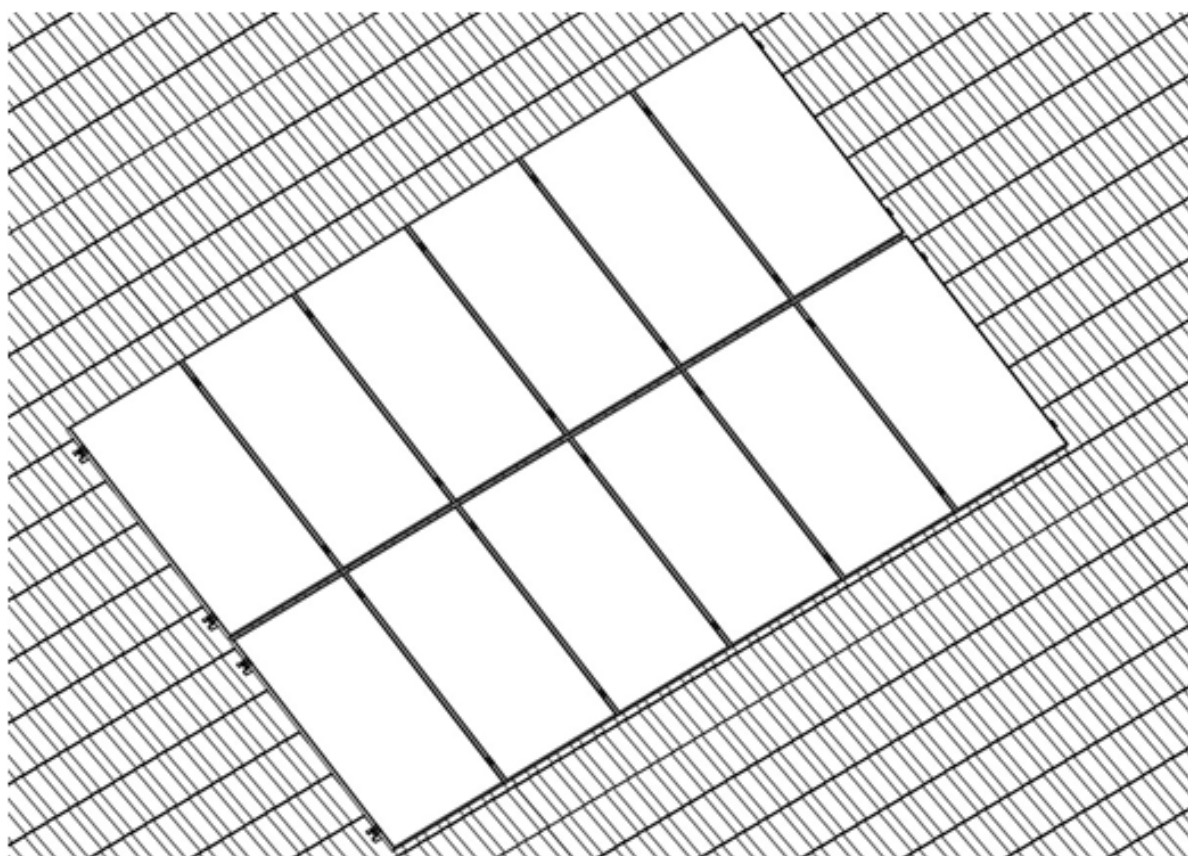


INSTALLATION MANUAL

BRIDGE ON A SHEET TILE K-56

MOUNTING SYSTEMS



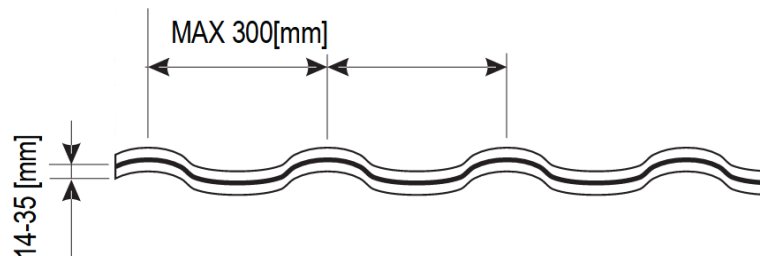
The mounting system above the roof, described below is used to mount photovoltaic modules on a pitched roof.

During production, every effort was made to provide you with a product of the highest quality which is also easy to mount. This instruction is a set of rules for the correct mounting of the mounting structure components but is not a blueprint or a substitute for it. The installer performing the mounting must be properly trained and licensed for the job. Overall responsibility for proper mounting rests with the installer who should select the appropriate type of construction.

In situations where the strength of the roof structure is questionable, a structural engineer should be consulted to perform strength calculations for the roof.

1. Technical data of the construction:

- The mounting system is compatible with pitched roof sheet tiles - minimum thickness of steel sheet 0,4[mm], aluminium sheet 0,5[mm],



- Minimum pitch of the roof 10 degrees,
- Maximum pitch of the roof 45 degrees,
- Maximum size of photovoltaic module 2275 [mm] x 1140 [mm],
- Additional weight per roof surface 12,5 [kg/m²]
- System wind uplift resistance 1060 [Pa]
- Maximum area of one row mounted horizontally 23,5 [m²]
- Maximum area of one row mounted vertically 47,6 [m²]

2. The layout of the modules shall be arranged to minimize or preclude the appearance of shadows on the modules. Keep in mind that even the shadow cast by trees or buildings can limit the yields generated by modules. When mounting the system in the summer, be aware that the shadow cast by trees and neighboring buildings will reach much further in winter.

Also, remember to keep the safe zone on the roof sheathing (fig. 1).

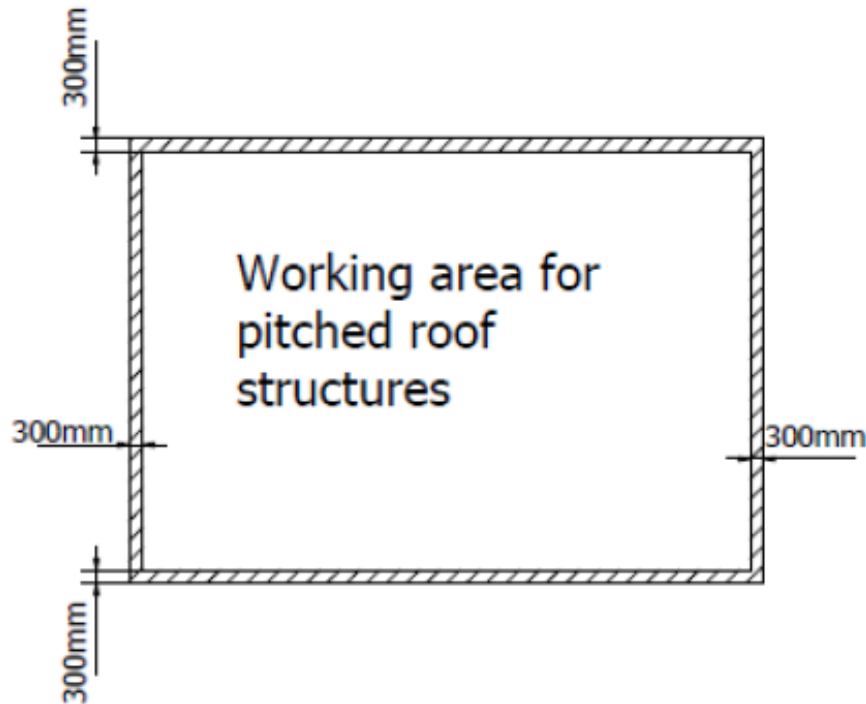


Fig. 1. Free zone for structures on the roof

3. List of parts (example quantities for two modules)

#	Component name	Component Part Number	Quantity	Comments
1	Bridge on a shite tile	K-56	6	
2	Sheet metal screw	K-20	24	
3	Mid Clamp	K-05	2	
4	End Clamp	K-06	4	
5	Allen bolt	K-18	6	
6	Feather	K-04	6	

4. The dimension of one row of modules can be calculated depending on the module assembly method with the following formula:

ATTENTION: Maximum row length - 21 [m].

- a. Formula for a row mounted on the short side:

LENGTH = NUMBER OF MODULES PER ROW * (MODULE LENGTH+20mm)+60mm

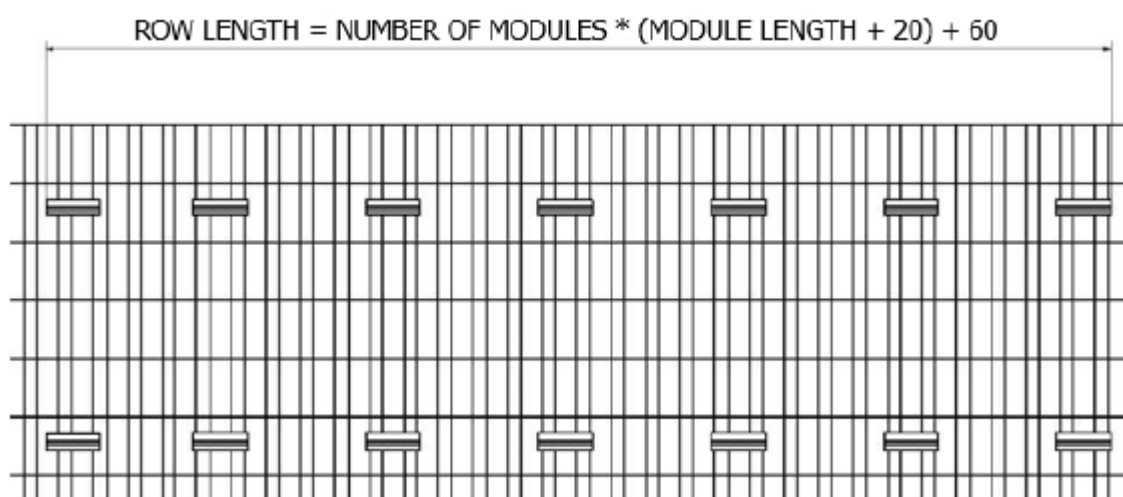


Fig. 2. Lengths of a row of modules mounted on the short side

- b. Formula for the row mounted on the long side:

ROW LENGTH = NUMBER OF MODULES IN A ROW * (MODULE WIDTH+20mm)+60mm

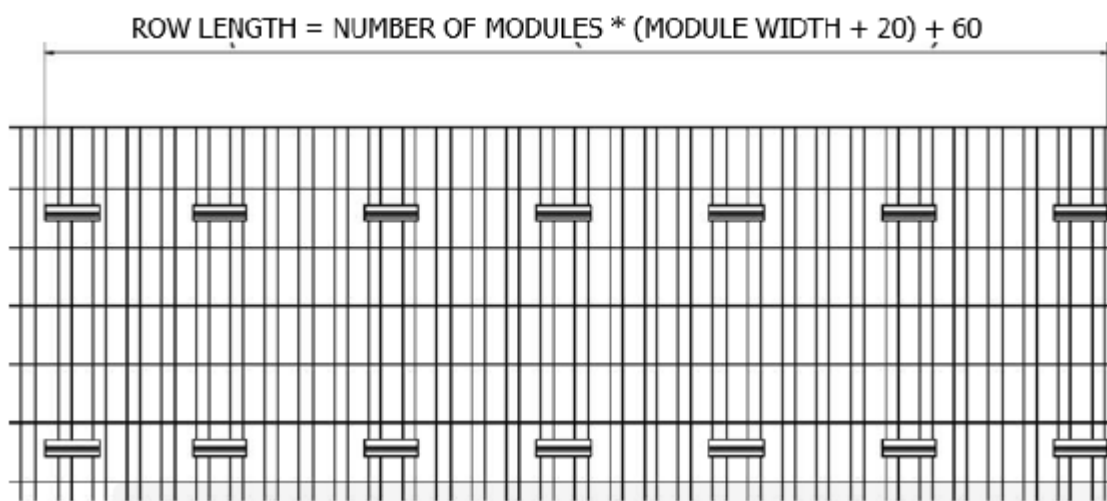


Fig. 3. Lengths of a row of modules mounted on the long side

5. The spacing between individual mounting points depends on the selected photovoltaic module and its mounting zones (see the module installation manual for information).
6. When arranging the bridges, pay attention to the distance from the tile offset (x), in order to obtain the same plane, parallel to the module frame.

Depending on the height of the metal tile embossing, the arrangement of the bridges is as follows:

- a. For a step of 14-25mm, dimension $x=100\text{mm}$ for the upper and lower bridge
- b. For a step of 26-35mm, dimension $x=10\text{mm}$ for the upper bridge and 210mm for the lower bridge

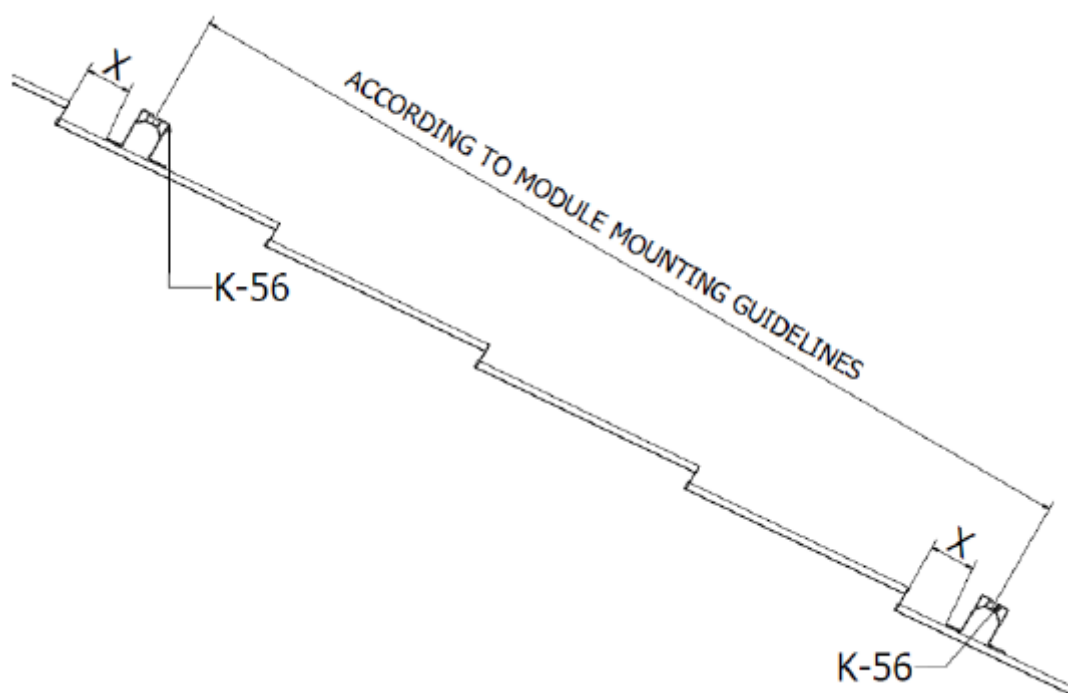


Fig. 4. Arrangement of the bridges on the metal roofing tile

7. The bridge prepared in this way should be anchored using at least four K-20 screws. The bridge must be installed perpendicularly to the line of the sheet humps, in such a way as to enable it to be anchored in a total of four points, on at least two humps of the metal roofing tile. Use a screwdriver to screw in the screws, these are self-drilling screws. It is important not to pre-drill the hole for the screw, as this will reduce the contact surface of the screw with the sheet, thus reducing the strength of the fastening. Remember that the gasket under the screw head and under the bridge is slightly pressed. Tightening must not cause significant deformation. Drive all screws at right angles, otherwise, the seal will not be correct.

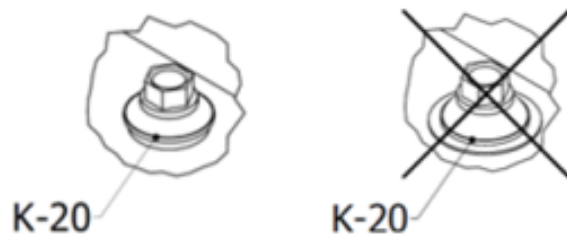


Fig. 5. Correct installation of K-20 screws

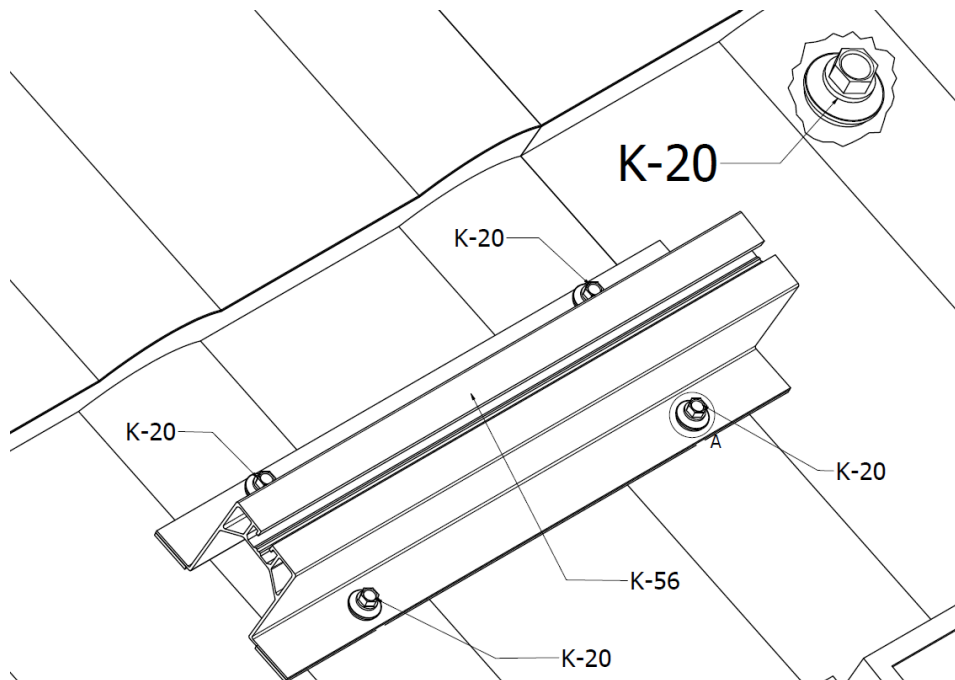


Fig.6. Screwing the bridge to the humps of the metal tile

8. The K-04 drain can be mounted to the structure prepared in this way, in a specially prepared channel. It can be mounted in any desired place.

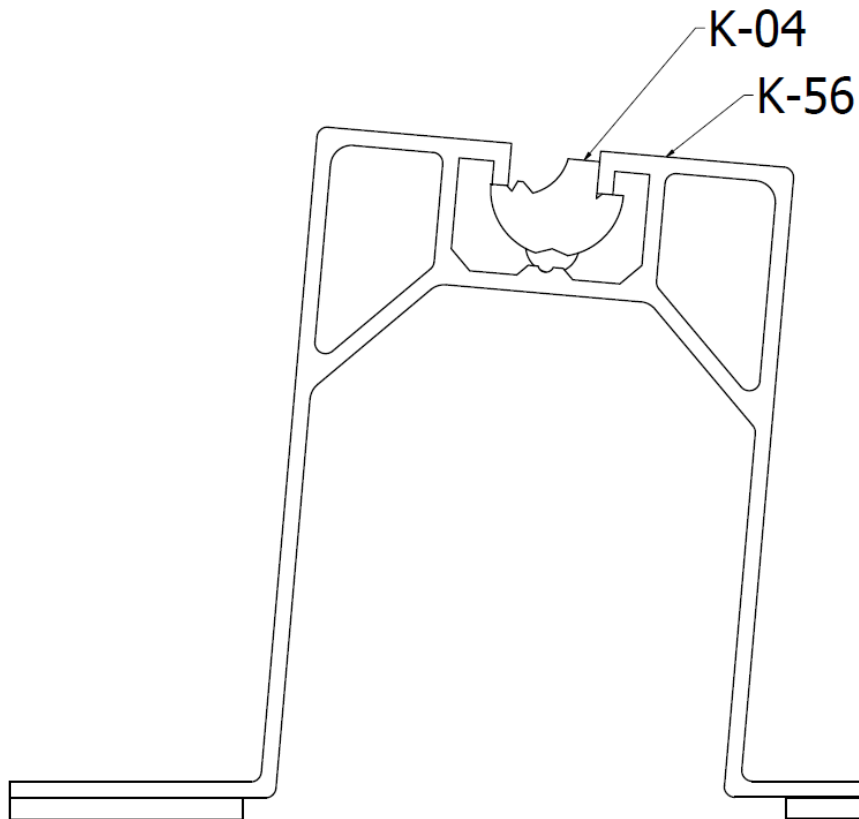


Fig. 7. Installation of the K-04 element

9. The first from the edge and the last will always be the end clamp (K-06), stabilizing the edge of the first and the last row of modules. In turn, the middle clamps (K-05) will simultaneously stabilize the sides of two modules. A properly selected end clamp will have a height equal to the thickness of the module, allen screws will be 10mm shorter than the module thickness, and middle clamps are universal and fit any module thickness.

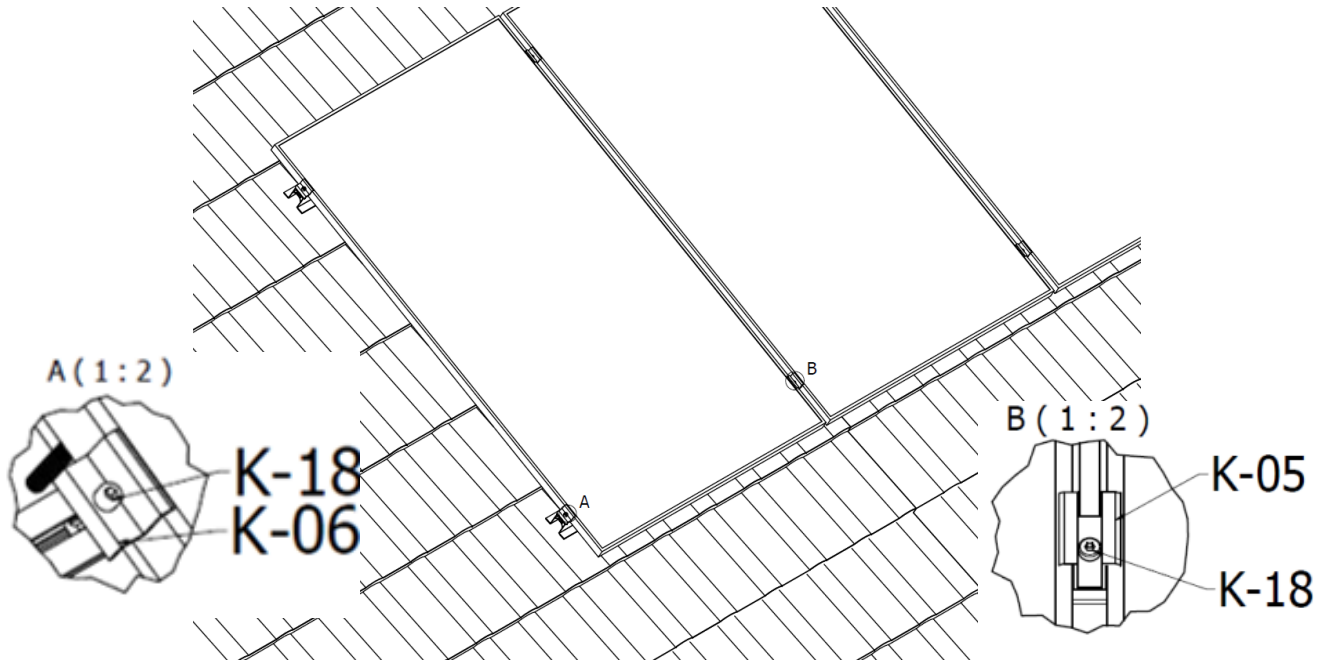


Fig. 8. Installation of modules

10. Clamps should be tightened with a torque of 18Nm.

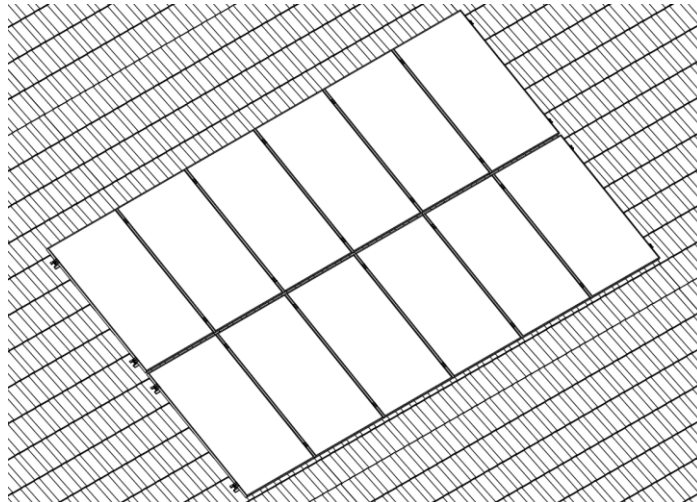


Fig. 9. View of a complex structure with modules

Thank you for using the construction of KENO Sp. z o. o.