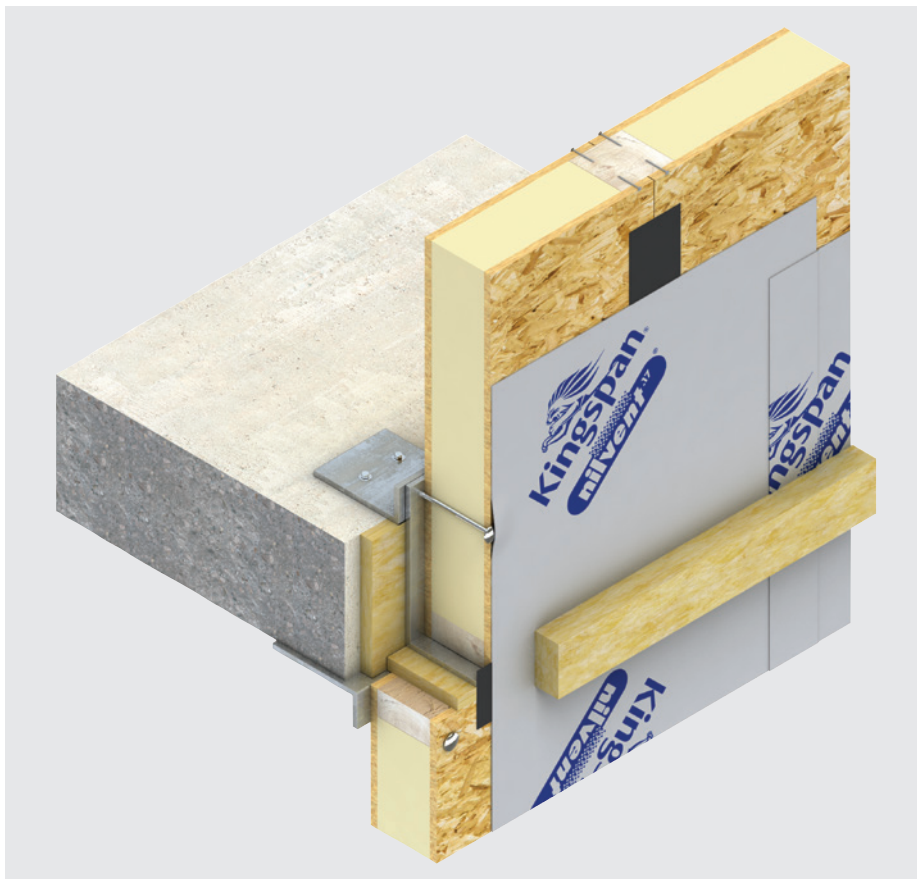




# Kingspan **TEK**® Cladding Panel

Structural Insulated Panels (SIPS) for Infilling the Apertures in, or Sheathing, the Structural Frame of a Building



- Can achieve whole wall U-values of 0.20 W/m<sup>2</sup>K or better
- Can achieve low air leakage rates
- BBA certified
- Insulation core manufactured with a blowing agent that has zero ODP and low GWP
- Quick and safe to build
- Internal works can start earlier
- Minimal on-site waste
- Can provide thin full wall constructions than conventional steel framed systems
- Can create highly energy efficient buildings with very low fuel bills

# Introduction

## The Kingspan TEK® Cladding Panel

The Kingspan TEK® Cladding Panel is a 142 mm or 172 mm thick structural insulated panel (SIP). Panels are connected with a unique jointing system.

The Kingspan TEK® Cladding Panel consists of a high performance rigid urethane insulation core, sandwiched between two layers of Oriented Strand Board type 3 (OSB/3). During manufacture, the insulation core of the TEK® Cladding Panel is autohesively bonded to the OSB/3 facings. This process provides more reliable and superior adhesion than the secondary bonding process used in the manufacture of most other SIPs.

The Kingspan TEK® Cladding Panel is a structural composite. This composite assembly provides stiffness, strength and predictable responses to applied loads.

The Kingspan TEK® Cladding Panel comprising 142 mm and 172 mm panels holds BBA Certification No. 02/S029.



## Applications

The Kingspan TEK® Cladding Panel leaves ample scope for individual design. The panels are pre-cut to match a project's engineering and design specifications, and are delivered to site ready for installation.

The Kingspan TEK® Cladding Panel can be installed 'in-board', as an infill panel in the apertures of the structural frame of a building or, alternatively, the panels can be installed 'out-board', sheathing the structural frame. Installing the TEK® Cladding Panel 'out-board' rather than 'in-board' can provide more internal space within a building, and can also automatically reduce thermal bridging in walls as the structural frame is implicitly sheathed with insulation.

Facade finishes can be fixed to the Kingspan TEK® Cladding Panel. The panels can provide the necessary thermal and structural performance for most facade systems. The TEK® Cladding Panel can also be used in conjunction with traditional masonry rainscreens.

Once installed, the Kingspan TEK® Cladding Panel should be wrapped in a breathable membrane, e.g. Kingspan nilvent®, as a temporary weather proofing. As with all construction systems, a long lasting external rainscreen is a necessary part of any wall built using the TEK® Cladding Panel.

NB The Kingspan TEK® Cladding Panel is not recommended for the construction of cellars or basements, or for use in high humidity environments, such as swimming pools.

## Environmental Sustainability at its Core

- Can be used to create highly energy efficient buildings.
- Can achieve whole wall U-values of 0.20 - 0.10 W/m²K or better.
- Can achieve air leakage levels significantly better than the 10 m³/hour/m² at 50 Pa maximum required by the Building Regulations / Standards.
- Fewer deliveries therefore less transport, congestion, noise, and traffic pollution, which reduces a project's impact on the environment.
- The OSB facing of a Kingspan TEK® Cladding Panel is PEFC Chain of Custody certified.
- The fibre-free insulation core of the panels is manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).



## Fast, Cost Effective & Predictable

- The lightweight panels can enable a fast track building process, which can help to reduce construction time.
- Can reduce the need for expensive and time consuming scaffolding as in most situations, the lightweight panels can easily be installed using mast climbers.
- Follow on trades can start work sooner, as once the Kingspan TEK® Cladding Panel is erected and wrapped with a breathable membrane (e.g. Kingspan nilvent®), the walls are weather-tight, and this can help the contractor complete the project more quickly.
- Much easier to predict project completion times, as the panels are relatively simple to erect, can reduce the need for complex rainscreen cladding rail fixing systems, and also require no wet trades or brick layers.
- Defects are vastly reduced due to factory controlled manufacturing and precise engineering of the Kingspan TEK® Cladding Panel.

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# Project Gallery

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RAD Building, Nottingham



King's College School, Cambridge



Ravenor Primary School, Ealing



River Studio EnerPHit, Warwickshire



Littleport and East Cambridgeshire Academy, Cambridge



The Word, South Shields



Durrington, Worthing



Atherleigh Park, Wigan



# Typical Constructions and U-values

## Assumptions

The U-values in the tables that follow have been calculated, under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U-value and Condensation Risk



Calculations, using the method detailed in BS EN ISO 6946: 2017 / I.S. EN ISO 6946: 2007 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation methods), and using the conventions set out in BR 443 (Conventions for U-value calculations).

The U-values in the tables that follow are valid for the constructions shown in the details immediately above. Unless otherwise stated, the U-values quoted are based on an internal construction comprising a 3 mm plaster skim on 12.5 mm plasterboard fixed to 50 x 25 mm softwood timber battens. The external finishes are as specified in the examples themselves.

NB For calculations which do not feature additional internal insulation, a 4% bridging factor has been assumed for the timber bridging the insulation in the panels. The thermal conductivity of the timber has been assumed at 0.12 W/mK.

NB Calculations assume that the use of a foil faced breather membrane yields an airspace thermal resistance of 0.54 m<sup>2</sup>K/W.

NB For the purposes of these calculations the standard of workmanship has been assumed good, and therefore the correction factor for air gaps has been ignored.

NB The figures quoted are for guidance only. A detailed U-value calculation and a condensation risk analysis should be completed for each project.

NB If your construction is different to those specified, and / or to gain a comprehensive U-value calculation along with a condensation risk analysis of your project, please consult the Kingspan Insulation Technical Service Department for assistance (see rear cover for details).

## Kingspan TEK® Cladding Panel Walls with 102.5 mm Brickwork Outer Leaf

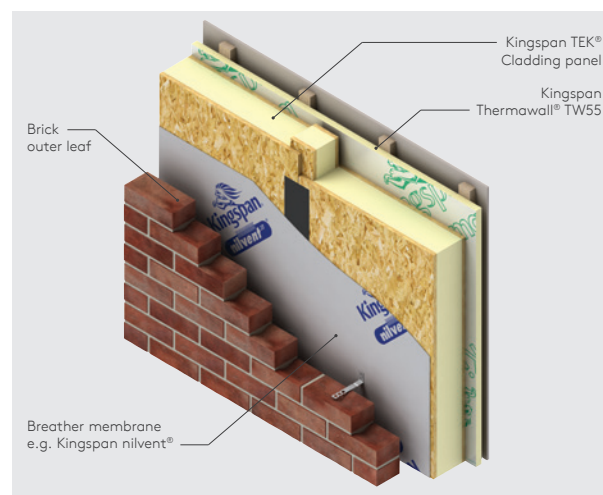


Figure 1

### U-values for Kingspan TEK® Cladding Panel Walls with Various Thicknesses of Additional Insulation and Different Breathable Membranes

Thickness of Kingspan TEK® Cladding Panel (mm)	Thickness of Kingspan Thermawall® TW55 (mm)	U-value W/m <sup>2</sup> K	
		Standard Breathable Membrane	Foil Faced Breathable Membrane
142	0	0.19	0.18
142	20	0.15	0.15
142	25	0.15	0.14
142	30	0.14	0.13
142	40	0.13	0.12
142	50	0.13	0.12
142	60	0.12	0.12
142	70	0.11	0.11
142	75	0.11	0.11
142	80	0.11	0.10
142	90	0.10	0.10
172	0	0.16	0.15
172	20	0.13	0.13
172	25	0.13	0.12
172	30	0.12	0.12
172	40	0.12	0.11
172	50	0.11	0.11
172	60	0.11	0.10
172	70	0.10	0.10

NB There are potential restrictions placed upon this product which vary dependant on building type, height, construction and location. For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, refer to the relevant Technical Bulletins at and links to Government websites [www.kingspantek.co.uk/fireregulations](http://www.kingspantek.co.uk/fireregulations).

# Typical Constructions and U-values

## Kingspan TEK® Cladding Panel Walls with Ventilated Cladding

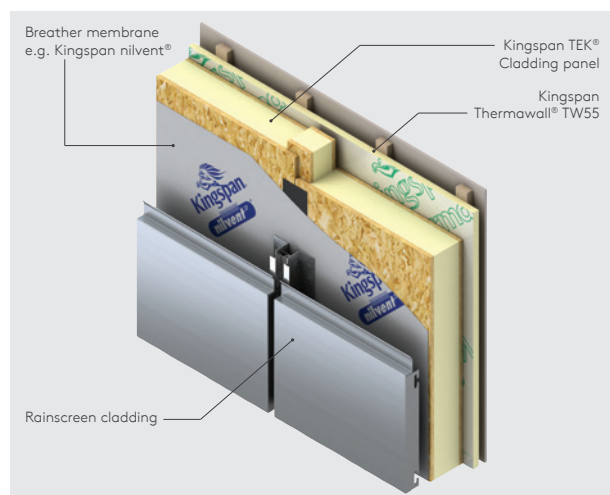


Figure 2

U-values for Kingspan TEK® Cladding Panel Walls with Various Thicknesses of Additional Insulation		
Thickness of Kingspan TEK® Cladding Panel (mm)	Thickness of Kingspan Thermawall® TW55 (mm)	U-value W/m²K
142	0	0.20
142	20	0.16
142	25	0.15
142	30	0.15
142	40	0.14
142	50	0.13
142	60	0.12
142	70	0.12
142	75	0.11
142	80	0.11
142	90	0.11
172	0	0.17
172	20	0.14
172	25	0.13
172	30	0.13
172	40	0.12
172	50	0.11
172	60	0.11
172	70	0.10

NB There are potential restrictions placed upon this product which vary dependant on building type, height, construction and location. For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, refer to the relevant Technical Bulletins at and links to Government websites [www.kingspantek.co.uk/fireregulations](http://www.kingspantek.co.uk/fireregulations).

# Design Considerations

## Specification Clause

The Kingspan TEK® Cladding Panel should be described in specifications as:-

The insulated wall sheathing / infill (delete as applicable) shall be 142 mm or 172 mm thick Kingspan TEK® Cladding Panel comprising a high performance rigid urethane insulation core, sandwiched between two layers of PEFC Chain of Custody certified Oriented Strand Board type 3 (OSB/3), autohesively bonded to the insulation core during manufacture. The product shall be manufactured: with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP); under a management system certified to ISO 9001: 2008, ISO 14001: 2004, BS OHSAS 18001: 2007 and ISO 50001: 2011; by Kingspan Insulation Limited; and installed in accordance with the instructions issued by them.

## NBS Specifications

Details also available in NBS Plus.

NBS users should refer to clause(s):

H10 150 (Minor works, standard and intermediate)

The logo for NBS Plus, consisting of the text 'NBS Plus' in white on a dark green rectangular background.

## Building Information Modelling (BIM)

Kingspan Insulation's BIM objects can be downloaded in Revit and in IFC formats. Please visit [www.kingspaninsulation.co.uk/bim](http://www.kingspaninsulation.co.uk/bim) for more information.

## Water Vapour Control

Consideration should be given to the risk of condensation, when designing thermal elements.

Condensation can be controlled, in buildings constructed with the Kingspan TEK® Cladding Panel, by ensuring the panels are properly installed in accordance with Kingspan Insulation Ltd's guidance, and a fully integrated and operating mechanical ventilation system is incorporated within the building design. Provided these directions are followed, interstitial condensation under normal domestic / office conditions should be minimised and no vapour control layer is required.

Notwithstanding this, a condensation risk analysis should be carried out for all projects following the procedures set out in BS 5250: 2011 + A1: 2016 (Code of practice for control of condensation in buildings). The Kingspan Insulation Technical Service Department (see rear cover for details) can provide this service.

If a condensation risk is predicted, it can be controlled, by ensuring there is a layer of high vapour resistance on the warm side of the insulation layer. If required, the vapour resistance of the wall lining can be increased by the use of a vapour check plasterboard\*; the use of Kingspan Thermawall® TW55, which contains an integral vapour control layer\*; the use of a layer of polythene sheeting\*; or by the application of two coats of Gyproc Drywall Sealer to the plasterboard lining.

\* With appropriate detailing at joints, penetrations and wall perimeters.

NB The Kingspan TEK® Cladding Panel is not recommended for cellars or basement constructions, or for use in high humidity environments.

## Spanning & Wind Loads

The maximum permissible (unfactored) working loads that a panel can resist for a given height between panel supports, cladding load and cladding eccentricity, are shown in the table overleaf. Load tables are based on the design procedures in BS EN 1995-1-1: 2004 + A1: 2008 (EC5) and an instantaneous deflection limit of span / 350 in accordance with the suggested deflection limits given in Table 7.2 of EC5. They apply to both pressure and suction forces on a vertical wall panel used as an infill.

The working loads should be compared against the unfactored wind loads calculated by the Building Designer in accordance with BS EN 1991-1-4: 2005 + A1: 2010 (Eurocode 1. Actions on structures. General actions. Wind actions).

No axial load is included, i.e. all sections are non-loadbearing save for the self weight of the Kingspan TEK® Cladding Panel itself and any supported claddings.

Cladding loads are assumed to be either:

- no cladding - cladding supported independently of the Kingspan TEK® Cladding Panel e.g. masonry and curtain walling systems;
- 0.60 kN/m<sup>2</sup> - most 'lightweight' cladding systems e.g. acrylic render on carrier boards, proprietary rainscreens and timber boarding with multiple batten layers; or
- 0.75 kN/m<sup>2</sup> - most 'heavyweight' cladding systems such as brick slips and tile hanging with multiple batten layers.

Eccentricity refers to the distance of the centre of weight of the supported cladding from the face of the Kingspan TEK® Cladding Panel (or approximately the clear cavity width).

It is assumed that panels are adequately restrained at the head and base against lateral movement and at the base for vertical support using suitable support brackets or shelf angles. It is assumed that panels are simple spans with pinned ends (i.e. not continuous past floors).

The span table given on the page overleaf provides generic guidance on the limits of applicability and each individual project should be checked by a suitably qualified structural engineer.

# Design Considerations

Panel Height - H (m)	Cladding Load - DL Cladding (kN/m <sup>2</sup> )	Eccentricity - E (mm)	Maximum Unfactored Wind Load - WL (kN/m <sup>2</sup> )
2.4	No cladding	-	2.76
2.4	0.60	50	2.71
2.4	0.60	75	2.70
2.4	0.75	50	2.69
2.4	0.75	75	2.68
2.7	No cladding	-	2.23
2.7	0.60	50	2.17
2.7	0.60	75	2.16
2.7	0.75	50	2.16
2.7	0.75	75	2.14
3.0	No cladding	-	1.82
3.0	0.60	50	1.76
3.0	0.60	75	1.75
3.0	0.75	50	1.75
3.0	0.75	75	1.73
3.6	No cladding	-	1.25
3.6	0.60	50	1.19
3.6	0.60	75	1.18
3.6	0.75	50	1.18
3.6	0.75	75	1.16
4.0	No cladding	-	0.99
4.0	0.60	50	0.93
4.0	0.60	75	0.92
4.0	0.75	50	0.92
4.0	0.75	75	0.90

## Notes:

- 1) Cladding loads are permanent actions.
- 2) Wind load is considered as instantaneous / short-term.
- 3) Deflection limit is L/350 for instantaneous deflection. No other limits were applied.
- 4) External skin assumed to be in service class 2 - outer skin.
- 5) 1 kN/m<sup>2</sup> approximately equals 100 kg/m<sup>2</sup>.

## Attachment Options

### General

Since attachment systems are proprietary and utilise different mechanisms for fixing the Kingspan TEK® Cladding Panel to the building structure, installation instructions should be sought from the system manufacturer. The examples given in the sections that follow are designed as guidance only. Please contact the Kingspan Insulation Technical Service Department for further details (see rear cover for details).

### 'In-board' - Fixing Inside the Structural Frame

The Kingspan TEK® Cladding Panel can be fixed inside the structural frame of a building as an infill panel between structural load-bearing elements, e.g. concrete posts. Typically, the TEK® Cladding Panel is secured to the structural frame using dead bolt fixings. At floor level the dead bolts are fixed through the panels to a continuous steel angle bracket, and at ceiling level they are fixed through the panels to angled cleats with slotted fixing connections, to allow for differential movement. A premium performance insulation, e.g. Kingspan Kooltherm® K15 Rainscreen Board, should be fixed to the external face of the floor slab to reduce thermal bridging through the structural frame of the building. See Figure 3 below for further details.

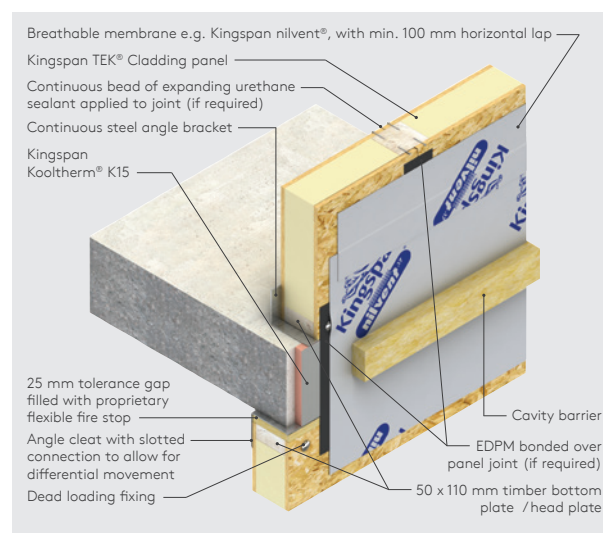
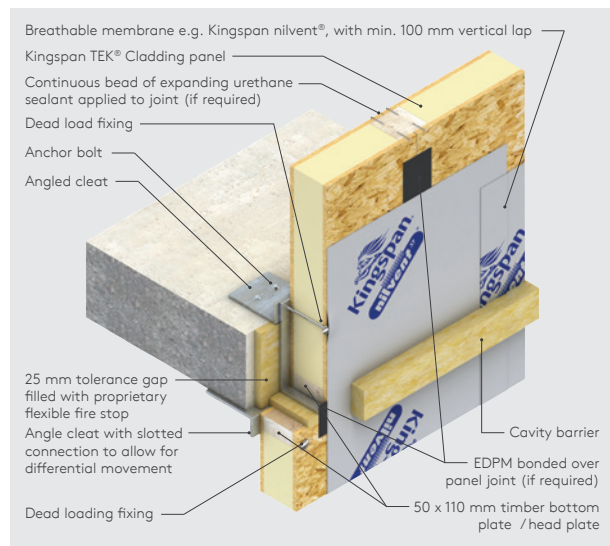


Figure 3: 'In-board', Fixing Inside the Structural Frame

### 'Out-board' - Fixing to the Outside of the Structural Frame

The Kingspan TEK® Cladding Panel can be fixed outside the structural frame of a building sheathing the structural load-bearing elements. Typically, the TEK® Cladding Panel is secured to the structural frame at floor and ceiling level using dead bolt fixings. Dead bolts are fixed through the panels to angled cleats fixed at 400 mm centres, subject to design loads. Fixings at ceiling level are typically slotted to allow for differential movement. See Figure 4 for further details.

# Design Considerations



**Figure 4: 'Out-board', Fixing to the Outside of the Structural Frame**

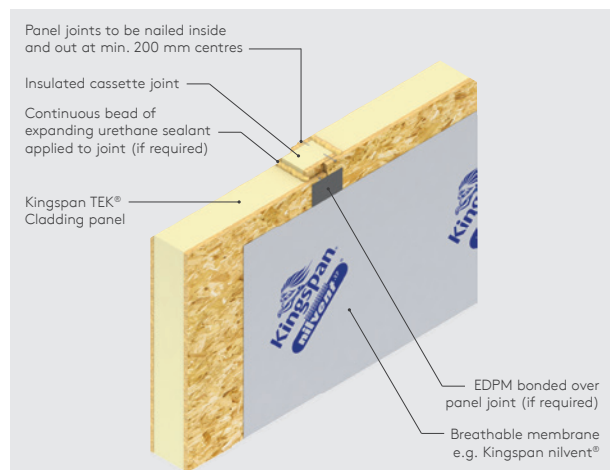
## Vertical Panel Joints

The Kingspan TEK® Cladding Panel has a routed channel along its long edges. This channel can accommodate a unique insulated cassette joint (see Figure 5). Alternatively, a C16 grade timber post can be used in this joint to provide increased structural performance e.g. where high racking strengths are required (see Figure 6). These joints are fixed in place through the panel's OSB/3 facings.

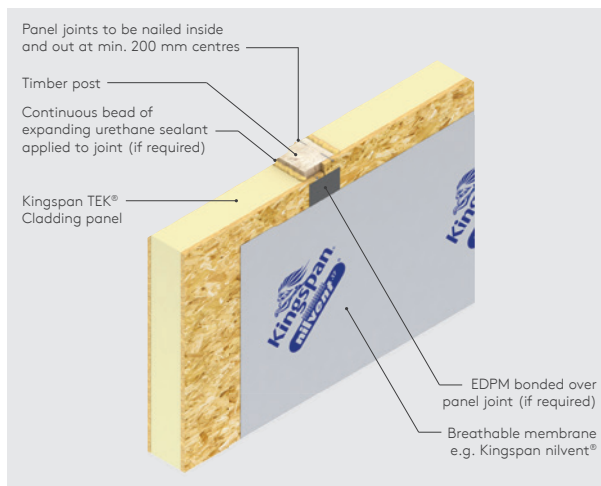
The joints can be sealed in two ways:

- expanding urethane sealant can be applied between the urethane core of the panel and the cassette joint / timber; and / or
- a continuous EPDM membrane can be bonded to the outer OSB/3 facing.

Sealing the jointing system in either of these ways enables Kingspan TEK® Cladding Panel joints to be very air-tight.



**Figure 5: Vertical Panel Junction with Insulated Cassette Joint**



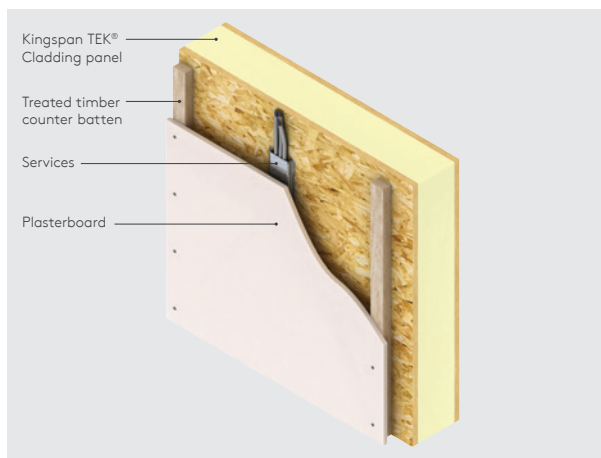
**Figure 6: Vertical Panel Junction with Timber Post**

## Internal Lining

The Kingspan TEK® Cladding Panel should be lined internally with plasterboard. The minimum plasterboard requirement may vary subject to statutory requirements for fire and acoustics. Please consult the Kingspan Insulation Technical Service Department (see rear cover for details) for definitive guidance on your construction.

Where services need to be fixed on an external Kingspan TEK® Cladding Panel wall there are two options for creating a service cavity:

- a single layer of min. 12.5 mm plasterboard on min. 25 mm deep by 50 mm wide vertical timber battens (see Figure 7); or
- a double layer of 12.5 mm plasterboard - the layer closest to the TEK® Cladding Panel should be chased out to create a cavity for services. The second layer should be 12.5 mm vapour check plasterboard (see Figure 8).



**Figure 7**



# Design Considerations

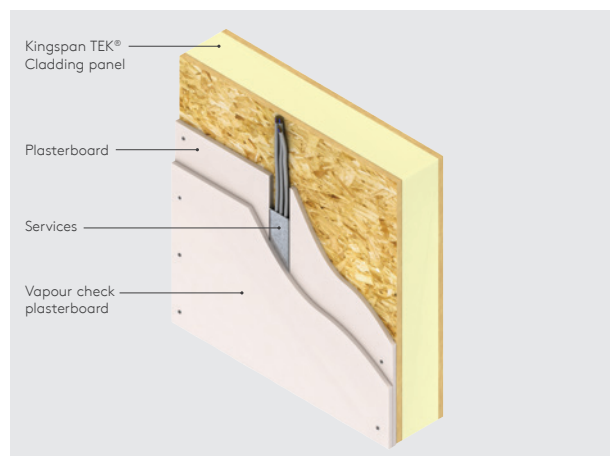


Figure 8

Where services need to be fixed and there is an additional layer of insulation, e.g. Kingspan Thermawall® TW55, fixed to the inside of the Kingspan TEK® Cladding Panel, a service cavity can be created by installing a single layer of min. 12.5 mm plasterboard on min. 25 mm deep by 50 mm wide vertical timber battens (see Figure 9).

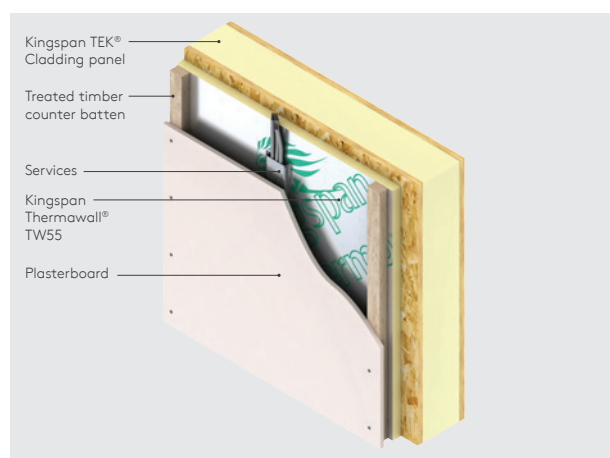


Figure 9

In all cases the need for electrical sheathing / conduit should be assessed in accordance with Building Regulations / Standards and BS 7671: 2001 (Requirements for Electrical Installations).

Where an electrical back box must be fixed to a Kingspan TEK® Cladding Panel wall, the electrical back box must be either surface mounted, or the service cavity must be sufficiently wide to accommodate a flush fitting electrical back box. Under no circumstances should the OSB/3 facing and / or the insulation core of the TEK® Cladding Panel, or any internal insulation, be 'chased out' to accommodate service fittings.

Where cabled services do not need to be fixed to the Kingspan TEK® Cladding Panel, a single layer of min. 12.5 mm plasterboard can be fixed direct to the panel (see Figure 10).

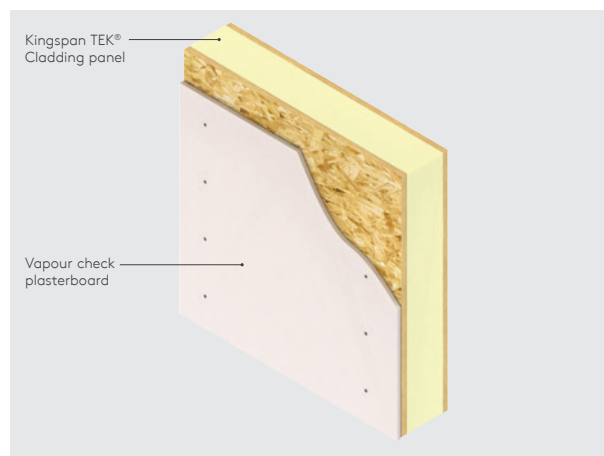


Figure 10

## External Cladding

As soon as possible after the Kingspan TEK® Cladding Panel has been secured to the structural frame of the building, a non-tenting breathable membrane, e.g. Kingspan nilvent®, should be fixed directly to the panels. External cladding should be installed over the breathable membrane.

The following are examples of external cladding for walls constructed using the Kingspan TEK® Cladding Panel:

- outer leaf of brickwork / stone, ensuring a minimum 50 mm cavity is maintained between the breather membrane and the brickwork;
- lightweight render coating carried on calcium silicate board which is supported by min. 25 mm deep by 50 mm wide vertical treated timber counter battens;
- feather edge timber boarding on min. 25 mm deep by 50 mm wide vertical treated timber counter battens;
- wall tiling mounted on tiling battens which are supported by min. 25 mm deep by 50 mm wide treated timber counter battens;
- proprietary brick slip system supported by min. 25 mm deep by 50 mm wide vertical treated timber counter battens; and
- proprietary rainscreen cladding systems.

Other external cladding options are possible, if you have any queries regarding the suitability of your external cladding, please contact the Kingspan Insulation Technical Service Department (see rear cover for details).

NB There are potential restrictions placed upon this product which vary dependant on building type, height, construction and location. For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, refer to the relevant Technical Bulletins at and links to Government websites [www.kingspantek.co.uk/fireregulations](http://www.kingspantek.co.uk/fireregulations).

## Fire Stops

Current Building Regulations / Standards should be considered with regard to the requirements for, and provision of, fire stops.

# Design Considerations

## Environmental Sustainability

It is widely recognised that there are four main global environmental sustainability issues: global warming, non-renewable resource depletion, toxic pollution and ozone depletion, and that these global issues far outweigh any local environmental sustainability issues in their need for immediate attention and potential impact from inaction.

Studies have shown that the first three issues are essentially one. The extraction and consumption (burning) of fossil fuels is by far the most significant contributor to global warming, non-renewable resource depletion and toxic pollution.

For housing, environmental sustainability comes down to two main issues: reduce fossil fuel use and specify zero ODP products.

By far the most economical method of reducing fossil fuel use in housing is to reduce space-heating demand. The investment for renewable energy sources only becomes convincing once space-heating demand is minimised.

The most effective way to reduce the space-heating demand of a building is to improve the energy performance of its envelope by specifying low U-values, low air-leakage rates and by avoiding significant linear thermal bridging wherever possible.

The former has been the subject of Building Regulations / Standards for 30 years but still has a long way to go before an optimum level is attained. It is estimated that U-values of 0.10 W/m<sup>2</sup>K would be the practical optimum.

Building Regulations / Standards are only starting to attend seriously to the issues of air-leakage and linear thermal bridging, which become more significant as U-values are reduced, but it is likely that Building Regulations / Standards will come to focus more on air-tight and better detailed constructions over the coming years as U-values and energy performance move closer to the optimum.

## Zero ODP and Low GWP

The fibre-free insulation core of the Kingspan TEK® Cladding Panel is manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

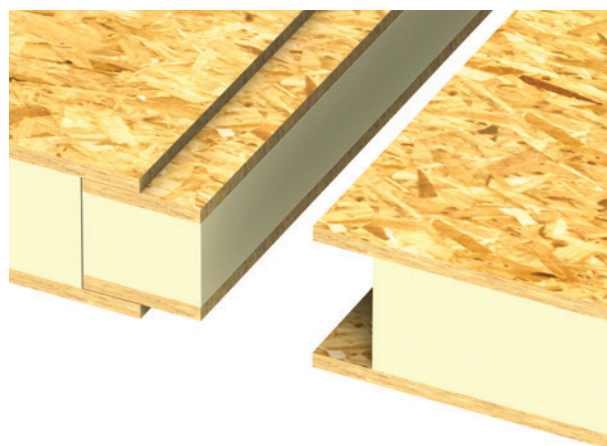
## U-values

The 142 mm thick Kingspan TEK® Cladding Panel yields worst case whole wall and roof U-values of 0.20 W/m<sup>2</sup>K with no additional insulation. The 172 mm thick TEK® Cladding Panel yields worst case whole wall and roof U-values of 0.17 W/m<sup>2</sup>K with no additional insulation. The panels can also meet the U-values that are expected to be set in future changes to the Building Regulations / Standards, as extremely low U-values, e.g. 0.10 W/m<sup>2</sup>K and lower, can easily be achieved with the addition of an insulated lining, e.g. Kingspan Thermawall® TW55, on the inside of the TEK® Cladding Panel. This can mean low running costs and impressive comfort for the lifetime of the building.

## Air-tightness

In addition to the excellent U-values that can be achieved by walls constructed using the Kingspan TEK® Cladding Panel, the closed cell structure of the rigid urethane insulation core of the panels does not allow movement of air within them. The insulation will not sag or physically deteriorate over time, as may be the case with other insulating materials.

The Kingspan TEK® Cladding Panel proprietary jointing system can help create a very air-tight structure for walls. This can help the building achieve air leakage levels significantly better than the 10 m<sup>3</sup>/hour/m<sup>2</sup> at 50 Pa maximum required by Building Regulations / Standards.



In order to achieve these low air leakage rates for the full building envelope, care must also be taken to maintain air tightness at junctions other than those between each Kingspan TEK® Cladding Panel, such as:

- air leakage at the junction of the soleplate and foundation substructure where temporary levelling shims have been used - air leakage can be minimised by ensuring the cement based mortar (e.g. EasiPoint Standard) which has been injected underneath the soleplate to distribute the load of the building, has been fully installed from both sides of the soleplate; and
- air leakage at intermediate floor zones can be minimised by ensuring that the joint between panels, is fully sealed with silicone sealant.

The Kingspan TEK® Cladding Panel does not suffer from the problems associated with other common construction techniques such as:

- air leakage through poorly sealed sockets, switches etc. in timber frame walls;
- air leakage at floor zones through wet plastered masonry cavity walls; and
- air leakage under skirting boards and through poorly sealed sockets, switches etc. in dry lined masonry cavity walls.

# Design Considerations

## Limiting Cold Bridging

Repeating thermal bridges occur where a material with a significantly worse thermal conductivity interrupts the insulation layer in a construction i.e. timber studs etc. U-value calculations for conventional timber frame systems take into account the effects of repeating thermal bridges. Guidance documents for the calculation of U-values, BS EN ISO 6946: 2017 / I.S. EN ISO 6946: 2007 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation methods) and BR 443 (Conventions for U-value calculations), indicate that in a typical domestic timber frame building, a minimum of 15% of walls and 9% of the pitched roof is un-insulated.

The percentage figures quoted include structural timbers and noggins, but do not account for timbers that are outside the wall or pitched roof area used for heat loss calculations, such as timbers around window zones, and at intermediate floors, as these are accounted for by linear thermal bridging ( $\psi$ -values).

The insulation layer in the Kingspan TEK® Cladding Panel is not interrupted by repeating studwork. Therefore, there is less repeating thermal bridging, which can yield better thermal performance. There are, however, some thermal bridges, e.g. where timbers are used to support point loads etc.

The overall result is that thermal bridging from timber elements, in walls constructed using the Kingspan TEK® Cladding Panel, can be as low as 4%.

Linear or non-repeating thermal bridges occur at junctions, e.g. wall to floor, and openings, e.g. windows, in the building fabric, and are expressed as psi ( $\psi$ ) values. A  $\psi$ -value is the heat loss through a junction, which is additional to the heat flow through the adjoining plane elements, and is expressed in W/mK.

$\psi$ -values are not taken into account in U-value calculations, but, instead, they are taken into account separately in the calculation methodologies used to assess the operational CO<sub>2</sub> emissions of buildings e.g. SAP in UK and DEAP in Republic of Ireland. The Kingspan TEK® Cladding Panel, particularly if installed 'out-board', achieves very good  $\psi$ -values, due to the continuity of insulation at junctions and openings.

Kingspan Insulation has had a number of junctions modelled and  $\psi$ -values calculated for them. For further information, please contact the Kingspan Insulation Technical Service Department (see rear cover for details).

## Responsible Sourcing

It should be noted that Kingspan Insulation only manufactures and supplies the Kingspan TEK® Cladding Panel and the information below only relates to the TEK® Cladding Panel.

Buildings constructed using the Kingspan TEK® Cladding Panel also use a large number of other components e.g. timber, fixings, sealants etc. These other components are sourced and provided by the Kingspan TEK® Delivery Partner or its contractor. Kingspan Insulation can not provide certification for these other components and this must be sought from the TEK® Delivery Partner or its contractor.

Kingspan Insulation's Selby, North Yorkshire manufacturing facility, at which the Kingspan TEK® Cladding Panel is produced, carries FSC® (FSC-C109304) and PEFC Chain of Custody certification. As standard, the OSB facing of the TEK® Cladding Panel is PEFC certified. This certification verifies that the OSB facing of the TEK® Cladding Panel is legally sourced from well managed forests.

The Kingspan TEK® Cladding Panel produced at Kingspan Insulation's Selby, North Yorkshire manufacturing facility is certified to BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) 'Very Good'.



NB The above information is correct at the time of writing. Please confirm at the point of need by contacting Kingspan Insulation's Technical Service Department (see rear cover for details), from which a copy of Kingspan Insulation's certificates can be obtained.

# Design Considerations

## BREEAM

The Kingspan TEK® Cladding Panel can help achieve credits in a number of sections of BREEAM. A technical bulletin has been produced covering, in detail, what credits are available. Copies of the technical bulletin can be downloaded from [www.kingspantek.co.uk/literature](http://www.kingspantek.co.uk/literature).

## Sustainability & Responsibility

Kingspan Insulation has a long-term commitment to sustainability and responsibility: as a manufacturer and supplier of insulation products; as an employer; as a substantial landholder; and as a key member of its neighbouring communities.

A report covering the sustainability and responsibility of Kingspan Insulation Ltd's British operations at its Pembridge, Herefordshire and Selby, North Yorkshire manufacturing facilities is available at [www.kingspaninsulation.co.uk/sustainabilityandresponsibility](http://www.kingspaninsulation.co.uk/sustainabilityandresponsibility).

## Less Transport

The Kingspan TEK® Cladding Panel is a structural composite incorporating several wall components in one, e.g. insulation and fixing substrate, therefore there are fewer deliveries compared with more traditional construction methods, where components can often be sourced from, and delivered by, a number of different distributors or manufacturers. The overall result is less transport, congestion, noise and traffic pollution, which reduces a project's impact on the environment.

## Minimal Landfill

The construction industry is responsible for around 61% of the UK's waste<sup>1</sup>. The key issue here is the land for landfill, which is fast running out. The government is currently dealing with this by imposing increasingly heavy landfill taxes. However, a number of EU countries have already instigated a landfill ban on combustible and recyclable materials.

The Kingspan TEK® Cladding Panel is factory manufactured, meaning there is minimal site wastage and therefore more efficient use of materials on-site. The minimal levels of site wastage means less site waste to landfill, which also helps to reduce cost.

<sup>1</sup> 'UK Statistics on Waste', February 2019 edition, Department for Environment, Food & Rural Affairs.

## Floor Space

When building a wall to achieve a U-value of 0.17 W/m<sup>2</sup>K using the Kingspan TEK® Cladding Panel, the structure can be just 283.0 mm thick. In comparison, a 100 mm steel framed wall to achieve the same U-value may have to be 325.8 mm thick, a 150 mm steel framed wall to achieve the same U-value may have to have a wall 365.8 mm thick.

### Kingspan TEK® Cladding Panel Wall

Wall thickness 283.0 mm

(3 mm skim, 12.5 mm plasterboard, 25 mm airspace between battens, 172 mm Kingspan TEK® Cladding Panel, 0.5 mm Kingspan nilvent® breathable membrane, 50 mm ventilated air space, 20 mm rainscreen cladding panel)

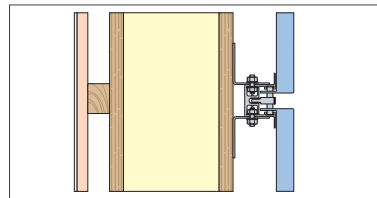


Figure 11

### 100 mm Steel Framed Wall

Wall thickness 325.8 mm

(3 mm skim, 12.5 mm plasterboard, 0.3 mm VCL, 100 mm deep steel frame filled with glass mineral fibre (0.038 W/mK), 10 mm calcium silicate board, 130 mm Kingspan Kooltherm® K15, 50 mm ventilated air space, 20 mm rainscreen cladding panel)

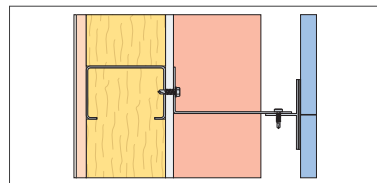


Figure 12

### 150 mm Steel Framed Wall

Wall thickness 365.8 mm

(3 mm skim, 12.5 mm plasterboard, 0.3 mm VCL, 150 mm deep steel frame filled with glass mineral fibre (0.038 W/mK), 10 mm calcium silicate board, 120 mm Kingspan Kooltherm® K15, 50 mm ventilated air space, 20 mm rainscreen cladding panel)

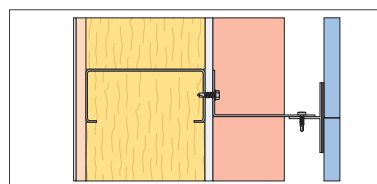


Figure 13

\* Internal floor area of each construction is rounded to one decimal place.

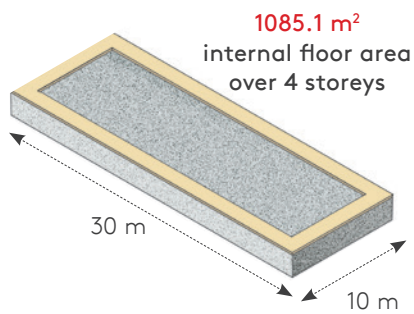
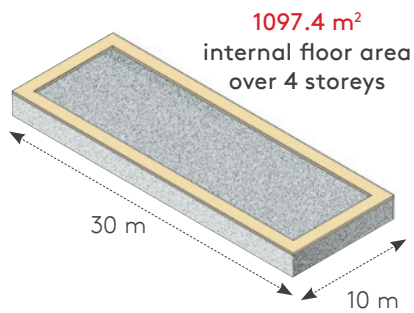
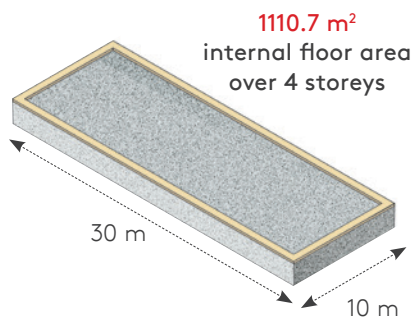
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# Design Considerations

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This means that the Kingspan TEK® Cladding Panel can provide more floor space for the same external dimensions.

With the Kingspan TEK® Cladding Panel, in the example shown below, you can achieve 13.3 m<sup>2</sup>\* more useable floor space than a building with 100 mm steel framed walls and 25.6 m<sup>2</sup>\* more useable floor space than a building with 150 mm steel framed walls of the same external dimensions and U-value (0.17 W/m<sup>2</sup>K).





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# Financial Advantages

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## Energy Savings

The most effective way to reduce the space heating demand of a building is to improve the energy performance of its envelope by specifying low U-values, low air leakage, and by avoiding significant thermal bridging wherever possible. The thermal efficiency of the Kingspan TEK® Cladding Panel can offer dramatic energy cost savings over the lifetime of the building.

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## Capital Cost Savings

To achieve equal energy performance e.g. a U-value of 0.17 W/m<sup>2</sup>K and air leakage as approximately 1 m<sup>3</sup>/hour/m<sup>2</sup> at 50 Pa, the capital cost of walls comprising the Kingspan TEK® Cladding Panel may be considerably lower than an equivalent construction using steel framing.

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## Landfill Savings

The Kingspan TEK® Cladding Panel arrives on site as a complete scheme therefore there should be no site wastage apart from packaging materials and empty foam cans. This results in more efficient use of materials and also lower landfill fees.

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## Labour Savings

The Kingspan TEK® Cladding Panel is designed and manufactured offsite and in the factory. Therefore, the scheme (including all ancillaries and fixings) is delivered complete and from one source, which will enable a weather-tight structure to be erected quickly.

Easily recognised components are shipped to the site for assembly, rather than waiting for a builder's interpretation of plans. The Kingspan TEK® Cladding Panel also comes in much larger dimensional sizes than other building materials meaning fewer components have to be handled during the erection process.

This can compare favourably with traditional construction techniques such as brick and block where there are more components which can result in more processes and therefore more labour and possible construction errors.

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## Opens Doors Faster

When the building is built for the purpose of renting, the shorter construction time of walls comprising the Kingspan TEK® Cladding Panel, can enable tenants to move in sooner and consequently the owner achieves a better cash flow and therefore faster payback.

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# Delivery Partners

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## Delivery Partners

Projects incorporating the Kingspan TEK® Cladding Panel are designed, coordinated and erected by a nationwide Delivery Partner network. These Delivery Partners have unrivalled knowledge of SIP construction and this ensures that the advantages of the TEK® Cladding Panel are designed and built into every project.

A full list of approved UK, Irish and international Delivery Partners is available from the Kingspan TEK® website (see rear cover for details).

The advantages of Kingspan TEK® Delivery Partner support are detailed below.

### Design

- Nationwide network with local knowledge.
- Experienced in all sectors of construction and external cladding.
- Collaborative approach with clients ensures design optimisation.
- Maximise design flexibility and spanning capability of the Kingspan TEK® Cladding Panel to minimise raw material costs.
- All supporting drawings and method statements are supplied.

### On Site

- Fully trained erectors offer peace of mind with predictable completion times, regardless of weather conditions.
- Rigorous attention to detail - audits ensure that excellence in design is replicated on site and 'as built' construction minimises air leakage and cold bridging.
- Single point of contact for entire supply chain, minimising risk and hassle for clients and contractors alike.
- CAD and CNC engineered offsite fabrication ensures the entire system arrives on site as a kit ready for installation without the need for additional on-site fabrication or waste.

Enquiries should be directed to a Kingspan TEK® Delivery Partner for the following:

- specific structural engineering design advice;
- to convert a drawing (including plans and elevations) into a Kingspan TEK® Cladding Panel design scheme; and
- quotations and lead times.

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# Sitework

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## Supply and Erect

Typically, the complete System is delivered to site ready for erection by fully qualified construction teams.



## Joining the Kingspan TEK® Cladding Panel System

The Kingspan TEK® Cladding Panel has a routed channel along its long edges, which accommodates a unique cassette joint. These are fixed through the panel's OSB/3 facings. Expanding urethane sealant is applied between the urethane core of the cassette and the panel. Sealing this jointing system with the expanding urethane sealant enables walls comprising the TEK® Cladding Panel to be very air-tight.

## Lifting Panels

Lifting should be organised in accordance with the Contractors own method statement.

## Delivery of the Kingspan TEK® Cladding Panel

Information relating to the site and its access will be required and should be provided at an early stage e.g. quotation stage. When the Kingspan TEK® Cladding Panel is delivered, it will be via an appropriate sized vehicle.

Additional information relating to the unloading, use and positioning of a crane and other machinery should be discussed with the Kingspan TEK® Delivery Partner.

## Storage of Components

The polyethylene packaging of the Kingspan TEK® Cladding Panel and associated timber components, should not be considered adequate for outdoor protection.

Ideally, the Kingspan TEK® Cladding Panel and associated timbers should be stored inside a building. If, however, outside storage cannot be avoided, all panels and timbers should be kept at least 150 mm off the ground on supports, and protected from the elements with an opaque polythene sheet or weatherproof tarpaulin sheet until used. Supports to the TEK® Cladding Panel should be positioned at maximum 1,200 mm centres ensuring the ground is flat, so that the panels will not twist.

Any products that have been allowed to get wet should not be used.

## Alterations to the Kingspan TEK® Cladding Panel

Alterations can usually be accommodated during the construction process if required. Prior approval in writing from Kingspan Insulation Technical Service Department (see rear cover for details) will be required. Alterations following completion of the building are possible but more difficult and should, where possible, be carried out by a Kingspan TEK® Delivery Partner who has access to the original design plans.

NB A structural engineer must verify all alterations.

## Water Ingress During Construction

The Kingspan TEK® Cladding Panel is supplied so that it is protected from the elements during and after the construction process. A breathable membrane (e.g. Kingspan nilvent®) is factory applied to prevent site error.

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# Sitework

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## Fixing Items to the Kingspan TEK® Cladding Panel

### Through Plasterboard Fixed Direct to the Kingspan TEK® Cladding Panel

Cabinets, boilers, radiators etc. can be fixed anywhere to the internal wall surface using appropriately sized screw fixings. Screws should be long enough to fully penetrate through the inner OSB face of the Kingspan TEK® Cladding Panel. For further information please contact the Kingspan Insulation Technical Service Department (see rear cover for details).

### Through Plasterboard Fixed to Timber Battens

Install noggins at locations where items are to be fixed. Noggins should be the same depth as the timber batten framework and should be fixed to the inner OSB face of the Kingspan TEK® Cladding Panel using appropriately sized screw fixings. Screws should be long enough to fully penetrate through the OSB. Cabinets, boilers, radiators etc. can be fixed through the plasterboard to the noggins using appropriately sized screw fixings.

Alternatively, in the case of rooms with many fixing points, or rooms that may be remodelled e.g. kitchens, 18 mm plywood may be fixed to the timber battens, using either drywall screws at 300 mm centres, or large headed galvanised clout nails at 150 mm centres, before the plasterboard is installed. Cabinets, boilers, radiators etc. can be fixed anywhere to the internal wall surface using appropriately sized screw fixings. Screws should be long enough to fully penetrate through the plywood.

For further information please contact the Kingspan Insulation Technical Service Department (see rear cover for details).

## Services Installation

### Wiring

Where possible run wiring through internal stud partition walls. However, if it is necessary to run wiring on the Kingspan TEK® Cladding Panel there are two possible methods, double layer plasterboard or single layer plasterboard on battens. Battens should be fixed to the inner OSB face of the TEK® Cladding Panel using appropriately sized screw fixings. Screws should be long enough to fully penetrate through the OSB. With both methods ensure that the wiring is protected with an IEE approved metal guard (see 'Design Considerations - Internal Lining, External Cladding').

Double layer plasterboard is an excellent option, especially if you are building to sell on or rent. Because there is no service cavity, the Kingspan TEK® Cladding Panel has a very solid sound unlike timber frame walls.

### Plumbing

Plumbing is done in a conventional fashion, utilising interior partition walls and / or plumbing chases. Any small bore plumbing that must run on the Kingspan TEK® Cladding Panel should be surface mounted using pipe clips screwed through internal lining into the internal OSB/3 facing of the TEK® Cladding Panel.

# Panel Details

## The Facings

The Kingspan TEK® Cladding Panel is faced on both sides with a maximum of 15 mm OSB/3, autohesively bonded to the rigid thermoset urethane insulation core during manufacture.

## The Core

The core of the Kingspan TEK® Cladding Panel is a high performance fibre-free, thermoset, 112 or 142 mm thick rigid urethane insulant manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).



## Standards and Approvals

The Kingspan TEK® Cladding Panel is manufactured to the highest standards under a management system certified to ISO: 9001 2008 (Quality Management Systems. Requirements), ISO 14001: 2004 (Environmental Management Systems. Requirements), BS OHSAS 18001: 2007 (Occupational Health and Safety Management Systems. Requirements) and ISO 50001: 2011 (Energy Management Systems. Requirements with Guidance for Use).

The Kingspan TEK® Cladding Panel's use holds BBA Certification No. 02/S029.



## Standard Dimensions

The Kingspan TEK® Cladding Panel is available in the following standard size(s):

Nominal Dimension		Availability
Length	(mm)	7,500 (max.)
Width	(mm)	200 (min.) 1,220 (max.)
Thickness	(mm)	142 (112 mm rigid urethane insulation core sandwiched between two layers of 15 mm OSB/3)
		172 (142 mm rigid urethane insulation core sandwiched between two layers of 15 mm OSB/3)

## Water Vapour Resistance

The insulation core of the Kingspan TEK® Cladding Panel typically achieves a resistance of 33.6 MNs/g, when tested in accordance with BS / I.S. EN 12086: 2013 (Thermal insulating products for building applications. Determination of water vapour transmission properties).

The OSB/3 facing typically achieves 7.5 MNs/g.

## Durability

The Kingspan TEK® Cladding Panel will have comparable durability to that of OSB/3 to BS EN 300 (Code of Practice for the selection and application of Particle Board, Oriented Strand Board (OSB), Cement Bonded Particle Board and Wood Fibre for specific purposes.), therefore as long as the wall remains weather-tight, a life of at least 60 years may be expected.

## Resistance to Solvents, Fungi and Rodents

The rigid urethane insulation core is resistant to dilute acids, alkalis, mineral oil and petrol. It is not resistant to some solvent-based adhesive systems, particularly those containing methyl ethyl ketone.

Adhesives containing such solvents should not be used in association with the Kingspan TEK® Cladding Panel. Panels which have been in contact with harsh solvents, petrol, mineral oil or acids, or components that have been damaged in any way should not be used.

The rigid urethane insulation core and facings used in the manufacture of the Kingspan TEK® Cladding Panel resist attack by mould and microbial growth and do not provide any food value to vermin.

## Strength & Stability

The loading capacity of the Kingspan TEK® Cladding Panel is sufficient for their use in cladding applications. The pull out strength of the OSB/3 facing of the panels is also sufficient to secure most external cladding systems. The number and type of fixings required to fix cladding systems to the TEK® Cladding Panel will vary with the geographical location of the building, the local topography, the height and width of the wall concerned and the type of mechanism being used to attach the cladding system. Fixing requirements should be assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 (Eurocode 1. Actions on structures. General actions. Wind actions).

For further specific structural properties please refer to BBA certificate 02/S029, which is available from [www.bbacerts.co.uk](http://www.bbacerts.co.uk) or contact the Kingspan Insulation Technical Service Department (see rear cover for details).



# Panel Details

## Fire Performance

There are potential restrictions placed upon this product which vary dependant on building type, height, construction and location. For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, refer to the relevant Technical Bulletins at and links to Government websites [www.kingspantek.co.uk/fireregulations](http://www.kingspantek.co.uk/fireregulations).

The Kingspan TEK® Cladding Panel in the constructions specified in the table below, when subjected to BS EN 1365-1: 1999 (Fire resistance tests for loadbearing elements. Walls), achieved the results shown.

Construction	Result
15.0 mm fire-resistant plasterboard (exposed face), on 25 mm battens fixed to the OSB facing of the Kingspan TEK® Cladding Panel (142 mm)	Achieved 77 minutes insulation, loadbearing capacity and integrity.
12.5 mm plasterboard (exposed face) on 25 mm battens fixed to the OSB facing of the Kingspan TEK® Cladding Panel (142 mm)	Achieved 42 minutes insulation, loadbearing capacity and integrity.

NB The results shown can also be applied to the Kingspan TEK® Cladding Panel in a 172 mm thickness.

When classified under BS EN 13501-2: 2007 + A1: 2009 (Fire classification of construction products and building elements. Classification using data from fire resistance tests, excluding ventilation services), the Kingspan TEK® Cladding Panel in the constructions specified in the table below, achieved the results shown.

Construction	Result
15.0 mm fire-resistant plasterboard (exposed face), on 25 mm battens fixed to the OSB facing of the Kingspan TEK® Cladding Panel (142 mm)	Achieved 60 minutes fire resistance (REI60)
12.5 mm plasterboard (exposed face) on 25 mm battens fixed to the OSB facing of the Kingspan TEK® Cladding Panel (142 mm)	Achieved 30 minutes fire resistance (REI30)

NB The results shown can also be applied to the Kingspan TEK® Cladding Panel in a 172 mm thickness.

Further details on the fire performance of Kingspan Insulation products may be obtained from the Kingspan Insulation Technical Service Department (see rear cover for details).

## Resistance to Airborne Sound

A laboratory test on a single 142 mm thick Kingspan TEK® Cladding Panel with no internal dry-lining achieved a sound reduction (Rw) of 31 dB.

## Thermal Properties

The  $\lambda$ -values and R-values detailed below are quoted in accordance with BS EN 13165: 2008 (Thermal insulation products for buildings - Factory made rigid polyurethane foam (PUR) products - Specification).

### Thermal Conductivity

The thermal conductivity ( $\lambda$ -value) of the OSB/3 component of Kingspan TEK® Cladding Panel should be taken as 0.13 W/mK. The declared thermal conductivity of the insulation core of TEK® Cladding Panel is 0.024 W/mK.

### Thermal Resistance

The Kingspan TEK® Cladding Panel have a thermal resistance (R-value) of 4.85 m<sup>2</sup>K/W (142 mm thick panels) or 6.10 m<sup>2</sup>K/W (172 mm thick panels). It is calculated by dividing the thickness of each component (expressed in metres) by its thermal conductivity and adding the resultant figures together. The resulting number is rounded down to the nearest 0.05 (m<sup>2</sup>K/W).

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# Contact Details

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