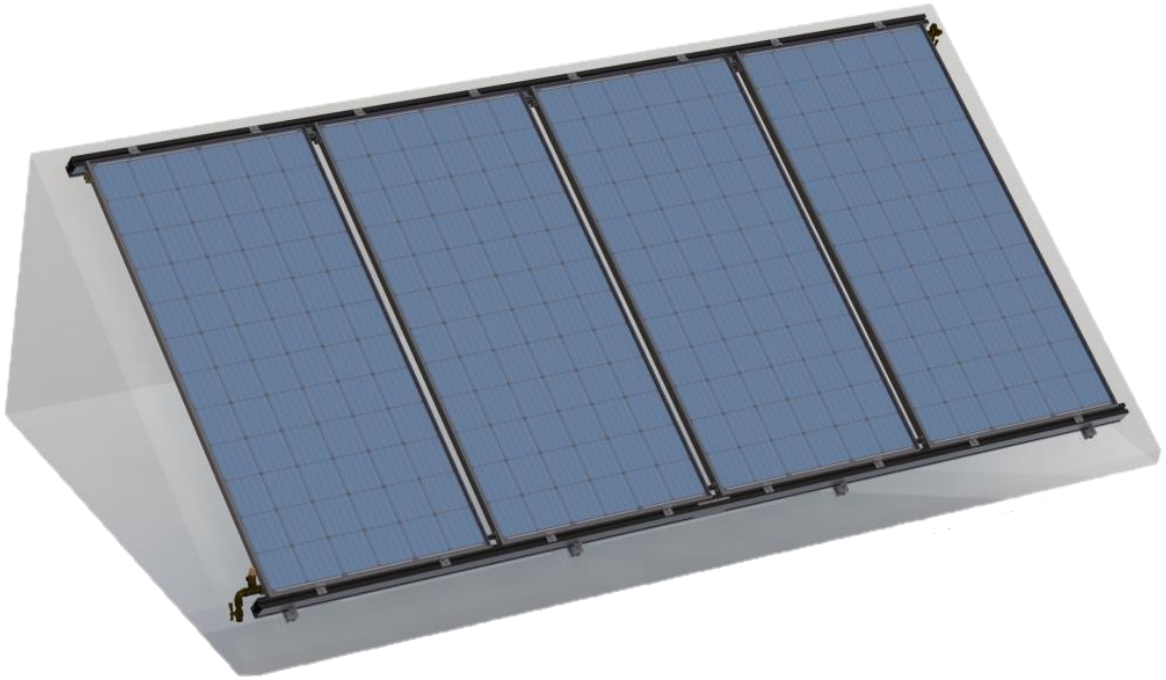
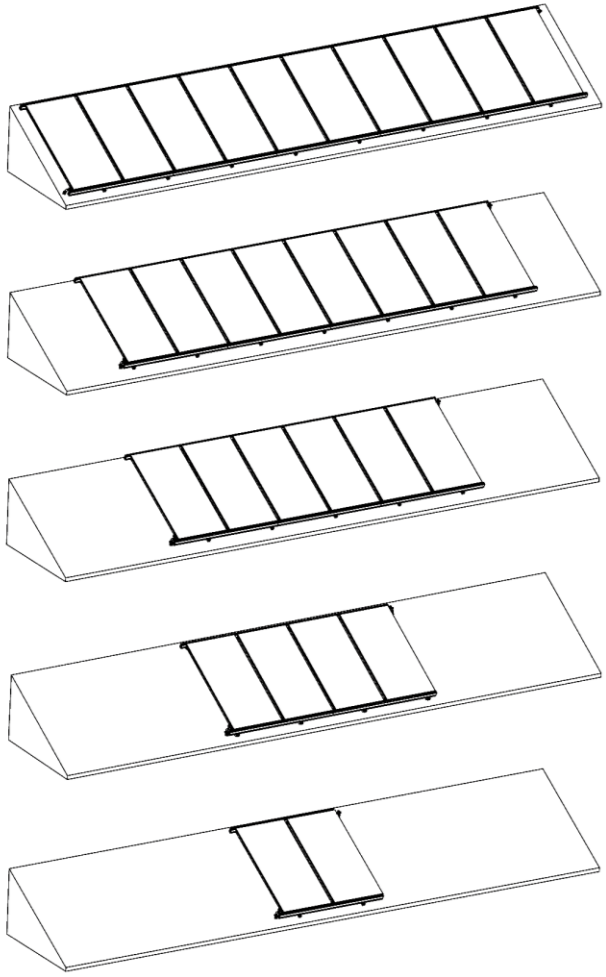


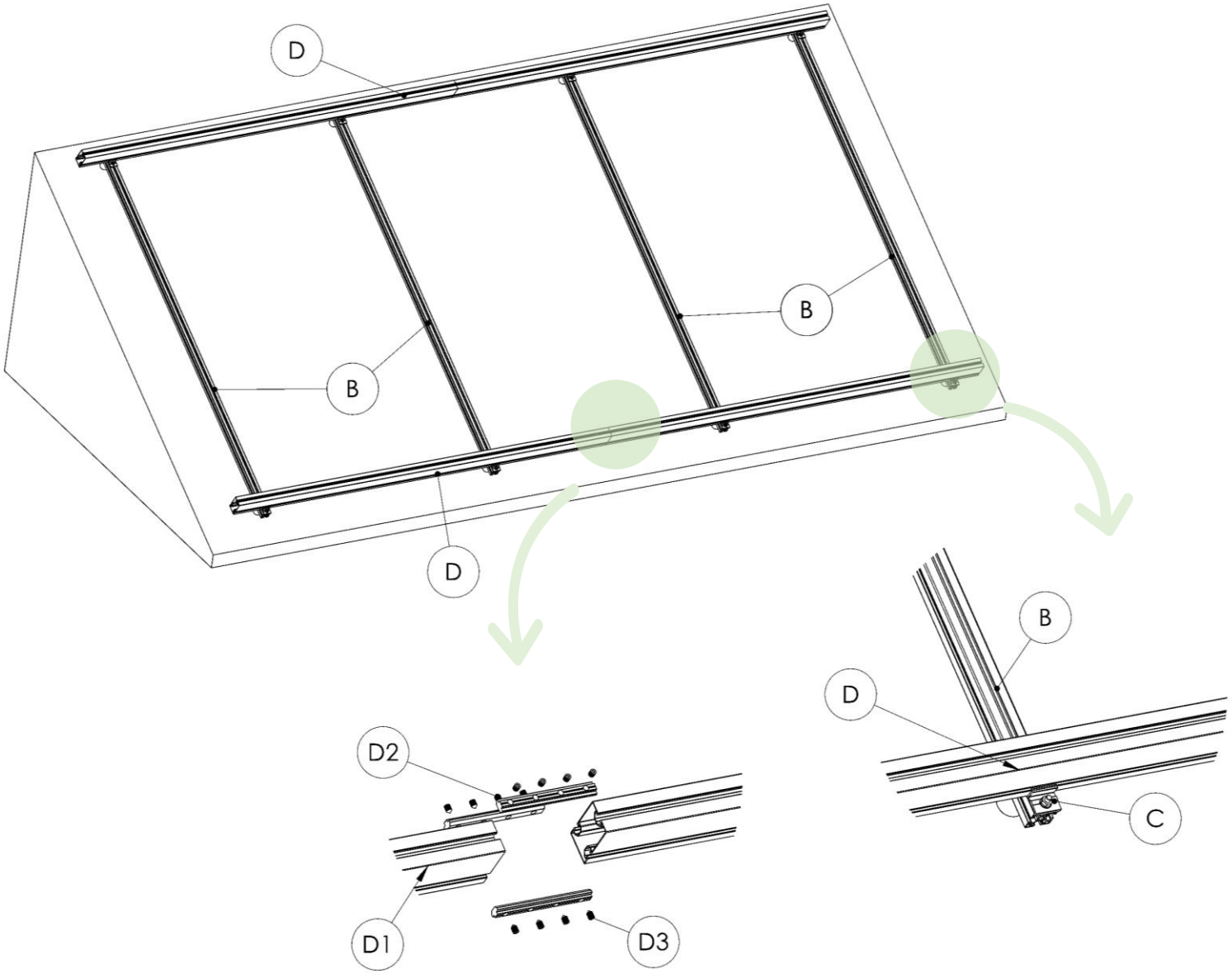


aH-BEC

ASSEMBLY MANUAL
Pitched-roof mounting
Rows from 1 to 10 panels

V 1.0
25/01/2023

abora
Advanced Solar Technology



B

Vertical Profile

Set C

Mounting clamps for horizontal rails to frames.
Including clamp, hammer head screw and flange nut

Set D

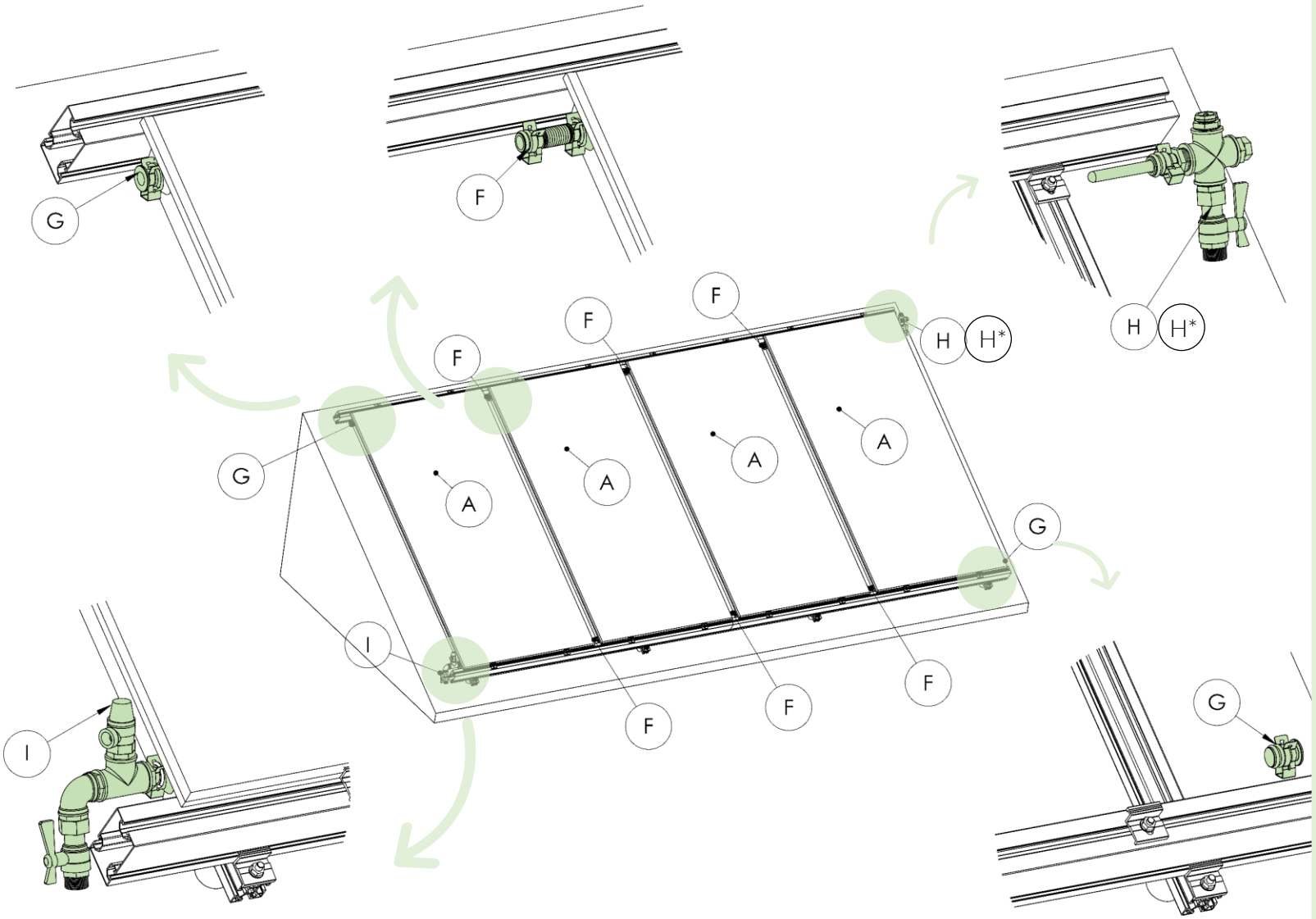
Horizontal ralis for panel anchorage

D1: Profile 50x85
D2: Connecting bar
D3: Allen screw M8

⚠

MÁXIMUM NUMBER OF PANELS ON A ROW: 10

Hydraulic connection elements



Set A

Hybrid solar panel aH72SK

Set F

Compensator

Set G

Cap

Set H

Row outlet set

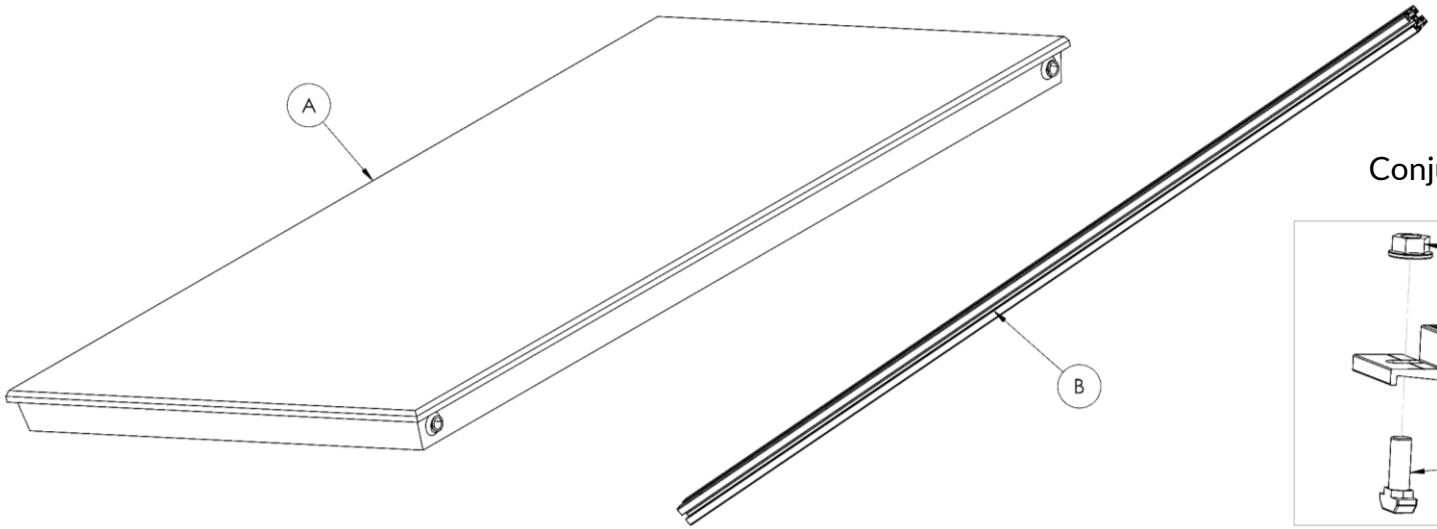
Set H*

Reference row outlet set
(see pg. 17)

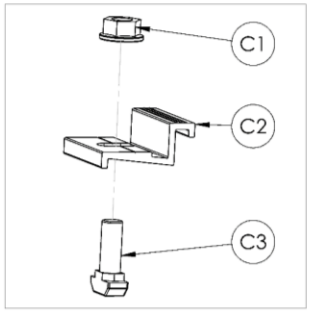
Conjunto I

Row inlet set

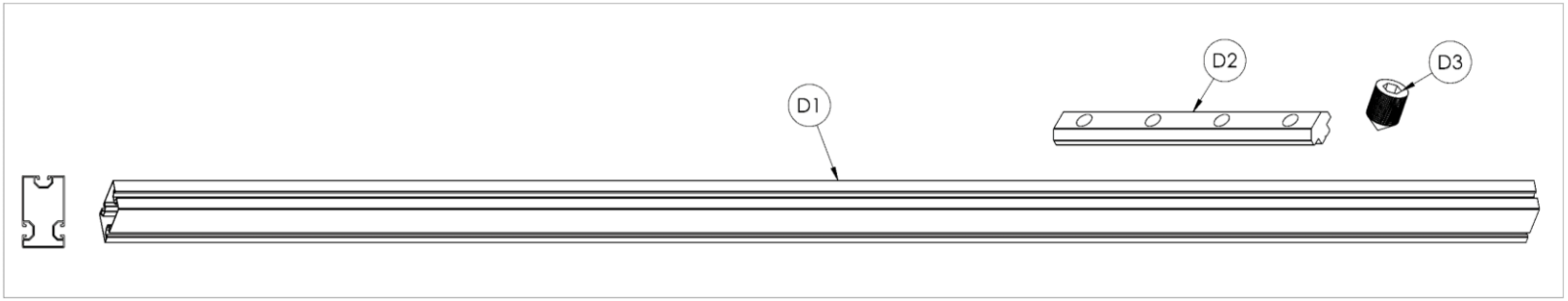
MÁXIMUM NUMBER OF PANELS ON A ROW: 10



Conjunto C



Conjunto D



A

Hybrid solar panel aH72SK

B

Inclined frame

Set C

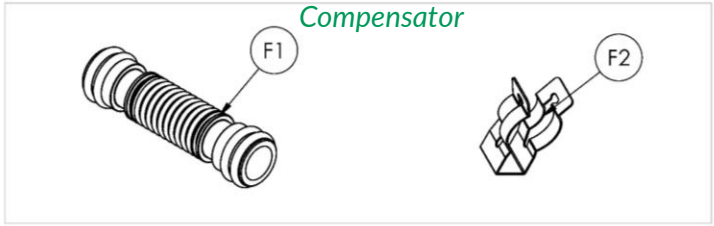
C1: Flange nut M8
C2: Clamp
C3: Hummer head screw M8

Set D

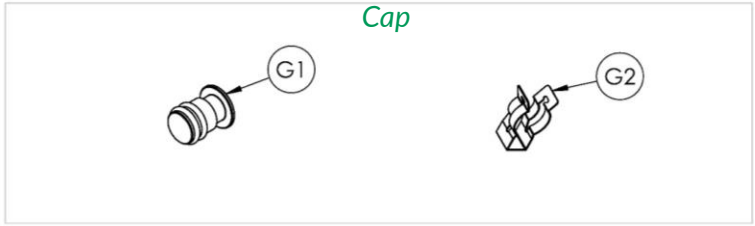
D1: Profile 50x85
D2: Connecting bar
D3: Allen screw M8

See Annex 2: *No. Of components supplied in the kit*

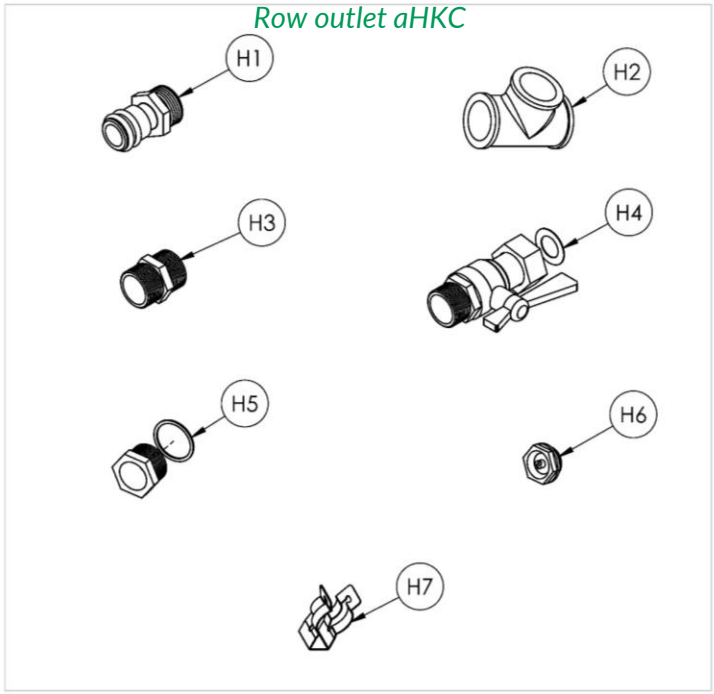
Set F
Compensator



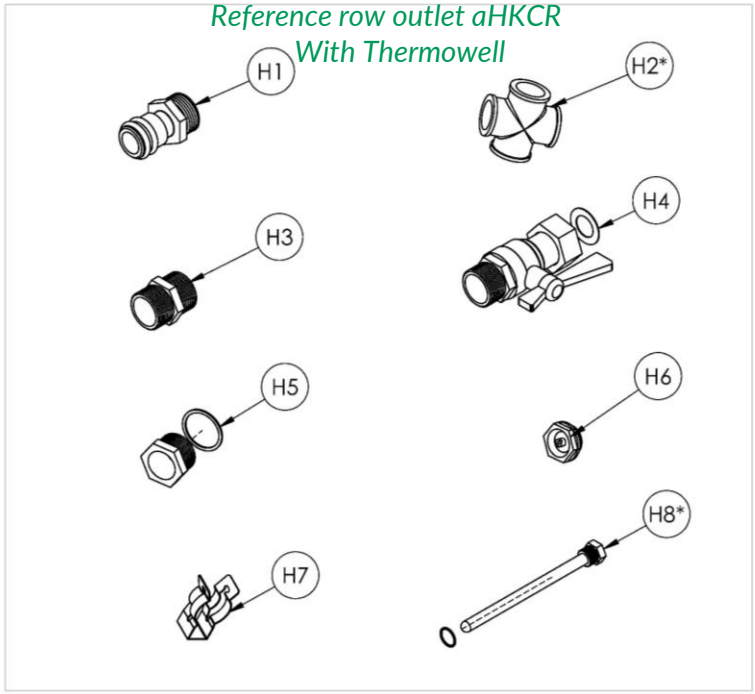
Set G
Cap



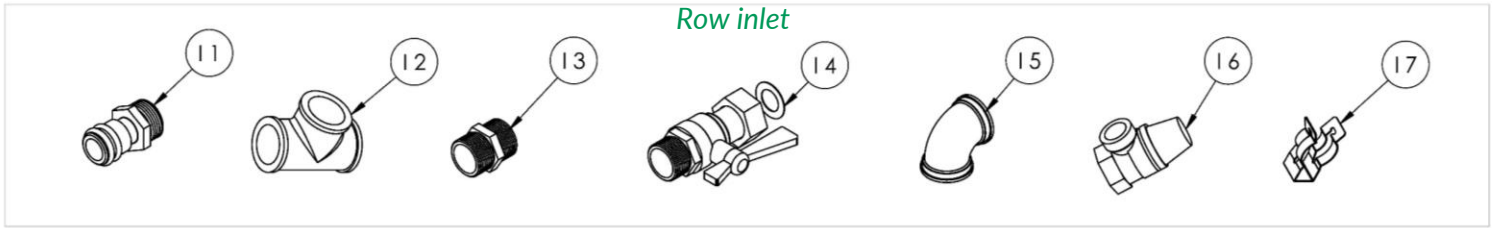
Set H
Row outlet aHKC



Set H*
Reference row outlet aHKCR
With Thermowell



Set I
Row inlet



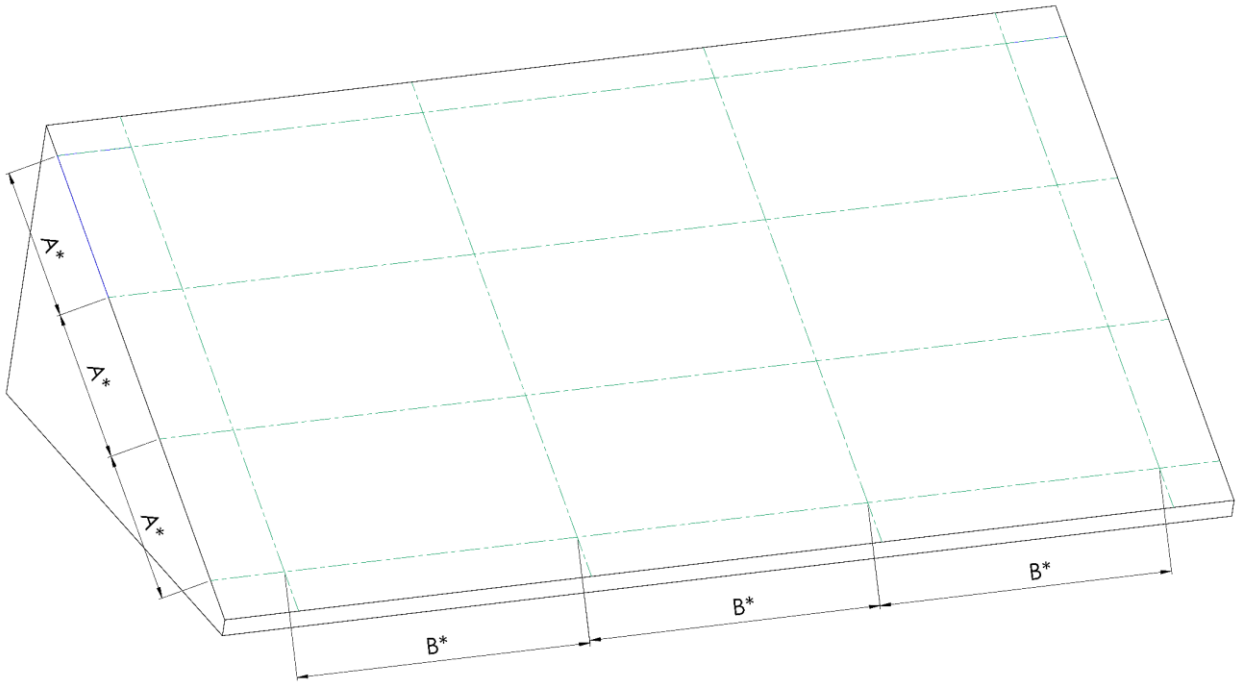
Set F *(Compensator)*
F1: Dilation compensator with O-ring seals
F2: Clamping clip

Set G *(Cap)*
G1: Cap with O-ring seals
G2: Clamping clip

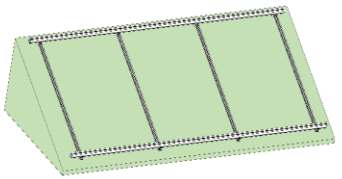
Set H *(Raw outlet set aHKC)*
Supplied in bag except for clamping clips, O-ring seals and flat gasket
H1: Quick junction fitting with O-ring seals
H2: T ¾"
H3: Plug ¾"
H4: Stopcock ¾" with flat gasket
H5: Reducer ½" a ¾"
H6: Bleeder ½"
H7: Clamping Clip

Set H*
(Reference row outlet aHKCR. With thermowell)
Supplied in bag except for camping clips, O-ring seals and flat gasket
H2*: Cross ¾"
H8*: Thermowell

Set I *(Raw outlet set aHKC)*
Supplied in bag except for camping clips, O-ring seals and flat gasket
I1: Quick junction fitting with O-ring seals
I2: T ¾"
I3: Plug ¾"
I4:Stopcock ¾" with flat gasket
I5: Elbow ¾" 90º
I6: Safety valve ¾"
I7: Clamping clip



Anchor base for panel structure

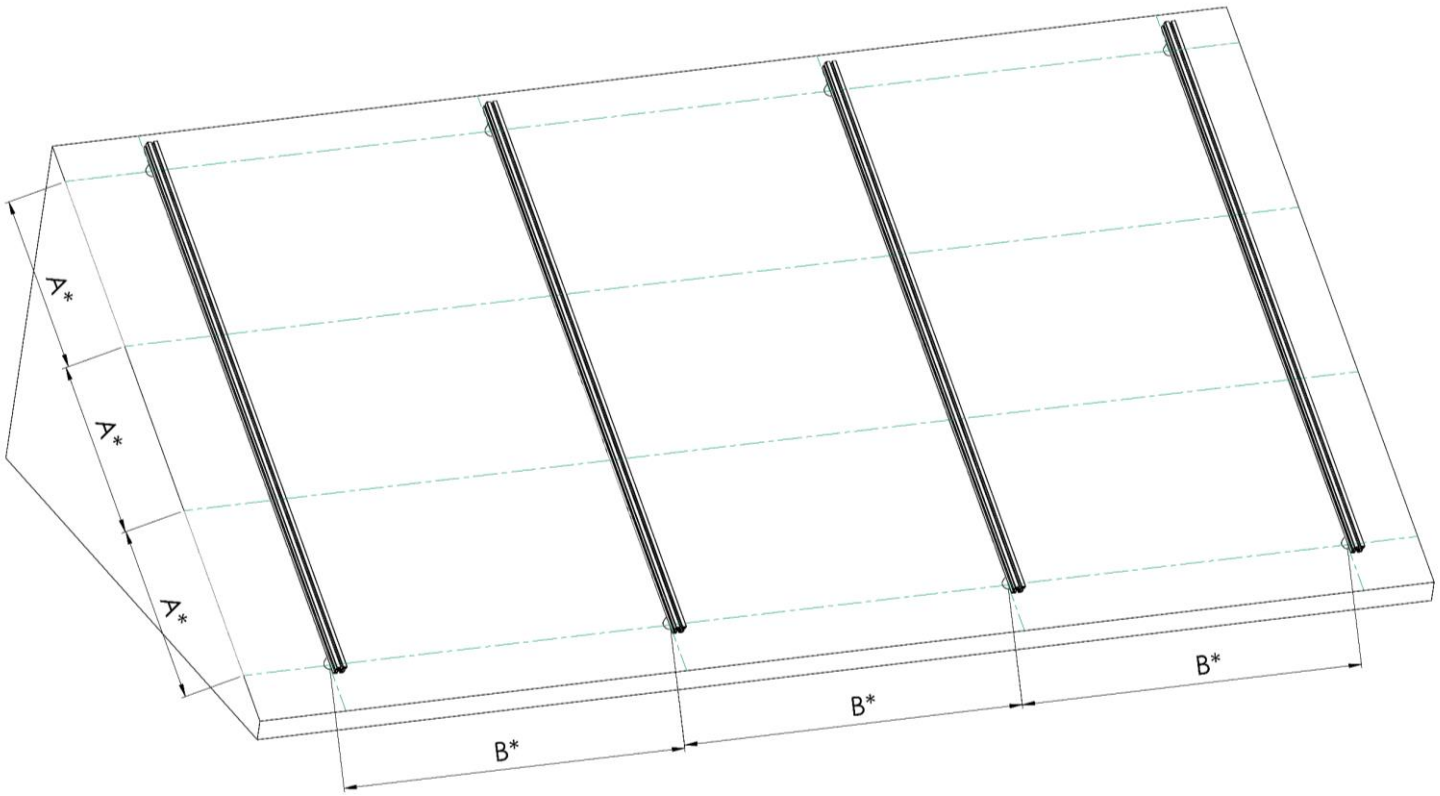


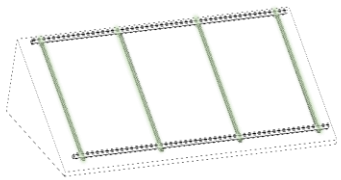
(A*) Distance between anchorages to deck.

The anchoring to the roof must be dimensioned by the installer/engineer according to the load to be supported by the panel structure, the bearing capacity of the building structure and the type of roof surface finish.

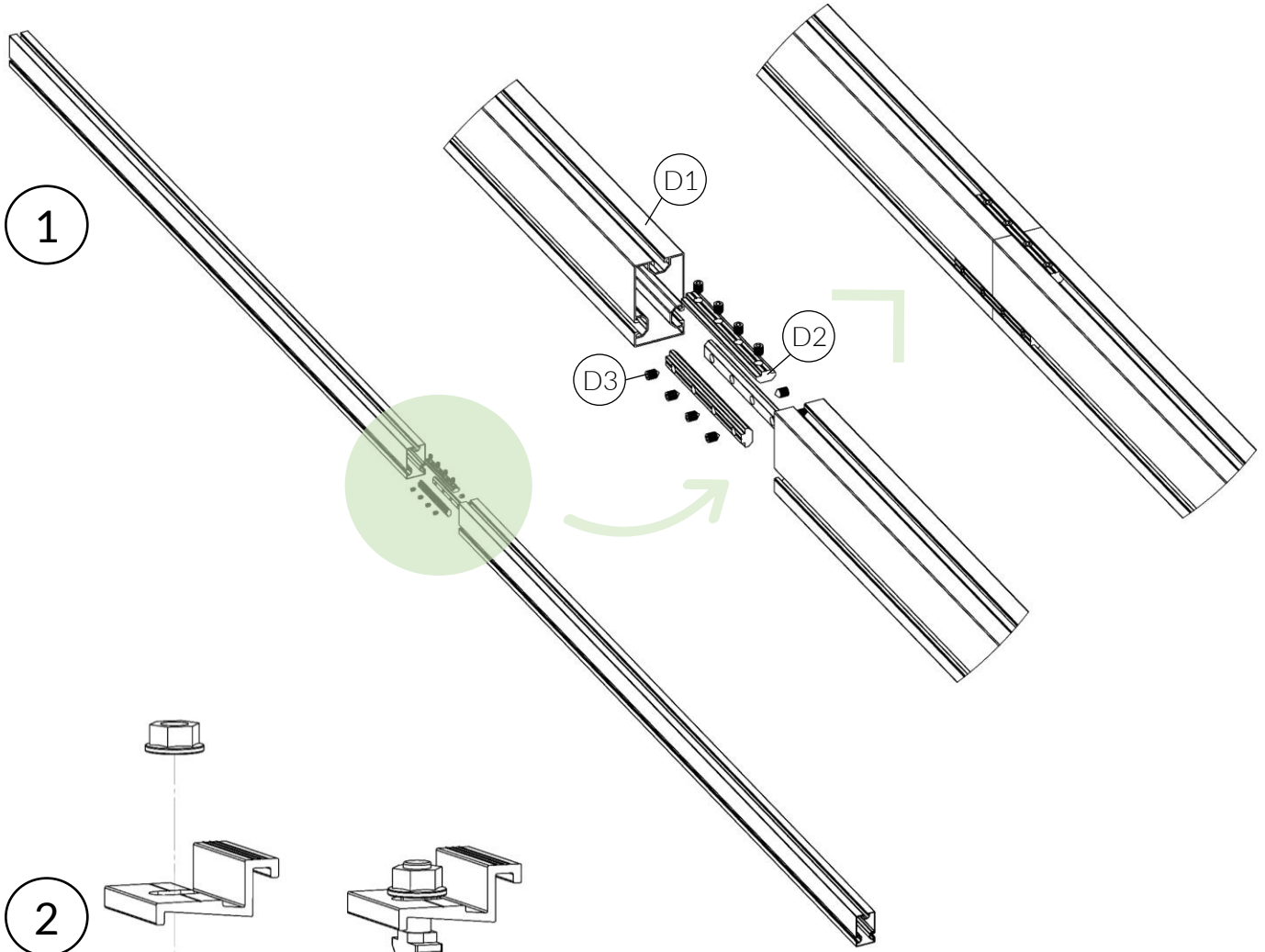
(B*) Distance between frames on a row.
This distance will depend on the number of frames on the row. In addition, this number will depend on the load to be supported by the panel structure and the load-bearing capacity of the building structure.

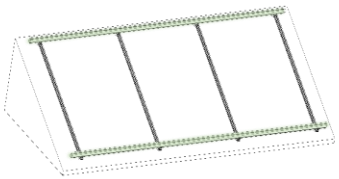
See Annex 1: *Distribution of frames on rows* ***(B*)***





The anchoring to the roof must be dimensioned by the installer/engineer according to the load to be supported by the panel structure, the bearing capacity of the building structure and the type of roof surface finish.





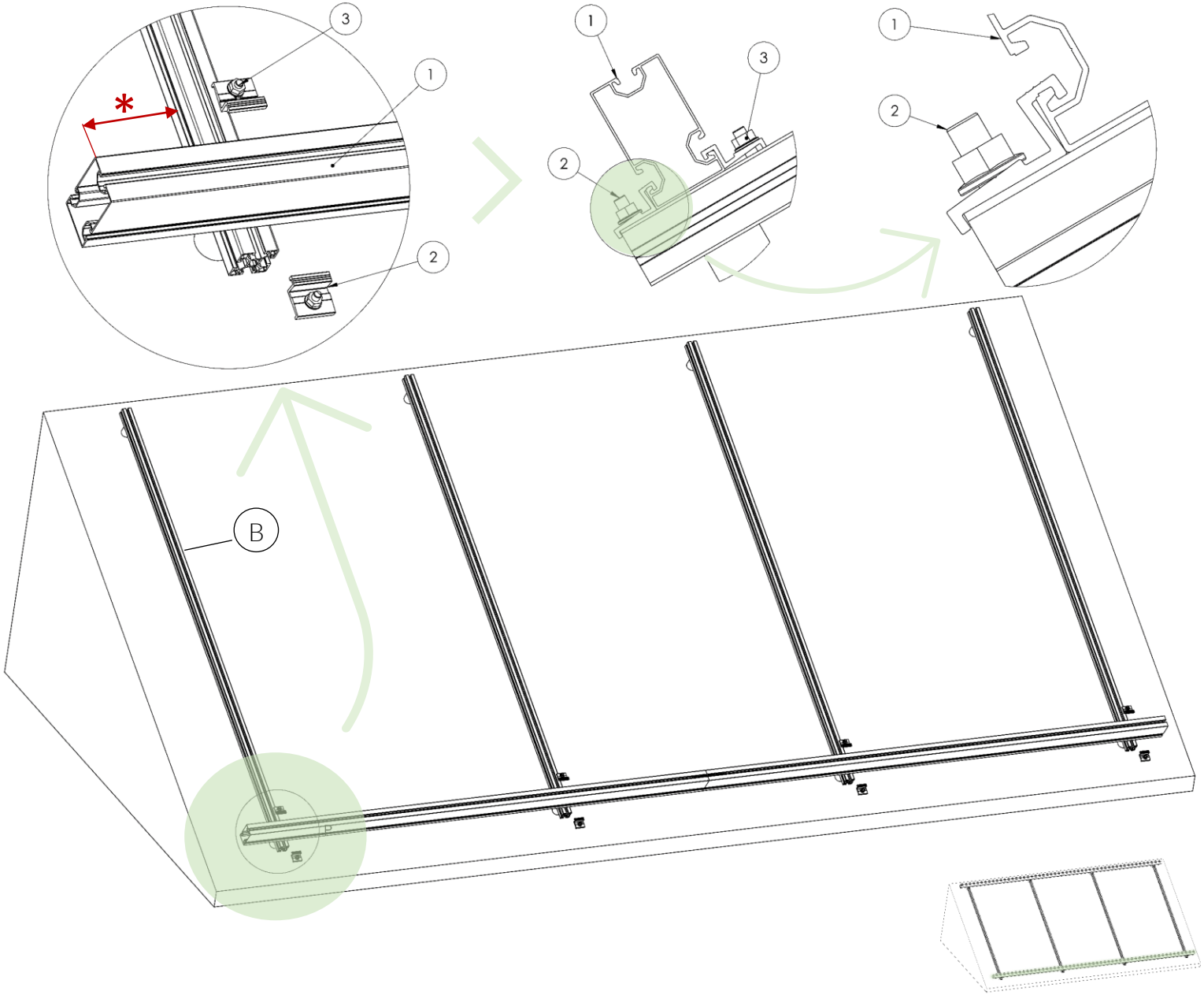
Step 1. Pre-assembly horizontal rails

Insert the three connecting strips (element **D2**) into the three rails of the horizontal guides (element **D1**) and then tighten the Allen screws (element **D3**). Repeat this step until the two horizontal rails, upper and lower, are complete.

Step 2. Pre-assembly mounting clamps

Pre-assemble the mounting clamps (Set **C**) without tightening the screw (item **C3**) so that it is easy to handle in the following steps.

04. Assembly lower panel rail



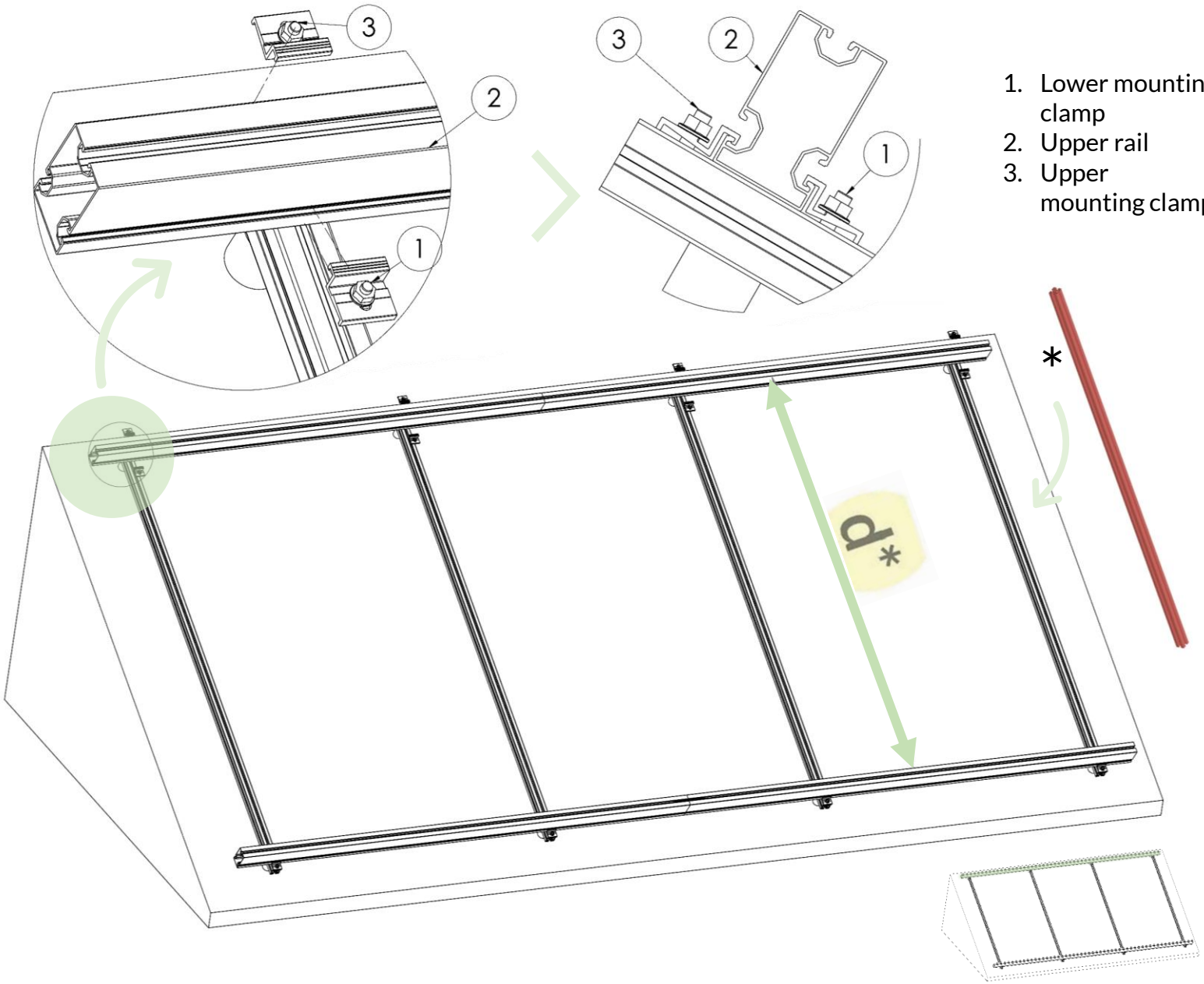
For the assembly of the lower horizontal guide, the lower mounting clamp (set **C**) must be anchored exactly on the edge of the 40x40 profile of the frame (element **B**), as shown in the pictures.

* **See Annex 1:**

Rail cantilever distance "V" in frame distribution plans according to the number of panels per row.

Legend

1. Lower rail
2. Upper rail
3. Upper mounting clamp



1. Lower mounting clamp
2. Upper rail
3. Upper mounting clamp

Place the upper horizontal rail at the distance d* from the lower guide and fit the mounting clamps (Set **C**).

DISTANCIE BETWEEN RAILS

Lenght panel=1970 mm

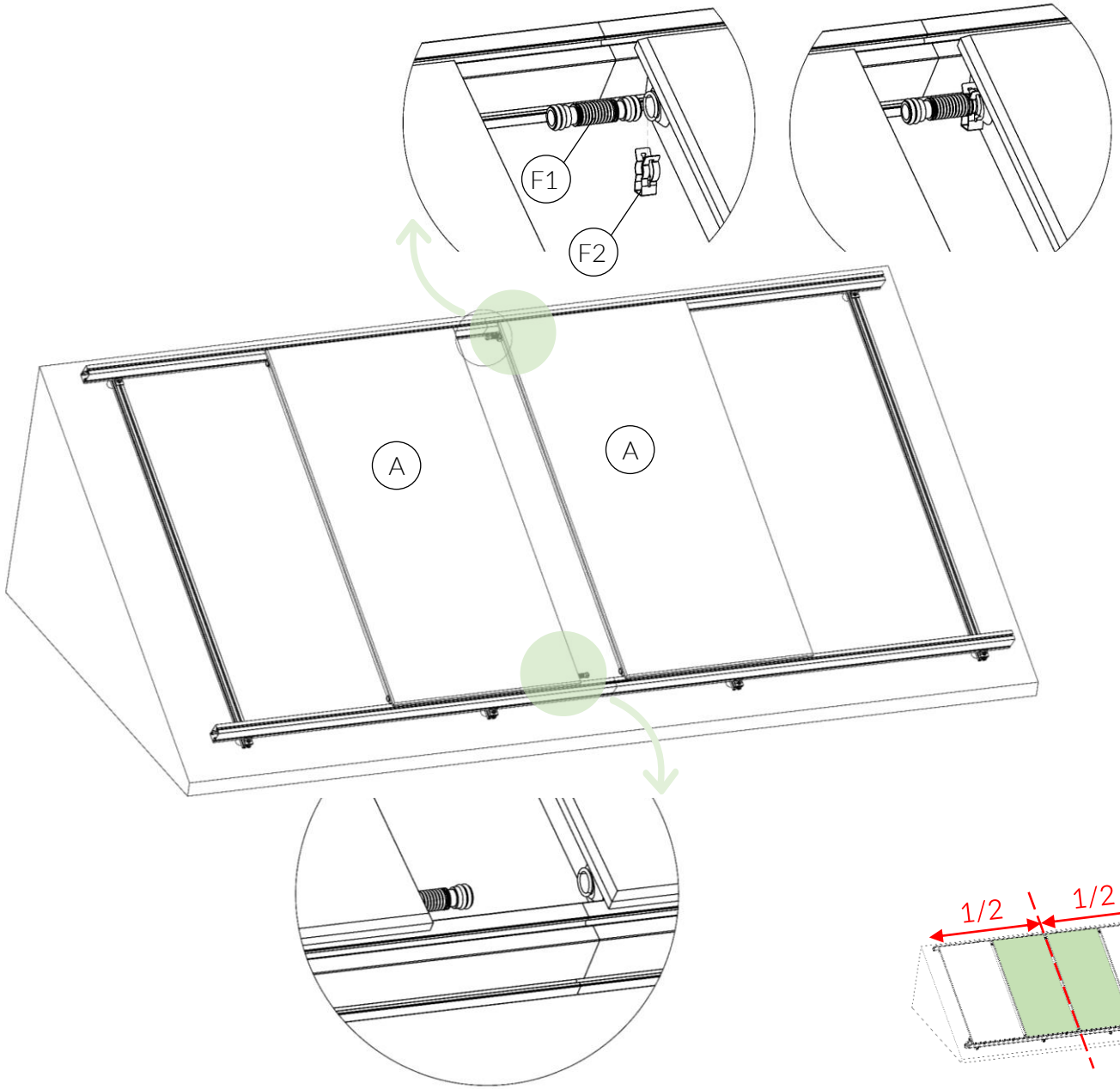
d*=1.942 mm ± 4

Lenght panel =1988 mm

d*=1.960 mm ± 4

Lenght of the panel on the identification label on its side

* For orders of more than 50 panels, **a black 40x40 profile with the exact dimension** between rails will be included.



Step 1. Panel placement

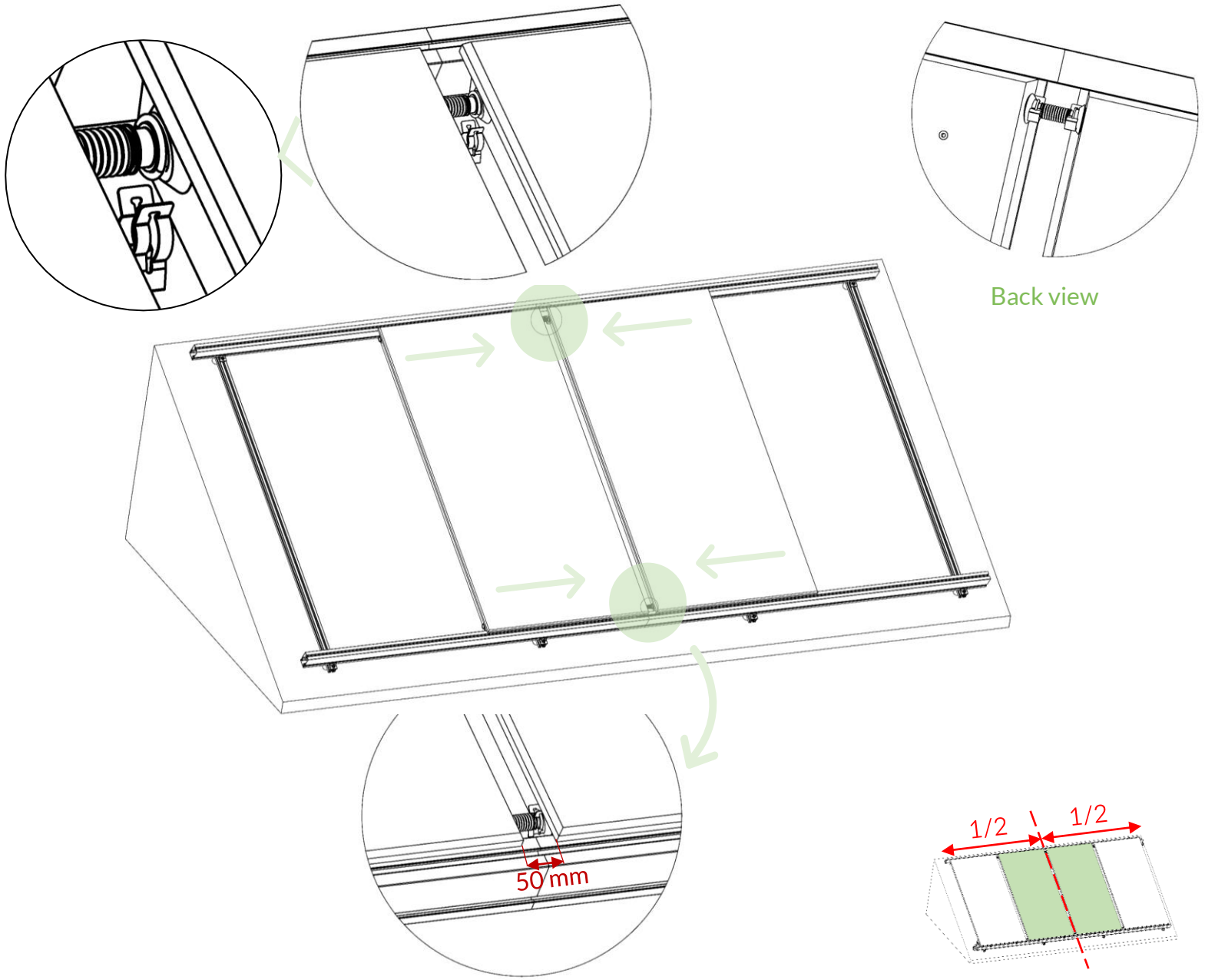
Position 2 panels (element **A**) at the mid-point of the row.

Step 2. Connection of compensators

Connect [1] one compensator (element **F1**) to one of the panels (element **A**) and the second compensator to the other. Attach the corresponding clamping clips as shown in the pictures

[1] It is recommended to use petroleum jelly or lubricant to facilitate the connection between the compensator and the panel piping. The product used must be specific and compatible with the heat transfer fluid and component materials.

It is necessary to fix the compensators with the clamping clip "F2" to prevent them from sliding inside the panel



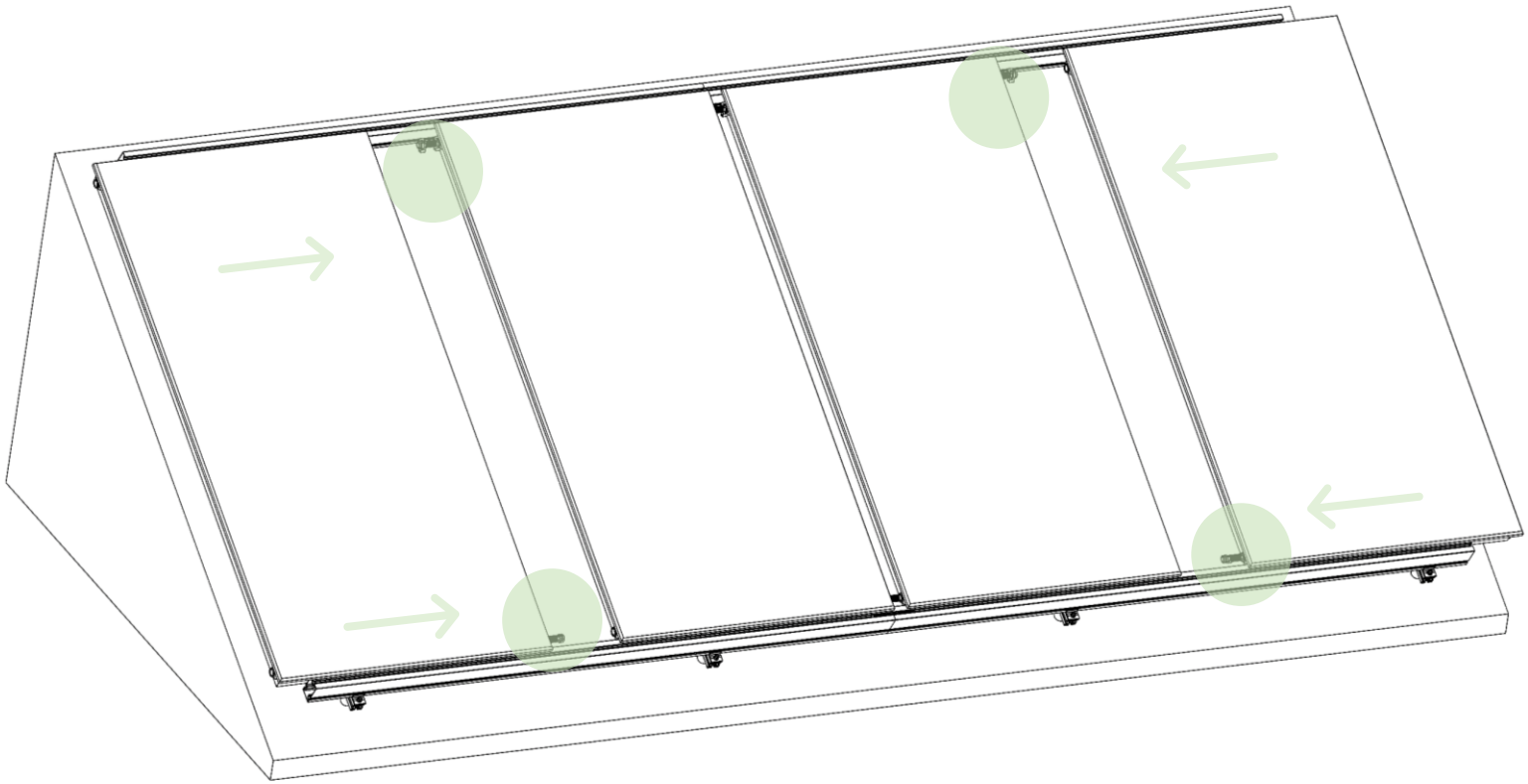
Step 3. Panels connection

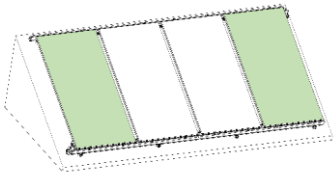
Between two people and alternating the push at the top and at the bottom at the height of the compensators, proceed to connect the two panels. As shown in the picture..

The compensator shall be guided into the free pipes of panels before this step.

After insertion, the corresponding clamping clips shall be attached.

The compensators will be correctly inserted into the panel pipes if the O-rings seals are inserted and the clamping clips can be correctly positioned using the groove in the compensator for this purpose

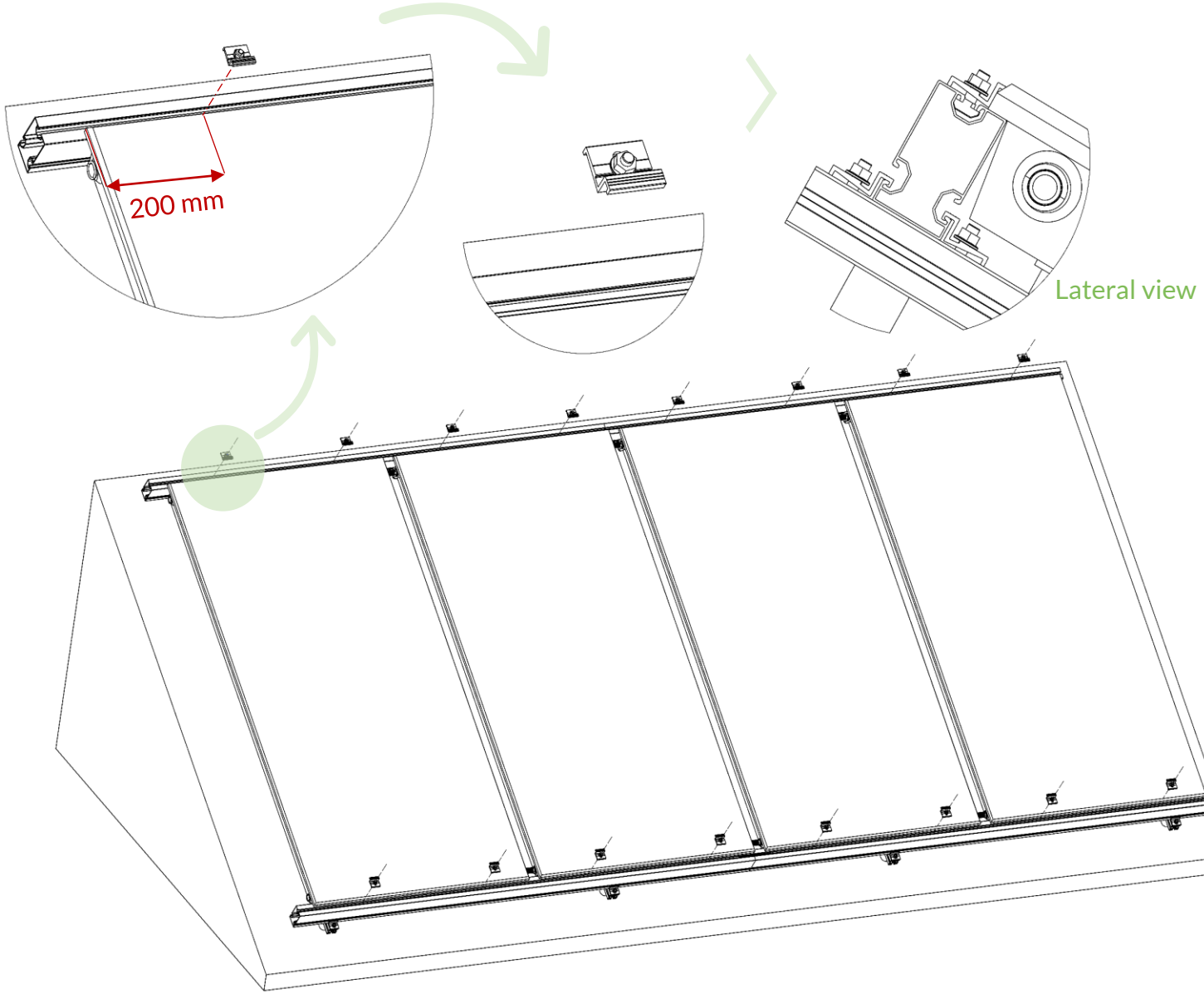




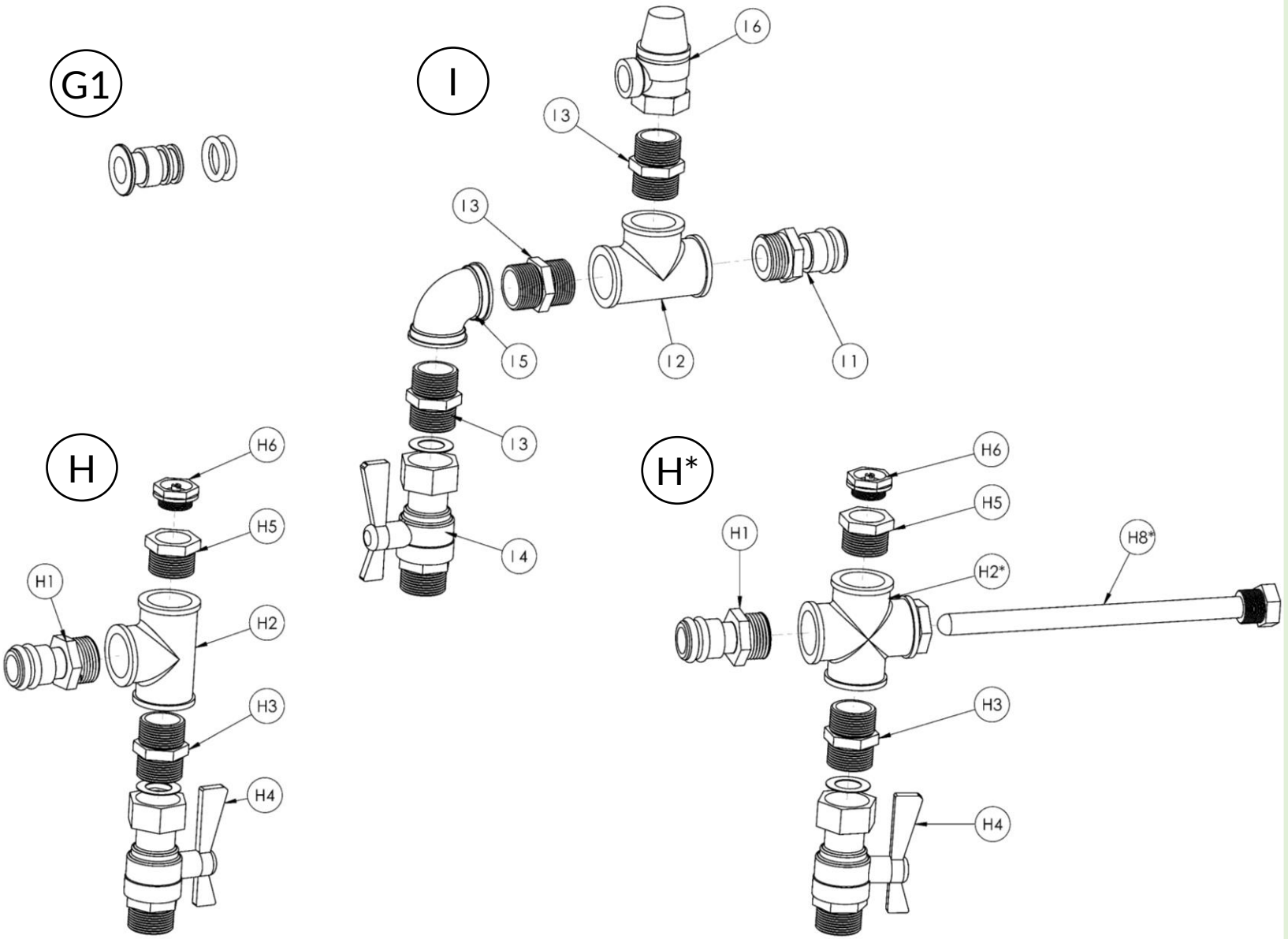
Repeat the above steps to connect, one by one, the rest of the panels of the row.

It is necessary to fix the compensators with the clamping clip "F2" to prevent them from sliding inside the panel

The compensators will be correctly inserted into the panel pipes if the O-rings seals are inserted and the clamping clips can be correctly positioned using the groove in the compensator for this purpose



Once the panels have been positioned, anchor them to the horizontal rails with four mounting clamps (Set **C**) on each panel.



Step 1. Fitting O-ring seals

Fitting O-ring seals, two per piece in:

- Cap (**G1**)
- Quick plug (**H1**)

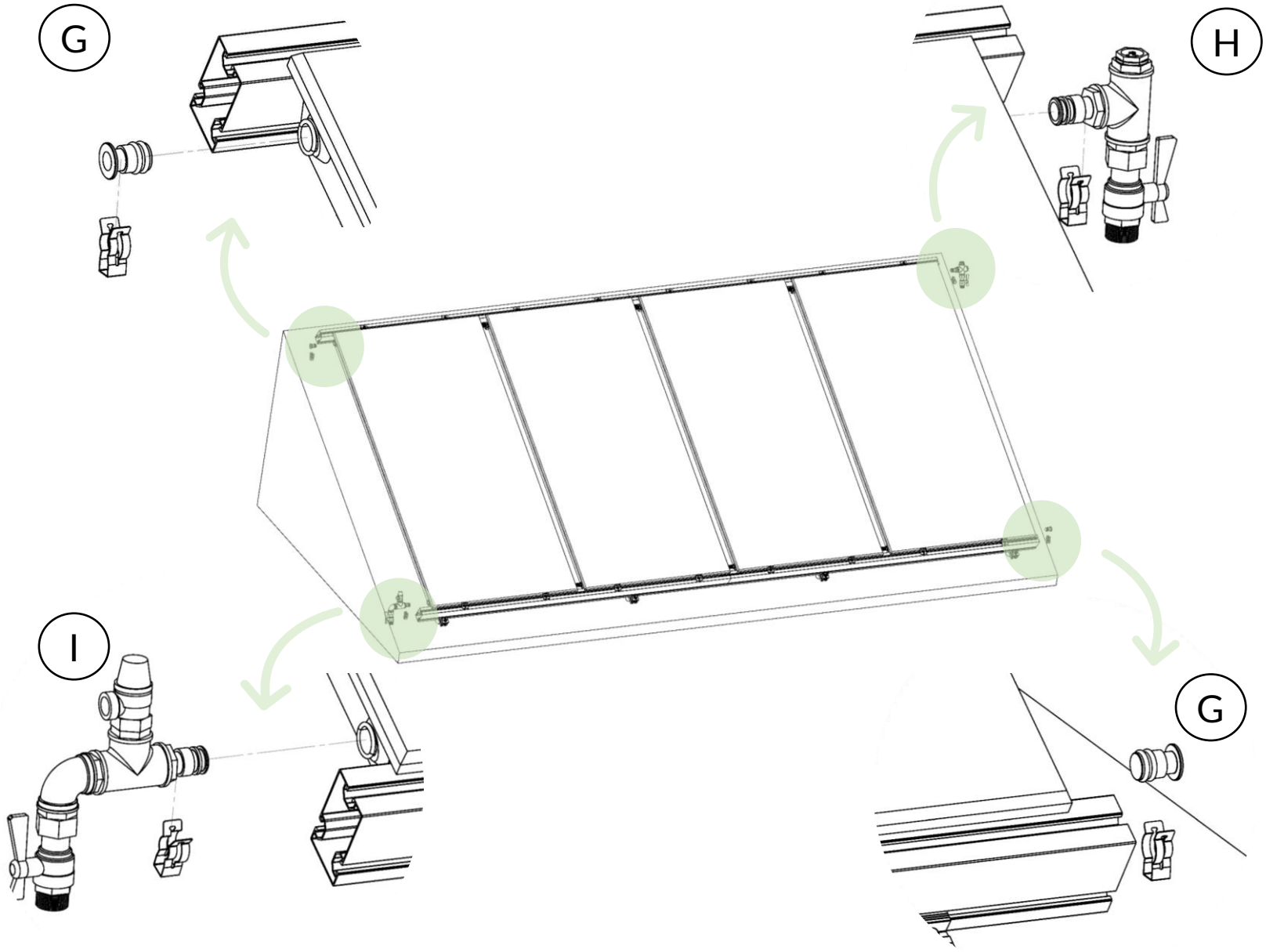
Paso 2. Pre-assembly sets

Pre-assembly row inlet set (Set **I**) and outlet set (Sets **H and H***)

In one of the rows, the reference row outlet set aHKCR must be placed to house the temperature sensor (**H***).

THERMAL COMPOUND paste is provided to be applied on the thermowells when the sensor is inserted.

The screwed joints between parts shall be sealed with hemp cord or similar to prevent leakage of the heat transfer fluid. The material used must be compatible with the heat transfer fluid



Connect the inlet assembly (Set **I**) to the inlet of the row.

Connect the outlet assembly (Set **H**) to the outlet of the row.

Connect the reference outlet assembly (Set **H***) to the outlet of the reference row.

Fit the caps (set **G**) on the two free pipes of the row.

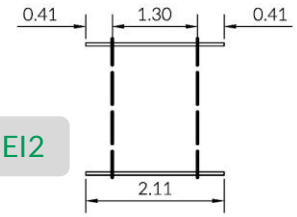
Finally, fit the clamping clips on each of the assemblies.

The hydraulic assemblies will be correctly inserted into the panel pipes if the O-rings seals are inserted and the clips can be correctly positioned using the groove in the quick-connecting pieces for this purpose.

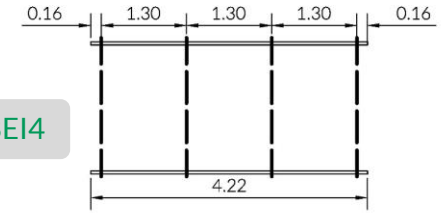
According to the number of panels on row

Pair row

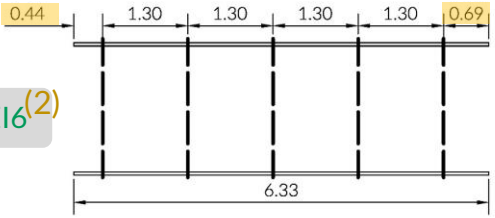
BEI2



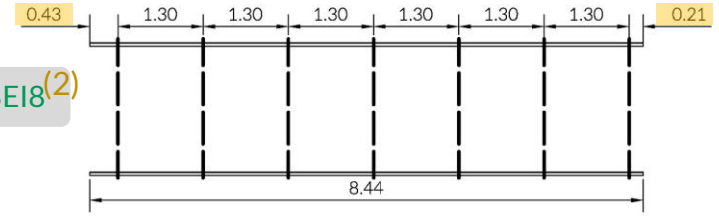
BEI4



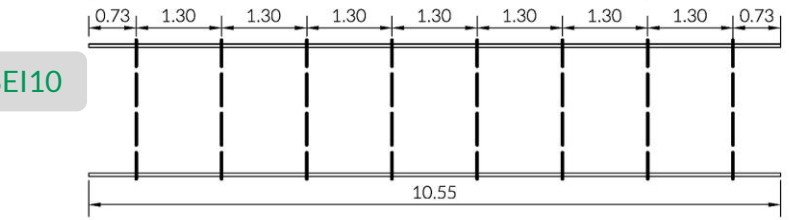
BEI6(2)



BEI8(2)

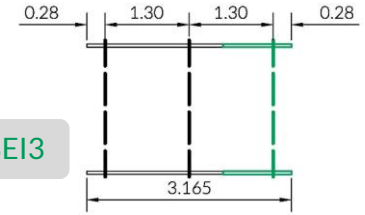


BEI10

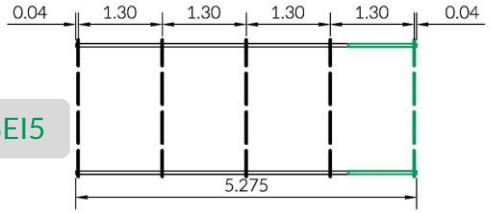


Impar row=Pair row+aH-BEI_KI

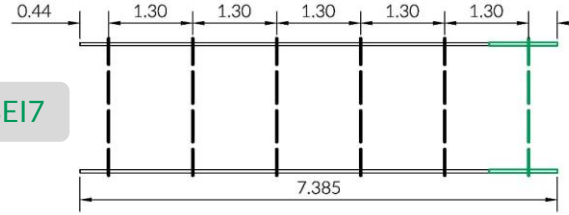
BEI3



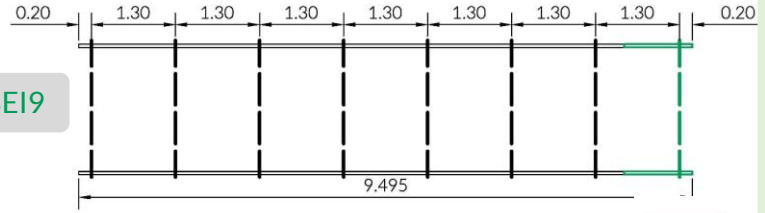
BEI5



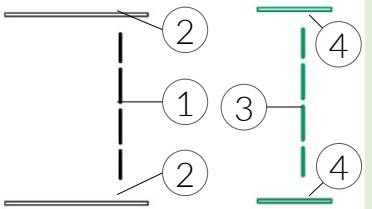
BEI7



BEI9



1. Frame “B”
2. Horizontal rail “D”
3. Frame. Impar kit
4. Horizontal rail D´ 1.055 mm impar kit



1,30 m between frames(1)

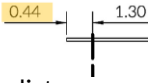
The number of frames in each row, depending on the distance between them, is as follows:

No Panels	No frames 1,3 m
1	-
2	2
4	4
6	5
8	7
10	8

* The structures have been calculated for 1.3 m distances between frames. However, at the customer's demand, in order to reduce the reactions in the anchorages, it can be reduced according to the customer's needs, supplying extra frames on demand (aH-BEI_PI+).

(2) Diagrams seen from the front of row

(2) Distance “V” = Horizontral *Rail* (D) *cantilever distance*



the cantilever distance on these rows are asymmetrical so that the junction box does not coincide with frame, symplifying testing and maintenance work.

ELEMENT/ SET	DESCRIPTION	UNITS							
		aH-BEI1	aH-BEI2	aH-BEI4	aH-BEI6	aH-BEI8	aH-BEI10	aH-BEI_KI Impar Kit	aH-BEI_PI+ Extra frame
A	Hybrid solar panel	1	2	4	6	8	10	+1	-
B	Inclined frame[1]	2	2	4	5	7	8	+1	1
C set	C1. Flange nut M8[2]	12	16	32	44	60	72	+8	4
	C2. Clamp[2]	12	16	32	44	60	72	+8	4
	C3. Hummer head screw M8[2]	12	16	32	44	60	72	+8	4
D set	D1. Connecting strip	0	0	6	12	18	24	+6	-
	D2. Allen screw M8 x 12	0	0	24	48	72	96	+24	-
	D3_2110. Profile 50 x 85 x 2110	0	2	2	6	8	10	-	-
	D3_1055. Profile 50 x 85 x 1055	2	0	0	0	0	0	+2	-

- ✓ If the loads to be supported by the frames are high, due to the conditions of the location of the installation, or the roof structure may be compromised by the transmission of point loads in each of the supports, in order to reduce the point reactions and distribute the load more uniformly over the area, the customer can, upon order, supply the **extra frames (aH-BEI_PI+)** that may be necessary. In this case, the distance between frames of the row will depend on the number of frames and will be shortened with respect to the indications in this manual (**See Annex 1 Distribution of frames on row**).

- ✓ The **impar aH-BEI** row are made up of a PAIR aH-BEI row together with an **aH-BEI_KI (Impar Kit)**. For example, to make a 7-panels row, a 6-panels row and an impar kit will be required: aH-BEI7=aH-BEI6+aH-BEI_KI

[1] For rows with 1.30 m distance between frames
[2] 1 extra unit is included in each kit

Elements independent of the number of panels on each row

SETS	DESCRIPTION	UNITS
G *(Cap)*	G1. Cap with 2 O-ring seals	2
	G2. Clamping clip	2
H *(Outlet row set aHKC)*	H1. Quick juction fitting with 2 O-ring seals	1
	H2. T ¾"	1
	H3. Plug ¾" with 2 O-ring seals	1
	H4. Stopcock ¾" with flat gasket	1
	H5. Reducer ½" to ¾"	1
	H6. Purger	1
	H7. Clamping clip	1
H* *(Reference outlet row set aHKCR With thermowell)*	H1. Plug ¾" with 2 O-ring seals	1
	H2*. Cross ¾"	1
	H3. Machón ¾"con 2 juntas O-ring	1
	H4. Stopcock ¾" with flat gasket	1
	H5. Reducer ½" to ¾"	1
	H6. Purger	1
	H7. Clamping clip	1
	H8*. Thermowell	1
I *(Inlet row set)*	I1. Plug ¾" with 2 O-ring seals	1
	I2. T ¾"	1
	I3. Plug ¾"	3
	I4. Stopcock ¾" with flat gasket	1
	I5. Elbow 90° ¾"	1
	I6. Safety valve ¾"	1
	I7. Clamping clip	1

Fitting elements for each row with any number of panels.

✓ For each installation, an aHKCR set (H*) is supplied, or those necessary for the configuration of the installation itself, upon customer order.
This set is the one that houses the temperature sensor(1). Depending on the sensors needed for the correct control of the installation, the necessary output assemblies with thermowells will be installed.

(1) not included in the kit

Thermal compound is provided to be applied inside the thermowell when introducing the sensor.

Compensators according to the no. of panels in each row

SET	DESCRIPTION	UNITS					
		aH-BEI2	aH-BEI4	aH-BEI6	aH-BEI8	aH-BEI10	aH-BEI_KI
F *(Compensator)*	F1. Dilation compensator	2	6	10	14	18	+2
	F2. Clamping clip	4	12	20	28	36	+4

The installation instructions and product specifications provided and all documents supplied with the hybrid panels must be observed. Failure to do so may void all warranty and product liability claims. For more information on the duration and conditions of the warranty, please consult the warranty policy in the private area of our website.

Abora Energy SL reserves the right to modify the document, in its continuous improvement work, without prior notice. Some details or elements of the product may deviate from what is described in this manual.

It is not advisable to add or omit components as this may impair the safety or performance of the product.

Before installation, the installer of the hybrid system must ensure that the installation is carried out by qualified personnel. National and local building regulations, occupational safety and accident prevention regulations, as well as environmental rules and regulations shall also be followed. The usual precautions for transport, installation and use of both the structure and the panel included in the "Panel Manual", available on our website, shall be taken into account.

Roof:

The particular properties of each roof must be taken into account, which requires professional advice. The installer of the hybrid system must ensure that the available roof covering and substructure are designed to withstand any additional loads that may occur. The condition of the roof structure should be rigorously checked. To do this, contact a structural specialist to analyse the particular characteristics of the building or site on which the panels are to be installed. The maximum calculated loads of the panel structures provided by Abora are included in the design document as a function of the spacing between frames. The reactions in the supports that will be transmitted to the building will depend on the loads considered for each location and must be studied in each case. If it is desired to reduce these reactions in order to adapt them to the resistance of the roof (or for any other reason), it is possible to choose to place extra frames in addition to those described in the general structures at the client's request.

The distance between the solar panels and the ridge or gutter must be at least 30 cm. The distance between the solar panels and the side of the roof must also be at least 30 cm.

The roof must be clean and dry when proceeding with the installation, irregularities must be corrected.

If the roof of the building has to be modified, the country-specific regulations and standards must be observed.

Electric system:

Protective equipotential bonding is a measure that applies to parts of the electrical installation which, under fault conditions, may have a potential different from earth, raising the risk of electric shock.

Bonding must be carried out in accordance with local regulations. For grounding and bonding requirements, refer to regional and national electrical and safety regulations. Grounding is achieved by attaching the panel housing to the structure and grounding the structure in accordance with these regulations. For proper connection of the earth wire, it is recommended to use a ring, eye terminal or round cable lug that is secured with a metric 6 bolt through the ring by screwing it into either of the two rivets provided on the panel. As indicated in the "Panel Manual".

The requirements for lightning and surge protection of PV mounting systems shall be established in accordance with the applicable regulations. In addition, the specifications of the competent power supply company must be observed.

Standards, rules and regulations:

When installing the mounting system we recommend paying special attention to the following standards, rules and regulations:

- Structural Eurocodes (from 0 to 9) and the Technical Building Code (CTE-DB-SE) or the reference standard in each country.
- DIN 1055 Load bearing design of buildings.
- DIN 18299 General standard for all building sectors.
- Any other standard applicable in the country or region in which the installation is carried out.

Abora is not liable for defects arising from:

- Improper assembly due to failure to follow manuals.
- Incorrectly dimensioned floor or deck anchors with excessive or insufficient tightening torques.
- Modifications of the installation not recommended by Abora.
- Assembly of elements not supplied by Abora.
- Improper handling of goods.
- Inadequate maintenance.

Abora reserves the right to make changes to the product at any time, without prior notice, if necessary for quality improvement. Illustrations in technical documentation, catalogues and other documents may be examples only, so the image may differ from the product..

Disposal and dismantling :

Dispose of the product in accordance with local laws and regulations.