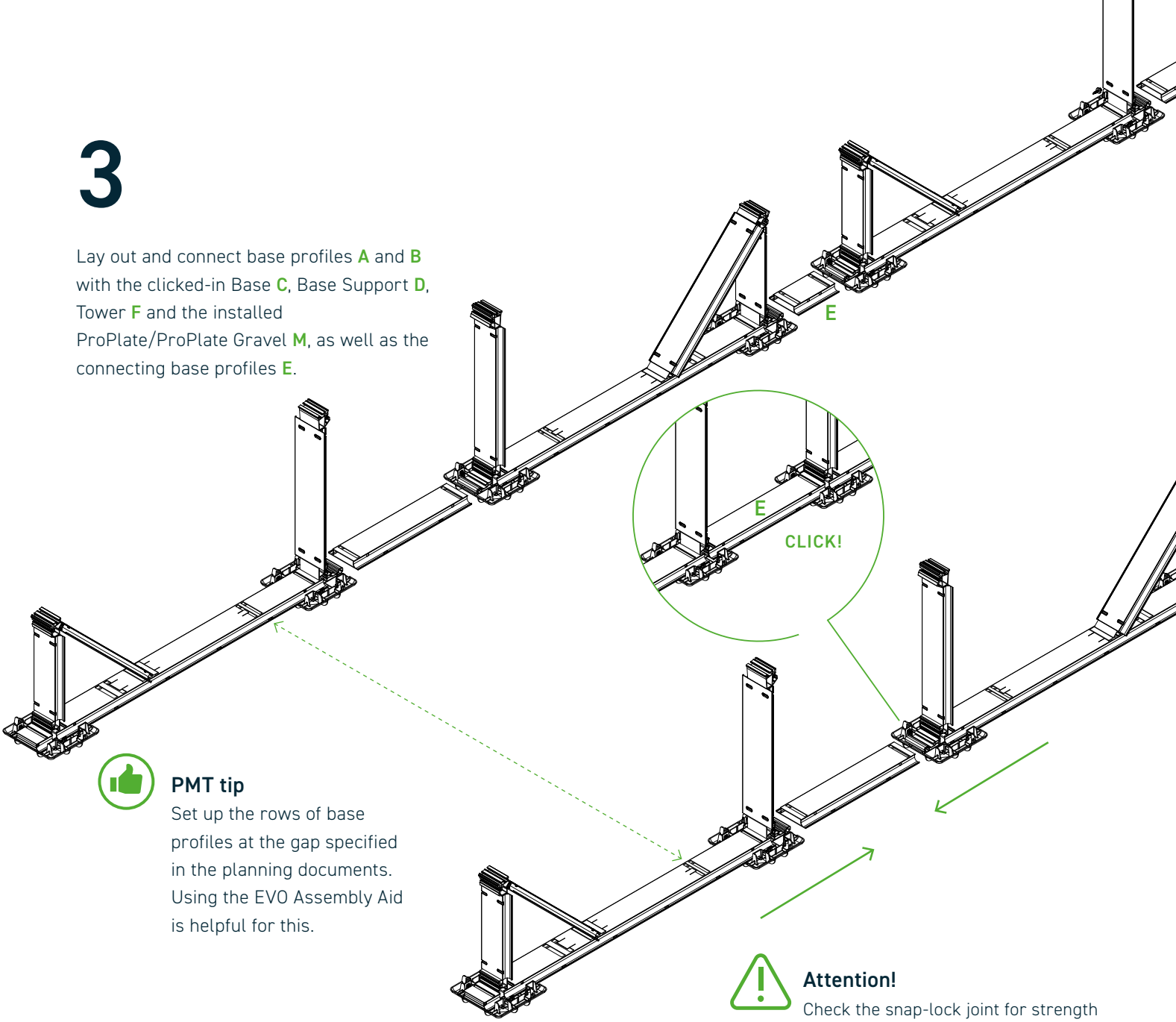


A ProPlate or ProPlate Gravel **M** must be installed under each Base **C** and each Tower **F**.

Attention!
Make sure that the locking lug and the indexing lug are properly engaged with base profiles **A** and **B**.

3

Lay out and connect base profiles **A** and **B** with the clicked-in Base **C**, Base Support **D**, Tower **F** and the installed ProPlate/ProPlate Gravel **M**, as well as the connecting base profiles **E**.



PMT tip
Set up the rows of base profiles at the gap specified in the planning documents. Using the EVO Assembly Aid is helpful for this.

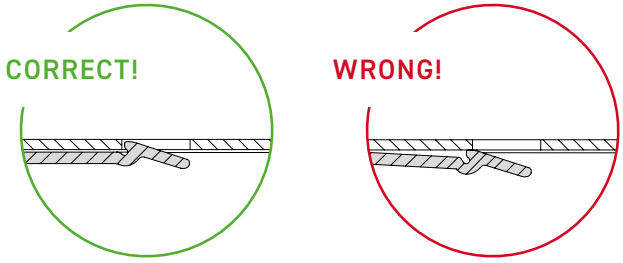
Attention!
Check the snap-lock joint for strength and to ensure it fits perfectly.

Lay out the main base profile **B** with the mounted Base **C** and Tower **F** in sequence in accordance with the project report.

The corresponding connecting base profiles **E** must always be positioned between the preassembled main base profiles. The required length can be found in the project report.

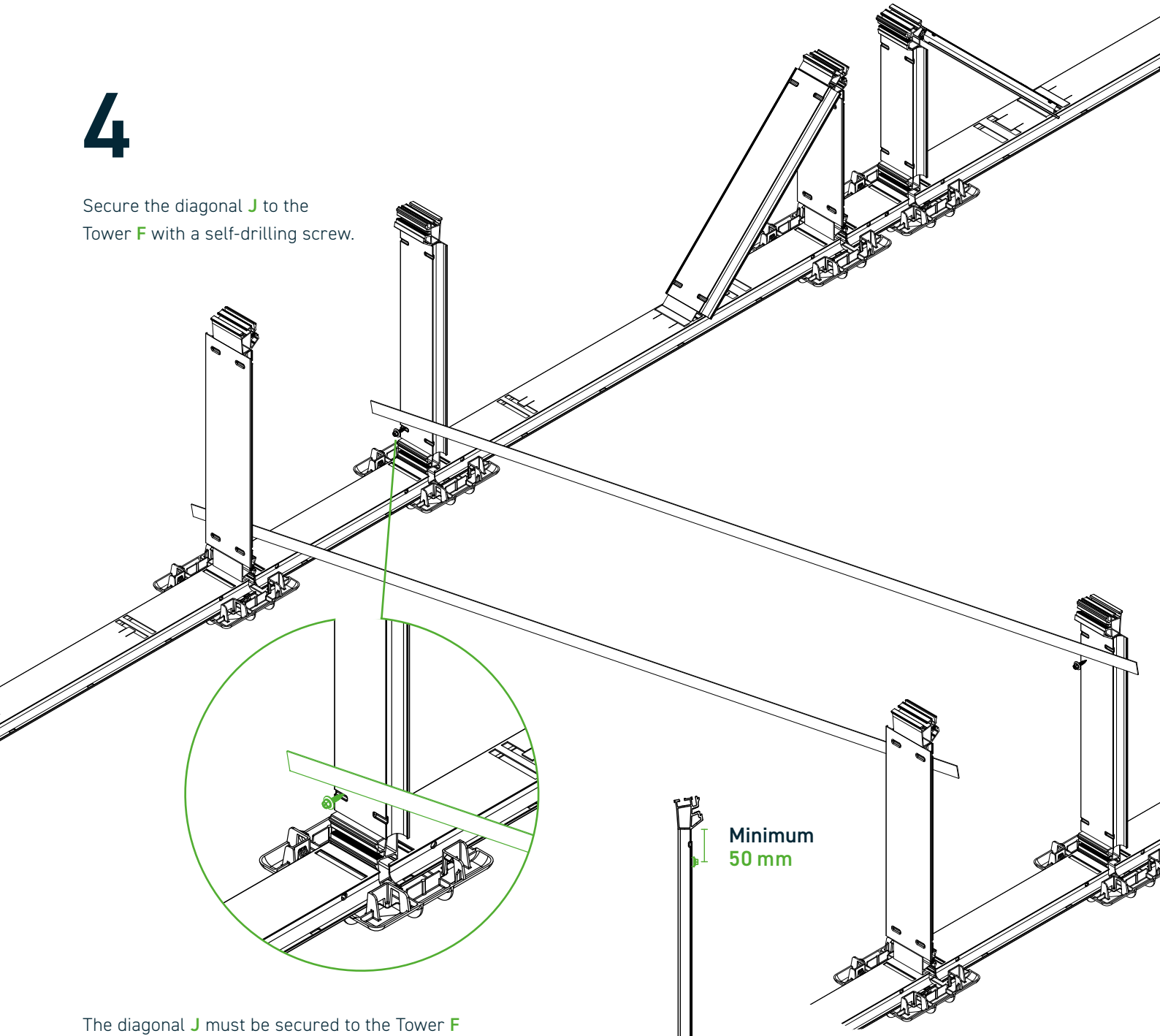
The sequence starts from east to west.
The sequence is the same in each row and always begins and ends at the row ends with a start and end base profile **A**.

Then slide the components into each other until you hear the snap lock engage.
The rows of base profiles must now be set up at the spacing specified in the project report (see PMT tip).

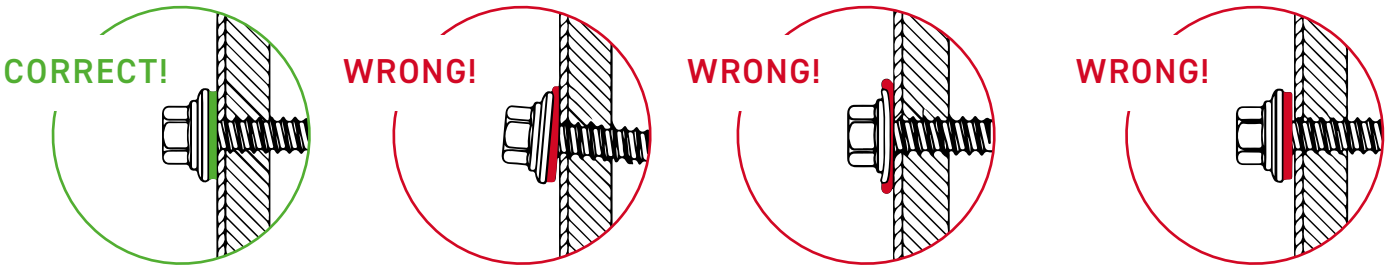


4

Secure the diagonal J to the Tower F with a self-drilling screw.

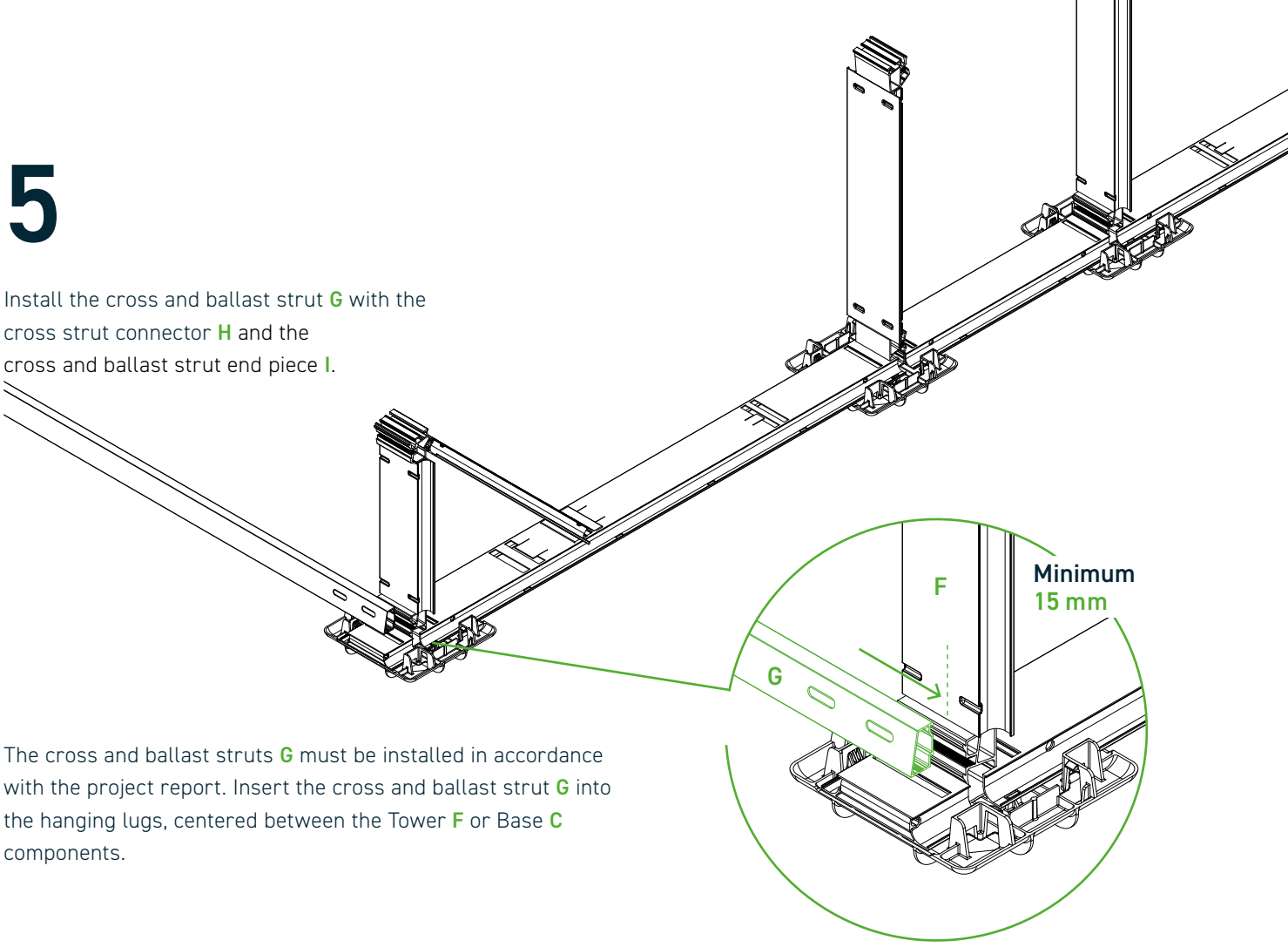


The diagonal J must be secured to the Tower F with self-drilling screws in accordance with the planning documents. One self-drilling screw must be used per Tower F. A minimum clearance of 50 mm must be observed when positioning.



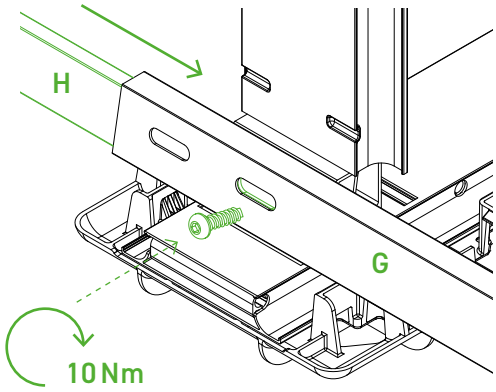
5

Install the cross and ballast strut **G** with the cross strut connector **H** and the cross and ballast strut end piece **I**.



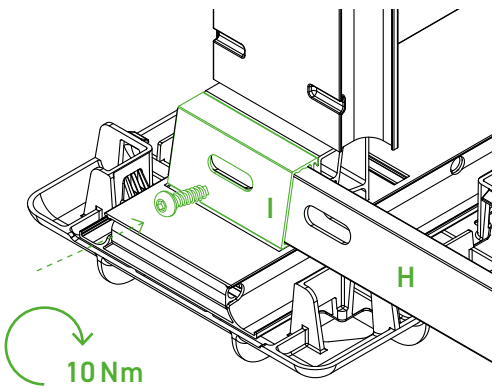
The cross and ballast struts **G** must be installed in accordance with the project report. Insert the cross and ballast strut **G** into the hanging lugs, centered between the Tower **F** or Base **C** components.

5.1

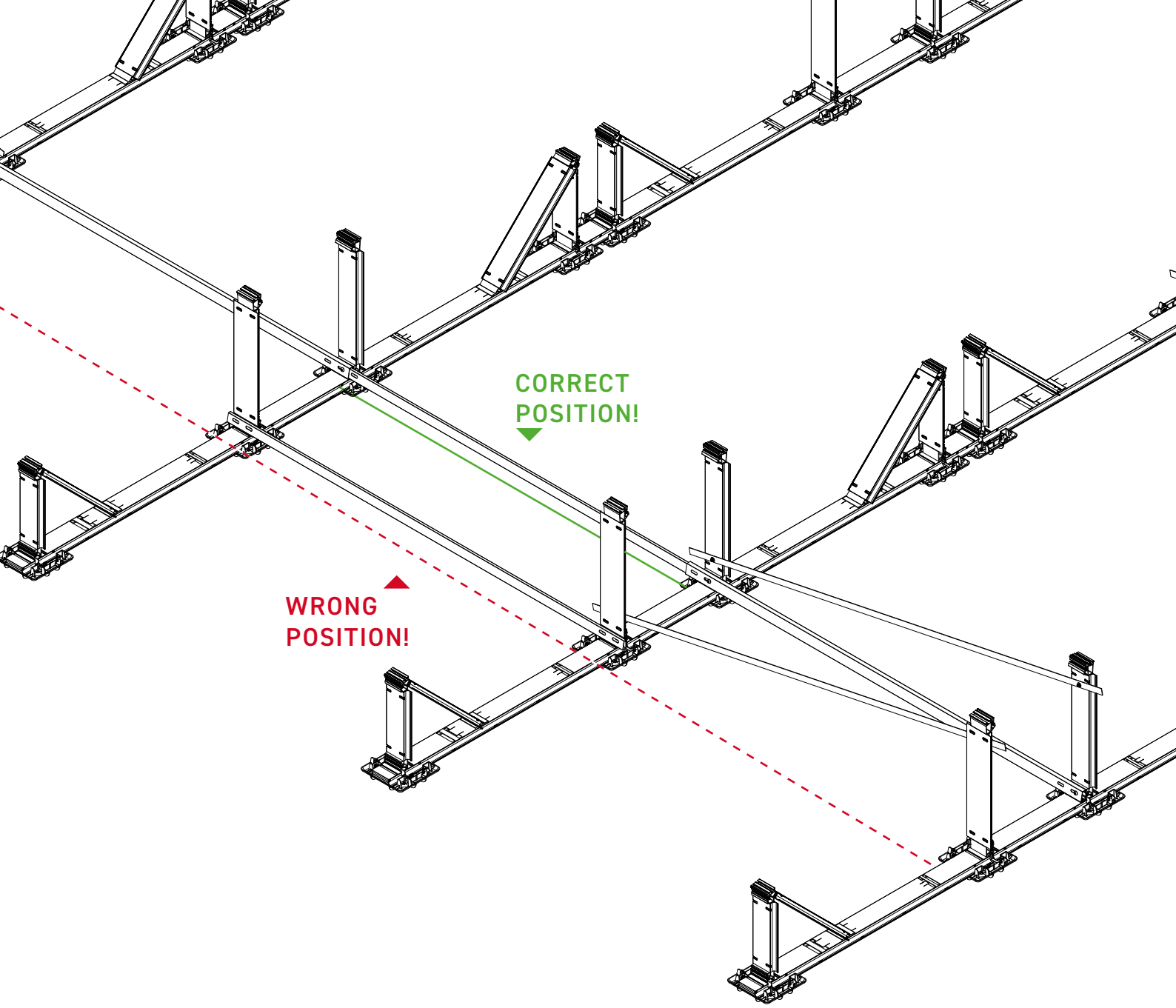


The cross strut connector **H** must be mounted at the specified locations in accordance with the project report. It must be inserted halfway into a cross and ballast strut **G**. The following cross and ballast strut **G** must be slid over the cross strut connector **H**. Each cross and ballast strut **G** must be fastened with two M8 × 30 screws.

5.2



If the connection ends with a cross strut connector **H**, a cross and ballast strut end piece **I** must be installed.



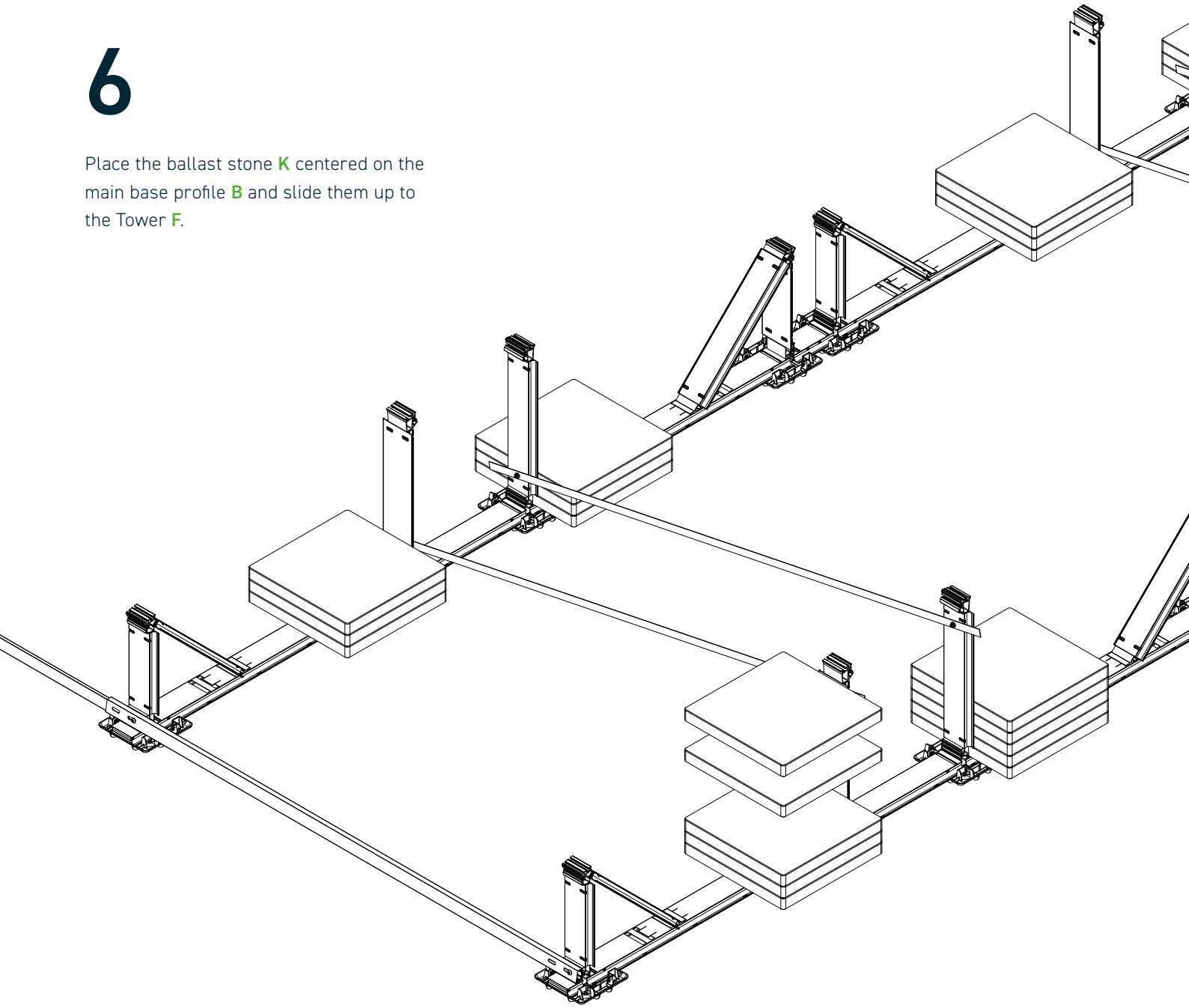
NOTE

The exact location/position of the cross and ballast strut **G** must always be taken from the current project documents.
The cross and ballast strut **G** must always be mounted on the Base **C** or Tower **F** facing the outer edge of the module field.

Attention! The positioning of the ballast stones may vary.
Please refer to your current project report for this information.

6

Place the ballast stone **K** centered on the main base profile **B** and slide them up to the Tower **F**.

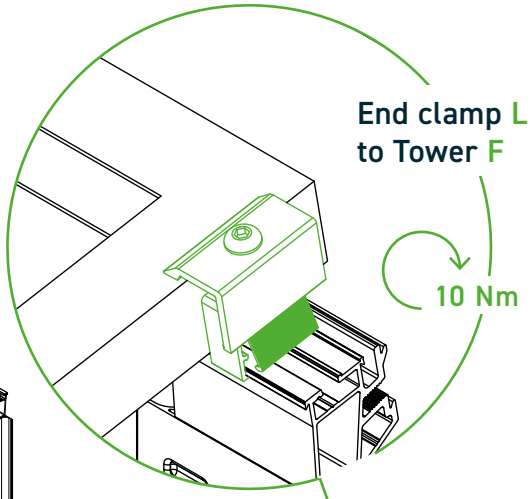


The placement and weight of the required ballast stones must be taken from the project report.

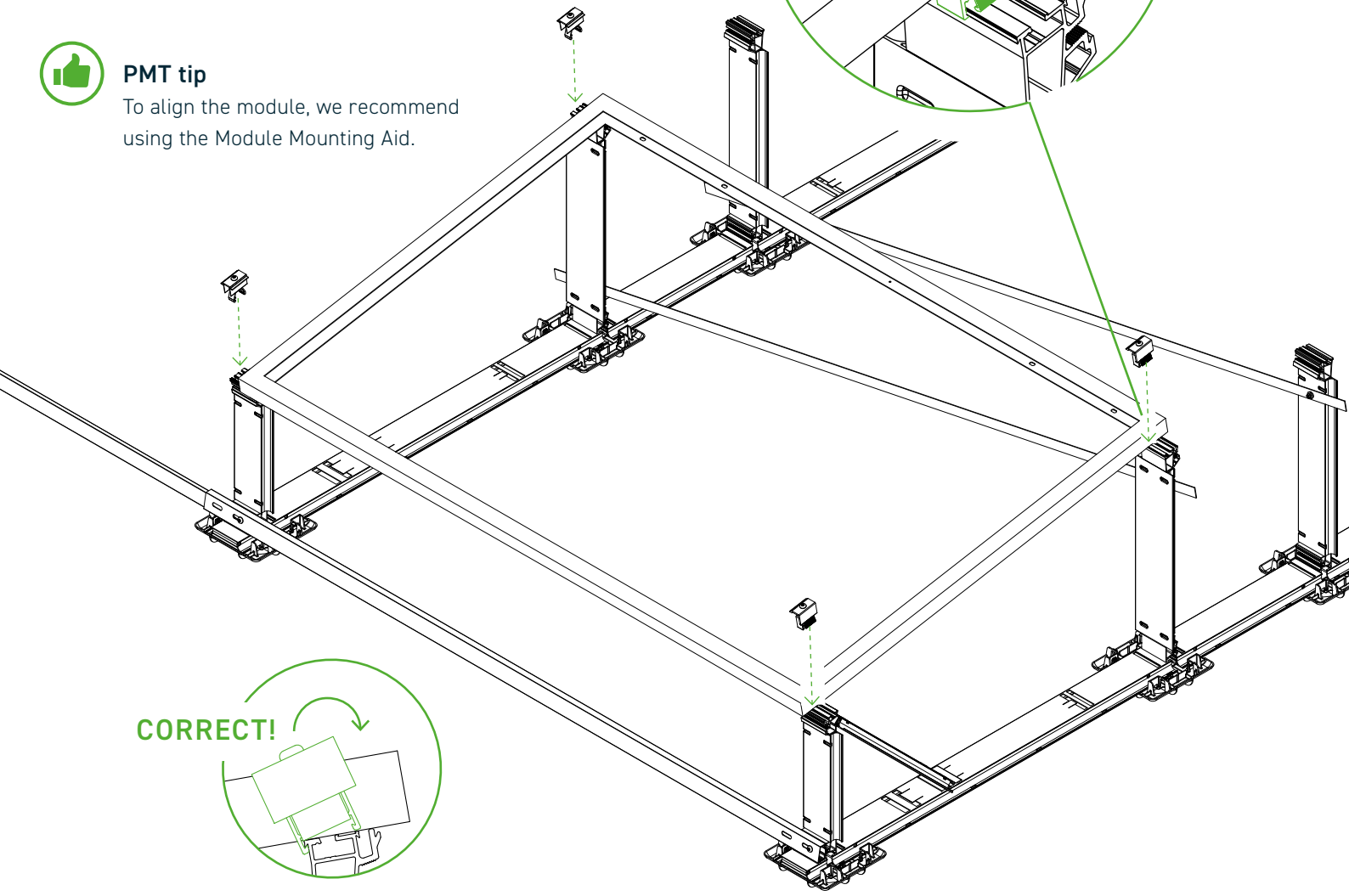
7.1

Place the modules and install the module clamps **L** on the Tower **F**, then tighten them.

Ensure the module is properly seated on the Tower **F**. Make sure that the middle and end clamps **L** are positioned flush and correctly on the module.



PMT tip
To align the module, we recommend using the Module Mounting Aid.

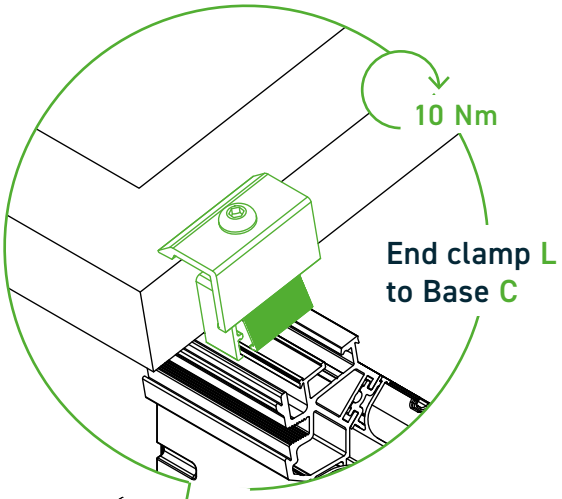


Position the middle and end clamps **L** on the side of the Tower **F** facing the Base **C** at the lower guide groove, then press them onto the opposite guide groove until you hear the snap lock engage. Ensure the middle and end clamps **L** are securely and flush seated in the guide grooves.

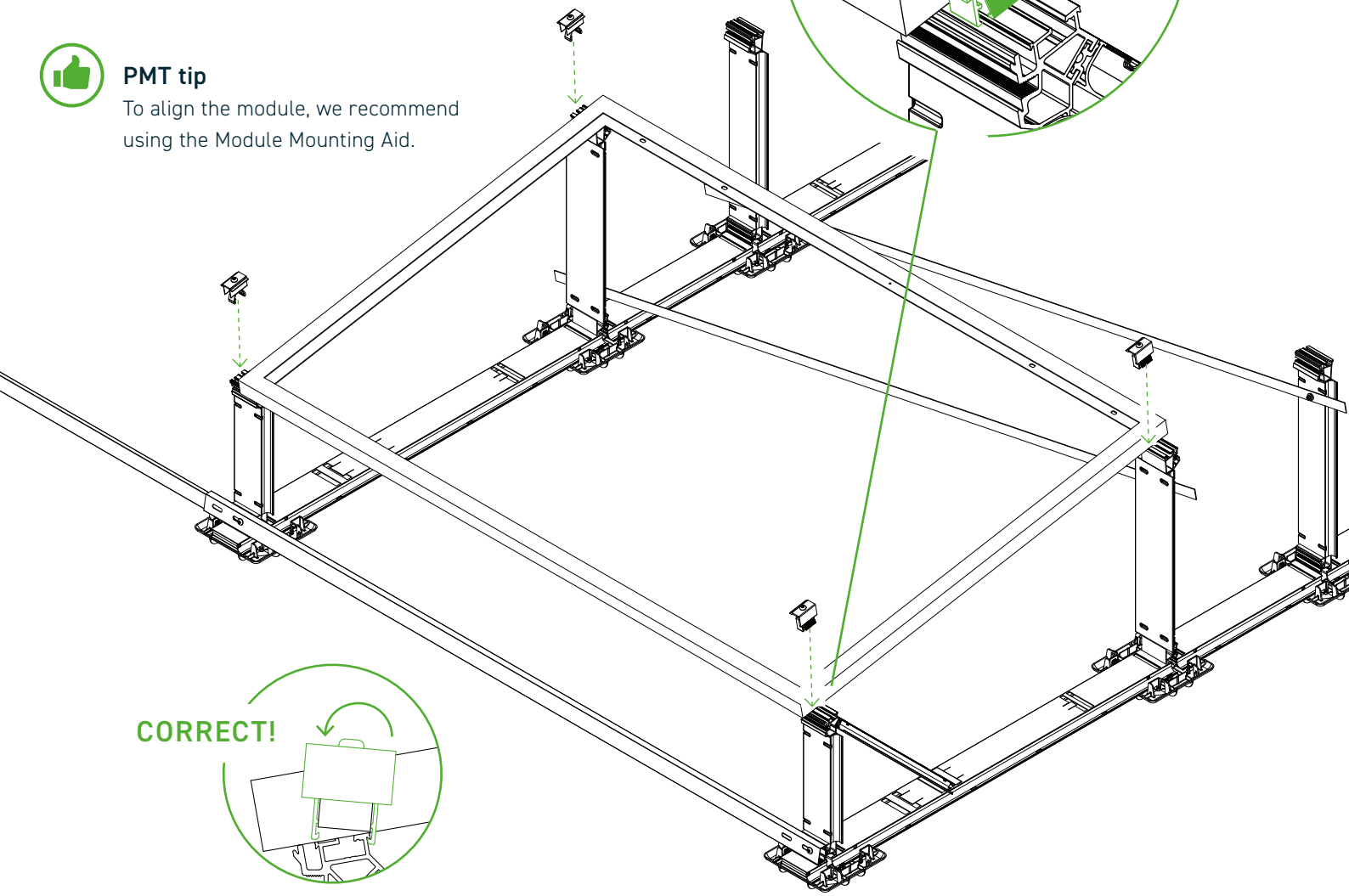
7.2

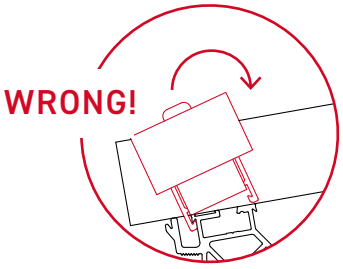
Place the modules and install the module clamps **L** on the Base **C**, then tighten them.

Ensure the module is properly seated on the Base **C**. Make sure that the middle and end clamps **L** are positioned flush and correctly on the module.



PMT tip
To align the module, we recommend using the Module Mounting Aid.

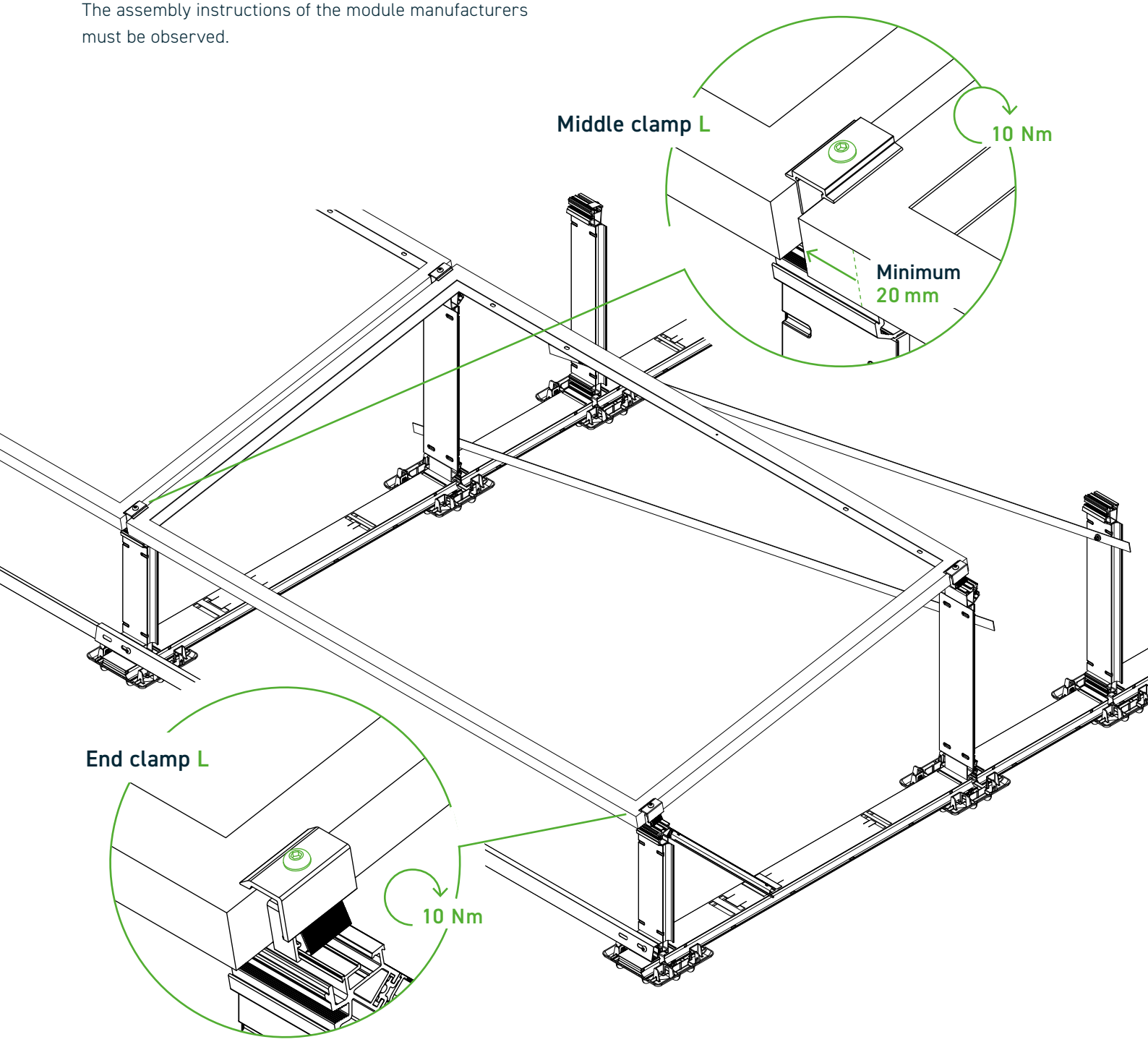


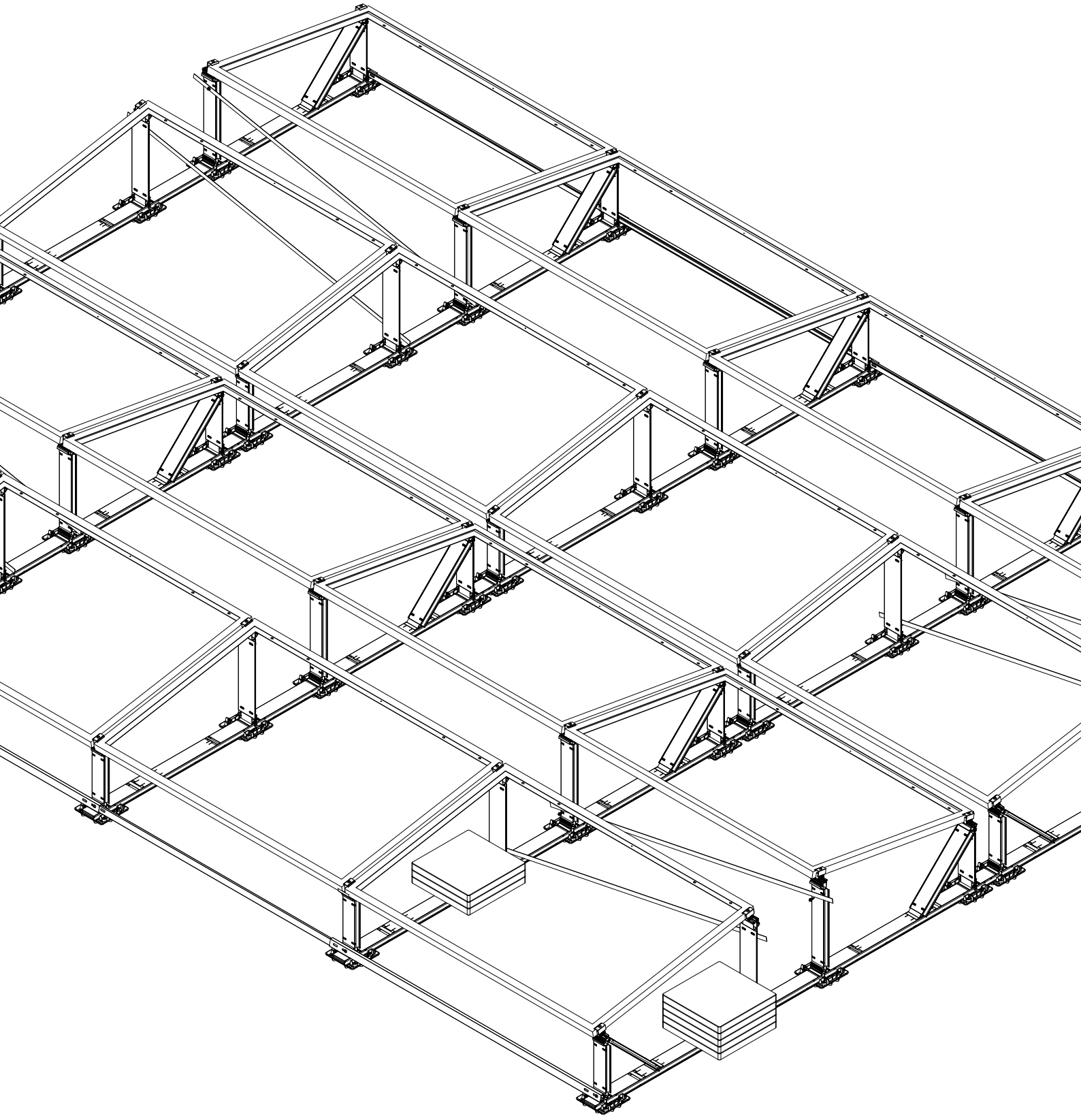


Position the middle and end clamps **L** on the side of the Base **C** facing the Tower **F** at the upper guide groove, then press them onto the opposite guide groove until you hear the snap lock engage. Ensure the middle and end clamps **L** are securely and flush seated in the guide grooves.

7.3

Tighten the clamp screws of the middle and end clamps **L** to 10 Nm. Then check to ensure they are firmly in place. The assembly instructions of the module manufacturers must be observed.





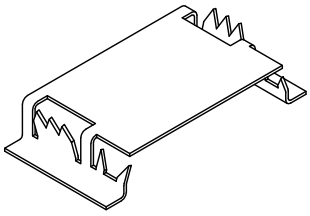
DONE WITH THE BASIC SYSTEM!

Attention! Some components are available in different lengths and versions.
The exact article versions can be found in the project documents.

Optional component types

1 TerraGrif

1.4310 (X10CrNi18-8)

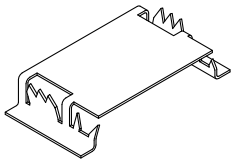


1

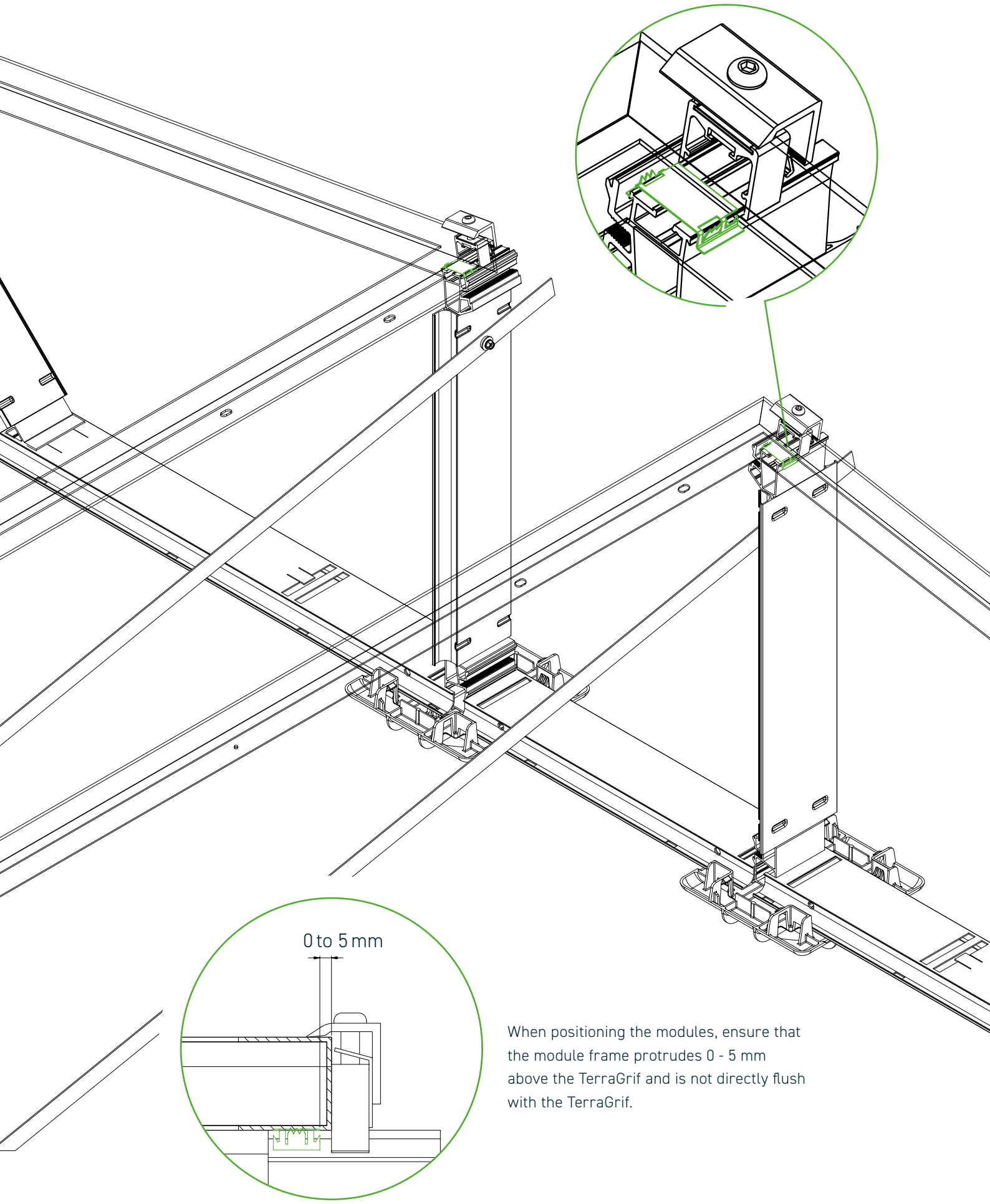
OPTIONAL INSTALLATION STEP **TERRAGRIF**

Component

TerraGrif

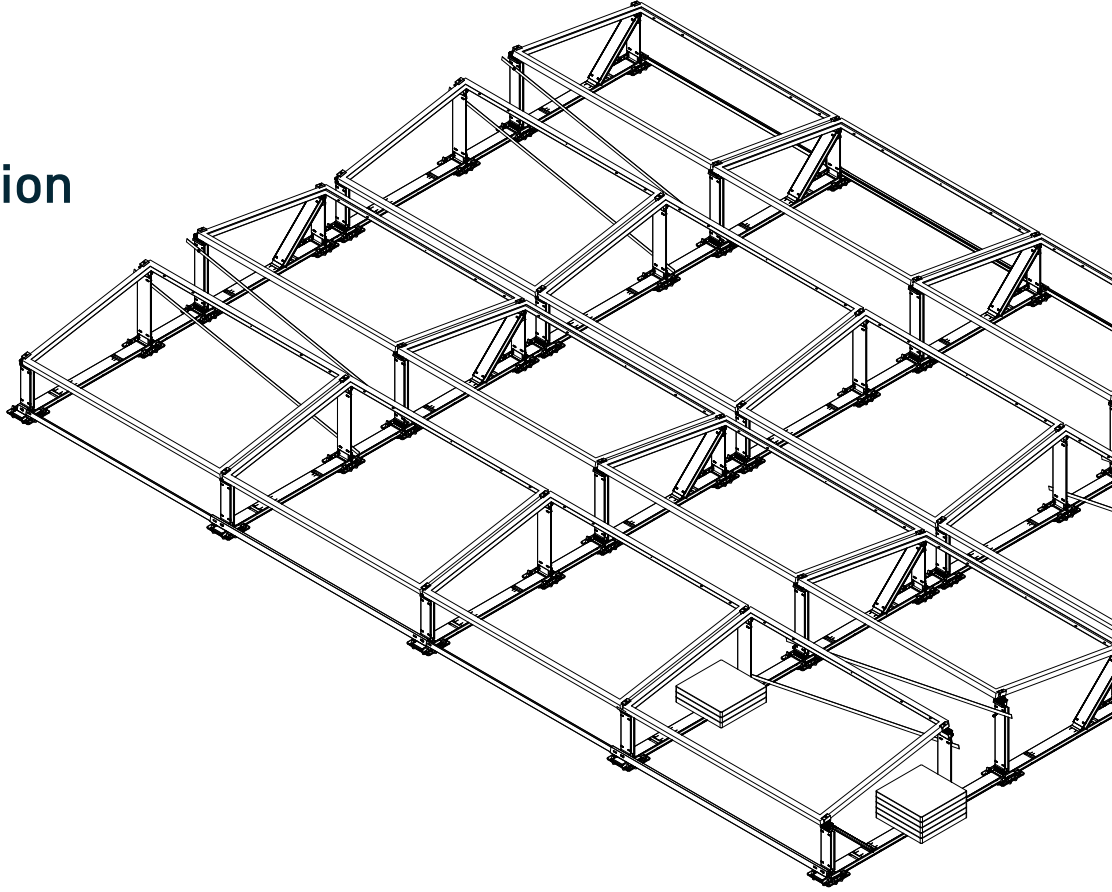


To ensure optimal equipotential bonding of the system, one TerraGrif must be attached to the Tower **F** per module.



When positioning the modules, ensure that the module frame protrudes 0 - 5 mm above the TerraGrif and is not directly flush with the TerraGrif.

Final Examination



Final Examination

- Check whether the entire system and all components have been installed in accordance with the current project report.
- It must be checked whether all screws are inserted at the intended points and tightened with the specified tightening torque.
- Information on the tightening torque can be found in the assembly instructions or on the packaging. Attention! These are safety-relevant and can lead to considerable damage if not observed.
- Check whether all ballast assembly has been performed with the specified weights. The information can be found in the current project report. Make sure that slipping, tilting or wobbling of the ballast elements is permanently eliminated. Attention! These are safety-relevant and can lead to considerable damage if not observed.
- Check that all click-connections are locked correctly.

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 for maintenance routines of the PMT EVO GREEN 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 facility has been installed properly. The warranty conditions can be found at pmt.solutions/downloads/.

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We are happy to advise you.

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