

Insulated Panels

# Kingspan X-dek™ Roof System Product Brochure

Longspan roof panels / Suitable for flat roofs with slope > 1%

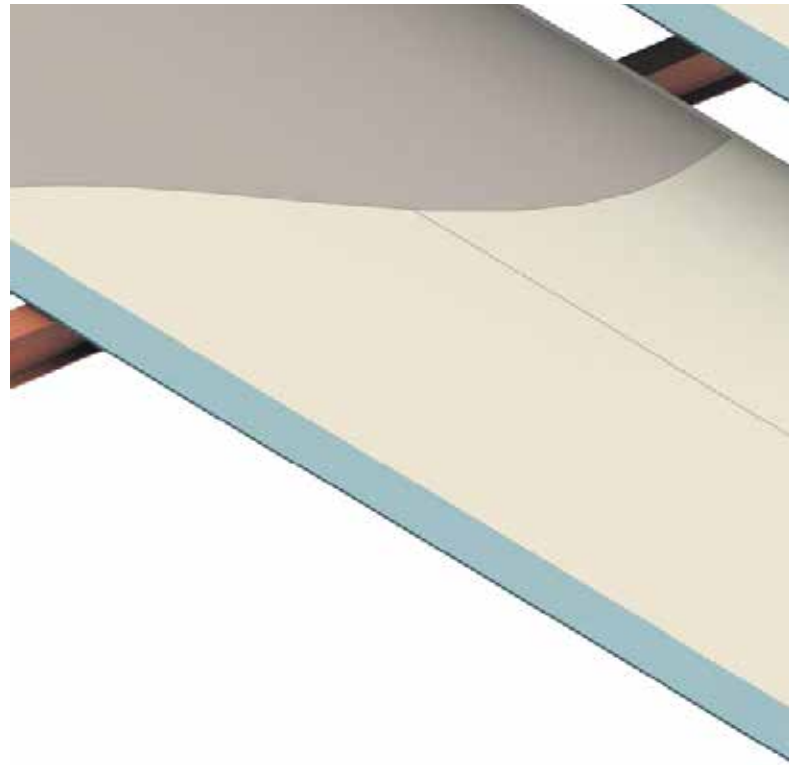


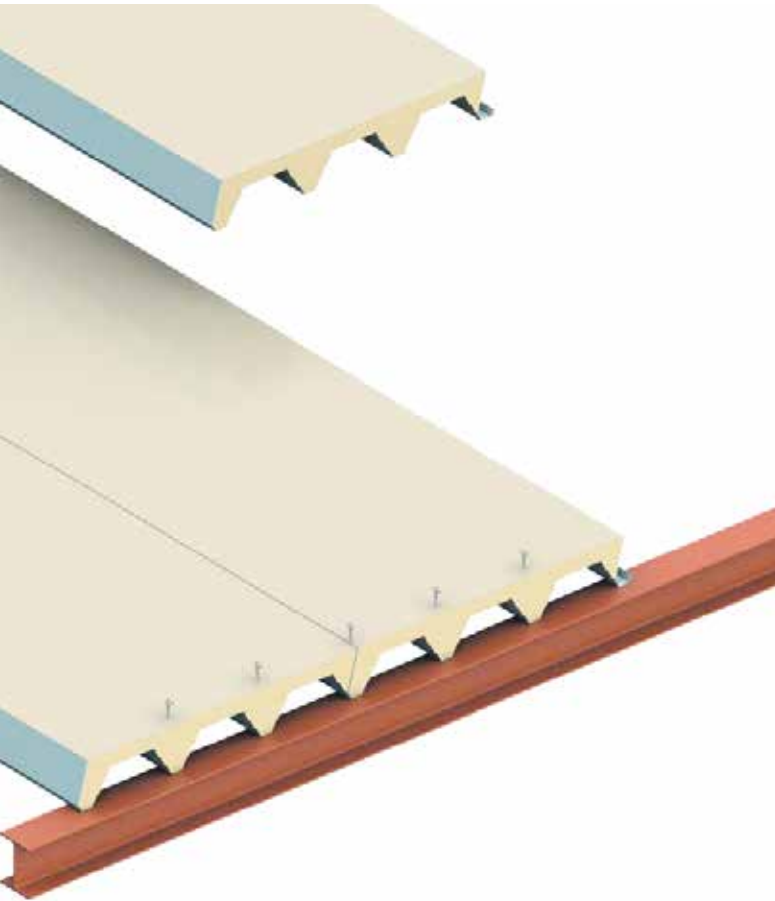
POWERED BY  
**QuadCore™**  
TECHNOLOGY

  
**Kingspan®**

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**“Faster to install than alternative built-up roof systems”**

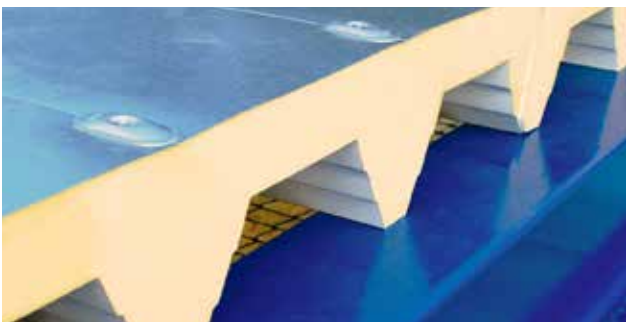


**Clear span capability of up to 6 meters**

### **X-dek™ Frame-to-Frame Long Spanning Insulated Roof Deck**

X-dek™ is an insulated roof deck combining a structural deck FireSafe™ insulation and a metal top sheet into one product.

Designed to support a choice of site applied standing seam or membrane finishes, X-dek™ provides a clear span capability of up to 6 metres, and is faster to install than alternative built-up roof deck systems. The internal face of the deck is pre-finished with a fresh white inner finish, providing a smooth clean interior appearance. X-dek™ is suitable for flat roof applications and is available with a Kingspan.





**X-dek™ is a frame-to-frame insulated structural roof deck. Key features include:**

#### **Structural & Design**

- Up to 6 metre spanning capability.
- Suitable for flat roof applications.
- Choice of membrane suppliers.
- Available as complete watertight solution - X-dek™ PVC.
- Requires no/limited secondary steelwork.
- Lengths available up to 15 metres.
- Provides a clean internal pre-finished interior building surface.

#### **Fast Installation**

- Ability to use pack-to-roof mechanical handling what minimizes need for manual handling.
- Reduced time on roof due to ease of installation.
- Reduction in quantity of components traditionally used on site eg. vapour control layer, fasteners etc.
- Facilitates earlier slab, services and fit-out trades - providing faster project completion and handover.
- Accelerates roof construction time.

#### **Internal**

- Clean, white internal appearance
- Suitable for suspension of internal lighting, secondary sprinkler pipe runs, heating/cooling ducting, roof ventilation & others, please consult the Kingspan Technical Service.

#### **Guarantees & Warranties**

X-dek™ is covered by the Kingspan Warranty, providing a guarantee of up to 20 years for thermal and structural performance. Please contact Kingspan for details.





X-dek™ flat roof



Conventional flat roof built-up assembly

### System Benefits

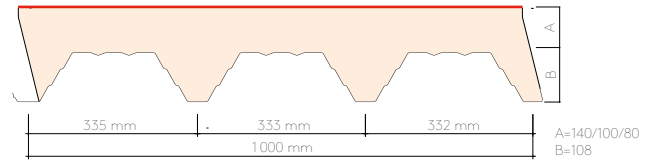
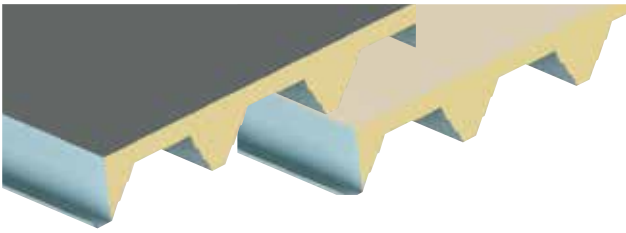
- Pre-engineered, frame-to-frame structural insulated roof deck.
- Fully complies with national safety requirements.
- Suitable for frame-to-frame spanning of up to 6 metres.
- Rapid, single component, single-fix installation – up to 1,200m<sup>2</sup> per day.
- End-of-life solutions are available.
- U-value up to 0,13 W/m<sup>2</sup>K.
- X-dek™ can contribute significantly to the air tightness of roof solution due to lack of cavities between steel deck and insulation.
- Firesafe insulated panel system.
- Can be used as a part of the flat roof system: X-dek TR20 (XB), X-dek TR27 (XB), X-dek Steel (XD) or as unique complete system: X-dek PVC (XM).



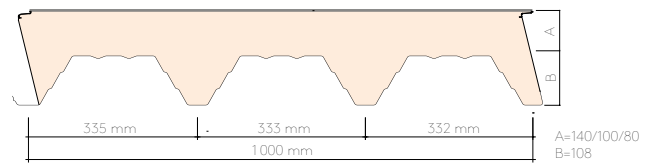
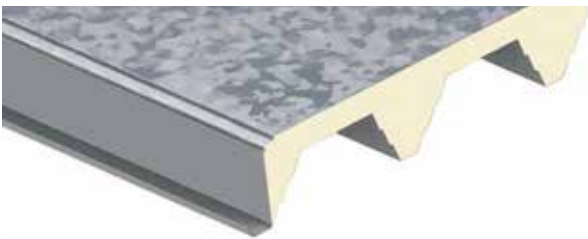
X-dek™ Flat Roof

**X-dek requires less steelwork and therefore leaves a more aesthetics finish.**

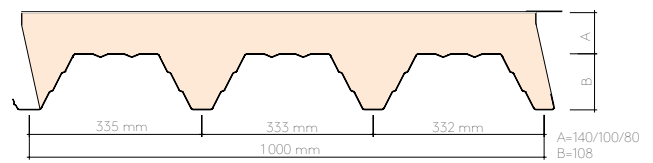
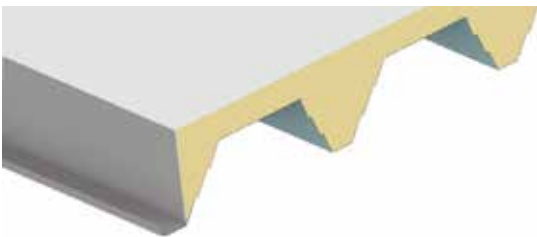
**KS1000 X-dek TR20/TR27 (XB/XG)**



**KS1000 X-dek Steel (XD)**



**KS1000 X-dek PVC (XM)**



**Products compatible with X-dek™ include:**

- Range of single ply membranes including PVC/TPO/TPE etc.
- Standing seam options.
- Mechanically fixed systems.
- Adhered systems.
- Range of bitumen waterproof systems including Asphalt and Torch-on solutions.

**Water-tight works:**

Each KS1000 X-dek roof panel (except X-dek PVC) must be finished with waterproof membrane. KS1000 X-dek can be used with conventional site applied membrane finished flat roof applications, which provides the specifier with a wide range of finish possibilities. Due to the type of the top finish (steel, TR20 or TR27) 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<br>PVC, TPO, EPDM, ... |                    | Bitumen Membranes |                    |
|--|--------------------|-------------------|--------------------|
| Adhered                                  | Mechanically fixed | Torch-on          | Mechanically fixed |
| steel, TR27<br>(PVC - fleece backed)     | steel, TR27        | TR20              | steel, TR20        |

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 dependent on the way that the top membrane has been fitted.



## Green Roofs

Extensive roof gardens are areas of vegetation close to those found in nature and which to a great extent look after themselves and develop naturally. They require plants that are suitable to extreme conditions and offers a high capacity for regeneration. These mainly self contained areas are made up from mosses, succulents, herbs and grasses. The vegetation is left to natural conditions.

### X-dek™ is suitable for:

Intensive roof gardens can include the planting of small and medium shrubs, grassed areas and occasionally trees. They may cover whole areas at the same level, be stepped or form islands.

Because of their flexibility in layout and use they offer just as many possibilities as a traditional ground level garden. The plants used make substantial demands on the layers, and they require regular watering and feeding.



Intensive Green Roof  
500kg/m<sup>2</sup> @2.5m double-span  
250kg/m<sup>2</sup> @3.5m double-span



Extensive Green Roof  
95kg/m<sup>2</sup> @ 5m  
Double-span



Brown roof





### Application

X-dek™ are roof panels suitable for flat roofs for all building applications except where there are low temperature internal conditions.

The KS1000 X-dek panel secures the base for final waterproof covering of the roof installed by others, or can be used as a complete watertight solution (X-dek PVC).

- X-dek panels are insulated roof panels suitable for flat roofs roof slope > 1%
- X-dek is the „long-span“ composite roofing panel, which provides the necessary structural strength and stiffness and the required level of thermal insulation.
- The KS1000 X-dek panels are suitable for „Green Roof“ solutions
- The X-dek panels can be used as „standard“ panel and as a part of steel structure „structural“ panel (restraining for the rafters).

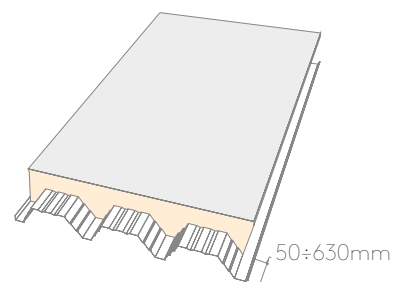


### Product tolerance

|                      |       |       |
|----------------------|-------|-------|
| Cut to Length        | -5 mm | +5 mm |
| Width                | -2 mm | +2 mm |
| Thickness            | -2 mm | +2 mm |
| End Square           | -3 mm | +3 mm |
| Flatness (per meter) | -2 mm | +2 mm |

### Available lengths

Standard lengths: from 3,0 to 15,0 metres.  
13,5 – 15 metres maximum can be supplied but are subject to a transport surcharge. All the panels are manufactured with CUT-BACK (on bottom trapezoidal steel) the standard cut-back is 50mm, the maximum available is 630 mm.





## Material – Steel

Internal skin:

Hot-dipped zinc coated steel according to EN 10346:2011. Grade S350GD+Z275 coated with Polyester 25 microns RAL9002 – standard thickness 0,9 mm, on special request available 1,1 mm.

External skin:

Hot-dipped zinc coated steel according to EN 10346:2011. Grade S220GD+Z275 – thickness 0,7 mm galvanised steel with a 5 microns clear film conversion layer for bonding to. Available profiles on top sheet: MiniBox.

**TR20** – bitumen impregnated glass fiber membrane suitable for multi layer torch on systems;

**TR27** – glass tissue facing suitable for mechanically fixed or fully adhered single ply PVC or EPDM membrane;

**PCV** - waterproof single layer PVC foil 1,2 mm thick made on fabric base. Standard exterior color is similar to RAL7035.

## Insulation core

The rigid closed cell insulation core is available in the following specification: Isophenic rigid foam – IPN (HCFC Free), nominal density of 40 kg/m<sup>3</sup>. Available nominal thickness of the core 80 mm, 100 mm and 140 mm.

## Performance

Thermal Insulation:  $\lambda=0,023$  W/mK:

| Panel Thickness (mm) | R value<br>[(m <sup>2</sup> K)/W] | U value<br>[W/(m <sup>2</sup> K)] |
|----------------------|-----------------------------------|-----------------------------------|
| 80 / option I        | 4.21                              | 0.23                              |
| 80 / option II       | 4.03                              | 0.24                              |
| 100 / option I       | 5.12                              | 0.19                              |
| 100 / option II      | 4.86                              | 0.20                              |
| 140 (XD)             | 7.57                              | 0.13                              |
| 140 (XB, XG, XM)     | 6.99                              | 0.14                              |

## Seals

Factory Applied Side Joint Seal.

All side joints have a factory applied anti-condensation tape made of standard PE side foam.

## Biological

Kingspan panels are normally immune to attack from mould, fungi, mildew and vermin, no urea formaldehyde is used in the construction, and the panels are not considered deleterious.

## Fire

Kingspan KS1000 X-dek roof panels has been tested according to EN 13501+A1:2010 as load bearing roof element. The ratings achieved are presented in the table below:

| Panel Type              | Core thickness [mm] |     |     |
|-------------------------|---------------------|-----|-----|
|                         | 80                  | 100 | 140 |
|                         | Fire Rating         |     |     |
| KS1000 X-dek TR20 (XB)  | B-s2,d0; REI15      |     |     |
| KS1000 X-dek T27 (XG)   | B-s2,d0; REI20      |     |     |
| KS1000 X-dek PCV (XM)   | B-s2,d0; REI30      |     |     |
| KS1000 X-dek Steel (XD) | B-s1,d0; REI30      |     |     |

## Acoustics

KS1000 X-dek panels have acoustic parameters as below:

| Panel type                          | Parameters according to Type of<br>EN ISO 717-1:1999 |          |         |
|-------------------------------------|--|----------|---------|
|                                     | RA1 [dB]   | RA2 [dB] | RW [dB] |
| KS1000 X-dek<br>80/100/140 XD       | 25   | 22       | 26      |
| KS1000 X-dek<br>80/100/140 TR27/PVC | 23   | 21       | 24      |
| KS1000 X-dek<br>80/100/140 TR20     | 22   | 20       | 23      |

Sound absorption factor:  $\alpha_{av} = 0,1$ .

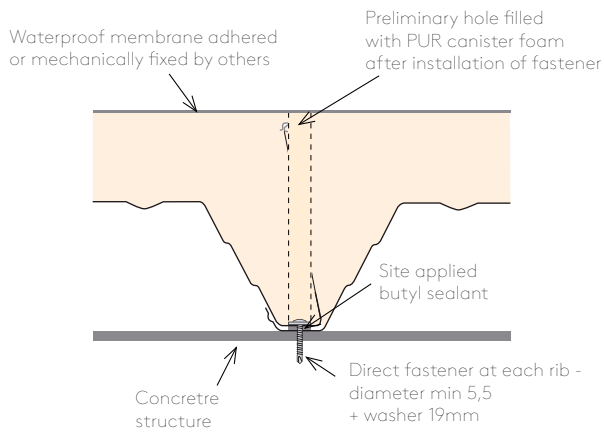
## Quality and durability

Kingspan Insulated panels are manufactured from the highest quality materials, using state of the art production equipment to rigorous quality control standards, complying with ISO9001 standard, ensuring long term reliability and service life.

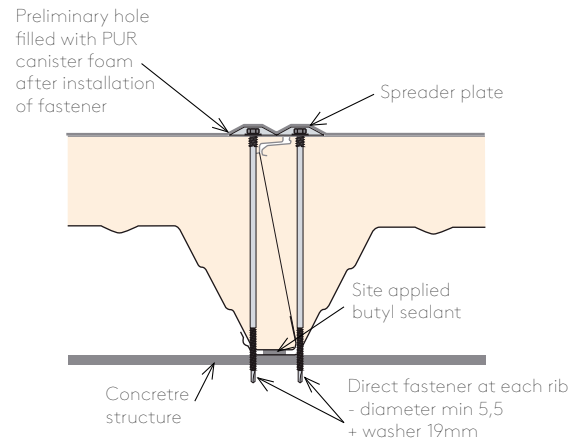
Kingspan will provide external coating and product warranties and guaranties on an individual project basis.

|  |   |
|--|---|
| <ul style="list-style-type: none"> <li>✓ Unique engineered solution of composite panel dedicated especially for „FLAT ROOFS“.</li> </ul>   | <ul style="list-style-type: none"> <li>■ Possible application on roof slope starting from 1%.</li> <li>■ Low risk of “human factor” in installation. Single part system safe and easy to install.</li> </ul>  |
| <ul style="list-style-type: none"> <li>✓ Big load bearing capacity of panel secured by bottom deep trapezoidal deck gauge at least 0.9 mm.</li> </ul>  | <ul style="list-style-type: none"> <li>■ Possibility of installation directly to the steel rafters. Purlin sub-structure not required. Reduction of steel consumption.</li> <li>■ Bottom deep trapezoidal deck can provide the lateral restraint for the rafters.</li> </ul>  |
| <ul style="list-style-type: none"> <li>✓ Product solution allows to carry out installation of panels regardless of the weather conditions.</li> </ul>  | <ul style="list-style-type: none"> <li>■ At built-up systems the installation must be carried out at “dry conditions” to avoid “capture” of water and humidity at insulation core and between the layers of roof. Increase of moisture by 1% of volume at insulation layer of MMMF – decreases the thermal insulation roughly by 15%.</li> </ul>  |
| <ul style="list-style-type: none"> <li>✓ IPN insulation core fully fills the whole section of X-dek panel providing maximum thermal performance.</li> </ul>  | <ul style="list-style-type: none"> <li>■ Excellent thermal performance of roof, which reduces the heating costs and emission of CO<sub>2</sub> of whole building.</li> <li>■ U-value range:<br/>140 mm thick core – 0,13 W/m<sup>2</sup>K<br/>100 mm thick core – 0,19 W/m<sup>2</sup>K<br/>80 mm thick core – 0,23 W/m<sup>2</sup>K</li> <li>■ Continuous IPN core eliminates the cold bridges and the risk of interstitial condensation</li> <li>■ Due to very low humidity absorption factor for the IPN foam, the risk of physical degradation of insulation core (increase of “lambda” value) is very small.</li> <li>■ Rigid IPN core allows to walk safely over the panels – very low risk of mechanical compression of insulation core – no visible “traffic paths” after installation and less stress on the laps / joints of the membrane over the lifetime of the building.</li> </ul> |
| <ul style="list-style-type: none"> <li>✓ Very low unit weight of X-dek panels, depending on option amounts from 14 up to 25 kg/m<sup>2</sup>.</li> </ul>   | <ul style="list-style-type: none"> <li>■ Lower dead load of roof covering which results in savings at steel section design.</li> </ul>  |
| <ul style="list-style-type: none"> <li>✓ Rapid installation process – one panel, instead of few layers one by one.</li> </ul>  | <ul style="list-style-type: none"> <li>■ Fast track construction – enables to start internal works earlier and finally can reduce the overall installation time, offering the owner the earlier operation of the building.</li> </ul>   |
| <ul style="list-style-type: none"> <li>✓ The top finish of X-dek panel can be prepared for application of various waterproof membranes. This gives the designer/contractor the chance to choose any type of waterproof membrane. The panels are offered with required accessories for final finish.</li> </ul> | <ul style="list-style-type: none"> <li>■ Waterproof membrane delivery can be in scope of Kingspan or Roofing Contractor.</li> <li>■ The Contractors can use their experience at installation of various waterproof membranes.</li> <li>■ All roofing elements available at one supplier. Technical support from one company.</li> <li>■ Reliability of experienced solutions and materials which guarantee long durability of whole roofing.</li> <li>■ The installation of various smoke-vents, roof-lights, fans and other technical equipment is possible on the X-dek panels.</li> </ul>  |
| <ul style="list-style-type: none"> <li>✓ KS1000 X-dek panels are manufactured from the highest quality materials, using state of the art production equipment to rigorous quality control standards, complying with ISO9001:2000 standards.</li> </ul>   | <ul style="list-style-type: none"> <li>■ Factory controlled high quality.</li> <li>■ Guaranteed long term reliability, service life and technical performance of panels.</li> </ul>   |
| <ul style="list-style-type: none"> <li>✓ Up to 20 years guarantee on thermal, static and fire performance of X-dek panels.</li> </ul>  |   |

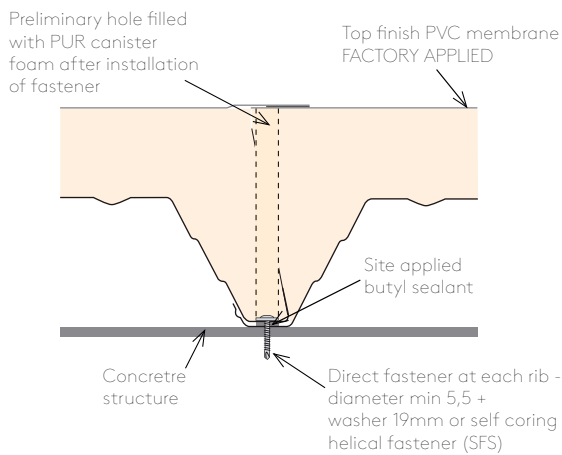
**X-dek Steel (XD) - option I**



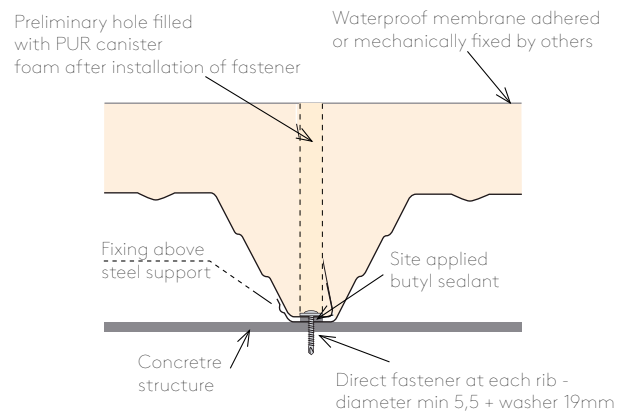
**X-dek Steel (XD) option II**



**KS1000 X-dek (PVC)**



**KS1000 X-dek (XD, TR20/TR27)**

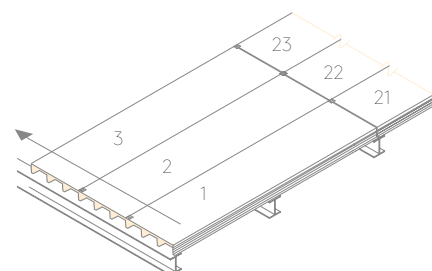
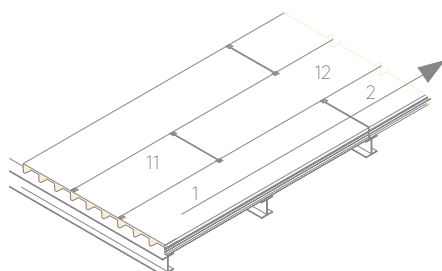


The minimum support width at the ends should be 40mm, the width of the intermediate support (depending on static calculations) should be at least 100mm.

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.

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 chessboard pattern for double span applications.



“Chess board” pattern (Uniformly distributed load for each rafter)

Regular (Unequal load for each rafter)

Load span tables [kN/m<sup>2</sup>], max. deflection limit L/200 SINGLE SPAN

| Upper layer                 |                | TR20/TR27/PVC                  |           | Bottom deck |           | 0,9mm     |           |           |           |           |           |
|-----------------------------|----------------|--------------------------------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Core thickness [mm]         | Load case      | Load type [kN/m <sup>2</sup> ] | Span [m]  |             |           |           |           |           |           |           |           |
|                             |                |                                | 2,0       | 2,5         | 3,0       | 3,5       | 4,0       | 4,5       | 5,0       | 5,5       | 6,0       |
| 80                          | Bearing (ULS)  | Downward                       | 10,380    | 8,260       | 6,850     | 5,355     | 4,704     | 3,561     | 2,758     | 2,279     | 1,915     |
|                             |                | Upward                         | 15,780    | 10,155      | 7,095     | 5,250     | 3,329     | 2,417     | 1,785     | 1,529     | 1,329     |
|                             | Rigidity (SLS) | Downward                       | 6,920     | 5,510       | 4,570     | 3,400     | 2,622     | 1,757     | 1,220     | 0,929     | 0,725     |
|                             |                | Upward                         | 10,520    | 6,770       | 4,730     | 3,500     | 2,500     | 1,728     | 1,240     | 0,946     | 0,740     |
| 100/140                     | Bearing (ULS)  | Downward                       | 10,380    | 8,260       | 6,850     | 5,355     | 4,704     | 3,639     | 2,885     | 2,378     | 1,993     |
|                             |                | Upward                         | 15,780    | 10,155      | 7,095     | 5,250     | 3,433     | 2,559     | 1,949     | 1,487     | 1,145     |
|                             | Rigidity (SLS) | Downward                       | 6,920     | 5,510       | 4,570     | 3,400     | 2,619     | 1,777     | 1,251     | 0,963     | 0,760     |
|                             |                | Upward                         | 10,520    | 6,770       | 4,730     | 3,500     | 2,350     | 1,717     | 1,300     | 0,969     | 0,740     |
| <b>a<sub>min</sub> (mm)</b> |                |                                | <b>50</b> | <b>50</b>   | <b>50</b> | <b>50</b> | <b>40</b> | <b>40</b> | <b>40</b> | <b>40</b> | <b>40</b> |

| Upper layer                 |                | TR20/TR27/PVC                  |           | Bottom deck |           | 1,1mm     |           |           |           |           |           |           |
|-----------------------------|----------------|--------------------------------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Core thickness [mm]         | Load case      | Load type [kN/m <sup>2</sup> ] | Span [m]  |             |           |           |           |           |           |           |           |           |
|                             |                |                                | 2,0       | 2,5         | 3,0       | 3,5       | 4,0       | 4,5       | 5,0       | 5,5       | 6,0       | 6,5       |
| 80                          | Bearing (ULS)  | Downward                       | 15,600    | 12,435      | 9,915     | 7,215     | 5,566     | 4,367     | 3,475     | 2,844     | 2,337     | 1,968     |
|                             |                | Upward                         | 21,060    | 13,545      | 9,450     | 6,990     | 4,833     | 3,848     | 3,146     | 2,565     | 2,228     | 1,917     |
|                             | Rigidity (SLS) | Downward                       | 10,400    | 8,290       | 6,610     | 4,810     | 2,889     | 1,990     | 1,391     | 1,017     | 0,728     | 0,535     |
|                             |                | Upward                         | 14,040    | 9,030       | 6,300     | 4,550     | 3,100     | 2,200     | 1,670     | 1,300     | 1,040     | 0,860     |
| 100/140                     | Bearing (ULS)  | Downward                       | 15,600    | 12,435      | 9,915     | 7,215     | 5,674     | 4,452     | 3,543     | 2,900     | 2,383     | 2,006     |
|                             |                | Upward                         | 21,060    | 13,545      | 9,450     | 6,990     | 4,833     | 3,848     | 3,146     | 2,565     | 2,228     | 1,917     |
|                             | Rigidity (SLS) | Downward                       | 10,400    | 8,290       | 6,610     | 4,810     | 2,943     | 2,027     | 1,417     | 1,036     | 0,741     | 0,545     |
|                             |                | Upward                         | 14,040    | 9,030       | 6,300     | 4,550     | 3,100     | 2,200     | 1,670     | 1,300     | 1,040     | 0,860     |
| <b>a<sub>min</sub> (mm)</b> |                |                                | <b>50</b> | <b>50</b>   | <b>50</b> | <b>50</b> | <b>40</b> | <b>40</b> | <b>40</b> | <b>40</b> | <b>40</b> | <b>40</b> |

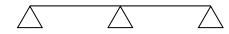
## REMARKS:

- ULS – Ultimate Limit State – indicated loads should be compared with factored (design) loads
- SLS – Serviceability Limit State – indicated loads should be compared with characteristic (un-factored) loads
- The above-mentioned calculations apply to panels with standard bottom steel skin strength specification of the  $f_y=350$  MPa (S350GD) or higher
- Maximum permissible deflection limit (SLS):  $L / 200$
- The dead load of panels is included in the above figures
- $a_{min}$  – the minimum width of end supports.

| Upper layer         |                                | 0,7mm      |           | Bottom deck |           | 0,9mm     |           |           |           |           |           |           |
|---------------------|--------------------------------|------------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Core thickness [mm] | Load type [kN/m <sup>2</sup> ] | Span [m]   |           |             |           |           |           |           |           |           |           |           |
|                     |                                | 2,5        | 3,0       | 3,5         | 4,0       | 4,5       | 5,0       | 5,5       | 6,0       | 6,5       | 7,0       | 7,5       |
| 80                  | Downward                       | 8,47       | 6,23      | 4,79        | 3,82      | 3,12      | 2,65      | 2,15      | 1,70      | 1,35      | 1,05      | 0,80      |
|                     | Upward                         | 9,49       | 7,09      | 5,57        | 4,52      | 3,77      | 3,16      | 2,56      | 2,12      | 1,78      | 1,52      | 1,28      |
|                     | <b>a<sub>min</sub> (mm)</b>    | <b>102</b> | <b>91</b> | <b>82</b>   | <b>76</b> | <b>70</b> | <b>68</b> | <b>60</b> | <b>55</b> | <b>49</b> | <b>41</b> | <b>40</b> |
| 100/140             | Downward                       | 8,96       | 6,61      | 5,15        | 4,15      | 3,45      | 2,91      | 2,47      | 2,01      | 1,63      | 1,31      | 1,02      |
|                     | Upward                         | 10,17      | 7,72      | 6,15        | 5,06      | 4,26      | 3,61      | 2,95      | 2,46      | 2,07      | 1,77      | 1,53      |
|                     | <b>a<sub>min</sub> (mm)</b>    | <b>108</b> | <b>97</b> | <b>88</b>   | <b>82</b> | <b>77</b> | <b>73</b> | <b>68</b> | <b>63</b> | <b>56</b> | <b>44</b> | <b>43</b> |

| Upper layer         |                                | 0,7mm      |            | Bottom deck |           | 1,1mm     |           |           |           |           |           |           |
|---------------------|--------------------------------|------------|------------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Core thickness [mm] | Load type [kN/m <sup>2</sup> ] | Span [m]   |            |             |           |           |           |           |           |           |           |           |
|                     |                                | 2,5        | 3,0        | 3,5         | 4,0       | 4,5       | 5,0       | 5,5       | 6,0       | 6,5       | 7,0       | 7,5       |
| 80                  | Downward                       | 9,85       | 7,41       | 5,66        | 4,50      | 3,67      | 3,05      | 2,38      | 1,87      | 1,49      | 1,16      | 0,89      |
|                     | Upward                         | 11,21      | 8,31       | 6,50        | 5,26      | 4,36      | 3,51      | 2,84      | 2,35      | 1,97      | 1,68      | 1,45      |
|                     | <b>a<sub>min</sub> (mm)</b>    | <b>119</b> | <b>108</b> | <b>97</b>   | <b>89</b> | <b>83</b> | <b>77</b> | <b>67</b> | <b>59</b> | <b>43</b> | <b>45</b> | <b>40</b> |
| 100/140             | Downward                       | 10,32      | 7,79       | 6,03        | 4,85      | 4,00      | 3,37      | 2,75      | 2,20      | 1,78      | 1,45      | 1,14      |
|                     | Upward                         | 11,90      | 8,97       | 7,10        | 5,82      | 4,88      | 3,98      | 3,24      | 2,69      | 2,27      | 1,94      | 1,68      |
|                     | <b>a<sub>min</sub> (mm)</b>    | <b>125</b> | <b>114</b> | <b>103</b>  | <b>96</b> | <b>90</b> | <b>85</b> | <b>77</b> | <b>69</b> | <b>61</b> | <b>55</b> | <b>48</b> |



Load span tables [kN/m<sup>2</sup>], max. deflection limit L/200 DOUBLE SPAN

| Upper layer         |                | TR20/TR27/PVC                  |            | Bottom deck |            |            |            |            |            |            |            | 0,9mm |  |
|---------------------|----------------|--------------------------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------|-------|--|
| Core thickness [mm] | Load case      | Load type [kN/m <sup>2</sup> ] | Span [m]   |             |            |            |            |            |            |            |            |       |  |
|                     |                |                                | 2,0        | 2,5         | 3,0        | 3,5        | 4,0        | 4,5        | 5,0        | 5,5        | 6,0        |       |  |
| 80                  | Bearing (ULS)  | Downward                       | 9,990      | 7,050       | 5,200      | 3,975      | 2,853      | 2,316      | 1,927      | 1,561      | 1,285      |       |  |
|                     |                | Upward                         | 14,865     | 10,230      | 7,500      | 5,700      | 3,098      | 2,388      | 1,886      | 1,702      | 1,551      |       |  |
|                     | Rigidity (SLS) | Downward                       | 6,660      | 4,700       | 3,470      | 2,650      | 5,466      | 4,107      | 3,189      | 2,506      | 2,015      |       |  |
|                     |                | Upward                         | 9,910      | 6,820       | 5,000      | 3,800      | 4,981      | 3,816      | 3,014      | 2,352      | 1,879      |       |  |
| 100/140             | Bearing (ULS)  | Downward                       | 9,990      | 7,050       | 5,200      | 3,975      | 3,187      | 2,448      | 1,927      | 1,553      | 1,271      |       |  |
|                     |                | Upward                         | 14,865     | 10,230      | 7,500      | 5,700      | 3,108      | 2,746      | 2,460      | 2,161      | 1,924      |       |  |
|                     | Rigidity (SLS) | Downward                       | 6,660      | 4,700       | 3,470      | 2,650      | 5,466      | 3,911      | 2,903      | 2,398      | 2,015      |       |  |
|                     |                | Upward                         | 9,910      | 6,820       | 5,000      | 3,800      | 4,662      | 3,704      | 3,014      | 2,379      | 1,920      |       |  |
|                     |                | <b>a<sub>min</sub> (mm)</b>    | <b>90</b>  | <b>90</b>   | <b>90</b>  | <b>90</b>  | <b>40</b>  | <b>40</b>  | <b>40</b>  | <b>40</b>  | <b>40</b>  |       |  |
|                     |                | <b>b<sub>min</sub> (mm)</b>    | <b>160</b> | <b>160</b>  | <b>160</b> | <b>160</b> | <b>120</b> | <b>120</b> | <b>120</b> | <b>120</b> | <b>120</b> |       |  |

| Upper layer         |                | TR20/TR27/PVC                  |            | Bottom deck |            |            |            |            |            |            |            | 1,1mm |  |
|---------------------|----------------|--------------------------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------|-------|--|
| Core thickness [mm] | Load case      | Load type [kN/m <sup>2</sup> ] | Span [m]   |             |            |            |            |            |            |            |            |       |  |
|                     |                |                                | 2,0        | 2,5         | 3,0        | 3,5        | 4,0        | 4,5        | 5,0        | 5,5        | 6,0        | 6,5   |  |
| 80                  | Bearing (ULS)  | Downward                       | 14,085     | 9,855       | 7,245      | 5,520      | 4,320      | 3,450      | 2,805      | 2,310      | 1,920      | 1,620 |  |
|                     |                | Upward                         | 21,795     | 14,755      | 10,320     | 7,620      | 5,292      | 4,185      | 3,416      | 2,862      | 2,417      | 2,093 |  |
|                     | Rigidity (SLS) | Downward                       | 9,390      | 6,570       | 4,830      | 3,680      | 5,466      | 4,107      | 3,189      | 2,506      | 2,015      | 1,188 |  |
|                     |                | Upward                         | 14,530     | 9,850       | 6,880      | 5,080      | 4,981      | 3,816      | 3,014      | 2,352      | 1,879      | 1,705 |  |
| 100/140             | Bearing (ULS)  | Downward                       | 14,085     | 9,855       | 7,245      | 5,520      | 4,320      | 3,450      | 2,805      | 2,310      | 1,920      | 1,620 |  |
|                     |                | Upward                         | 21,795     | 14,755      | 10,320     | 7,620      | 5,292      | 4,185      | 3,416      | 2,862      | 2,417      | 2,093 |  |
|                     | Rigidity (SLS) | Downward                       | 9,390      | 6,570       | 4,830      | 3,680      | 5,466      | 3,911      | 2,903      | 2,398      | 2,015      | 1,242 |  |
|                     |                | Upward                         | 14,530     | 9,850       | 6,880      | 5,080      | 4,662      | 3,704      | 3,014      | 2,379      | 1,920      | 1,783 |  |
|                     |                | <b>a<sub>min</sub> (mm)</b>    | <b>90</b>  | <b>90</b>   | <b>90</b>  | <b>90</b>  | <b>40</b>  | <b>40</b>  | <b>40</b>  | <b>40</b>  | <b>40</b>  |       |  |
|                     |                | <b>b<sub>min</sub> (mm)</b>    | <b>160</b> | <b>160</b>  | <b>160</b> | <b>160</b> | <b>120</b> | <b>120</b> | <b>120</b> | <b>120</b> | <b>120</b> |       |  |

## REMARKS:

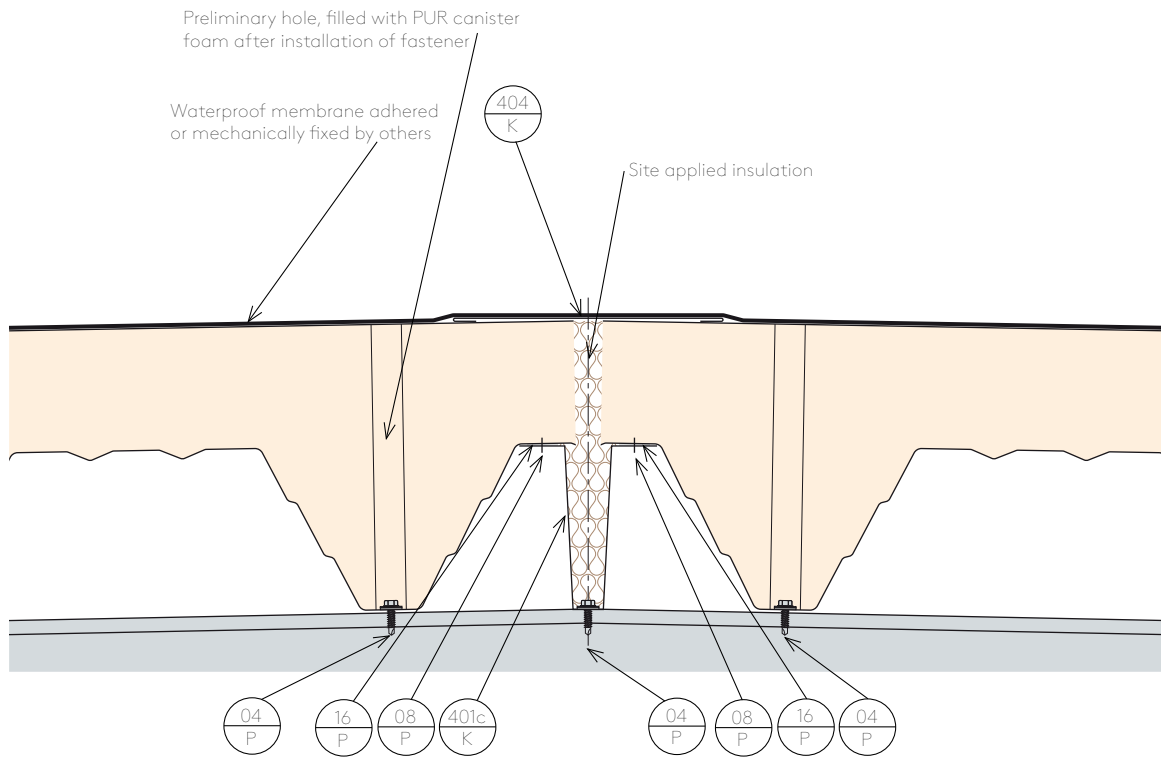
- ULS – Ultimate Limit State – indicated loads should be compared with factored (design) loads
- SLS – Serviceability Limit State – indicated loads should be compared with characteristic (un-factored) loads
- The above-mentioned calculations apply to panels with standard bottom steel skin strength specification of the  $f_y=350$  MPa (S350GD) or higher
- Maximum permissible deflection limit (SLS):  $L / 200$
- The dead load of panels is included in the above figures
- $a_{min}$  – the minimum width of end supports;  $b_{min}$  – the minimum width of intermediate supports.

| Upper layer         |                                | 0,7mm    |                             | Bottom deck |            |            |            |            |            |            |            | 0,9mm      |            |            |
|---------------------|--------------------------------|----------|-----------------------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Core thickness [mm] | Load type [kN/m <sup>2</sup> ] | Span [m] |                             |             |            |            |            |            |            |            |            |            |            |            |
|                     |                                | 2,5      | 3,0                         | 3,5         | 4,0        | 4,5        | 5,0        | 5,5        | 6,0        | 6,5        | 7,0        | 7,5        |            |            |
| 80                  | Downward                       | 8,47     | 6,23                        | 4,79        | 3,82       | 3,13       | 2,61       | 2,22       | 1,90       | 1,62       | 1,40       | 1,20       |            |            |
|                     |                                | Upward   | 9,49                        | 7,09        | 5,57       | 4,52       | 3,77       | 3,19       | 2,75       | 2,40       | 2,11       | 1,87       | 1,68       |            |
|                     |                                |          | <b>a<sub>min</sub> (mm)</b> | <b>102</b>  | <b>91</b>  | <b>82</b>  | <b>76</b>  | <b>70</b>  | <b>66</b>  | <b>62</b>  | <b>59</b>  | <b>56</b>  | <b>52</b>  | <b>49</b>  |
|                     |                                |          | <b>b<sub>min</sub> (mm)</b> | <b>205</b>  | <b>182</b> | <b>165</b> | <b>152</b> | <b>141</b> | <b>132</b> | <b>125</b> | <b>118</b> | <b>111</b> | <b>105</b> | <b>99</b>  |
| 100/140             | Downward                       | 8,96     | 6,62                        | 5,15        | 4,03       | 3,44       | 2,89       | 2,47       | 2,02       | 1,71       | 1,47       | 1,27       |            |            |
|                     |                                | Upward   | 10,17                       | 7,72        | 6,15       | 5,06       | 4,26       | 3,65       | 3,16       | 2,76       | 2,44       | 2,18       | 1,95       |            |
|                     |                                |          | <b>a<sub>min</sub> (mm)</b> | <b>108</b>  | <b>97</b>  | <b>88</b>  | <b>80</b>  | <b>77</b>  | <b>73</b>  | <b>69</b>  | <b>63</b>  | <b>58</b>  | <b>55</b>  | <b>52</b>  |
|                     |                                |          | <b>b<sub>min</sub> (mm)</b> | <b>216</b>  | <b>193</b> | <b>177</b> | <b>160</b> | <b>155</b> | <b>146</b> | <b>139</b> | <b>126</b> | <b>117</b> | <b>110</b> | <b>104</b> |

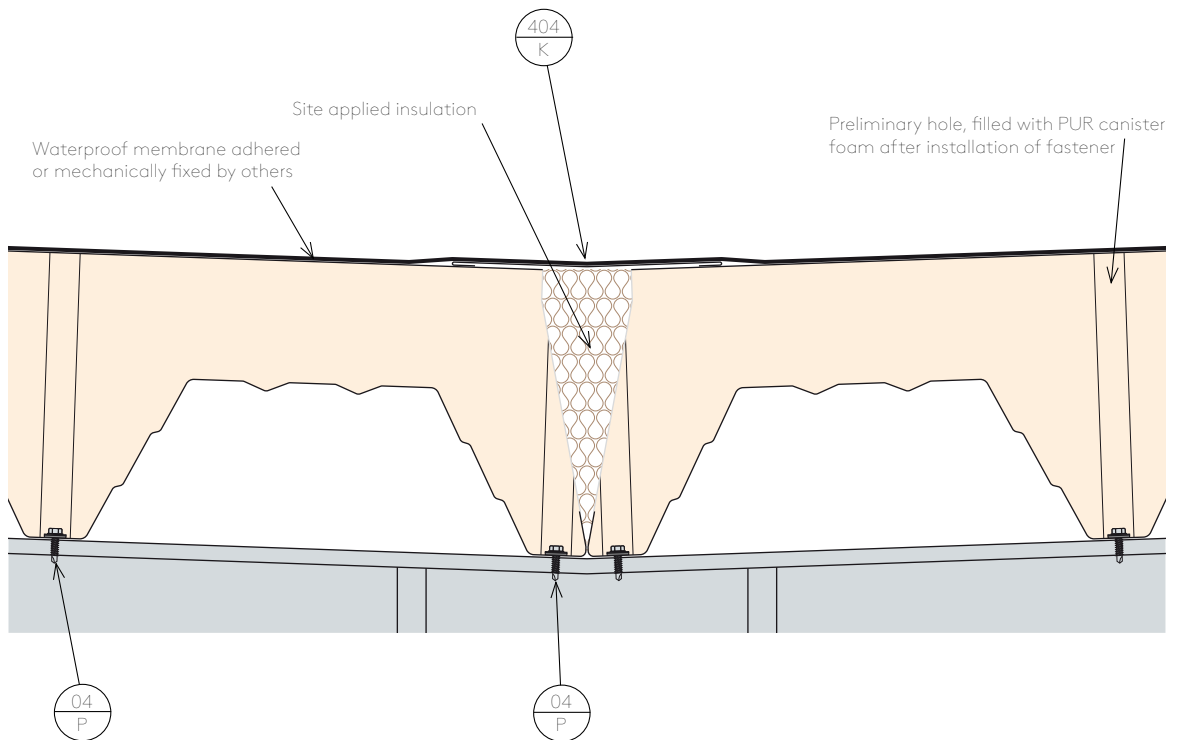
  

| Upper layer         |                                | 0,7mm    |                             | Bottom deck |            |            |            |            |            |            |            | 1,1mm      |            |            |
|---------------------|--------------------------------|----------|-----------------------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Core thickness [mm] | Load type [kN/m <sup>2</sup> ] | Span [m] |                             |             |            |            |            |            |            |            |            |            |            |            |
|                     |                                | 2,5      | 3,0                         | 3,5         | 4,0        | 4,5        | 5,0        | 5,5        | 6,0        | 6,5        | 7,0        | 7,5        |            |            |
| 80                  | Downward                       | 9,85     | 7,41                        | 5,66        | 4,49       | 3,67       | 3,05       | 2,58       | 2,21       | 1,91       | 1,66       | 1,46       |            |            |
|                     |                                | Upward   | 11,21                       | 8,31        | 6,50       | 5,26       | 4,36       | 3,70       | 3,18       | 2,77       | 2,28       | 2,16       | 1,93       |            |
|                     |                                |          | <b>a<sub>min</sub> (mm)</b> | <b>119</b>  | <b>108</b> | <b>97</b>  | <b>89</b>  | <b>83</b>  | <b>77</b>  | <b>73</b>  | <b>69</b>  | <b>65</b>  | <b>62</b>  | <b>59</b>  |
|                     |                                |          | <b>b<sub>min</sub> (mm)</b> | <b>238</b>  | <b>216</b> | <b>194</b> | <b>178</b> | <b>165</b> | <b>154</b> | <b>145</b> | <b>137</b> | <b>130</b> | <b>124</b> | <b>119</b> |
| 100/140             | Downward                       | 10,32    | 7,79                        | 6,03        | 4,84       | 4,00       | 3,36       | 2,87       | 2,42       | 2,07       | 1,79       | 1,56       |            |            |
|                     |                                | Upward   | 11,90                       | 8,97        | 7,10       | 5,82       | 4,88       | 4,17       | 3,61       | 3,16       | 2,80       | 2,49       | 2,24       |            |
|                     |                                |          | <b>a<sub>min</sub> (mm)</b> | <b>125</b>  | <b>114</b> | <b>103</b> | <b>96</b>  | <b>90</b>  | <b>85</b>  | <b>80</b>  | <b>75</b>  | <b>70</b>  | <b>66</b>  | <b>63</b>  |
|                     |                                |          | <b>b<sub>min</sub> (mm)</b> | <b>249</b>  | <b>227</b> | <b>207</b> | <b>191</b> | <b>179</b> | <b>169</b> | <b>161</b> | <b>150</b> | <b>140</b> | <b>132</b> | <b>126</b> |

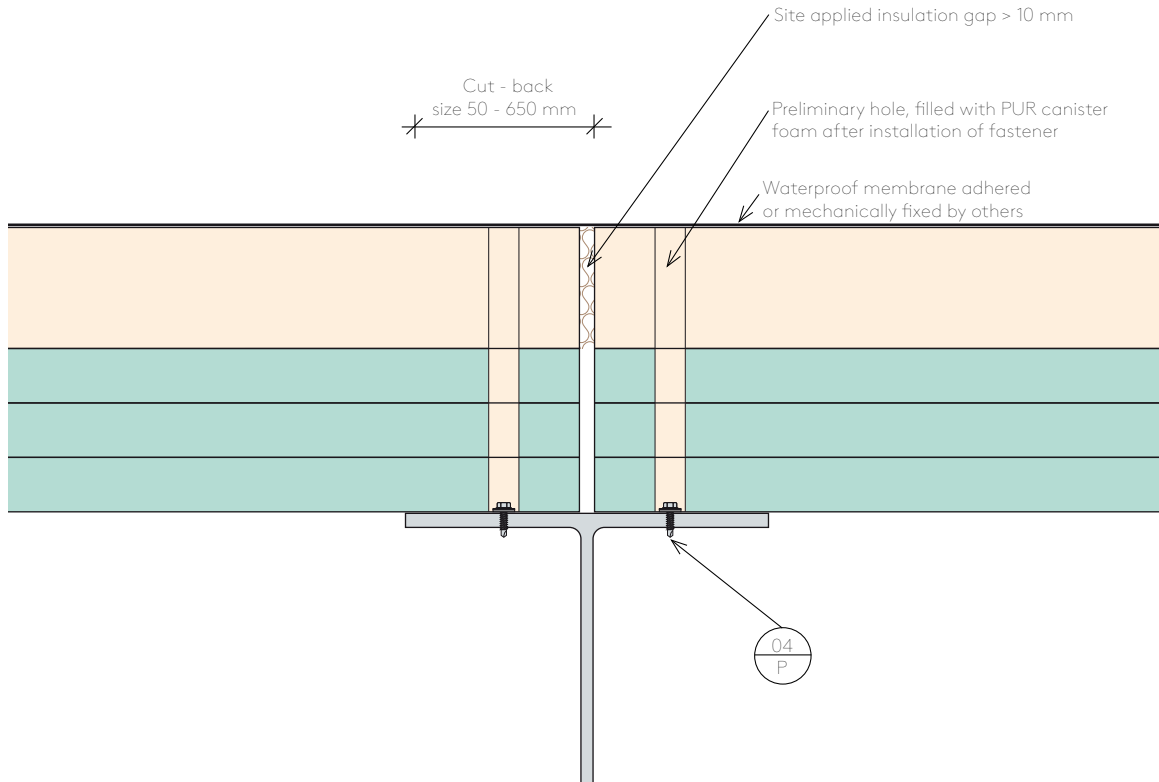
D0.0.1.a. X-dek Ridge



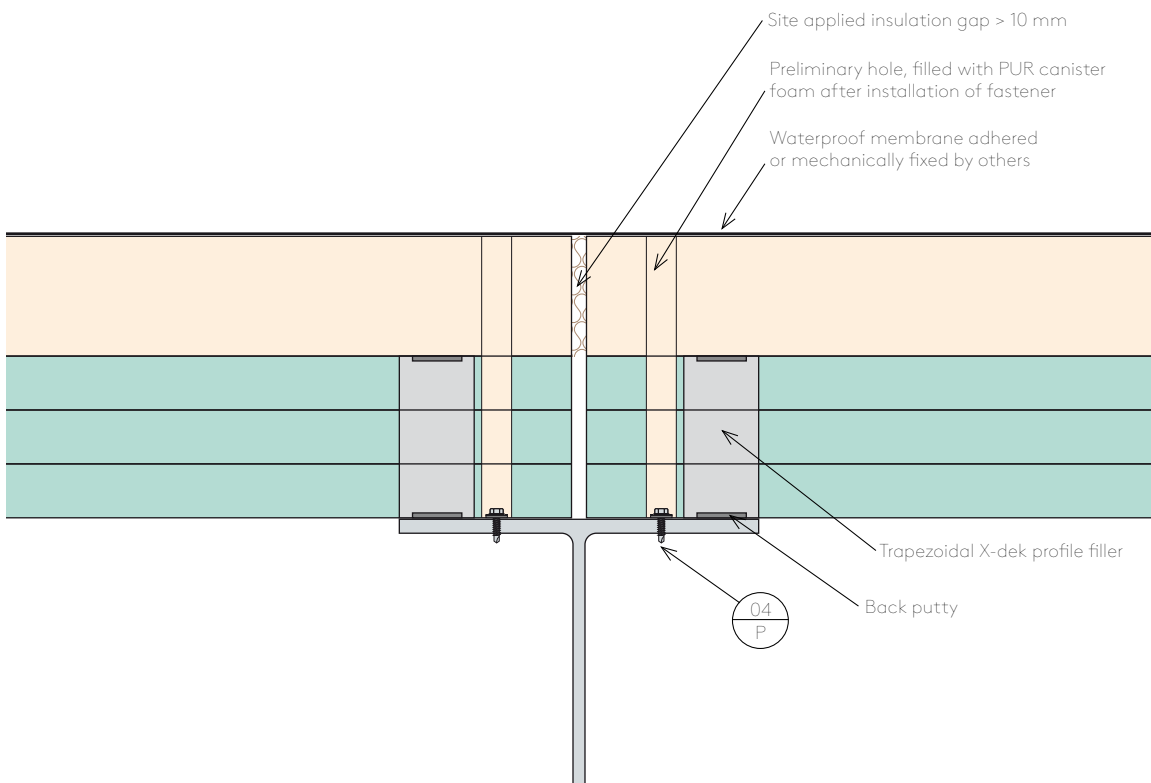
D8.9. X-dek Valley Detail



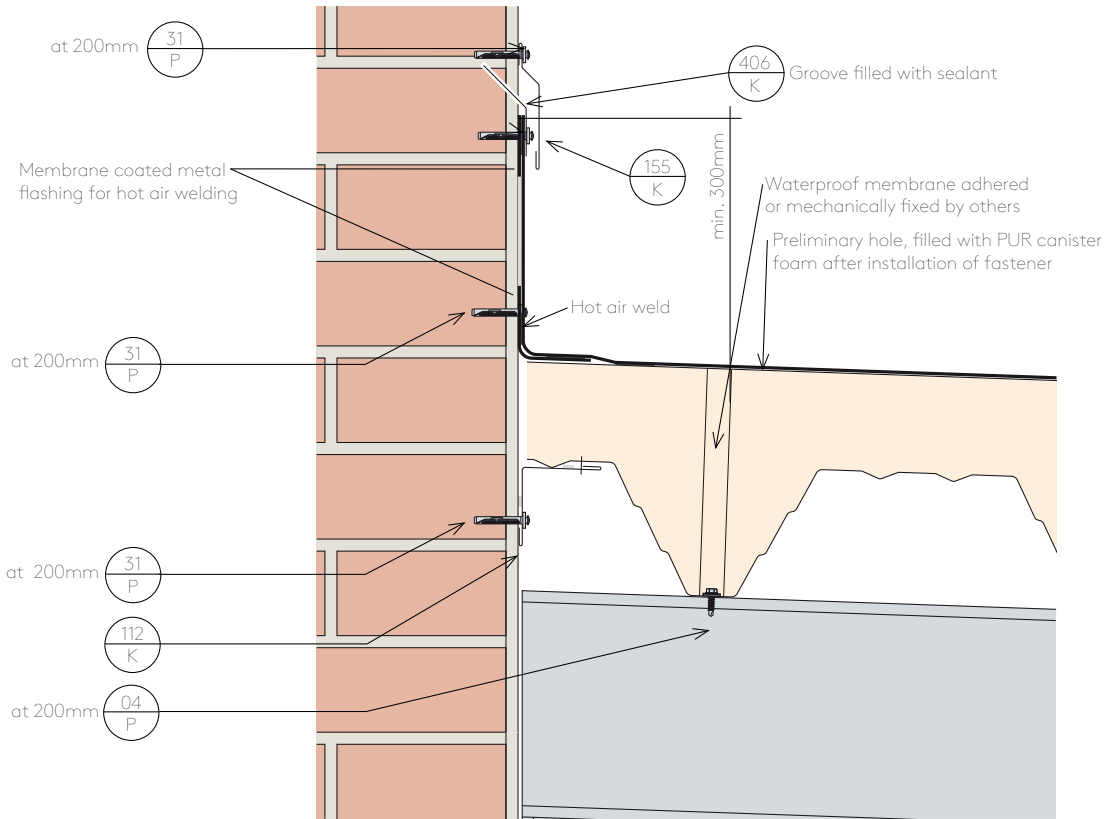
D0.0.3. X-dek Cut-back Detail



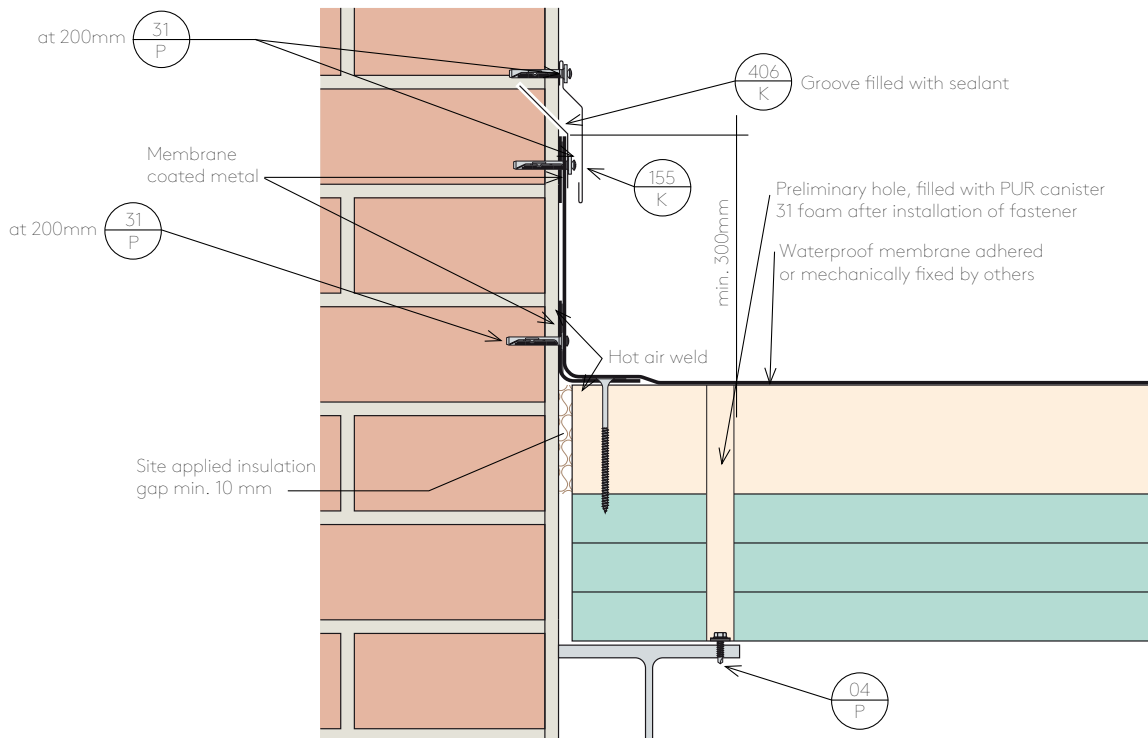
D0.0.4. X-dek But joint Detail



D16.4.1.c. X-dek Roof to Brickwork Junction

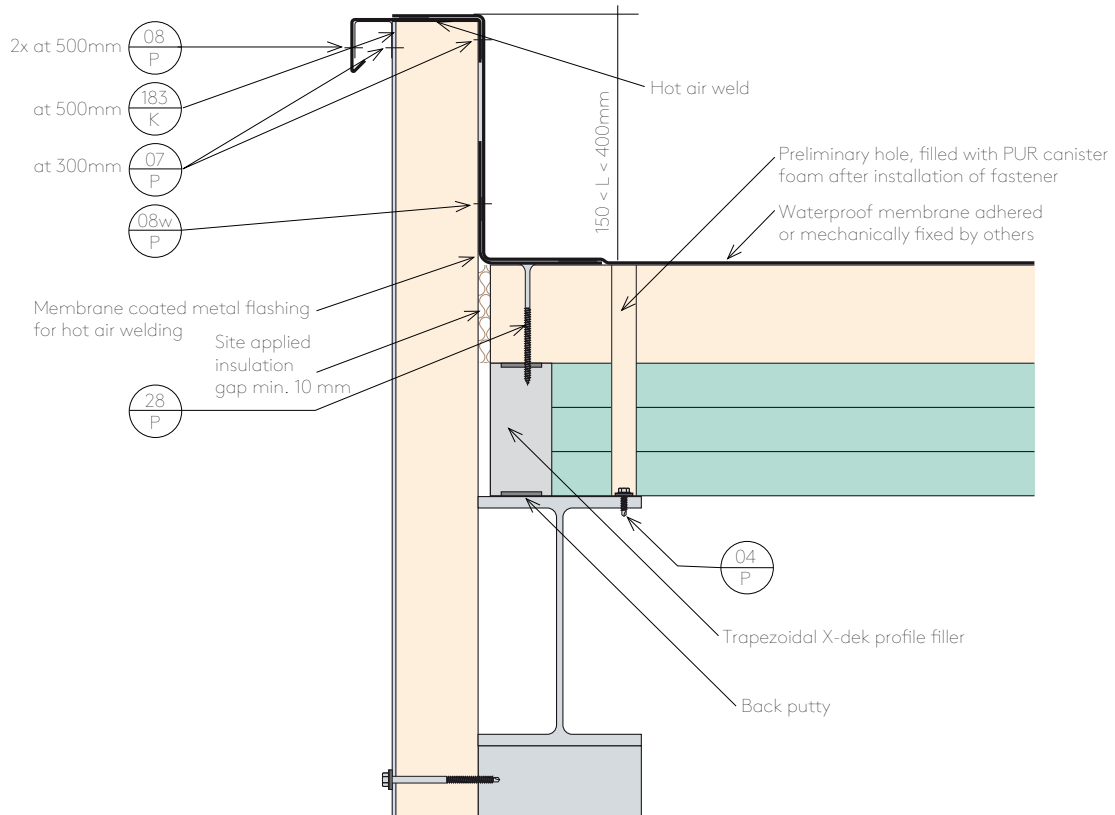


D17.4.1. X-dek Roof to Brickwork Junction

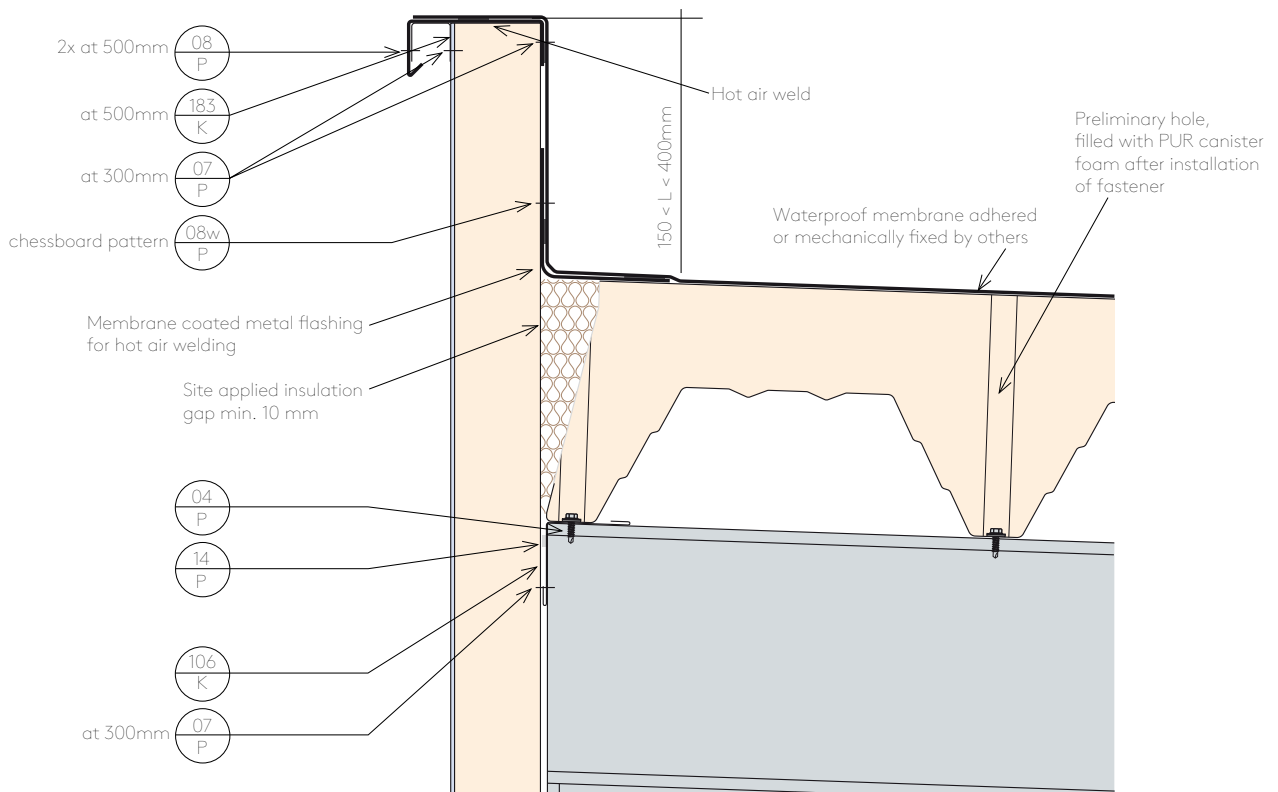




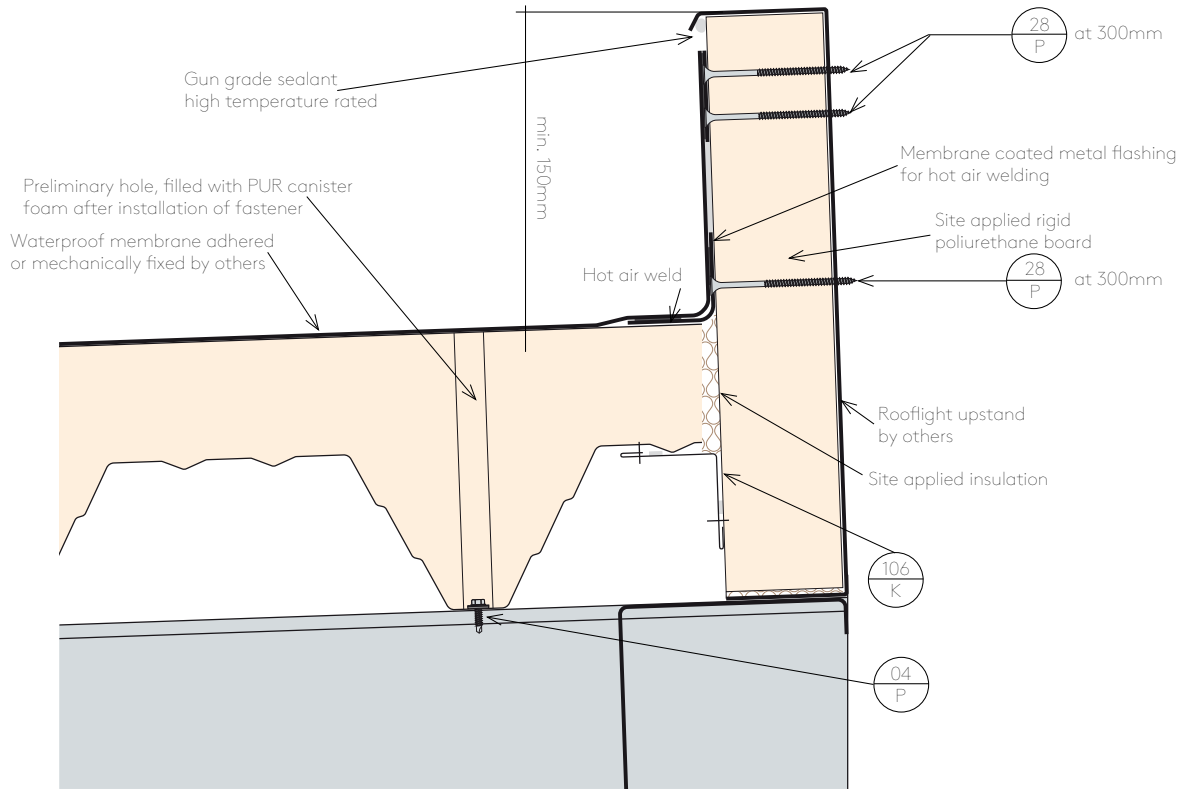
**D5.5.1. X-dek Gable Wall Parapet**



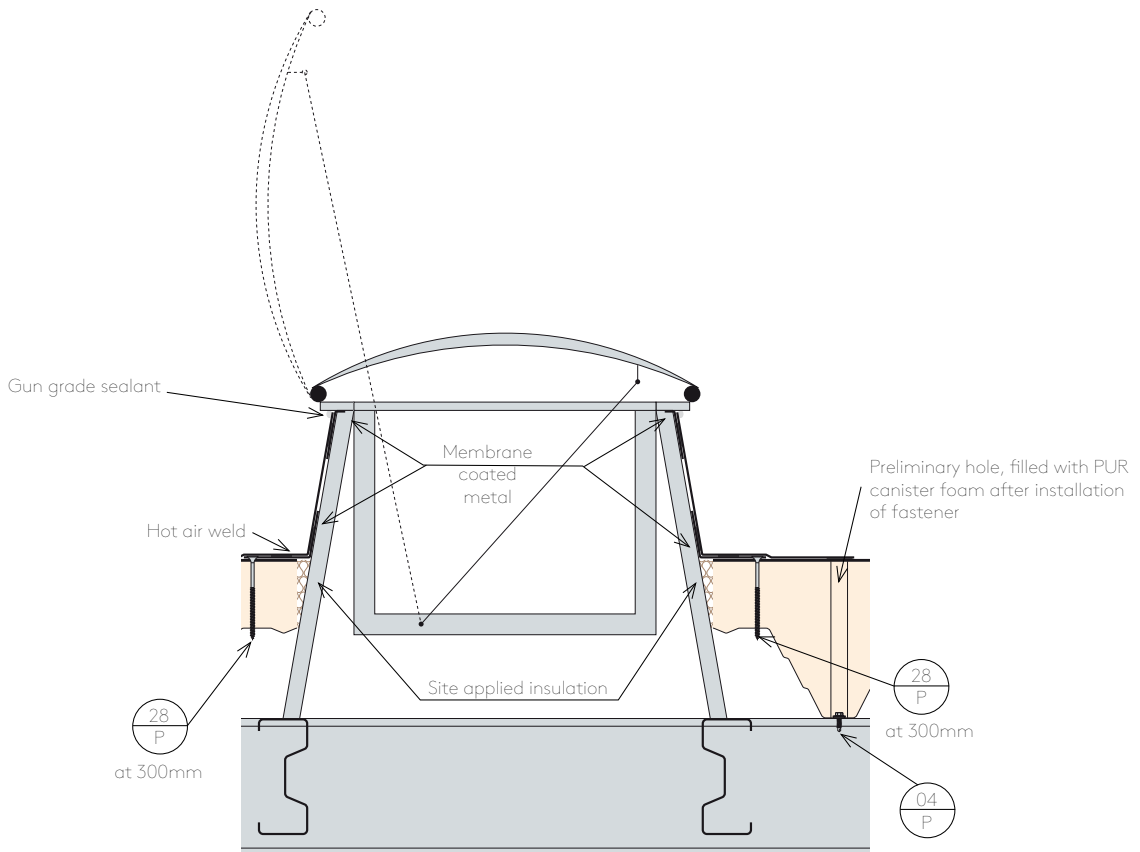
**D5.5.2.a. X-dek Gable Wall Parapet**



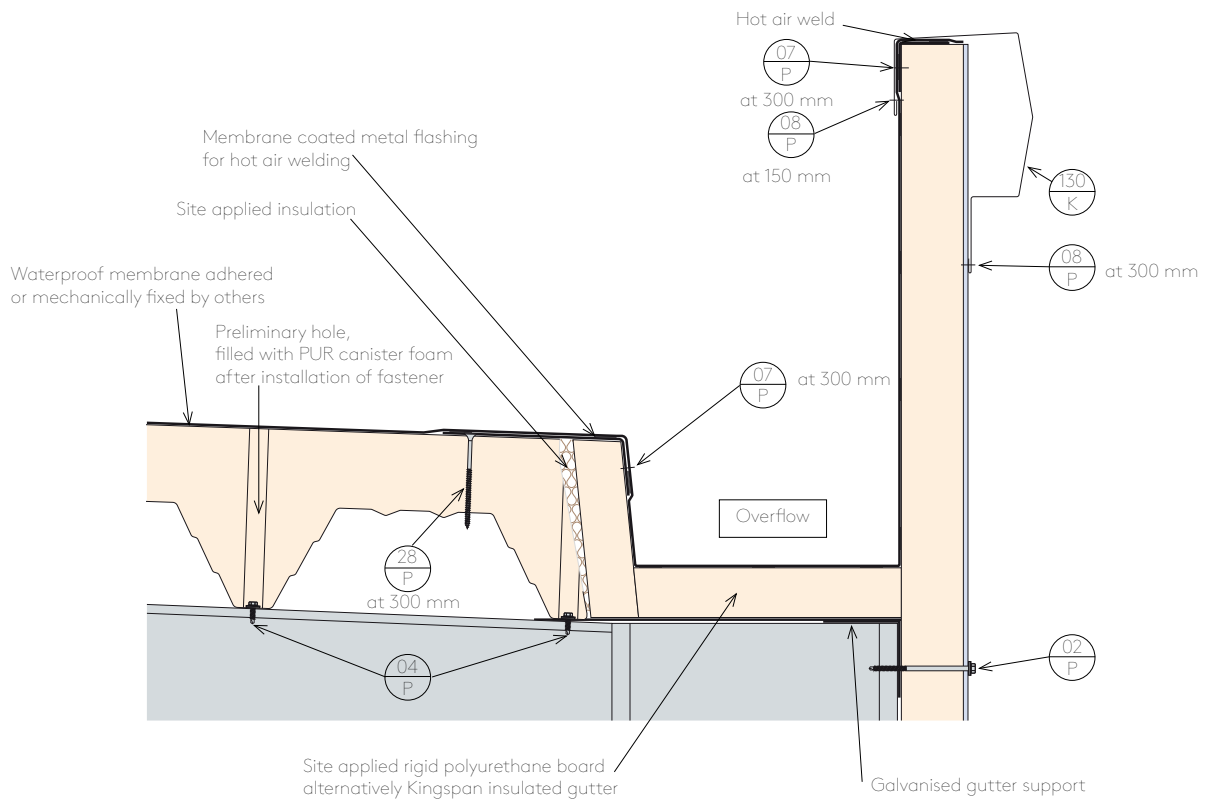
D44.1.1.a. X-dek Roof/Skylight – Pyramid/Dome Type



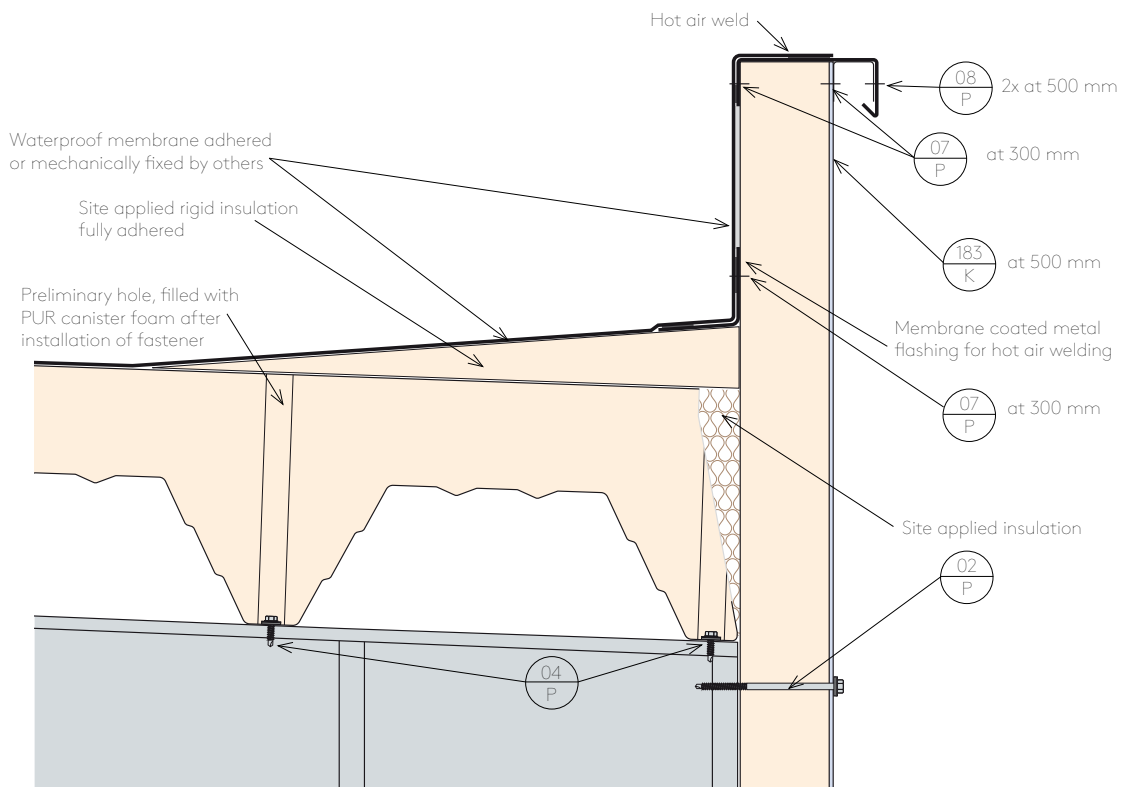
D46.1.1.a. X-dek Smoke Vent



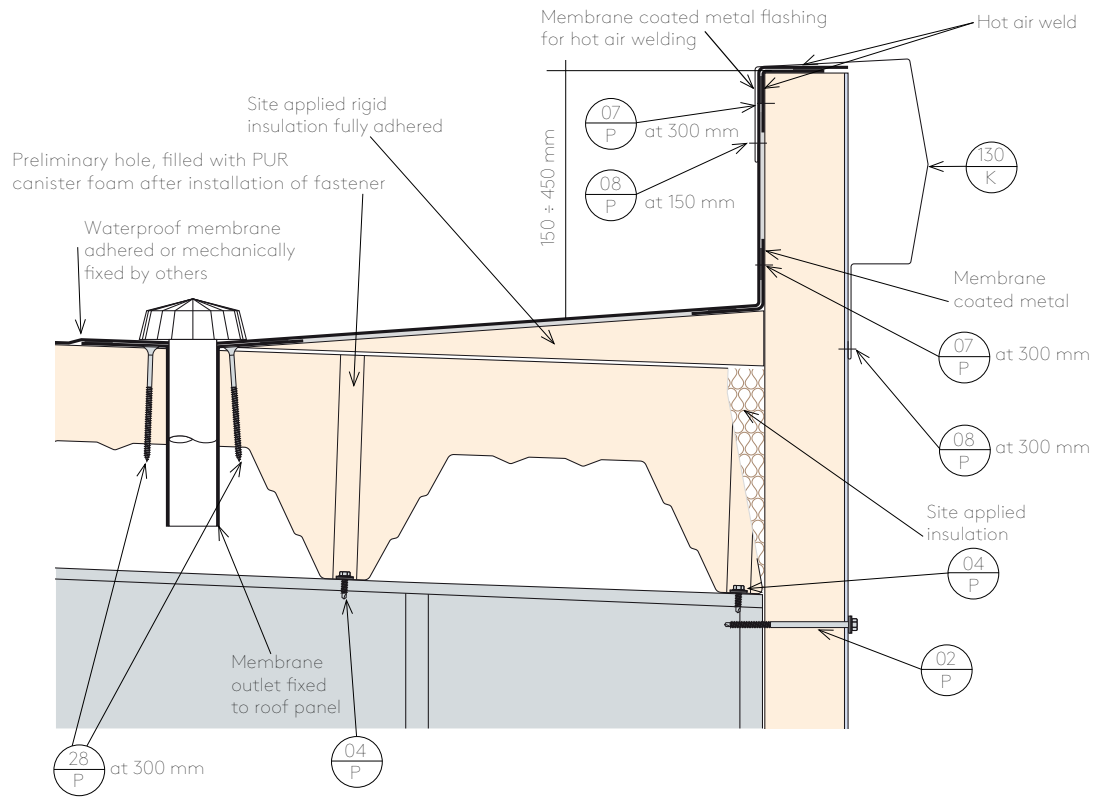
**D6.7.1. X-dek Eaves Detail**



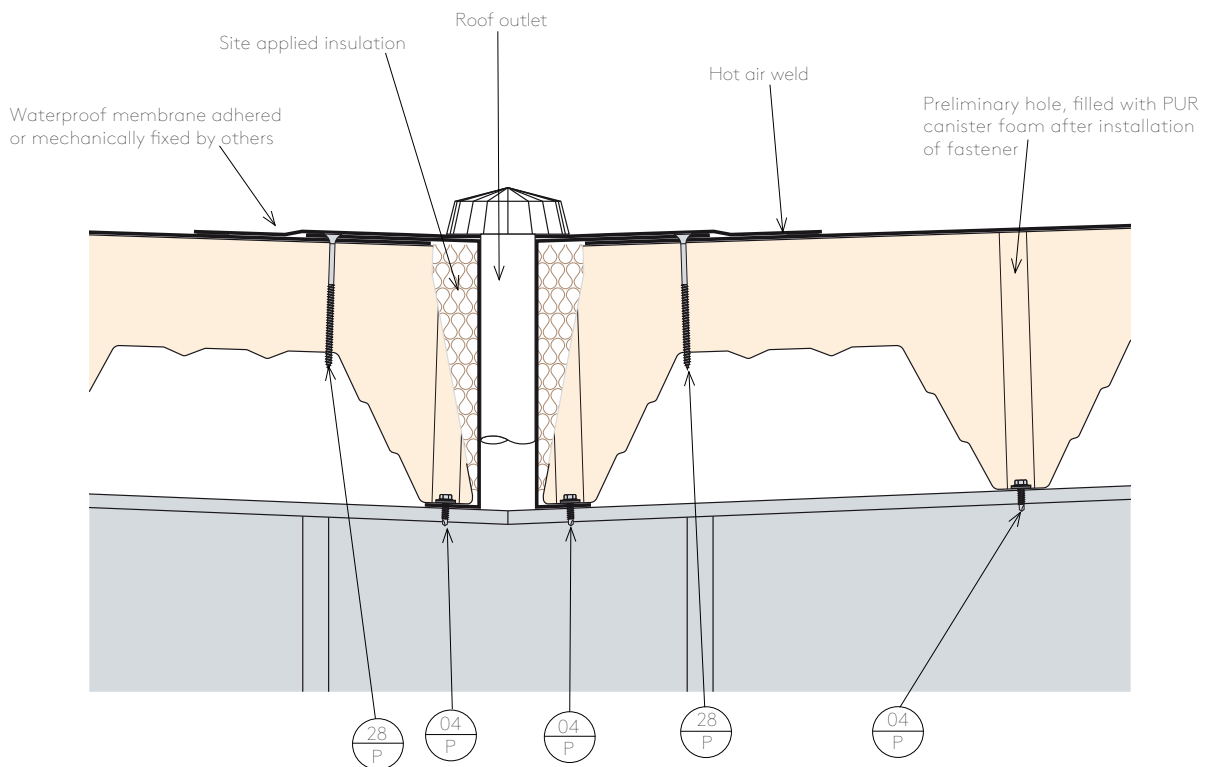
**D6.9.1. X-dek Eaves Detail**



**D6.8.1. X-dek Eaves Detail**

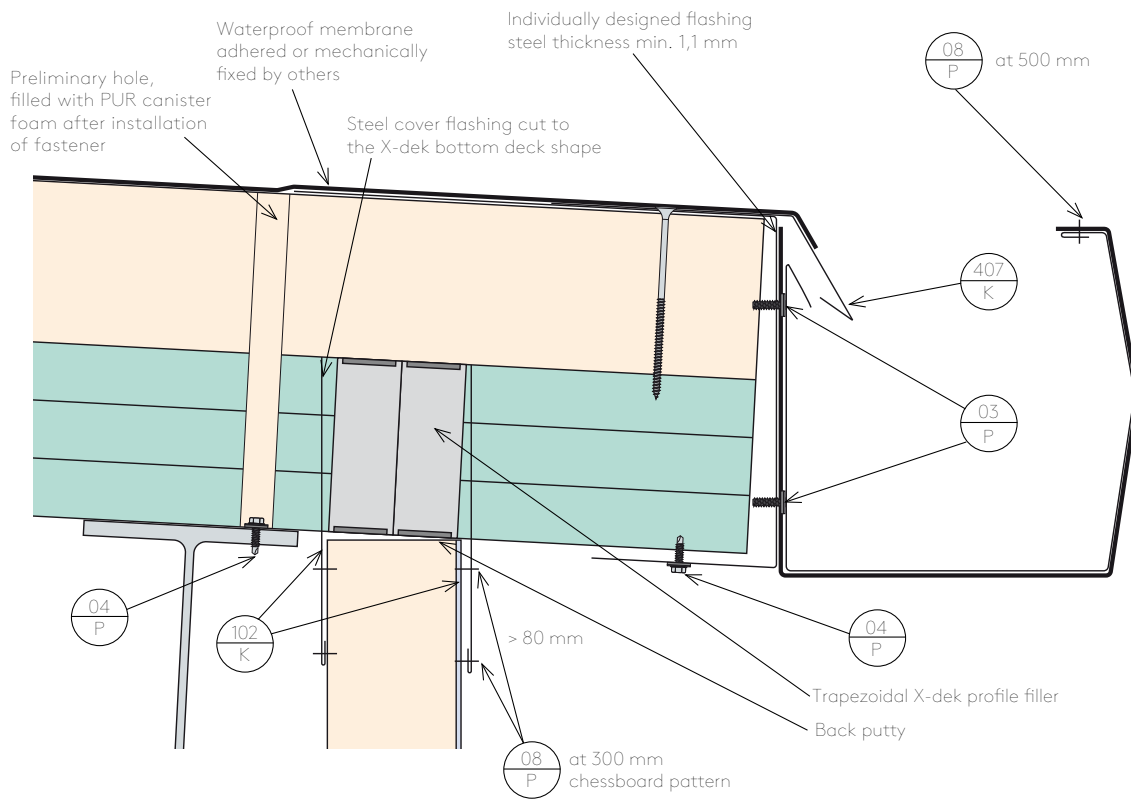


**D8.8. X-dek Eaves Detail**

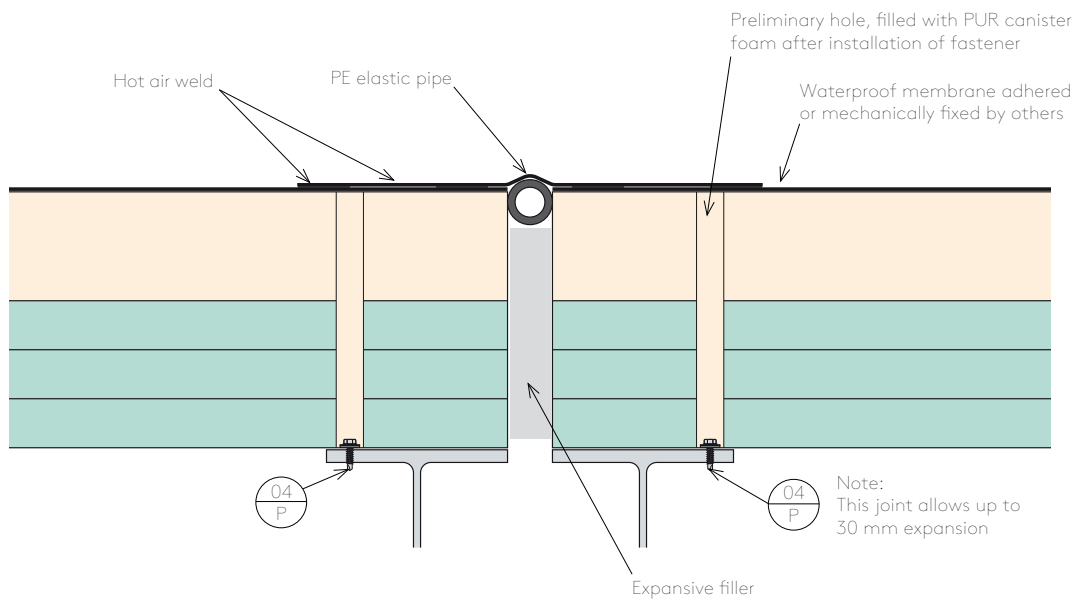




**D0.5.a. X-dek External Gutter Detail**



**D20.2. X-dek Expansion Joint**





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 [www.viavac.com](http://www.viavac.com).

When panels are supplied with a plastic protective film this should be removed immediately after site installation. Site assembly instructions are available from the Kingspan Technical Services.

### Sealants & Fillers

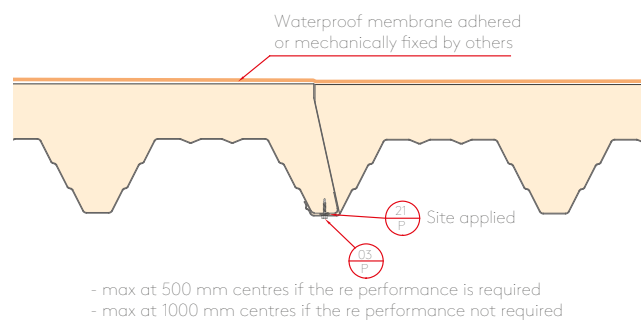
The panels need to be fitted as close together as possible to assure a certain airtightness. At each side joint it is necessary to apply butyl rubber sealing tape. For further panels stability, proper joint tightness and alignment, and fire resistance of the KS1000 X-dek panels, the stitching screws must be applied along the side lap of the panels. The stitching screws are usually applied from the bottom side of roof, however the application from the top is also possible.

Recommended distance of the stitching screws are:

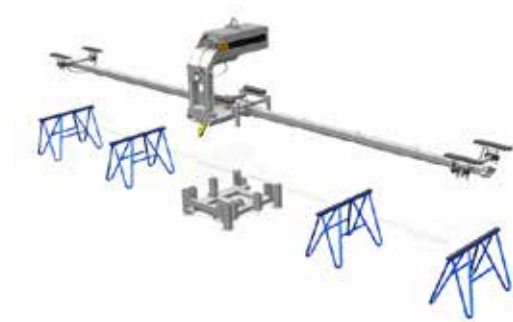
- ≤ 500 mm – for the applications where fire resistance is required,
- 500÷1000 mm – for the applications where fire resistance is not required.

### 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 300 mm 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.

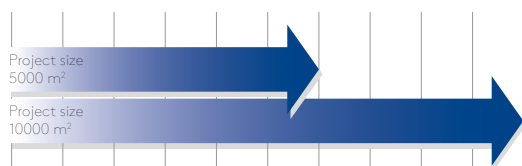


### Inspections

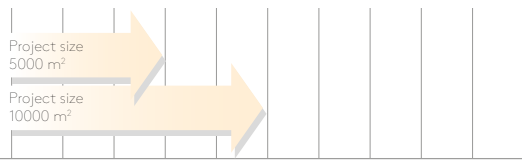
It is recommended that the roofs made of KS1000 X-dek panels should be inspected at least once a year according to Kingspan Standard Inspection and Maintenance rules. During the roof inspections all participants must obey the health and safety rules and regulations.

### Build speed

#### Multipart Built-up Systems



#### Kingspan Insulated system



Weeks

- Fast Build cuts site time by 100% – reduces prelims and attendance costs.
- Maximises investor/occupier trading income opportunity.
- Factory manufactured system facilitates zero defect installation and build quality

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Kingspan Sp. z o.o.  
ul. Przemysłowa 20  
27-300, Lipsko  
tel.: +48 378 31 00  
fax: +48 378 13 30  
[www.kingspan.com](http://www.kingspan.com)

For the product offering in other markets  
please contact your local sales representative  
or visit [www.kingspan.com](http://www.kingspan.com)

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10/2017

