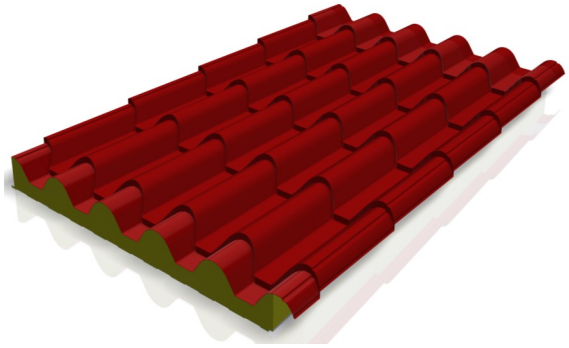
Product Instruction Sheet:

Polyurethane Roof Tile Panel T.PU 350



Packaging & Shipping

The polyurethane roof tile panels are packed in bundles. In order to reduce the volume of the bundles and protect the panels, the panels are piled up in the bundle with their faces facing each other, as shown in the adjacent image.

Under the bundle, expanded polystyrene block supports are placed in order to protect and facilitate the transport by crane or by forklift.

The entire bundle is wrapped with a transparent polyethylene film to protect the products from environmental conditions, according to the bundling machine boundaries.

Upon request, it is possible to place a self-adhesive transparent polystyrene film on the outer surfaces of the panels to protect the paint coating against mechanical damages.

The adhesive film should be removed immediately upon receipt of the product and in no case later than 4 weeks after the date of manufacture. Panels with adhesive film should never be exposed to rain and to solar radiation.

The dimensions of the bundle vary. The table on the right shows the number of panels in the bundle, the overall height of the bundle and the weight per length (meters), in relation with the thickness of the panels.

The overall width of the bundle does not exceed 1250mm.

The total length of the bundle depends on the desired panel length of each order and is from 1.75m to 14m with a 350mm step.

The total height of the bundle depends on the desired panel thickness of each order and is not more than 1000mm.

The transportation of the shipments is made by truck carriers by land using the road network.

Upon request or if the conditions require, it is possible to dispatch the products in containers. It is necessary to use special equipment for loading and unloading products.

In case of transportation with container, table values do not apply. Packages and dimensions depend on the type of the container. They are suitably matched for full volume coverage. Technical department of company can carry out a preliminary loading assessment.

Panel length	Number of panels per bundle	Overall bundle height	Bundle weight
[m]		[mm]	[kg]
1,75	10-10-8	890 / 2500	170 / 476
2,80	10-10-8	890 / 2500	273 / 764
3,50	10-10-8	890 / 2500	341 / 955
4,90	10-10-8	890 / 2500	477 / 1336
5,60	10-10-8	890 / 2500	545 / 1526
6,30	10-10-8	890 / 2500	613 / 1717
7,00	10-10-8	890 / 2500	682 / 1909
8,40	10-10-8	890 / 2500	818 / 2290
9,80	10-10-8	890 / 2500	954 / 2671
10,50	10-10-8	890 / 2500	1022 / 2862
12,60	10-10-8	890 / 2500	1227 / 3435
14,00	10-10-8	890 / 2500	1363 / 3816

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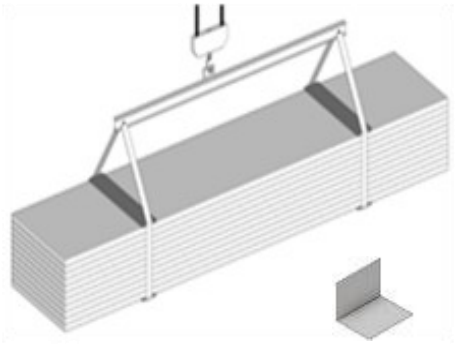
Product unloading

The unloading of the bundles can be done either by crane or by forklift. It is a procedure that falls under the customer's responsibility.

Unloading by crane

The bundles are hung with synthetic fiber straps at least on two points. The distance between the straps must not be less than half the length of the panels. Commonly the distance between the straps is the 3/5 of length of the panels. It is recommended to use synthetic fiber straps with a width of not less than 100mm. It is not advisable to use chains or wire ropes.

Wooden or plastic planks can also be used as spacers. Their length must be greater than the width of the panels (40mm) and their width at least the same as the width of the straps. We recommend the use of 1 mm thick metallic angles and twice the width of the straps at the points of contact of the straps with the bundle to avoid deformation of the panel edges.



Lifting devices must be secured to prevent slipping. Movements should be done carefully, slowly and gradually.

Take into account the total weight and length of the panels as well as the possible bending of the bundle.
The bend arrow must not exceed the maximum permissible limits.

Unloading by forklift

It is recommended to use forklift trucks suitable for handling panels or related products with the possibility of bearing extension attachments for the distance between the forks.

The width of the forks must be at least 250 mm and the distance between them not less than 2 m. The final opening should be not less than the 3/5 of the length of the panels.

Storage

The bundles can be stored on the ground on top of supporting boards. They can be stacked on top of each other, but not more than 3 bundles per stack.

They can be stored either indoors or outdoors. In any case they must be protected against environmental conditions. It is recommended to remove the package (film) before storage.

Storage time **indoors** should not exceed 6 months and the storage room should be dry and well ventilated.

Storage time **outdoors** should not exceed 60 days. It is recommended to place the bundles with 5% slope for the drainage of the rainwater.

As long as the paint coating is unattached the panels are protected against oxidation.

It is generally advisable to install the panels as soon as possible and not later than 1 month from the day of receipt.

When transporting using containers, bundles must be unloaded in less than 15 days.

Protect the panels from direct sunlight, rain, moisture, dust and from mechanical damages.

Handling

Always use Personal Protective Equipment (such as protective gloves, safety shoes, workwears, etc.) in accordance with the regulations. Do not use metallic tools and lifting devices that may damage the panels or the coating.

Generally handling the panels is a two persons job. Lift the panel and place it carefully upright next to the bundle. Do not drag the panels together. Avoid in any case to damage the surface coating.

It is strongly recommended not to place packages on high-rise constructions.
Otherwise, secure and anchor the packages in order to avoid the risk of a fall that can lead to serious or even mortal injury.

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Installation

The panels should only be installed by qualified personnel with appropriate knowledge and experience. Always refer to the construction plans for proper installation. Additional instructions can be provided by the technical department of the company.

To avoid unnecessary losses and damaging the panels, use the appropriate equipment and tools. A circular saw or jigsaw can be used to cut the panels on site. Tools with abrasive or friction discs are not recommended. Also suitable are drills and screw drills, without impact, with adjustable torque.

- The polyurethane roof covering tile panels are designed to cover roofs with a slope of not less than 10%.
- Roofs with a slop of 10% to 15% can be covered with one-piece panels if the length from ridge to eave is less than 14m.

The polyurethane tile panels are designed for roofing, but can also be used for sidewall cover. It is not recommended to use these panels for sidewall coverage, as the aesthetic effect is not as expected.

Generally the working temperature limits of the panels is between –25ο το 60οC.

Polyurethane tile panels are not designed for horizontal installation and usually they are supplied without transversal overlap.

Assembly process

The roof cover direction is always from right to left as we see in the building. The schematic diagrams below provide a schematic representation of the cover direction.

The assembly process is simple when carried out by suitably qualified personnel. The key points of the process are as follows:

1. The panels are raised and mounted on the roof. Any manipulation deformations may need to be corrected.
2. Install the panels carefully from the beginning. Later it is much more difficult to properly reposition them.
3. Place the first panel on the roof, right and fasten it to the structural elements.
4. The tile panels are positioned with their longitudinal axis at an angle to the vertical axis of the purlins. This angle is such that the bottom of the panels has a difference of not more than 4 mm.

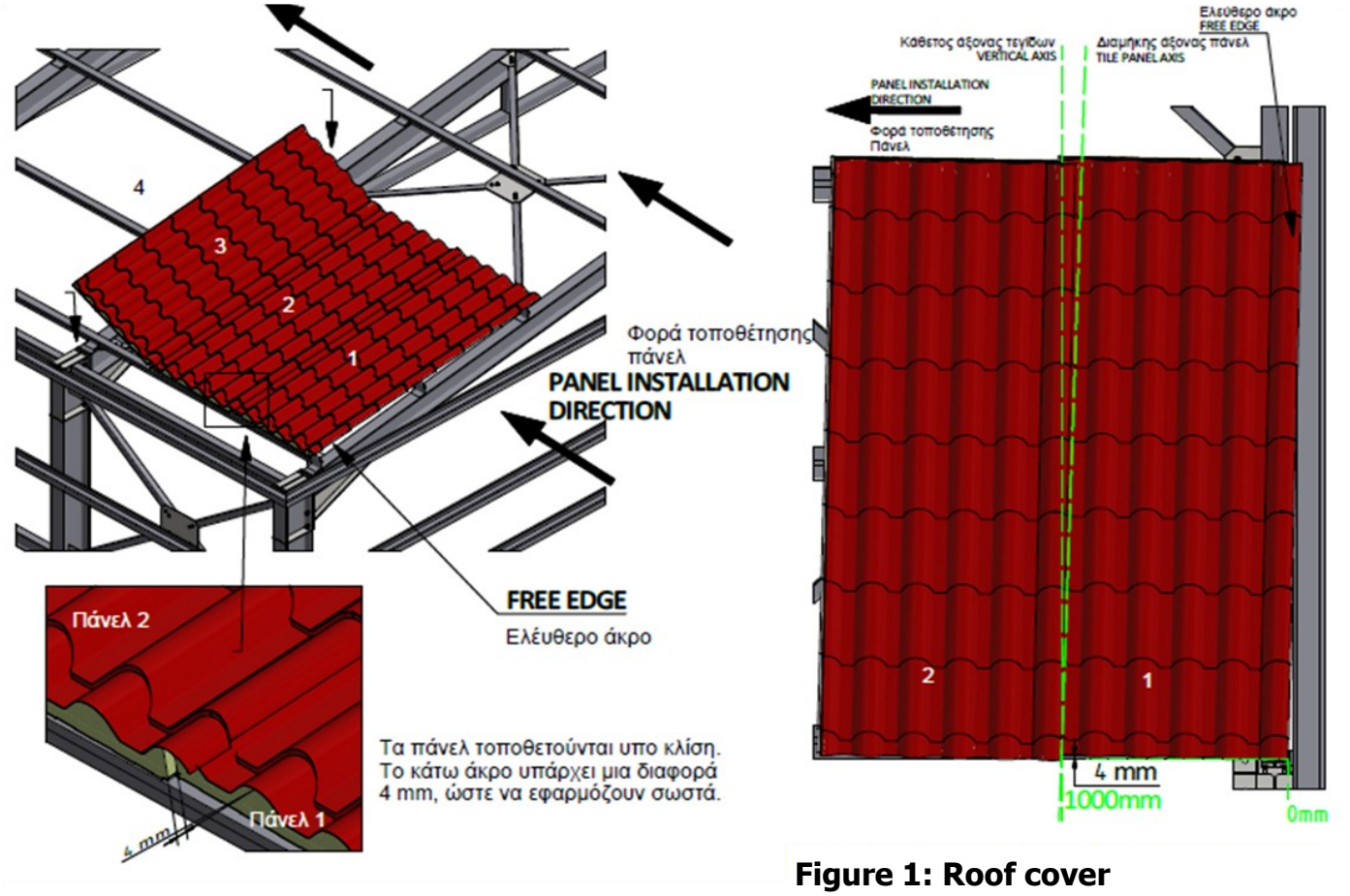

Figure 1: Roof cover

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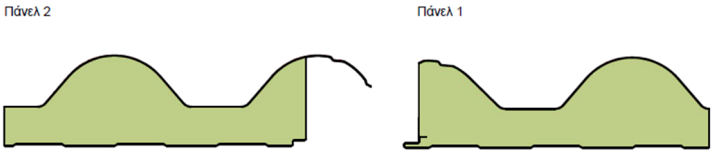
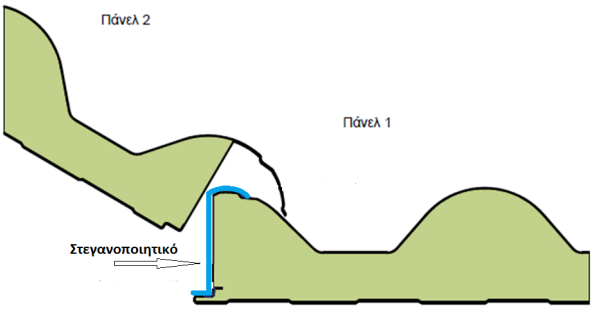
5. The screws are better to get into the peaks and not into the valleys.
6. The panels are fixed to the purlins with screws according to the manufacturer's instructions. Depending on the study and environmental conditions (annealing), screws shall be installed on at least three (3) of the tops of each panel in each purlin.
7. Then, along the longitudinal axis of the first panel, sealants are applied, as shown in the drawing.
8. The next panel lifts up and comes in and button at an angle. It is temporarily aligned and held in place.
9. The screws are applied to the last peak of the first panel, which consists also the first peak of the next one. Screws are applied in both connecting panels.
10. Apply the remaining screws to the peaks of the second panel apart from the last one.
11. For complete protection we need to "sew" the connecting panels externally and internally with screws eg. 4.3x19mm.
12. The installation steps are repeated in the installation direction until the roof is covered and at the end special pieces are installed.

Fasteners

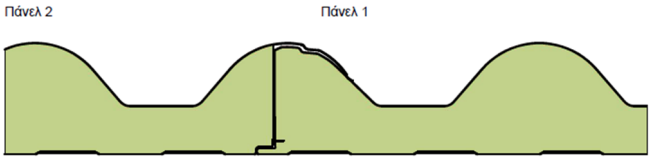
The roof panels are fastened to the structural elements by the visible anchor method, as shown in the next page figure.
The dimensions of the screws vary and depend on both the panel itself (thickness, weight, laminates and so on) and the designer engineer of the structure.
Typically self-tapping screws with hexagonal head and washer with sealing ring are used. Their material can be high-strength steel or stainless steel. The type of screws depends on the materials of the structure.
It is also proposed to use trapezoidal plates to increase the clamping force when the conditions require it.



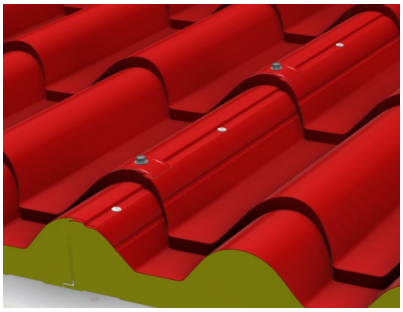
Σχήμα 1 : Φέρνουμε τα δύο πάνελ το ένα δίπλα στο άλλο, αφήνοντας ένα μικρό κενό μεταξύ τους.

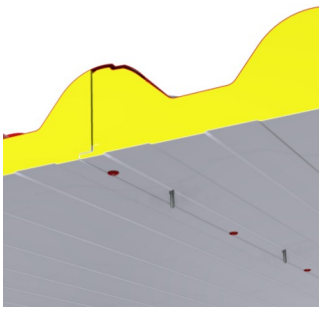


Σχήμα 2 : Σηκώνουμε το ένα πανελ (2), και το κατεβάζουμε ώστε να κουμπώσει με το άλλο (πάνελ 1)



Σχήμα 3 : Κουμπωμένα πάνελ





Sealants

In any case, in order to achieve the best possible results at the joints of the panels, it is recommended the use of sealants.

Sealants are not included in the order. It is possible to supply these sealants upon request. Sealants are applied during the installation of the panels and not at the factory.

To achieve the best possible sealing results, it is recommended to use sealants with high fire resistance and water resistance.

In particular, it is suggested to use acrylic or butyl acrylic sealants in the inner side, which offer the best possible resistance to fire.

While on the outer side of the panel are preferred silicone base sealants, whose waterproofing characteristics are more effective.

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Important Installation Notes

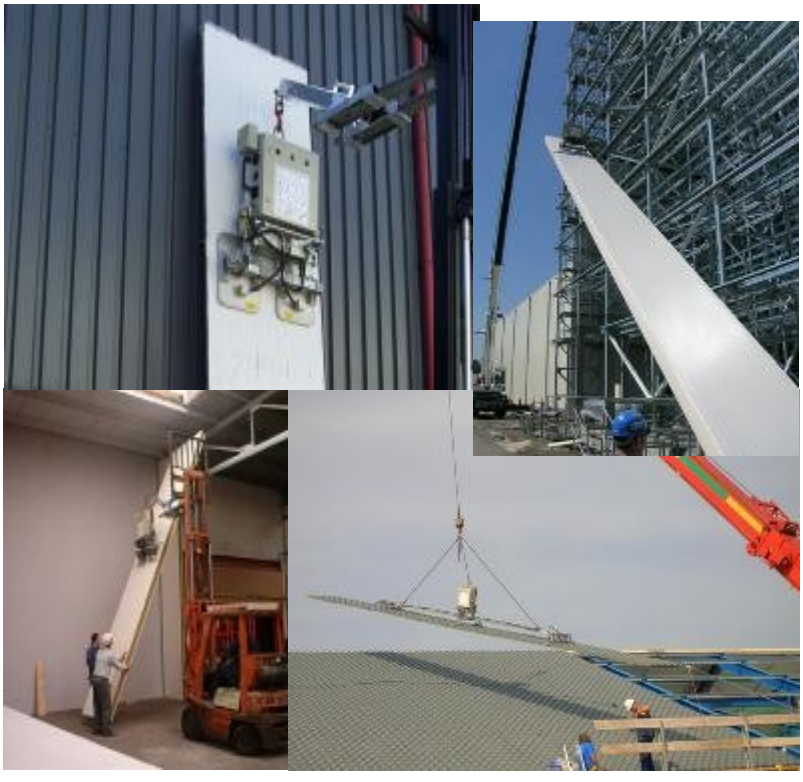
- Always use Personal Protective Equipment and always follow the hygiene and safety rules and regulations
- Always use the appropriate tools to handle panels for both processing and transport.
- It is permissible to make minor corrections to any deformations that may arise from the handling of the panels.
- Ensure that the structure is intact and perfectly aligned
- REMOVE the protective adhesive film of the panels if any.
- Pay close attention to the proper installation of the panels so that they fit correctly before install them on the structure.
- Proceed gradually, it is preferable a short delay at the beginning rather fixing the mistakes later.
- The panels must be properly aligned and have a perfect snap
- Do not leave gaps at the joints. If there are gaps, the panels lose their properties (thermal insulation, fire resistance, air permeability, water permeability)
- Do not omit the use of sealants and do not use them sparingly.
- Use suitable sealants that are weather resistant and do not corrode the metal face of the panels.
- Pay attention to the coating of the plates. The panels do not wear over time as long as their coating remains intact.
- Select materials and components resistant to galvanic erosion, especially when there are various metals that come in contact.
- The tightening torque of the screws must be such as to secure the panel without deforming it.
- Do not burden the panel with your weight when screwing in because it can be deformed and not clamped
- Complete the installation by placing decorative and protective accessories.
- Carefully clean the roof without damaging the coating, especially from metallic objects that can be oxidized.
- Wash the structure creating a rainfall in order to check for possible leakages.

Vacuum lifting devices

Professional vacuum lifters offer security and speed in installing panels to cover roofs or walls. Some of the advantages of these are the following:

- They offer security and improve working conditions by relieving staff from handling heavyweight panels (a prerequisite is to comply with safety rules)
- Saving and reducing the workforce for the construction of the project. Saving time and reducing construction costs.
- Reduce the damage after removing the clamping and lifting accessories that come into contact with the panels
- Flexibility due to their operation with rechargeable batteries

Clad boy quarantines easy, fast and safe installation of the panels in all kind of buildings.



The company has the ability to dispose of such devices **(Clad-Boy)** upon agreement. Along with the device, instructions for use and handling are sent. Before operating the device, read the operating instructions carefully.

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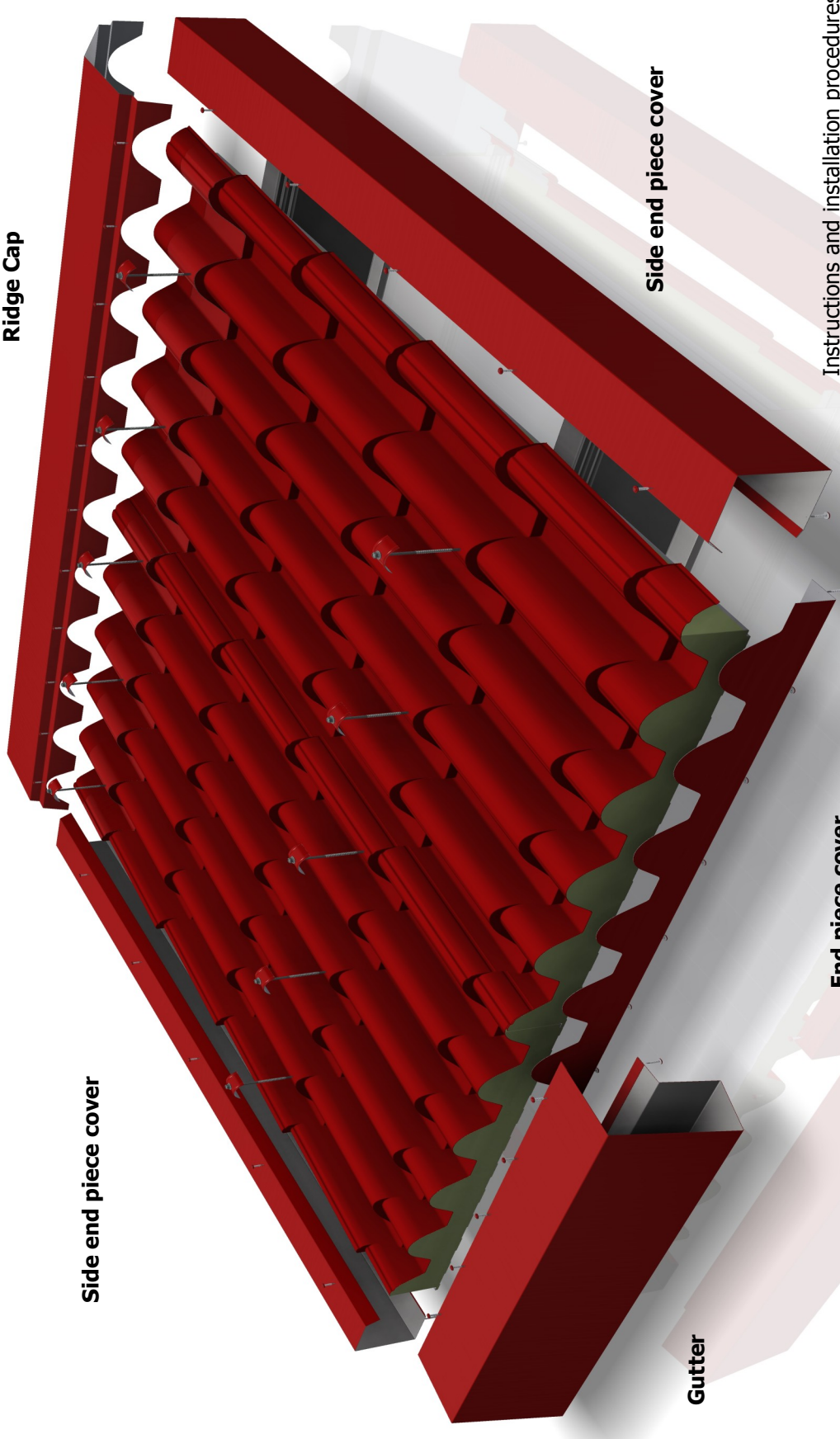
Construction details



End piece cover

For effective protection against rainfall, it is necessary to use it in combination with a 3 cm cut-off and sealant.και στεγανοποιητικό.

Instructions and installation procedures are available in the technical section of the company.
For more details and applications contact the company design department.

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Technical support

The company has the ability to provide Technical Support before, during and after construction.

Contact us and ask for instructions and additional information such as:

- **Calculation of coverage areas**
- **Special construction details**
- **Tips for fire protection, thermal insulation and sound insulation**
- **Development and design items with specified use.**

Maintenance

Self-supporting insulating panels are products that require little or no maintenance. Any maintenance required is mainly limited to cleaning. However, it is advisable to carry out an annual check, which includes:

Cleaning check. If necessary, wash the panels with water and soap using a soft brush. You can use scrubbers and pressure water jets, but not high pressure (<50bar). Do not have the nozzle of the water jet perpendicular to the surface.

Coating control. If marks or scratches are observed on the paint coating, repair and repaint the surface.

Check the screws. Retighten or replace the screws needed.

Check accessories. Check all the accessories, gutters, end pieces, ridge caps, etc. for oxidation, if necessary clean and repaint the pieces.

Quality & Reliability

The rapid service of our customers' needs, combined with our modern technological equipment, our well-trained staff and our dependable products, place Metallemporiki - Th. Makris SA among the leading companies in the sector.

The company applies a Quality and Environmental Management System in accordance with ISO 9001 and ISO 14001 standards and guarantees the durability and reliability of its products.

The company's panels comply with building regulations and with EN 14509 European Norm.

> In addition to this Instruction Data Sheet, the products are accompanied by the Product Data Sheet, the Declaration of Performance, the CE marking, and all the necessary legal documentation.

Note

All information can be used as a general guide but in no case as a technical manual and the company can not be held responsible if damage is caused .

The laws, regulations and standards of different countries vary and change. Contact our technical department for additional information.

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