

KS1000 X-Dek™ Roof Panel Installation guide

This installation guide should be read in conjunction with the 'project specific' design drawings and method statements. Care should be taken to ensure that this guide is read and understood in its entirety prior to any site work commencement.

Should any procedure not be understood, or, if works being undertaken are not covered by this guide, please consult relevant Kingspan Technical Department.

Although this 'installation guide' is deemed to be correct at the time of publication. Kingspan Insulated Panels will accept no responsibility for any errors, omissions or misinterpretation of the information within. We reserve the right to amend the information at any time in the future.

Delivery & Off-Loading

Panels are normally delivered to the site by road transport, the number of packs depends on panel and pack size. The packs are separated with EPS bearers which create gaps between the packs to allow lifting straps or forklift tines to be inserted. It is the customer's responsibility to arrange lifting equipment and labour to unload the packs. This usually requires using a crane, with or without a lifting beam, or a forklift, depending on panel length and weight.

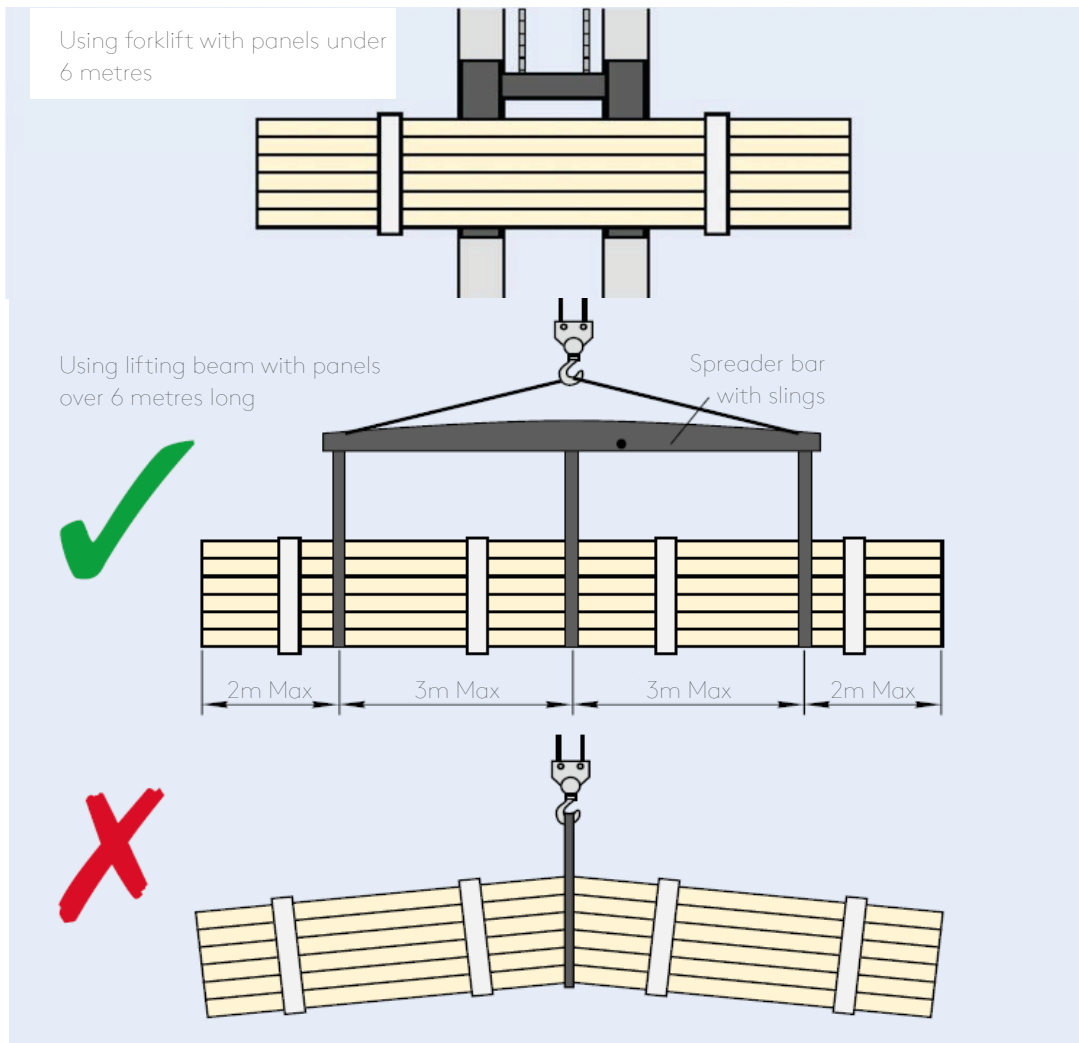
Panels are being packed into bundles, which usually consist of:

- 8 panels for X-dek panel core thickness 80mm
- 6 panels for X-dek panel core thickness 100mm

To maximise the quantity of panels they are packed crown to each-other. The quantity of packs per trailer depends on the length of panels – usually it is at least 4 packs, this will mean a delivery of 220 ÷ 430 m² for X-dek80 and approximately 170 ÷ 320 m² with the X-dek100. The packs are wrapped in a clear stretchable foil and every individual pack is labelled with short specification list and basic instructions for unloading and handling.

All materials arriving on site should be checked promptly against relevant advice or delivery notes to ascertain correct quantities, specifications and lack of damage. Any shortages or damages MUST BE reported within 24 hours of receipt of goods on site – otherwise any further claims will not be accepted.

Unloading packs up to 6m may be proceeded with a standard forklift. Bundles longer than 6m require being unloaded with a crane and a suitable leveller to spread the pressure on the panels to prevent any damage. See schedule below for placing instructions of the lifting tools. When hoisting packs or panels into position protect the edges if necessary to avoid damage. Use flat slings and not chains for hoisting. Packs should not be placed on top of each other.



Unloaded packs are best to be placed in the horizontal position with a minimum distance between packs of 0.5m. (this space is required for the correct use of the vacuum-devices so that you don't damage the other packs).

It is often necessary to store packs of panels on site for a period before they are fixed. To ensure that the panels remain in prime condition until they are installed the following precautions should be taken.

- Store packs off the ground and on a slope, so that should rain water penetrate the wrapping film will drain away. Support the packs evenly with timber or EPS bearers spaced at 1.5 metres. Bearers should always be placed one directly above another.
- If packs cannot be kept in a building they should be covered with a weather-proof sheet ensuring that the sheet drains water away effectively and does not allow ponding on top of the pack. It should also allow air circulation through the stacks of panels.
- Store packs in a secure area, where they will not be damaged or stolen.
- Inspect the storage site and the packs regularly to ensure the panels remain in good condition.
- Do not store packs where people will walk across them.

After unloading all package materials need to be separated and disposed in the correct waste-containers.

Construction Requirements

Improper or inaccurate erection of the supporting structure for X-dek panels not only creates difficulties for the installation of panels, but can also invalidate the assumptions underlying the panel specification and cause additional stresses for the panels leading to the serious deformations of panels. In extreme cases, poor erection could compromise the integrity of the building envelope.

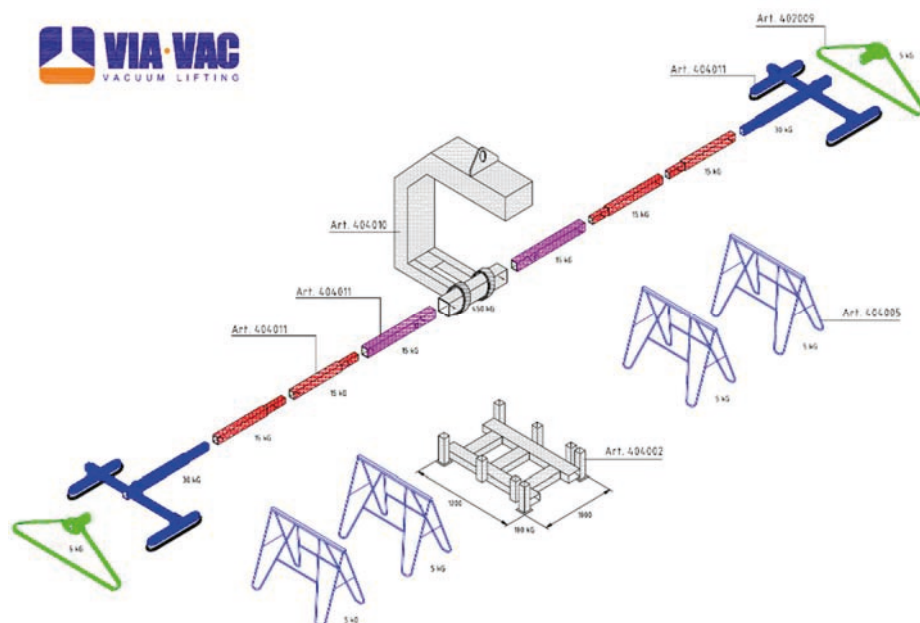
In general the supporting structure for X-dek panels must be made and assembled to an accuracy defined in **EN 1090-2:2008** (Execution of steel structures and aluminium structures. Technical requirements for the execution of steel structures). Despite of the fact that the above standard refers to steel structures, Kingspan demands to use the appropriate values of allowable tolerances, for the concrete supporting elements as well.

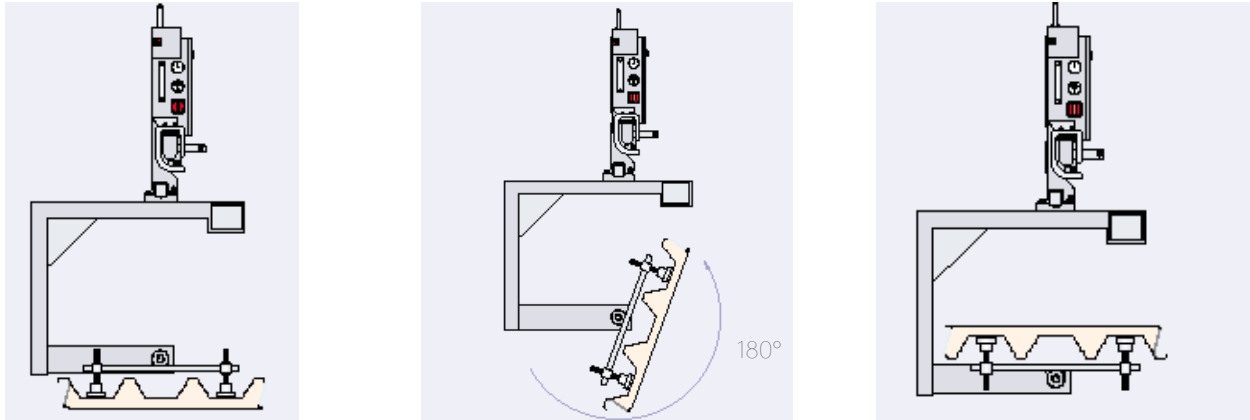
For installation of KS1000 XD panel (option steel-steel) the supporting structure must be made and assembled to an accuracy of L/600 between bearing planes of adjacent supports, where L is the distance between neighbouring supports.

For all external applications the KS1000 XD option must be specified with the external profilation of Mini-Box. The flat profile on external XD option is extremely sensitive to temperature influence and can cause local deformations of external surface.

Site Handling

Typically the panels are stored in bundles crown-to-crown manner, for turning the panels (50%) there is recommended to use special vacuum-pump device with a 180° rotation unit. The equipment is called **RotaBoy**. The **RotaBoy** equipment can be obtained directly from the Manufacturer – Viavac, or can be hired from local ViaVac office or their representative. Address of the nearest office you can find at <http://www.viavac.com/>.





For the operation of turning the panels it is recommended to use two supporting frames (see above) covered with soft materials. Every second panel which is turned - is being placed on these frames to change the position of the RotaBoy. The next panel is now directly ready for lifting and fitting after visual control.

When panels are supplied with a plastic protective film this should be removed immediately after site installation.

When lifting the panels the visual control is needed to ensure that also the side-overlap is not damaged or deformed - as this is very important for the correct fitting of the panels.

When using the **RotaBoy** or any other means of lifting tools the necessary health and safety rules and regulations should be taken into consideration and strictly followed, to prevent any damage or accidents.

Except with very short panels we strongly advise to avoid lifting or turning the panels by hand. When placing the packs on the roof you should take in consideration the local weight on the construction and possible damage to construction or panels.

Site Installation

The installation of KS1000 X-dek Roof panels on a particular building must be planned carefully to ensure the work can proceed in safety. The contractor normally prepares a method statement for his client, which indicates who is responsible for safety, what equipment and particularly what safety equipment, will be used for each stage of the work, and **the sequence of installation**.

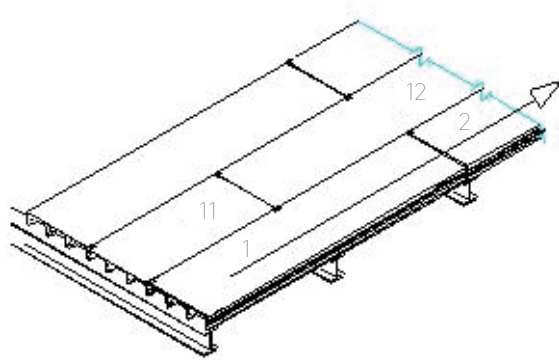
The general principles apply:

- Ensure that the purlins or other supporting elements (rafters, girders) have been installed to provide a level fixing plane for the panels.
- Fasten the first panel at the edge of the roof area to be clad, ensuring it is correctly aligned and the right way round for lapping etc, and then fix as indicated in the construction details.
- Install the recommended fasteners in their correct positions to fix the panel to the steelwork. Note that the number of fasteners may have to vary depending on the wind suction load. For all fixing options of KS1000 X-Dek panels the fasteners must be located at each crown (valley) – see details below.
- After fixing the panel to the supporting structure the stitching screws along the side-lap of the panels (see detail in the next section) must be applied, at a distance specified on working drawings. **It is very important that application of stitching screws is carried out just after the fixing of successive panels to the structure.** Leaving this operation to be fulfilled, when all panels are fastened to the supporting structure may result in inaccurate tightening of side joints, and uneven external surface of the panels ("step at joint"). For application details please see the "Fixing" chapter.
- When sealants are applied at laps or joints, ensure surfaces are clean and dry, apply the tape seal to the surface before removing backing paper, and cut (do not tear) the sealant at the end of a run.
- If the panels have to be cut on site always use a reciprocating type saw (jigsaw or similar), **do not use abrasive wheel cutters**. After cutting remove swarf from the panel surface, and any burrs from the cut edges. Eye protection should always be worn when cutting or drilling.

As the panel is being lifted on to the roof, the correct position is being marked and checked, the cover width is marked and checked. The panel can be completely fixed whilst the next panel is being lifted in position on the roof.

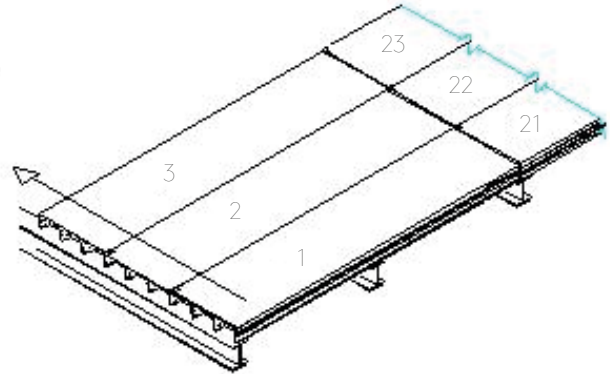
For Double Span panels the general layout of the panels can be arranged in two ways: Regular or Chessboard pattern – see below.

Kingspan recommends to specify “chess board” pattern for double and multi-span static schemes to avoid any unequal loads to rafters.



“Chess board” (staggered)

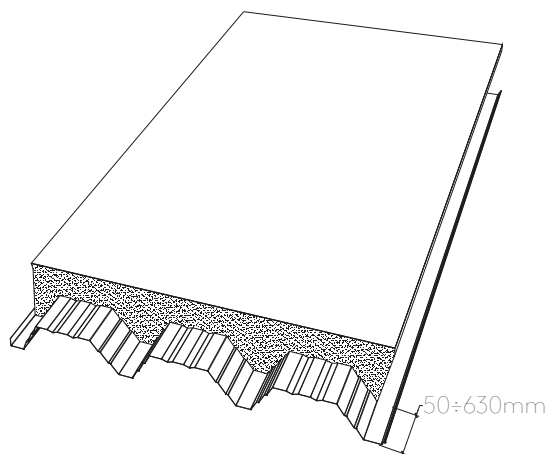
(Uniformly distributed load for each rafter)



Regular

(Unequal load for each rafter)

Several end-joint connections are possible (see Kingspan X-dek Standard Details). In standard, all the panels are manufactured with end-lap (minimum length of 50mm; maximum 630mm), which is made on the bottom trapezoidal deck, this allows to join longitudinally panels without special accessories from the bottom. It is recommended to leave a gap of 5-10mm, between the panels core at end-lap joint for further filling with PUR canister foam.

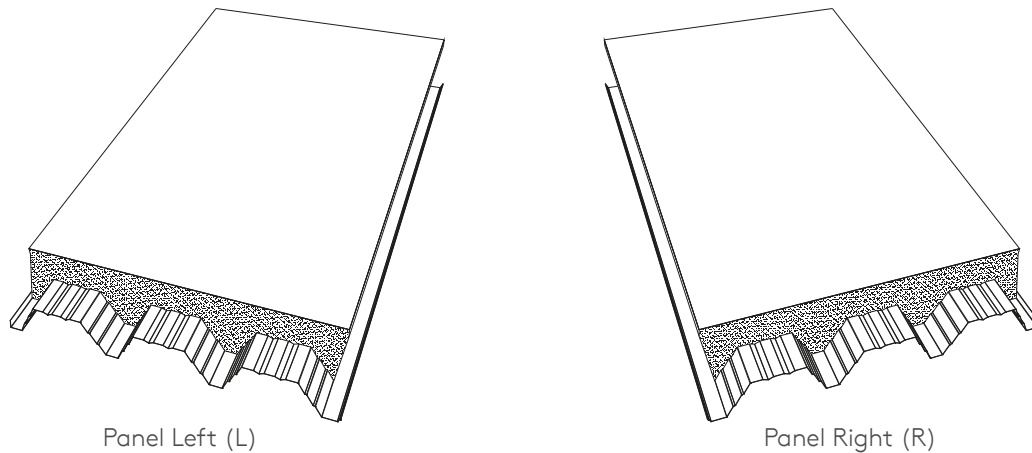


Depending on position of end-lap in relation to side-lap (“free wave”) the X-dek panels are available in two “orientations”: **Left(L)** and **Right(R)** – see scheme below.

The orientation of X-dek panels has influence on the direction of installation. In general the:

- **Left panels** are installed from left side towards right side of roof,
- **Right panels** are installed from right side towards left side of roof.

The orientation of panels is very important at the moment of preparation of cutting list, because indicated orientation of panels determines unequivocally the installation direction. Once the panels are produced with certain orientation the change of installation direction is extremely difficult and makes serious problems during installation.



The minimum support width at the ends should be **40mm**, the width of the intermediate support (depending on static calculations) should be at least **100mm**.

Fixing

Depending on the specification of KS1000 X-dek panels there are two options of fixing the panels.

Option 1

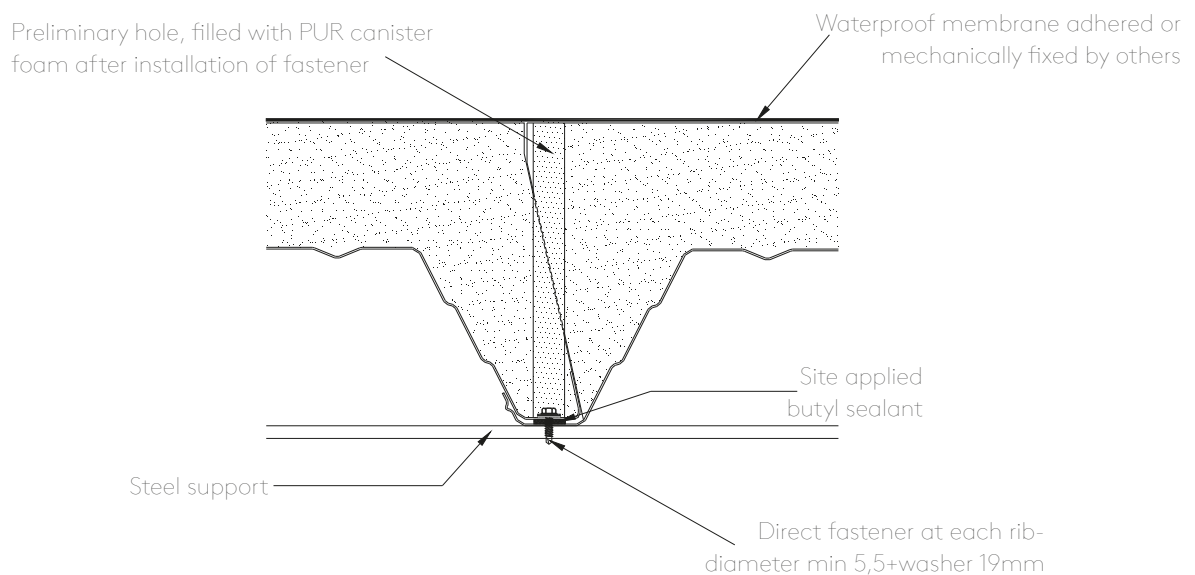
Direct fixing of only bottom steel deck to the supporting structure using short screws. This solution requires drilling preliminary hole of a diameter of 20-25mm from the top surface down to the bottom steel deck. Then the proper fastener – diameter minimum 5,5mm - is fixed at the bottom of the hole directly to the supporting element. After fixing the fastener the preliminary hole is to be filled with PUR canister foam.

The drilling of preliminary hole is not necessary when using SFS "self-coring" screws:

- SD3-D10-T19/C9-5,5x30 – the supporting steel element max. thickness of 3mm;
- SD14-D10-T19/C9-5,5x46 – the supporting steel element thickness of 4÷14mm;

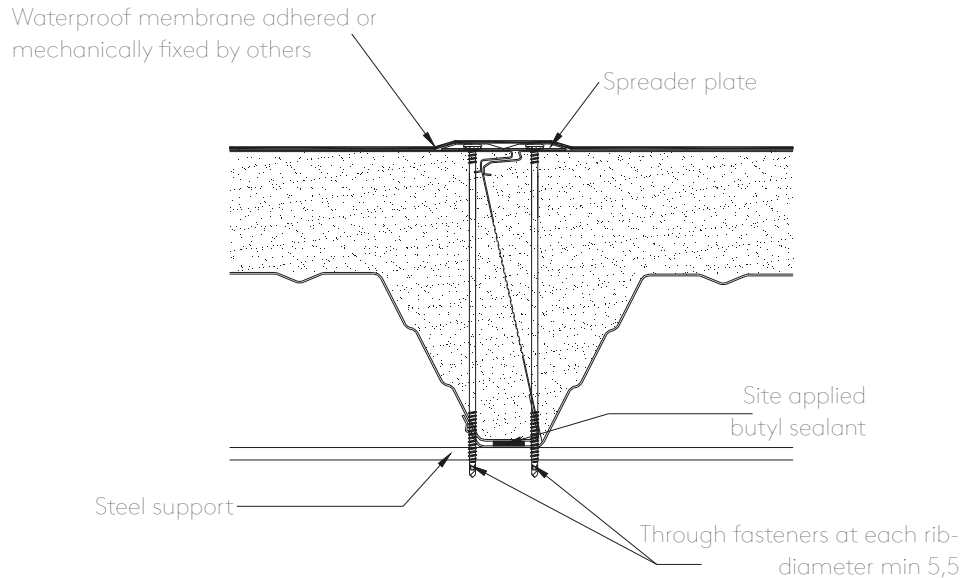
The fasteners must be applied at each rib over the supporting element; exact quantity of fasteners must be specified by the engineer due to local wind suction conditions.

The above option is specially recommended for the XB, XG and XM panel option. This solution can be also used for XD panels finished with steel on the top, but at this case the hole at the top skin must be prepared prior to core removal.



Option 2

The fixing of the panels with long through fasteners – diameter minimum 5,5mm – through prepunched spreader plate. The recommended spreader plate is SFS IE-C or IRD dimension 82x40mm. The fasteners must be applied over each rib along the supporting element, exact quantity of fasteners must be specified by the engineer due to local wind suction conditions. Recommended quantity is 2 screws over each rib.

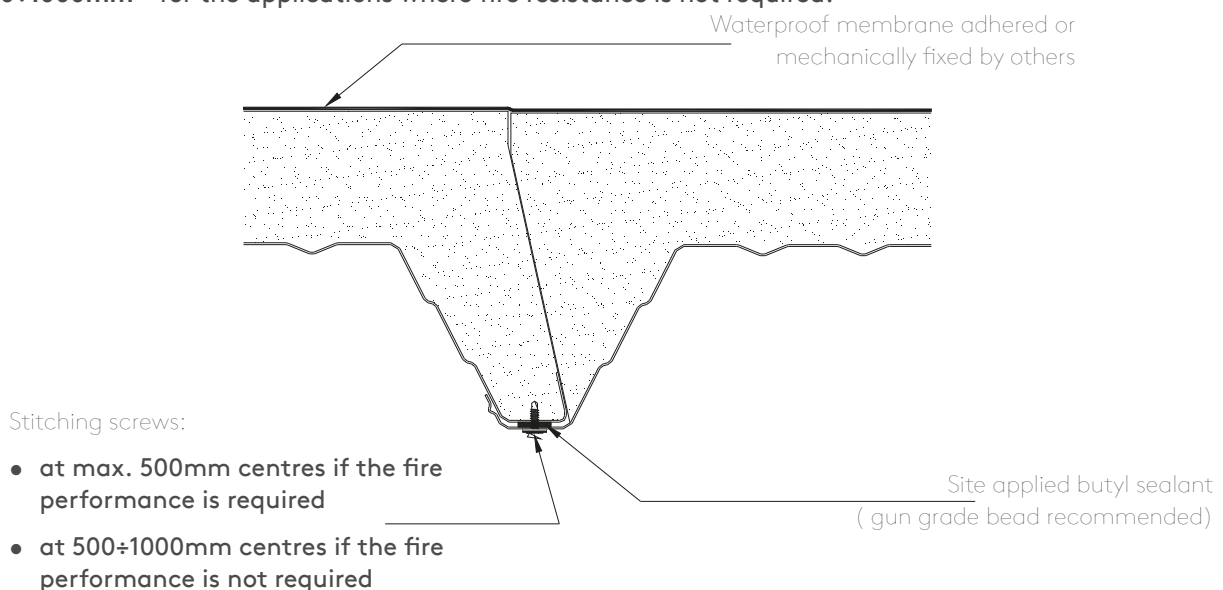


As it was stated in installation principles, the stitching of side lap **must be carried out, just after fastening of each panel to the supporting structure**. This solution is to secure overall panel stability, joint tightness, surface alignment and fire resistance of the X-dek panels. The stitching screws must be applied along the side lap of the panels (see detail below). The stitching screws are usually applied from the bottom side of roof, however the application from the top is also possible.

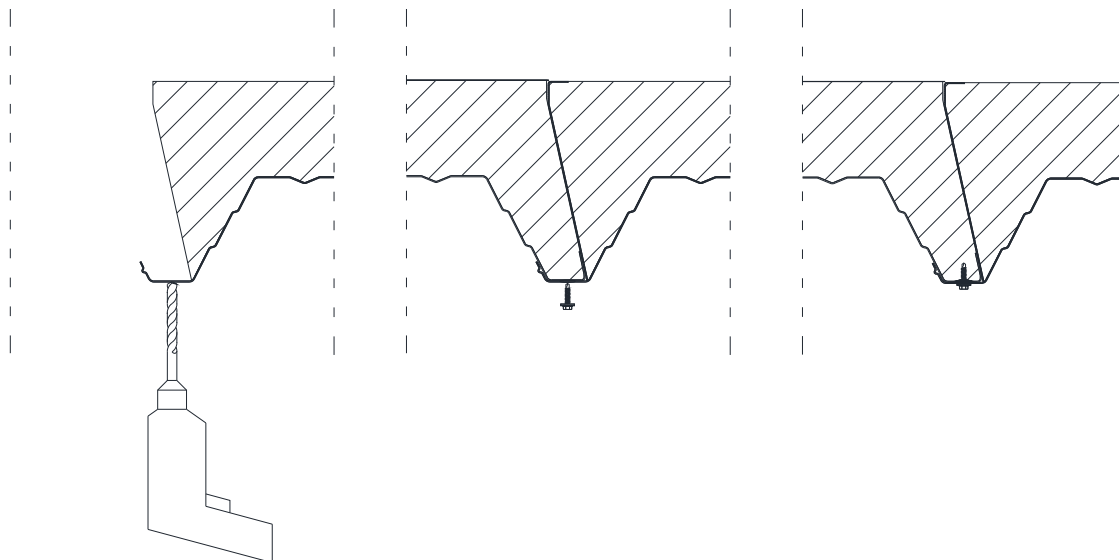
The application of stitching screws, either from the bottom or from the top, must be carried out in certain sequence. The stitching screw's application must always start at the support area, and moving towards the mid-span of panel. Maintaining the proper sequence will secure the proper joining of panels at side-lap and provide required tightness of joint.

Recommended distance of the stitching screws are:

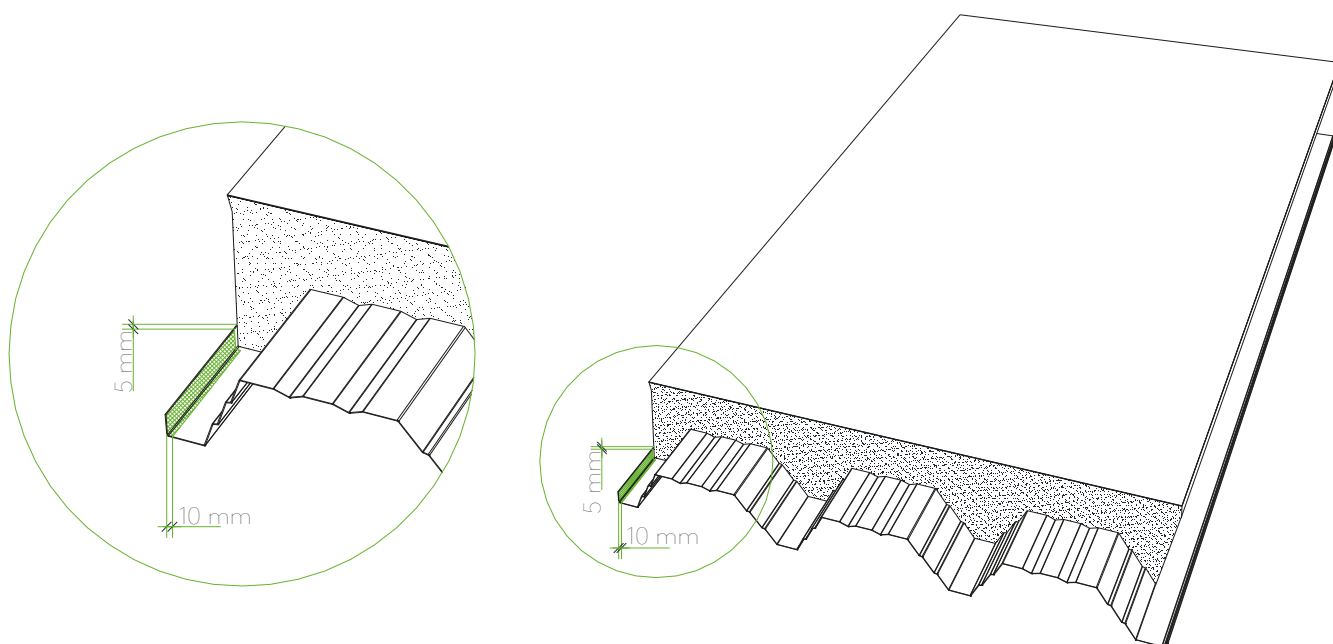
- **Max. 500mm** - for the applications where fire resistance is required,
- **500÷1000mm** - for the applications where fire resistance is not required.



It is recommended to drill preliminary whole in free crown to make stitching easier.



To be able to make the end lap joint it is recommended to cut off part of cutback from bottom panel marked at drawing below.



Fixing with additional, reinforcing steel sheet

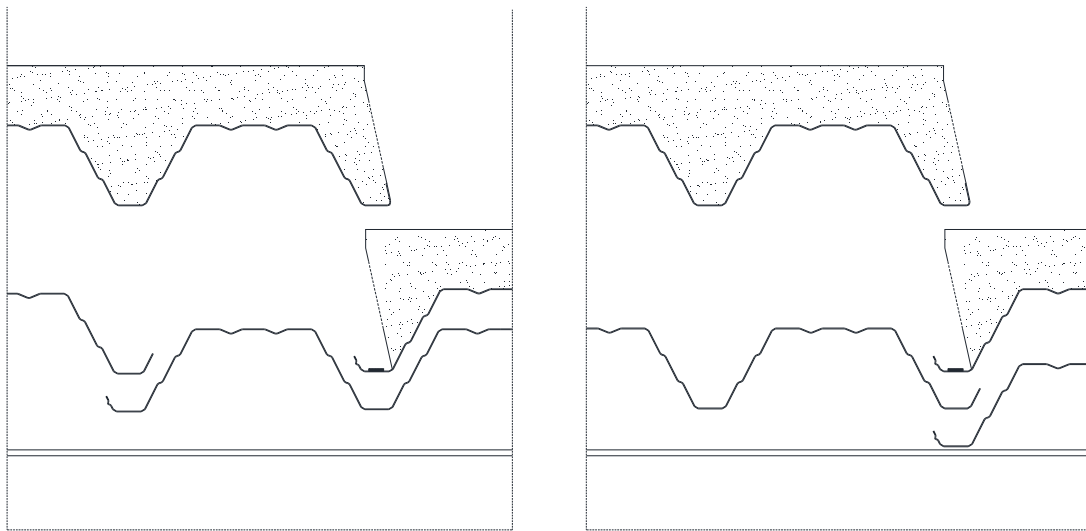
(double steel sheet for bigger load capacity)

If the panels load capacity is not enough, additional internal trapezoidal sheet would be needed. In this case few issues has to be taken into consider for every single project individually:

- Choosing of direction and way of sheet installation.
- Choosing of suitable stitching screws.
- Sealing of sheets joint.

It is recommended that trapezoidal sheet and X-dek panels were moved in modulus direction by "one rib" distance (333mm) by each other. Such action helps to avoid stitching of 4 or more pcs. of steel sheets at joint, but it requires double stitching (first for steel sheets and second for X-dek panels). During such installation panels joint will be covered by additional sheet, so place of panels joint should be marked and visible only for stitching time.

Application of sheets directly under the panel (sheet joint is under the panels joint) is fully acceptable. It requires one time stitching, but screws which will be use have to drill through 4 sheets (e.g. 4 x 1,1mm). In this situation proper stitching is more difficult installation and choosing of stitching screws have to be strongly considered.

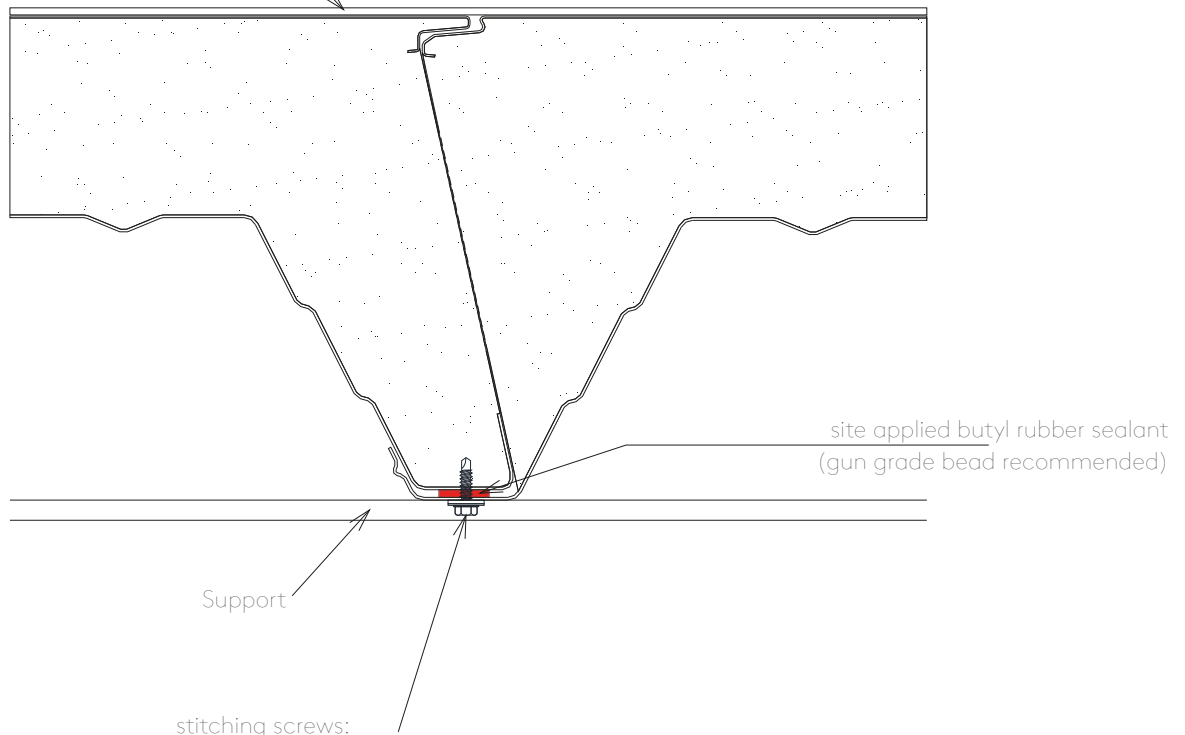


It is recommended to drill preliminary whole in additional steel sheets and free crown to make stitching easier.

Sealants & Fillers

The panels need to be fitted as close together as possible to assure a certain air-tightness. Due to overall rigidity of X-dek panels this operation may require some extra force to be applied when fitting panels – especially when applying side-lap stitching screws. At each side joint it is necessary to apply butyl rubber sealing, either tape or gun grade bead (see detail below). **Kingspan recommends to use butyl gun grade bead, because of higher plasticity and better filling of the side-lap gap during tightening.**

Waterproof membrane adhered or mechanically fixed by others



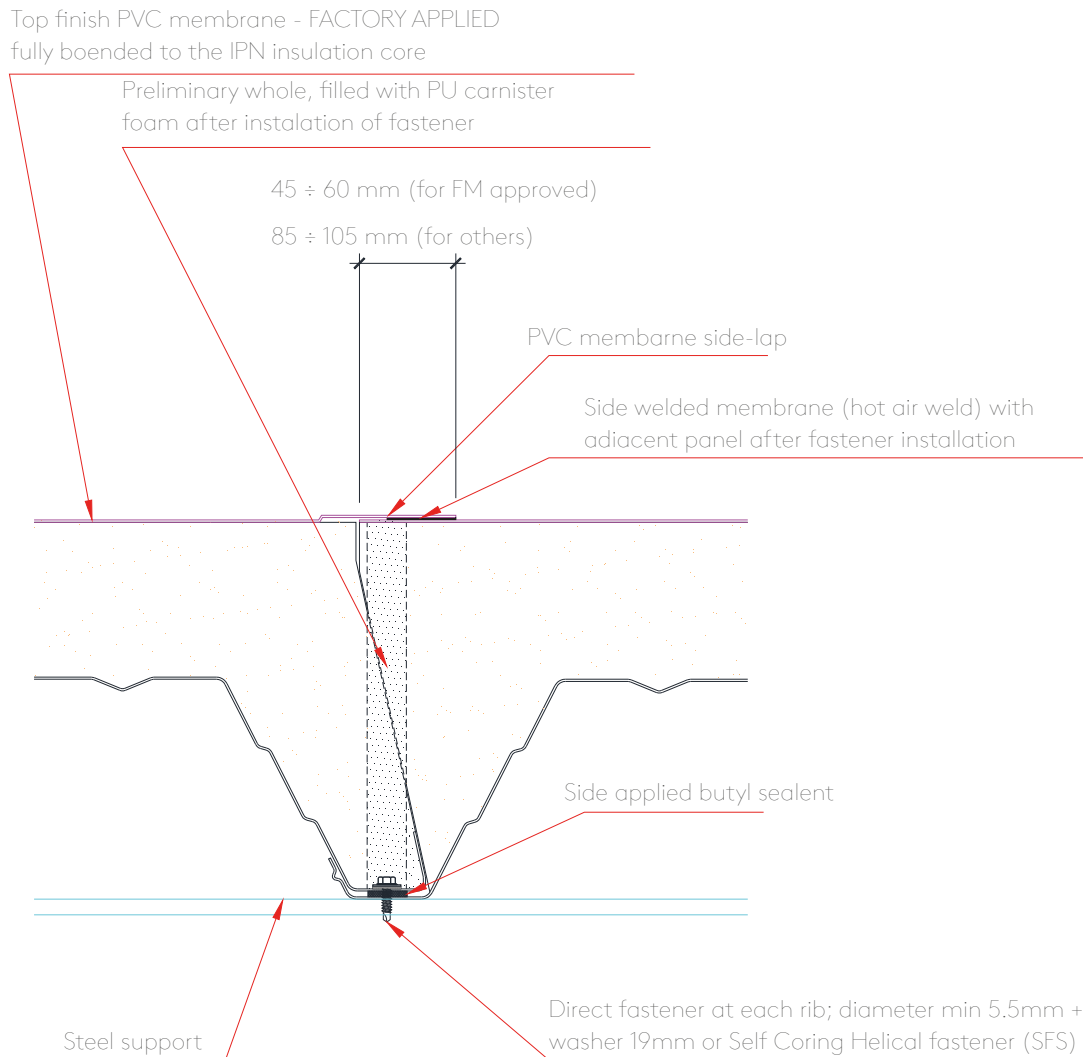
stitching screws:

- at 500mm centres if fire resistance is required
- at 1000mm centres if fire resistance is not required

In standard corrosion conditions there is no need of sealing for additional steel sheets. But in high corrosion environment sealing with butyl rubber sealant is recommended.

Water-tight works

The KS1000 X-dek(XM) option is factory finished with PVC membrane, and water-tight works depend on hot-air sealing of PVC membrane side laps(see detail below). The welding of the PVC membrane must be carried out by approved and experienced roofing contractor. The roofing contractor must follow the PVC membrane manufacturer instructions and procedures during welding.



The X-Dek roof panel option TR20(XB), TR27(XG) and steel(XD), must be finished with waterproof membrane installed by others.

The X-dek roof panels can be used with conventional site applied membranes for flat roof applications, which provides the Specifier with a wide range of finish possibilities. Due to the type of the top finish (XB, XG or XD) different types of membrane can be used and different technique of fastening can be used. Please see the table below which indicates the possible top solutions:

KS1000 X-dek top option in relation to Waterproof finish solution (Application Table)			
Polymer membranes PVC, TPO, EPDM, ...		Bitumen Membranes	
Adhered	Mechanically fixed	Torch-on	Mechanically fixed
Steel(XD), TR27(XG) (PVC - fleece backed)	Steel(XD), TR27(XG)	TR20(XB)	Steel(XD), TR27(XG)

The installation of particular roofing membrane must be carried out according to the Supplier instructions in relation to the membrane fixing method.

The water-tightness and durability of the roof is very much depending on the way how the top membrane has been fitted.

Roof-penetrations

When positioning the roof-penetration you always need to take in consideration the position of the grooves on the top of the panel.

When the roof-penetrations are larger than 300mm the openings must be additionally reinforced with extra supporting elements to compensate the loss of capacity of the panel.

Units fitted on the top of the roof must be checked by structural engineer concerning extra loads which can be applied onto the panel and if any additional support is required due to this elements.

Inspections

It is recommended that the roofs made of KS1000 X-dek panels should be inspected at least once a year according to Kingspan Standard Inspection and Maintenance rules. During the roof inspections all participants must obey the health and safety rules and regulations.

Contact Details

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The information provided in this datasheet is accurate as of its date of publication and represents our commitment to quality and transparency.

However, Kingspan Insulated Panels reserve the right to modify product specifications without prior notice to reflect advancements or improvements.

For applications not explicitly covered within this datasheet, consultation with our Technical Advisory Service is strongly advised to ensure the product meets your specific requirements.

Users are responsible for verifying the product's suitability for their particular needs and for ensuring compliance with all applicable laws and regulations.

We reserve the right to update this datasheet, and any other informational materials, at our discretion and without notice.

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For the latest information, please visit: www.kingspan.com/hu/hu/

For the most up to date and comprehensive product details, always refer to the latest version of this datasheet by scanning the QR code below.

