Insulated Panels
Nordics

Kingspan
KS1000 RW Roof panel
Design and installation Guide

POWERED BY
QuadCore™
TECHNOLOGY

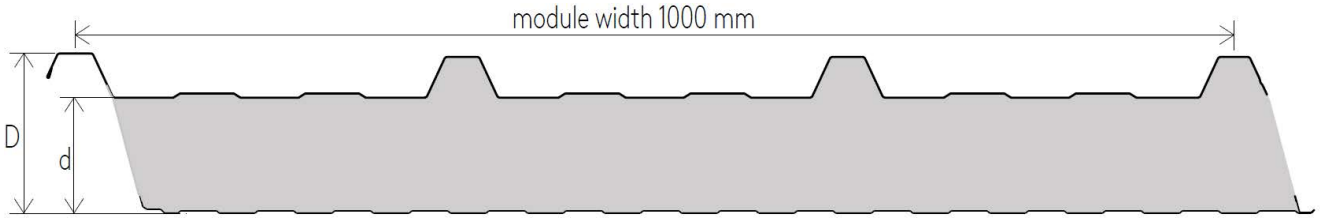
Kingspan®

PRODUCT INFORMATION

GENERAL

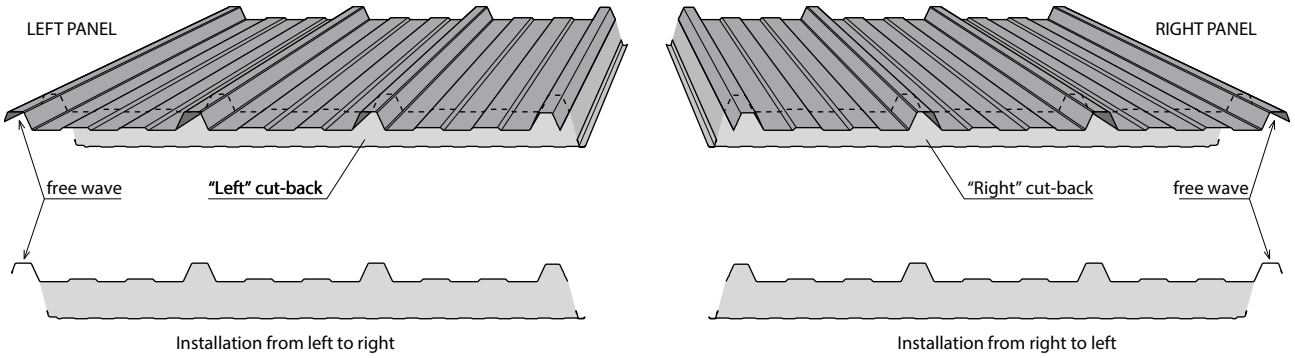
KS1000 RW Roof Panel is a through-fix profiled insulated roof panel, which can be used for building applications with roof pitches of 4° or more. The panel is available in a width of 1000 mm. Thanks to the prefabricated nature of the insulated panels, they are quicker to install than traditional roof structures, making the roof instantly wind and water-tight and significantly reducing construction risks. The KS1000 RW Roof Panel is available with our QuadCore® and IPN insulation cores, in thickness (d) range of 40-200 mm (up to 160 mm with IPN). The panel can be produced in lengths up to 15,0 m.

CROSS SECTION

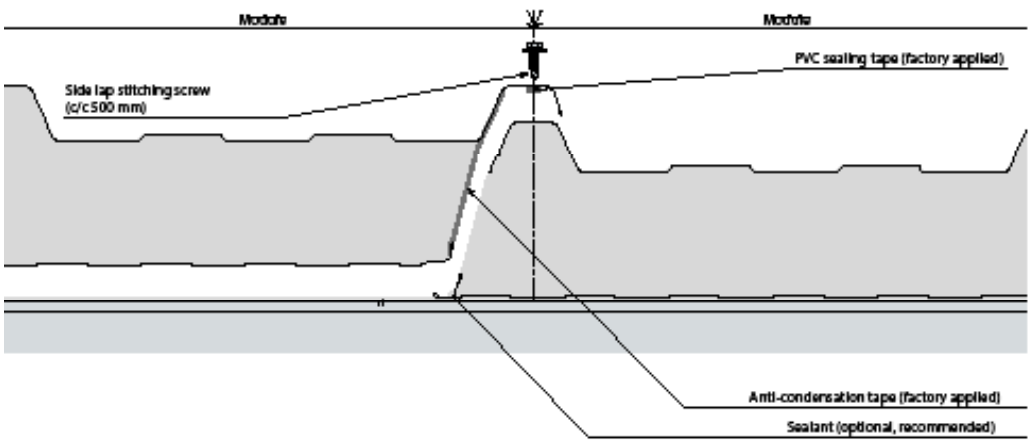


PANEL ORIENTATION

KS1000 RW Roof Panel are produced with an extended external top sheet, with the extension length defined as "cut-back". The cut-back is produced with a minimum length of 50 mm and maximum 350 mm. The cut-back can be placed on either ends, but only one side of the panel, which allow flexibility in direction of installation.



SIDE LAP ASSEMBLE



DESIGN PHASE

PLANNING THE ROOF DESIGN

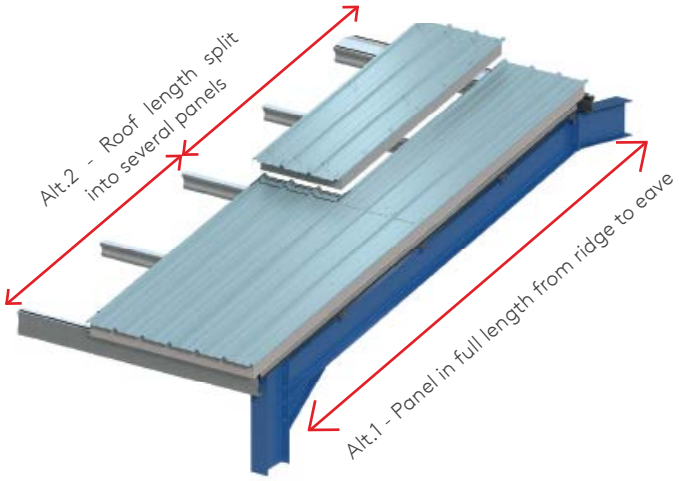
There are several aspects to be considered when planning the roof design, with the most important properties to meet being fire performance, building physics and structural performance.

The traditional way of building with RW panels is having a main and sub structure distributing the loads coming from the panels.

MAIN STRUCTURE DESIGN

Given that the RW panels meet the requirement of **reaction to fire**, the first thing that needs to be considered is the roof slope. The KS1000 RW Roof Panel can be used on pitched roof down to the slope of 4° (7 %), given that the panels will be installed as full panels from ridge to eave without any joints (Alt. 1). If the roof design would require panels to be joined in the longitudinal length of the panels, the minimum slope required is 6° (11 %).

If the panels will need to meet a certain level of **fire resistance,** the roof slope and project loads should be consulted with Kingspan to make sure the product is correct for its purpose.



SUB-STRUCTURE DESIGN

Due to that the panels are designed to be installed in the direction of ridge to eave there is a need of a sub-structure to distribute the loads from the panels to the main frame. The sub-structure is not part of the delivery from Kingspan, but to meet the structural requirements of the RW panels both spacing between supports and the support width should comply with available content on webpages or by consulting with Kingspan. The fire and structural performance of sub-structure will need to be evaluated by the designer and/or supplier.

PANEL STRUCTURAL DESIGN

Structural design of the panels shall be designed according to EN 14509 and loads according to Eurocode 1 (load standards) and/or local regulations. For roof panels the most relevant loads are natural loads from snow and wind, and other loads from permanent installations like solar panels, suspensions etc. Loads and other pre-conditions shall be defined on the project by the designer/customer. Kingspan has no responsibility other than designing based on the provided information. The aspects that will need to be considered are:

- **Span length** shall be decided based on worst case scenario combination of snow load, wind suction load and other permanent loads. Span lengths can be read in load span tables available on our webpages or consulted with Kingspan. In case of a demand for **fire resistance** span length also shall be consulted with Kingspan.

- **Support width** will be defined based on load scenario. Absolute minimum support width is 40 mm at end support and 60 mm at intermediate supports. ***However*** at certain cases the support width has to be wider in order to avoid crushing of the core.

- **Cantilever at eaves and verges** are depedent on load case scenario and product specification. For optimized solution at eaves consult with Kingspan. At verges about 1/3 of the panel can surpass the support.

- **Fixings** shall be calculated based on span length, wind suction loads, type of fixings and type of support material. As part of the service Kingspan can define the quantity of fixings when responsible for the delivery of accessories. In most cases it's sufficient to have 3 fixings per support for each panel in the most wind affecated areas of the roof and 2 fixings per suppport for the less wind affected areas. If there is very high wind affected areas and long spans it might be relevant to have more than 3 fixings per support. See more information on placement of fixings on page 7.

PREPARATION PHASE

WORK SAFETY

Work safety shall always be prioritized and be followed according to national regulations and building site rules.

In regards to installation of sandwich panels, Kingspan remind of the following pre-cauions.

- Wear protective clothing and equipment when handling the panels to protect from sharp corners and edges, dust from sawing, etc.
- No personell should stand below when lifting panels and bundles.
- Guidelines from lifting equipment should be followed
- Panel installation during strong wind or in general bad weather should always be considered by managment on the building site. The panels can easily be caught by wind and can result in risk of accidents.
- Quality check of the panels should be done before installing to avoid any extra unneccessary actions that can cause accidents.

INSTALLATION PLANNING

To ensure efficient installation it's recommended to create a plan before panel delivery. Depending on the project size and complexity it's recommended early in the ordering phase to specify which panels and accessories is first needed to the building site. Kingspan can support on this matter in combination of optimizing transport for cost and environmental impact. On request Kingspan can also provide lists of bundles to help with planning where to place the bundles on the building site.

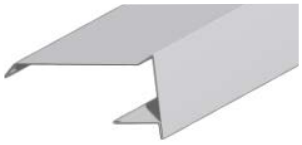
DETAILS AND ACCESSORIES

In the preparation phase please study the relevant details for the installation. This is to ensure the quality and functionality of the application, and also to be able to order the needed accessories before installation is meant to start.

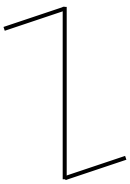
Make sure to select panel fixings for correct purpose. The fixings should meet the requirement for material, environment, thickness of panel and where the fixings is placed on the panel (valley or top crown). Storm washer should be used when fixing in top crown. Kingspan recommends fixings of stainless steel which can optionally be coated to match color of the roof. Have in mind this will extend the lead time for the fixings.

FLASHINGS

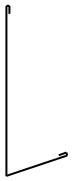
Ridge flashings



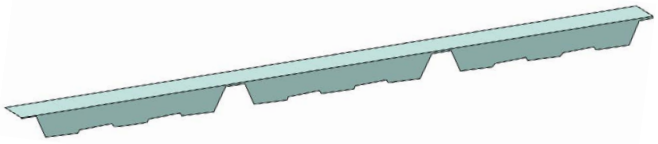
Verge flashings



Gutter bearing Z-profile

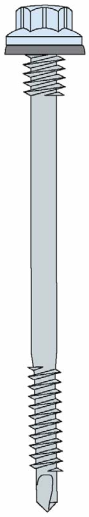


Cover flashing gutter profile



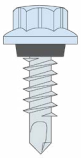
Ridge scalloped flashing [K102]

FIXINGS & SEALANTS



Panel fixing

Storm washer



Flashing screw

Sealing tapes

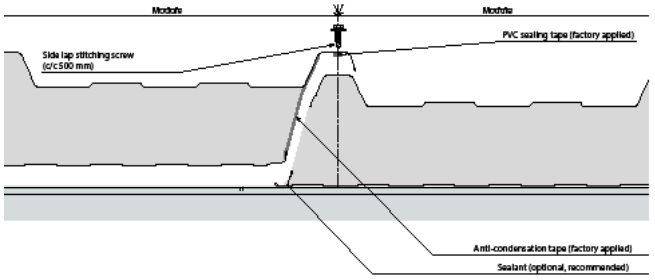
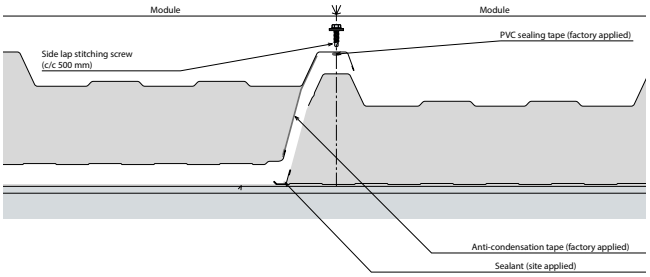
Canister foam

Sealant

PE outer filler gasket [P12]

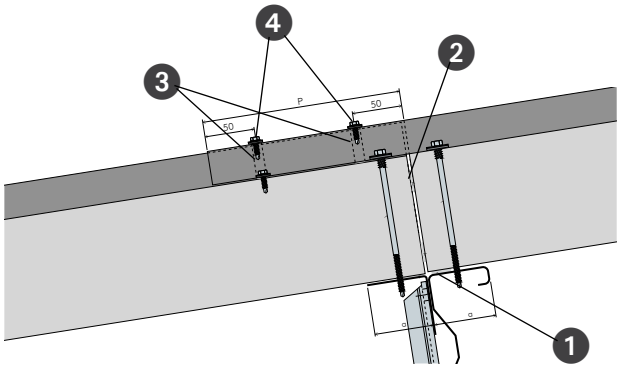
SEALING OF JOINT AND OVERLAP

The side joint of the RW Roof panel is designed with a factory applied PVC sealing tape in the overlap of the joint, but it shall also be evaluated the necessity to apply sealant on-site on the internal lip of the joint. It's a general recommendation to apply sealant in all type of buildings, but the table below shall be followed as minimum.

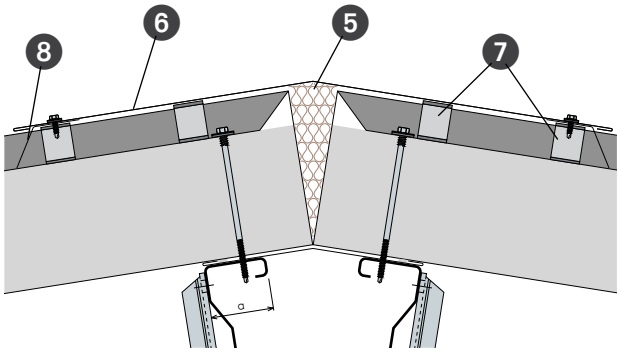
Intended use of building	Relative humidity and indoor temperature			Standard humidity Insulating joints of side panels
	15°C	20°C	25°C	
Storerooms, warehouses	<50%	<35%	<25%	
Offices, shops and most of the retail outlets	50-65%	35-50%	25-35%	
Buildings for few users	65-80%	50-60%	25-45%	
Buildings for numerous users (e.g. sports halls, kitchens)	80-95%	60-70%	45-55%	
Higher humidity in buildings (special purpose buildings, e.g. swimming pools, laundries, breweries)	>95%	>70%	>55%	

In order to ensure an air- and watertight roof it's key to have all connections sealed in a proper way. If the panels has has to be joined in the longitudinal direction, the cut-back length **P** shall have the length as defined in table below.

Roof pitch	Cut-back length **P**
6-7°	250 mm
7-12°	200 mm
12-20°	150 mm
>20°	100 mm



When joining panels, between the panels and support it shall be applied a sealing tape ❶. Across the panel section it shall be applied 2-4 strips of sealant ❷ and between the overlap of the steel sheets it shall be applied minimum of two stripes with sealant ❸ across the panel width. Flashing screws ❹ shall be installed in two rows as showed in the illustration.



On gable roof solutions it shall be applied canister based foam ❺ in the wedge. Between the the external ridge flashing ❻ and panel surface it shall be installed double sets of filler gaskets ❼. On the sides of the external ridge flashing it shall be installed ridge scalloped flashings ❽ to prevent birds to access.

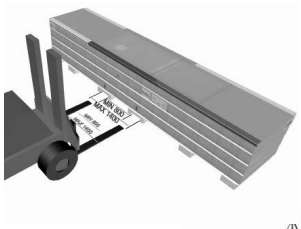
AT THE BUILDING SITE

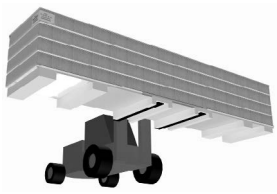
ACCEPTANCE CONTROL

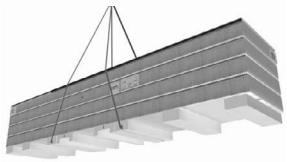
1. After the truck(s) arrive at the building site you should control that the driver is delivering to the correct building site to avoid any extra work with off- and unloading at a later stage.
2. Do a visual check of the bundles at the truck before unloading. If there are any visible damages you should take pictures and documentate before unloading.
3. If some damages only appear after unloading this should also be documentated in same way as nr. 2. Remember to put a note to the freight papers and get a copy.

UNLOADING

1. Kingspan inserts a detailed instruction on how to unload and store the panels in each bundle. Read the instruction carefully to avoid unnecessary damages.
2. The bundles have to be lifted carefully to avoid any damages. When unloading with a forklift only one bundle should be lifted at a time. When unloading with crane, bundles longer than 6 meters shall be unloaded with lifting beam and textile strips, with maximum 4 meters between the straps.
3. Place the bundles on an even foundation.
4. Don't put other loads on top of the panel bundles. This may scratch the finished panel surfaces. If the panels have to be loaded on top of each other, make sure t check that the EPS support feet are free from stone and other sharp-edged objects

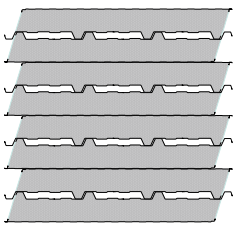




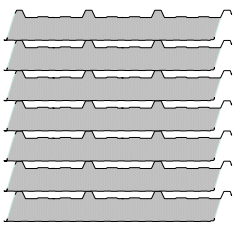


PANEL IDENTIFICATION

On the bundles there is placed a document with information about the content, such as order number, panel specification, panel lenghts and panel codes. Standard way of packing of RW panels is every second panel is stacked up-side down (zic-zac) to fit more panels into the bundle. On request the panels can be stacked with crown-up, but note that it can affect the cost due to lower quantity of panels fitted onto a truck.



Standard packaging



Crown-up packaging

The panels are delivered with a protective film on the external face and stripes with film on the internal side. The film is to avoid light scratches to the surface during handling and transport. If the protective film stays on for too long there is a risk for glue residues. In order to avoid this the protective film shall be peeled off during or right after installation and must be removed within 60 days from production date. The production date can be found on the bundle label. Removal of protective film must only happen in the range of -25° to 60°C to avoid the risk of glue residues. When stored outdoors the panels shall be protected from direct UV radiation, as this makes the plastic foil porous, which later can make removal difficult. When stored outdoors in the cold months, the protective film becomes stiff. If glue remains on the panels, please contact Kingspan for cleaning instructions.

Claim must be made to Kingspan within 60 days from panels production date. Situations outside our recommendations do not constitute for claim.

PANEL CUTTING AND OPENINGS

Cutting of panels might be required on site. When cutting panels use a circular saw, jigsaw or eventually a metal nibbler to cut the steel sheet. It's important to use suited blades for cutting in metal. A bayonet saw can be used used to cut the foam after the steel has been cut.

When cutting openings, pre-drill holes in the corners of opening to be able to enter with a saw and follow the procedure above. Please note that large openings may weaken the panel strength and affect the fire resistance properties of the structure. Static calculation of the panel with openings should be checked to verify that the capacity is sufficient.

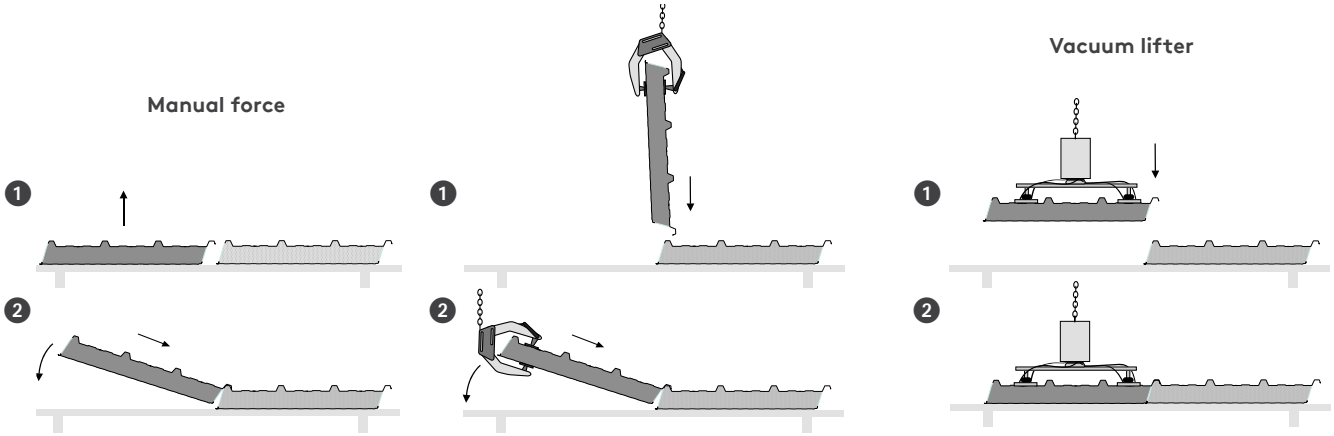
It's important to avoid any metal dust on the steel surfaceswhen cutting to prevent corrosion. To prevent this a metal nibbler is the preferred cutting tool.

HANDLING OF PANELS

The Kingspan panel is a sandwich structure where the core and steel facings act as a composite. If the steel facings are cut across the length of the panel or delaminated from the core, it will reduce some or all of it's function. The panels are supplied with finished surfaces and therefore have to be handled with care. If welding or using an angle grinder near panels, the panel surfaces must be protected. Cover opened panel bundles when finishing work for the day.

LIFTING PANELS ON THE ROOF

Lift panels using lift aid equipment, such as vacuum lifter, lifting clamp or eventually by hand if suitable. Remember to use an additional safety line while lifting. When lifting panels, steer the panel using a line fixed to one edge with a clamp or similar to avoid any uncontrolled rotation. It's prohibited to penetrate the sides of the QuadCore/IPN panels to steer the panel. This action can cause a crack in the longitudinal direction of the panel. Illustration on the next page in principle how panels are lifted into place onto the

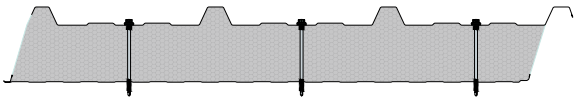


FIXING OF RW PANELS

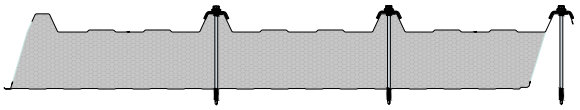
RW panels shall be fixed to the supports with correct quantity of fixings as described for the design phase. The fixings can be placed as in these options:

1. In the valley of the panels
2. In the top crown with storm washer
3. Combination of 1. and 2. when in need of more than three fixings per suppport

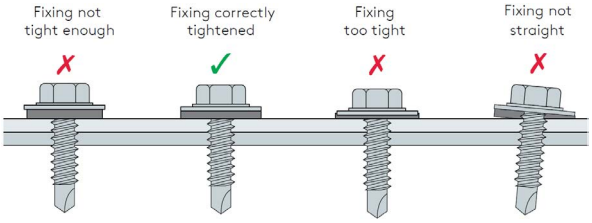
Panel fixings shall be correctly tightened and perpendicular to the face. To achieve this it's recommended to use a screwdriver with a depth limiter. Revolutions per minute (RPM) should be 1500-2000 and torque 600-700 Nm.



Alt. 1 - fixings in the valley



Alt. 2 - fixings on top crowns



INSTALLATION

STEP 1

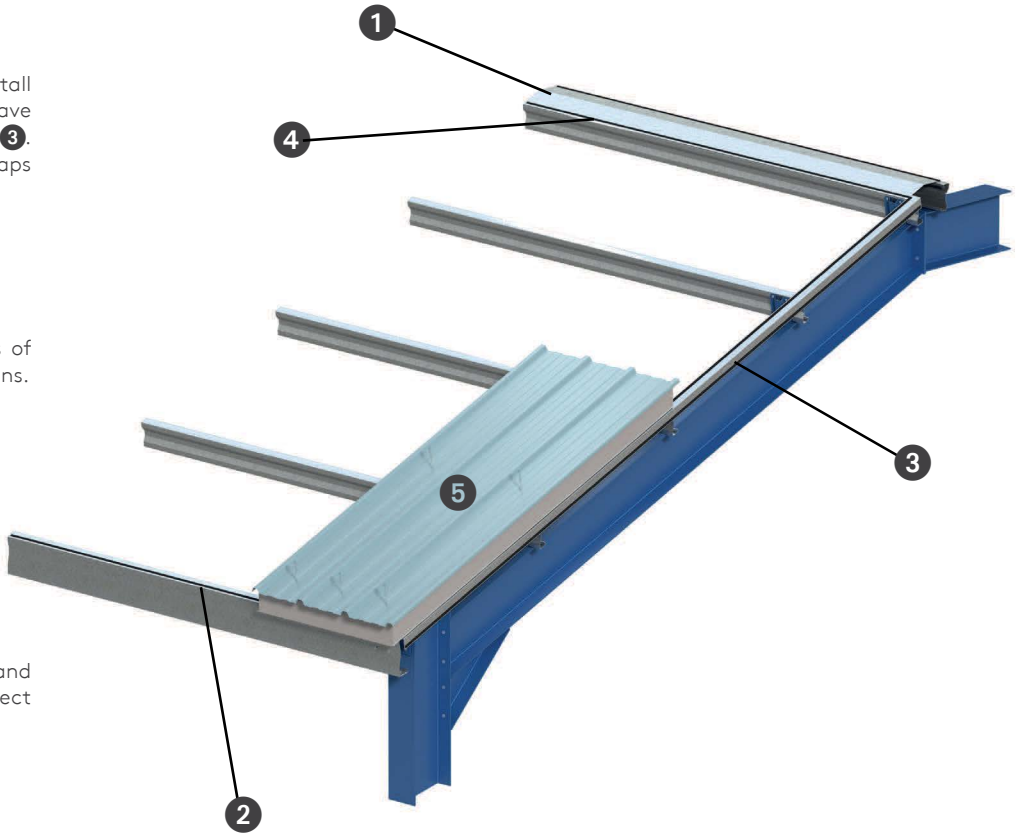
Before lifting panels to the roof, install internal ridge flashing 1, internal eave flashing 2, internal verge flashing 3. Remember to use sealant in the overlaps of the flashings.

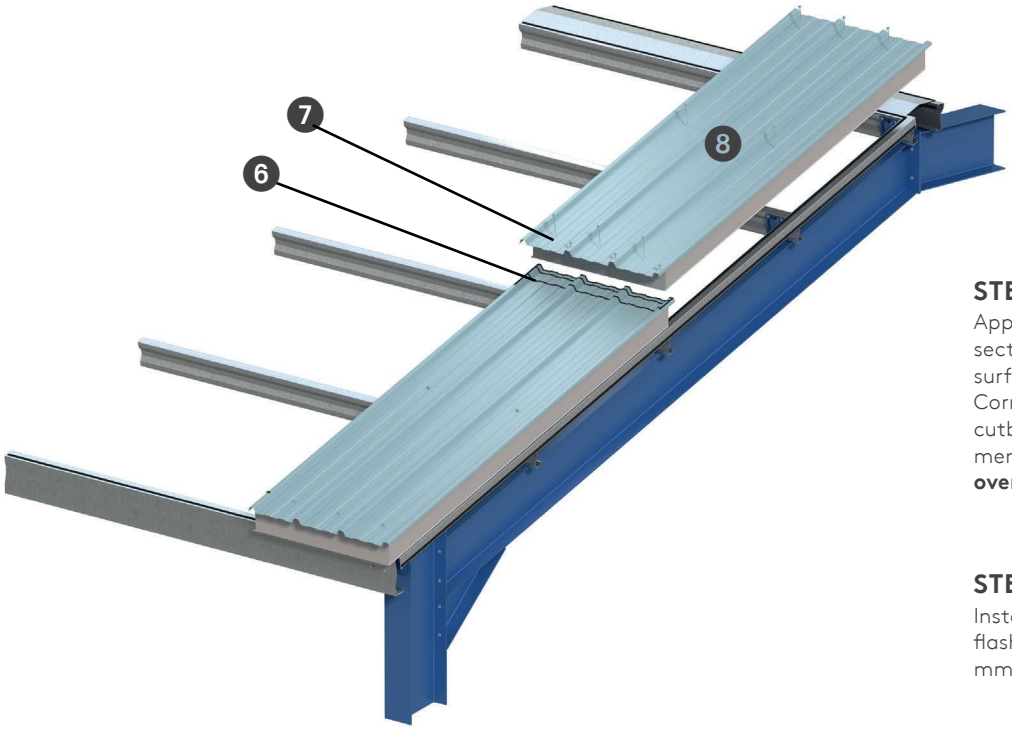
STEP 2

Apply sealing tape 4 to the edges of the flashings and eventually the purlins.

STEP 3

Lift the first RW panel 5 to the roof and fix it to the supports with the correct quantity of fixings.





STEP 4

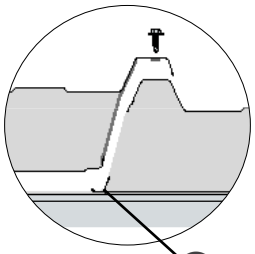
Apply stripes of sealant 6 across the section of the panel and the panel surface in the area of the overlap. Correct quantity of stripes and length of cutback should meet the requirements mentioned under **Sealing of joint and overlap** on page 5.

STEP 5

Install the next panel 8 Install flashings screws 7 in two rows. c/c 333 mm.

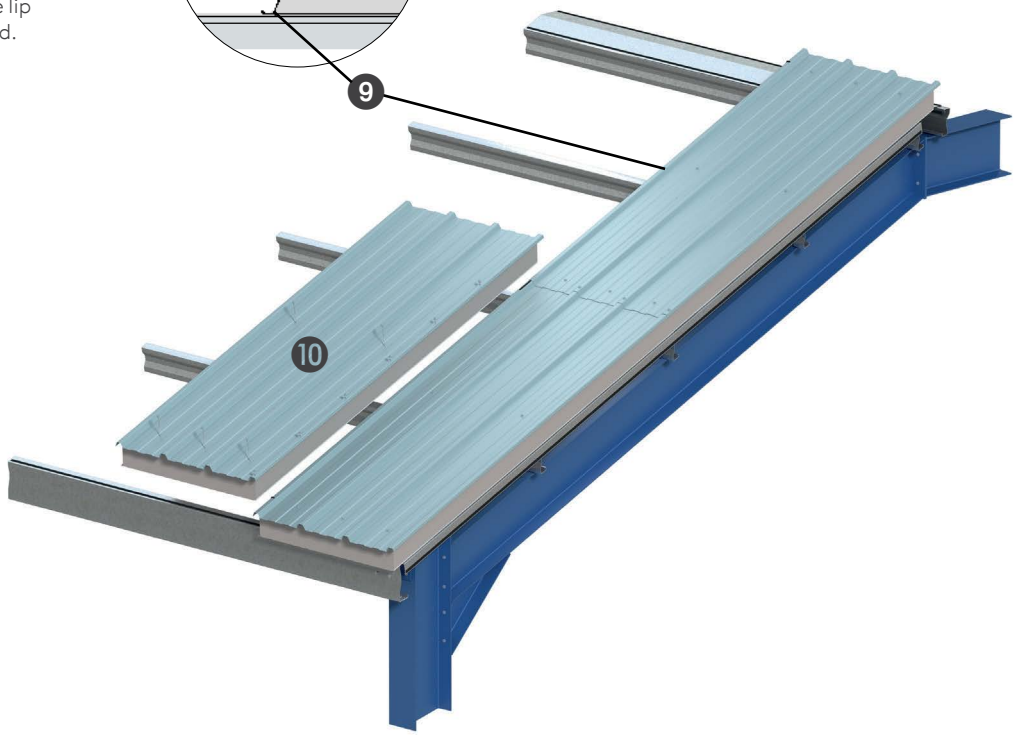
STEP 6

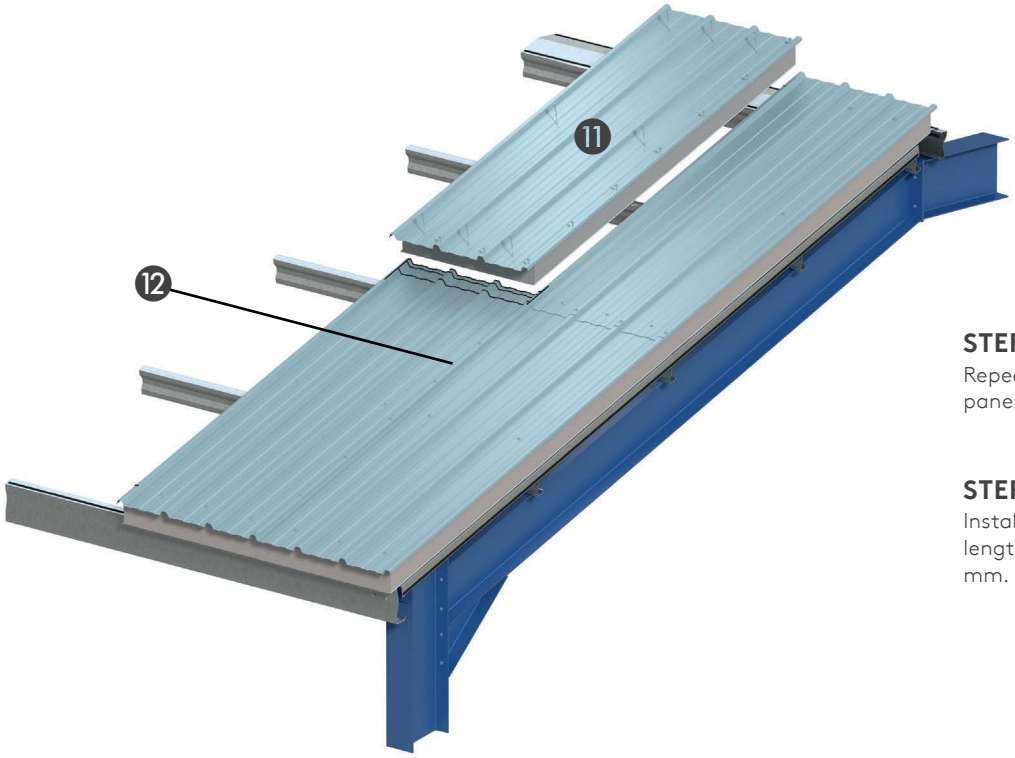
Before installing the next panel fill the lip of the joint with sealant 9, if needed.



STEP 7

Install the next panel 10.





STEP 8

Repeat step 4 before installing the next panel 11.

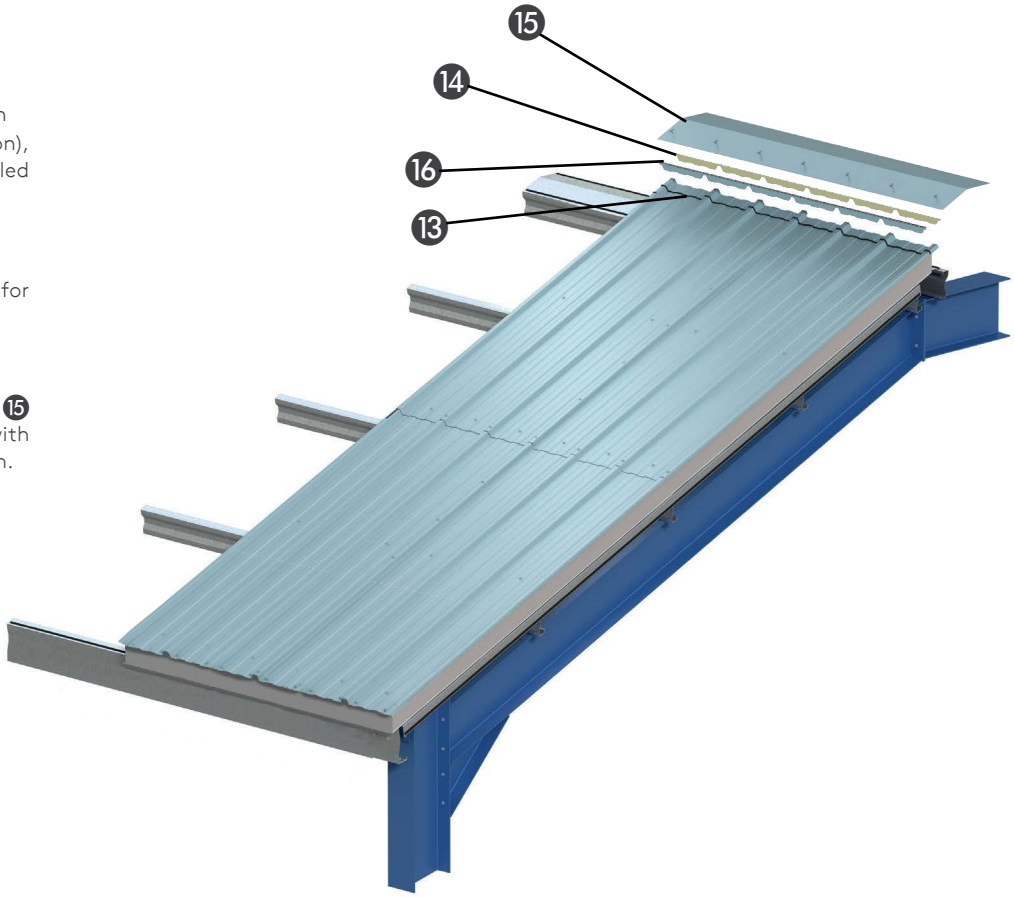
STEP 9

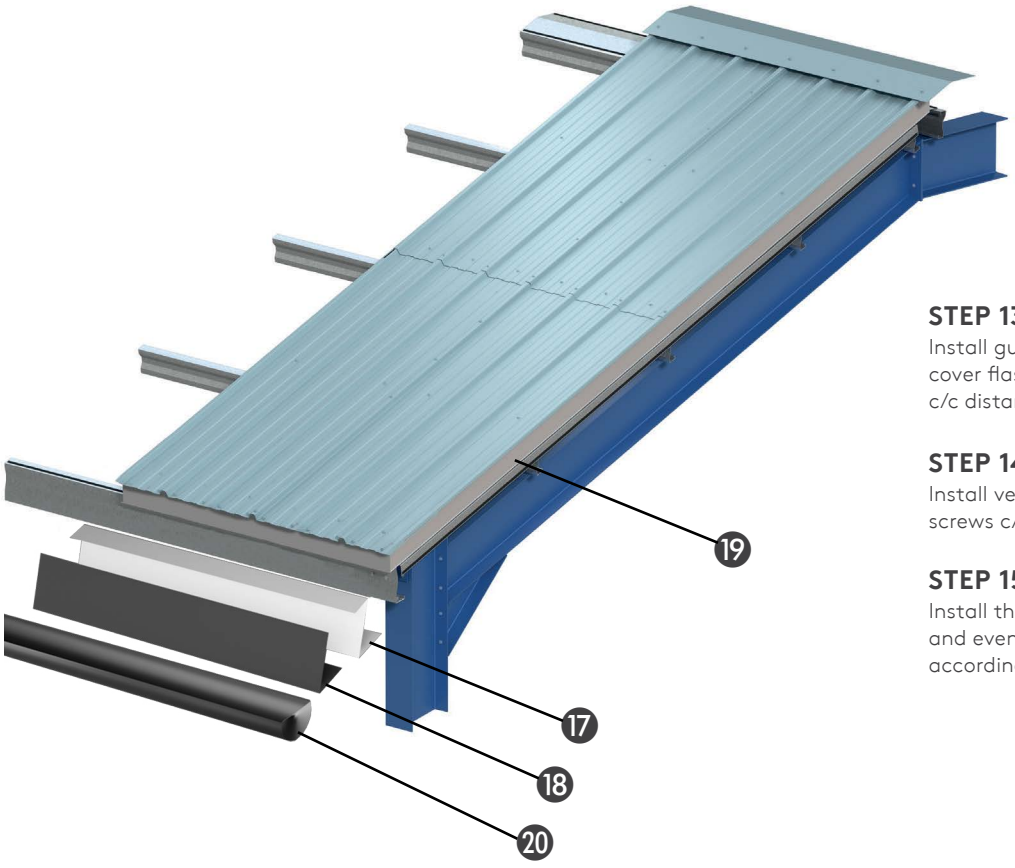
Install flashings screws 12 in the whole length of the overlap c/c distance 500 mm.

STEP 10
When panel installation is done (from both sides when gable roof solution), the wedge in the ridge shall be filled with canister based foam.

STEP 11
Apply stripes of sealant/glue 13 for fastening filler gaskets 14.

STEP 12
Install external ridge flashing 15 and ridge scalloped flashing 16 with flashings screws c/c distance 300 mm.





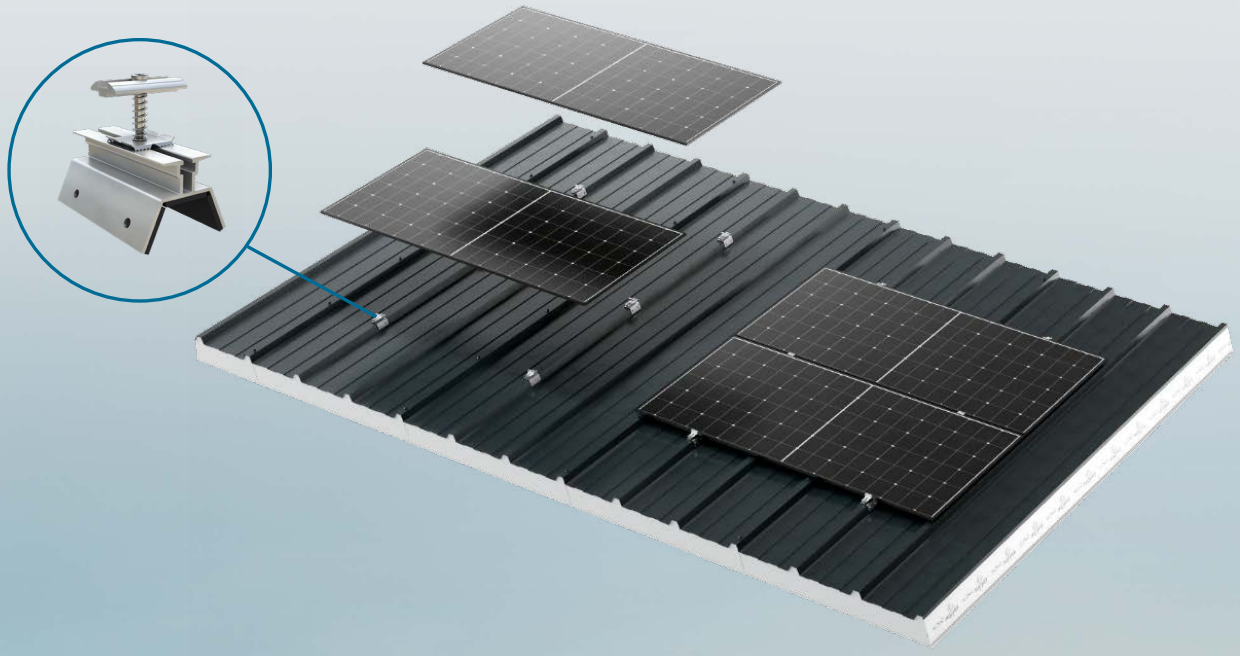
STEP 13
Install gutter bearing Z-profile 17 and cover flashing 18 with flashings screws c/c distance 300 mm.

STEP 14
Install verge flashing 19 with flashings screws c/c distance 300 mm.

STEP 15
Install the rain water system 20 and eventual snow stopper system according to suppliers guidelines.

INSTALLATION OF PV SOLAR SYSTEM

NEW! Introducing **PoweRail RW,** a ready system for installing solar PV. Kingspan's PoweRail RW has been developed specifically for the installation of solar PV modules on pitched roofs with KS RW QuadCore® Roof Panels. PoweRail RW fixes directly to the external profile of the roof panel, making photovoltaic installation faster and easier than ever before. More information on **PoweRail RW** can be found on our webpages or by contacting your local Kingspan office.



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