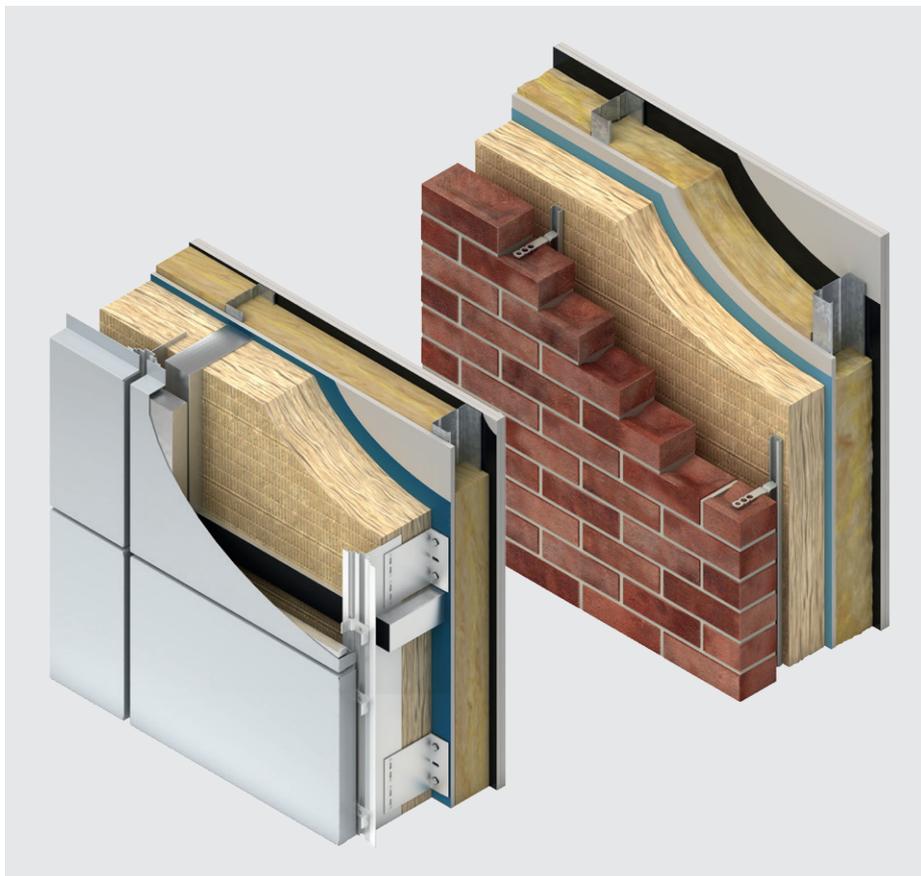


K-Roc® Rainscreen Slab

Insulation for use behind rainscreen façades, including steel and timber frame systems with a masonry outer leaf



- Rock mineral fibre insulation with a thermal conductivity of 0.034 W/mK
- A1 Euroclass - acceptable for use behind rainscreen façades in all buildings regardless of building type, height, construction and location
- Successfully tested in a façade system to BS 8414-2: 2015 + A1: 2017 in accordance with the performance criteria set out in BR 135

Typical constructions

K-Roc® Rainscreen Slab for rainscreen applications

Rainscreen façade systems are proprietary, resulting in a wide variation of possible system build-ups, material combinations and mechanisms that are used to fix and support the external cladding to the wall structure.

Fixings and supports penetrating the insulation through to the structure form point thermal bridges. The effect on the thermal performance of the overall façade system can be significant. Whilst the use of thermal isolators can assist in mitigating the impact of thermal bridging, the type and placement of fixings and supports can exacerbate heat flow through the façade assembly affecting the U-value.

For these reasons, it is advised that the Kingspan Insulation Technical Service Department is contacted for specific U-value calculations (see rear cover for details).

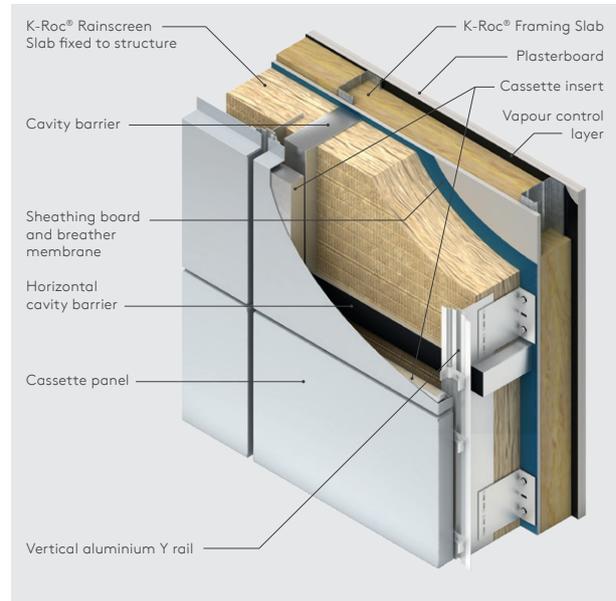


Figure 1 - Aluminium cassette & SFS

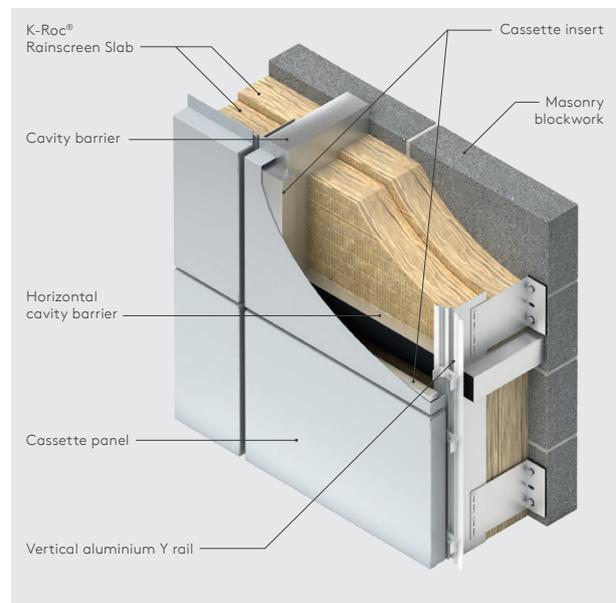


Figure 2 - Aluminium cassette & masonry blockwork

Typical constructions

K-Roc® Rainscreen Slab for steel frame systems

It is advised that the Kingspan Insulation Technical Service Department is contacted for specific U-value calculations (see rear cover for details).

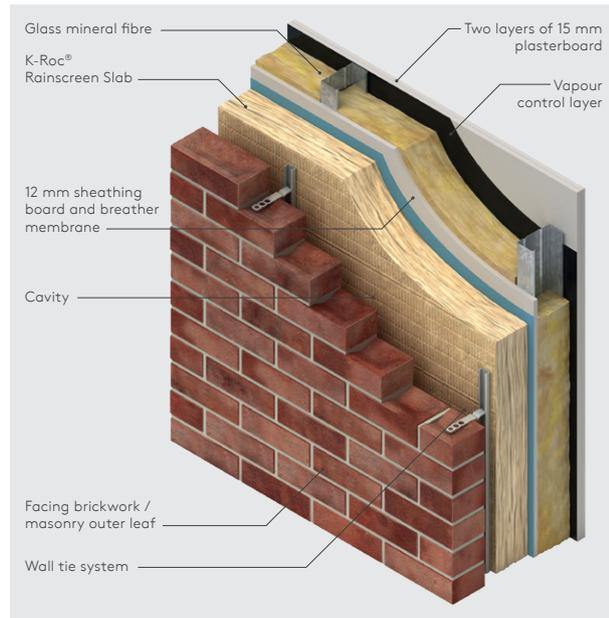


Figure 3 - Masonry brickwork & SFS

Design considerations

Linear thermal bridging at junctions and point thermal bridging

Basic principles

Linear thermal bridging describes the heat loss / gain that occurs at junctions between elements e.g. where an external wall meets the roof, or at junctions around openings in the building fabric where the thermal insulation layer is discontinuous e.g. sills, jambs and lintels.

Interruptions within the insulation layer by materials with poorer insulating properties can result in a thermal bridge, which in turn can lead to problems of condensation and mould growth, especially if there is a drop in surface temperature.

The heat flow at these junctions and opening locations, over and above that through the adjoining plane elements, is the linear thermal transmittance of the thermal bridge: measured in W/mK; referred to as a 'psi-value'; and expressed as a ' ψ -value'.

The lower the ψ -value, the better the performance, ψ -values are taken into account in the calculation methodologies e.g. the Standard Assessment Procedure (SAP) that are used to assess the operational CO₂ emissions and, where applicable, the fabric energy efficiency of new buildings.

ψ -values can comprise either, or a combination of, approved, calculated or assumed values.

Existing building junction losses are not typically accounted for in whole building heat loss calculations and only the risks of surface condensation and mould growth are considered.

Point thermal bridging describes the heat loss associated with penetrating an insulation layer at discrete points. Point thermal bridging is typically used as an adjustment to a U-value for an element, taking account of the number of brackets, fixings or fasteners (n) and their associated point thermal losses; these losses are measured in W/mK; referred to as a ' χ -values'; and expressed as a ' χ -values'.

The U-value of a rainscreen wall is adjusted to account for point thermal bridging by adding an adjustment to the U-value based on the number of penetrations per square metre of wall (n) multiplied by the calculated point thermal transmittance (χ) for brackets penetrating the insulation layer. The χ -value can be determined through 3-Dimensional numerical calculation as described in BS EN ISO 10211: 2017 / I.S. EN ISO 10211: 2017 (Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations).

Reducing linear & point thermal bridging

Heat typically flows through the easiest path. For a wall insulated with K-Roc® Rainscreen Slab, the main linear thermal bridges are the reveals, exposed slab edges and balconies, the junctions between the walls and the roof and where the external wall and ground floor meet. In addition, point linear transmittance will occur through the rainscreen fixing system chosen, where the rainscreen supports penetrate the insulation layer.

Whilst there are some 'approved' details available for insulation installed to the outer face of the construction, these are largely targeted at new build constructions. However, where applicable, they are also considered good practice for refurbishment.

Continuity of insulation is the best approach to limiting losses from junctions or from losses associated with fixing the rainscreen façade. If continuity is not achievable, overlap of insulation layers and use of lower conductivity materials represents a good practice approach. Where neither option is possible, the risk of condensation will require particular consideration in determining an appropriate approach. Details and designs should be considered in the context of the building, its construction, characteristics, condition and ventilation provisions.

Detailing at junctions to minimise the effects of linear thermal bridging and the associated risk of condensation or mould growth is important and there are some simple design considerations that can be adopted when insulating to help mitigate the risks and to reduce heat loss.

- The reveal linear thermal bridge can be avoided either by positioning the window frame so that it overlaps the insulated cavity barrier, or if this is not possible, the linear thermal bridge can be reduced by insulating the reveal at jambs, head and sill. Where existing windows or doors are not replaced as part of renovation works, design and detailing of the rainscreen façade should consider the potential for future window replacement works.
- One of the largest thermal bridging losses for buildings is the heat lost through junctions between balconies and the external wall / intermediate floor. Good practice for new buildings is to isolate the external balcony from the building structure, using an appropriate thermal break, combined with consideration of the reinforcement material used to connect the balcony back to the main structure (e.g. stainless steel has a much lower thermal conductivity than mild steel).

Design considerations

- For existing buildings, the option to use an appropriate thermal break may not be available and the effect of heat loss from balconies through the external rainscreen façade needs careful consideration. Wrapping the external balcony in appropriate insulation can assist in this circumstance to reduce the effects of heat lost through this junction.
- For a new build construction, where K-Roc® Rainscreen Slab is used to sheath a frame construction at the edge of ground floors, the distance between the top surface of the floor insulation or perimeter insulation upstand, and the bottom of the wall insulation must be a minimum of 150 mm for a concrete floor (for the UK) and 225 mm (for the Republic of Ireland). For a suspended timber floor, the distance must be a minimum of 200 mm. The further appropriate wall insulation extends past the floor insulation, the better the thermal performance of the junction between the wall and the floor.
- For existing building's junctions between walls and ground floor, good practice wherever possible is to extend an appropriate insulation (for example rock mineral fibre) below ground level, so that wall and floor insulation layers overlap. Best practice would be to excavate and extend appropriate external insulation below ground level (ideally by at least 300 mm below finished floor level) to reduce the heat flow path and therefore reduce junction losses.
- Where the rainscreen system is used at roof level as part of a parapet detail, insulation continuity should be maintained using an appropriate insulated upstand to reduce cold bridging. An upstand with a minimum resistance of 1.14 m²K/W is required around the perimeter of the roof on the internal façade of parapets. The upstand should extend a minimum of 150 mm above the roof insulation and achieve a minimum distance of 300 mm between the top of the insulation upstand and the bottom of the horizontal roof insulation. Insulation should be carried up into parapets at least as high as the flat roof insulation upstand.

Where Insulating as part of a rainscreen system, there are also some simple design considerations that can be adopted to reduce point thermal transmittance.

- Point thermal bridges cause increased flow of heat and should be taken into consideration when designing a façade / façade system. The first priority should be to eliminate continuous conductive elements and instead use discontinuous supports to make required connections back to structure. When the thermal bridge is a necessity, such as when the structure must penetrate uninterrupted through the insulation, look for materials with the lowest possible thermal conductivity or that allow for a reduction in the amount that the insulation layer is bridged. Thermal decoupling of the substructure from the ventilated façade can be achieved through thermal separation layers. The use of a neoprene / isolator pad, between the 'helping hand' bracket and the structure, can help to mitigate the effects of cold bridging.
- Support system suppliers should be able to calculate the thermal value of their brackets and isolators, and ensure that the installation minimises the overall impact of thermal bridging. However, in most instances a detailed three-dimensional U-value is required to assess the impact of the chosen design on the framing system.

For further advice on reducing linear and point thermal bridging, please consult Kingspan Insulation's Technical Service Department (see rear cover for details).

Design considerations

Responsible sourcing

K-Roc® Rainscreen Slab is certified to BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) 'Pass'.



K-Roc® Rainscreen Slab is manufactured under a management system certified to ISO 14001: 2015 (Environmental Management Systems. Requirements).

NB The above information is correct at the time of writing. Please contact the Kingspan Insulation Technical Service team (see rear cover for details) for copies of certificates.

Specification clause

K-Roc® Rainscreen Slab should be described in specifications as:

The wall insulation shall be K-Roc® Rainscreen Slab _____ mm thick: comprising a rock mineral fibre insulation.

The product shall be manufactured under a management system certified to ISO 9001: 2015 (Quality management systems) and ISO 14001: 2015 (Environmental management systems) and installed in accordance with the instructions issued by Kingspan Insulation Limited.

Product classifications

Uniclass UK

Pr_25_57_06_50 Mineral fibre slab insulation

CAWS

H92/775 Thermal insulation

H92/776 Thermal insulation

Details also available at the **NBS Source**.

Fire safety

For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards in Great Britain, refer to the relevant Technical Bulletins and links to Government websites at www.kingspaninsulation.co.uk/fireregulations (for GB) or contact technical services at technical@kingspaninsulation.ie (for Ireland).

Fire stop & cavity barrier strategy

Current guidance to the Building Regulations / Standards should be considered with regard to the performance requirements for, and the provision of fire stops and cavity barriers. For further information please contact the Kingspan Insulation Technical Service Department (see rear cover for details).

Water vapour control / condensation

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

A condensation risk analysis should be carried out following the procedures set out in BS EN ISO 13788: 2012 / I.S. EN ISO 13788: 2012 (Hygrothermal performance of building components and building elements. Internal surface temperature to avoid critical surface humidity and interstitial condensation. Calculation methods). The Kingspan Insulation Technical Service Department (see rear cover for details) can provide this service.

Wind loading

K-Roc® Rainscreen Slab has been tested to BRE digest 346: 1989 (The assessment of wind loads. Part 7: wind speeds for serviceability and fatigue assessments), withstanding the applied dynamic wind loading at a maximum design pressure of 3.6 kPa, or 100 mph (44m/s) and assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 (Eurocode 1. Actions on structures - General actions - Wind actions) / I.S. EN 1991-1-4: 2005 (Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions (including Irish National Annex)) taking into account:

- length / width / height of the building;
- orientation of the building;
- wind speed;
- aspect (e.g. on a hill side); and
- topographical value of the surrounding area.

Sitework

Installation

The installation guidance for K-Roc® Rainscreen Slab outlined in this section must only be followed after considering the below.

To ensure compliance with the latest Building Regulations / Standards please consult your system supplier, the current guidance to the Building Regulations / Standards or Local Building Control for more information.

In England and Wales, for 'relevant' buildings over 18 m in height, membranes used as part of the external wall construction above ground level should achieve a minimum of Euroclass B-s3,d0.

Since rainscreen façade systems are proprietary and use differing mechanisms to fix and support the external cladding to the wall structure, installation guidance should be sought from the system manufacturer or supplier.

Nevertheless, in the absence of any other guidance the instructions set out below may be followed.

- Insulation slabs should be installed break-bonded with slab edges lightly butted and in such a manner to achieve a close fit between the slab and substrate interface so as to avoid gaps behind or between the slabs.
- Slabs should be cut neatly around fixings and brackets, so as to avoid gaps.
- The number and type of mechanical fixings required to fix K-Roc® Rainscreen Slab will vary with the geographical location of the building, the local topography, the height and width of the wall concerned, the wall structure, and the type of mechanism being used to attach the cladding system.
- A minimum of 3 fixings per m² are required to secure the insulation slab to the wall structure.
- The requirement for additional fixings should be assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 / I.S. EN 1991-1-4: 2005.
- The fixings should be evenly distributed over the whole area of the slab.

Refer to:

Ejot UK Limited +44 (0) 1977 687 040
www.ejot.co.uk

SFS Intec +44 (0) 330 0555 888
www.sfsintec.biz/uk

- For brickwork cladding fixings, an approved restraint system should be used. For more information, please refer to:

Ancon Ltd +44 (0) 1142 755 224
www.ancon.co.uk

Recommended fixing patterns

- Fixings should have a minimum head diameter of 70 mm. A typical fixing pattern has three fixings per square metre, with one metal fixing at the centre of every slab.

General

Cutting

- The use of dust masks is recommended, in accordance with CDM Guidelines, to prevent inhalation in the event loose fibres become airborne during the process of cutting.
- Cutting should be carried out using a hard steel bladed saw.
- Ensure accurate trimming to achieve close butting joints and continuity of insulation.

Daily working practice

- At the completion of each day's work, or whenever work is interrupted for extended periods of time, slab edges and joints should be protected from inclement weather.
- K-Roc® Rainscreen Slab should be left exposed for the shortest period of time possible during the construction phase. The installer and design team should assess whether additional protection may be required for the project. In the event that K-Roc® Rainscreen Slab does become wet, slabs should be allowed to dry out as much as possible and then inspected before installation is finalised and any damaged panels replaced.

Availability

- K-Roc® Rainscreen Slab is available through specialist insulation distributors and selected builders' merchants throughout Great Britain and Ireland.

Packaging & storage

- The polyethylene packaging of Kingspan Insulation products, which is recyclable, should not be considered adequate for outdoor protection.
- Ideally, slabs should be stored inside a building. If, however, outside storage cannot be avoided, then the slabs should be stacked clear of the ground and covered with an opaque polythene sheet or weatherproof tarpaulin. Slabs that have been allowed to get wet should not be used.

Health & safety

- Kingspan Insulation products are chemically inert and safe to use.
- A Safety Information Data Sheet for this product is available from the Kingspan Insulation website www.kingspaninsulation.co.uk/safety or www.kingspaninsulation.ie/safety.

Warning - do not stand on or otherwise support your weight on this product unless it is fully supported by a load bearing surface.

Product details

The product

K-Roc® Rainscreen Slab is a rock mineral fibre insulation.

Standards & approvals

K-Roc® Rainscreen Slab is manufactured to the highest standards under a management system certified to ISO 9001: 2015 (Quality Management Systems. Requirements) and ISO 14001: 2015 (Environmental Management Systems. Requirements).

The use of K-Roc® Rainscreen Slab (in thicknesses of 30 - 200 mm) is covered by BBA Certificate 20/5845.



Standard dimensions

K-Roc® Rainscreen Slab is available in the following standard size(s):

| Nominal dimension | Availability |
|-------------------------|---|
| Length (m) | 1.2 |
| Width (m) | 0.6 |
| Insulant Thickness (mm) | Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes. |

Moisture properties

K-Roc® Rainscreen Slab typically achieves a water vapour resistivity of 5 MNs/gm and a water vapour diffusion resistance factor of 1 MU, μ in accordance with BS EN 12086: 2013 (Thermal insulating products for building applications. Determination of water vapour transmission properties).

K-Roc® Rainscreen Slab typically achieves a water absorption (short term) of $\leq 1 \text{ kg/m}^2$ when tested to BS EN ISO 29767: 2019 (Thermal insulating products for building applications. Determination of short term water absorption by partial immersion).

K-Roc® Rainscreen Slab typically achieves a water absorption (long term) of $\leq 3 \text{ kg/m}^2$ when tested to EN 12087: 2013 (Thermal insulating products for building applications. Determination of long term water absorption by immersion).

Density

K-Roc® Rainscreen Slab has a density of 45 kg/m^3 .

Thermal properties

The λ -values and R-values detailed below are quoted in accordance with BS EN 13162: 2012 + A1: 2015 (Thermal insulation products for buildings. Factory made mineral wool (MW) products. Specification).

Thermal conductivity

The slabs achieve a thermal conductivity (λ -value) of 0.034 W/mK .

Thermal resistance

Thermal resistance (R-value) varies with thickness and is calculated by dividing the thickness of the slab (expressed in metres) by its thermal conductivity. The resulting number is rounded down to the nearest $0.05 \text{ (m}^2\text{K/W)}$.

| Insulant thickness (mm) | Thermal resistance ($\text{m}^2\text{K/W}$) |
|-------------------------|---|
| 80 | 2.35 |
| 100 | 2.90 |
| 120 | 3.50 |
| 150 | 4.40 |

NB Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

NB The thermal performance of rock mineral fibre products is declared in accordance with EN 13162: 2012 + A1: 2015, as required by the EU Construction Product Regulations. EN 13162: 2012 + A1: 2015 does not provide for any assessment of the degradation of thermal performance over time. As such, it is not possible to guarantee that the declared thermal performance of mineral wool will be valid for the lifetime of the product's use.

Product details

Fire performance

Under System 1 AVCP, K-Roc® Rainscreen slab achieves European Classification (Euroclass) A1 when classified to EN 13501-1: 2018 (Fire classification of construction products and building elements - Classification using data from reaction to fire tests). The Certificate of Constancy of Performance (certificate number 0809 - CPR - 19000635) and UKCA Technical Assessment (certificate number UK 0836-CPR-22/P6091) are available upon request.

K-Roc® Rainscreen Slab in the constructions specified in the table below, when subjected to BS EN 1364-1: 2015 (Fire resistance tests for non-loadbearing elements – Walls) achieved the results shown.

| | | |
|-------------------|--------------------|-------------------|
| Test | BS EN 1364-1: 2015 | |
| Build-up | 1* | 2** |
| Report no. | EUI-21-B-000335-A | EUI-21-B-000335-B |
| Issue date | 21 April 2022 | 21 April 2022 |
| Direction | Inside to outside | Outside to inside |
| Integrity (mins.) | 112 | 132 |

When classified under BS EN 13501-2: 2016 (Fire classification of construction products and buildings elements- Classification using data from fire resistance tests, excluding ventilation services), K-Roc® Rainscreen Slab, in the constructions specified below, has achieved the fire classifications shown.

| | | |
|-------------------|---------------------|-------------------|
| Classification | BS EN 13501-2: 2016 | |
| Build-up | 1* | 2** |
| Report no. | EUI-21-000335 | |
| Issue date | 9 May 2022 | |
| Direction | Inside to outside | Outside to inside |
| Integrity (mins.) | EI 90 | EI 120 |

* Build-up 1 - 2 x 15 mm layers of Fireline plasterboard, VCL, 100 mm **K-Roc® Framing Slab** between metal studs @600tc (Kingspan Steel Framing System), 12 mm Y-wall sheathing board, Kingspan nilvent® and 100 mm **K-Roc® Rainscreen Slab**.

Build-up 2 - 100 mm **K-Roc® Rainscreen Slab, Kingspan nilvent®, 12 mm Y-wall sheathing board, 100 mm **K-Roc® Framing Slab** between metal studs @600tc (Kingspan Steel Framing System), VCL and 2 x 15 mm layers of Fireline plasterboard.

K-Roc® in a specific construction (see Figure 4 below) has been successfully tested to BS 8414-2: 2015 + A1: 2017 (Fire performance of external cladding systems - Test method for non-loadbearing external cladding systems fixed to and supported by a structural steel frame), in accordance with the performance criteria set out in BR 135 (Fire performance of external thermal insulation for walls of multi-storey buildings).

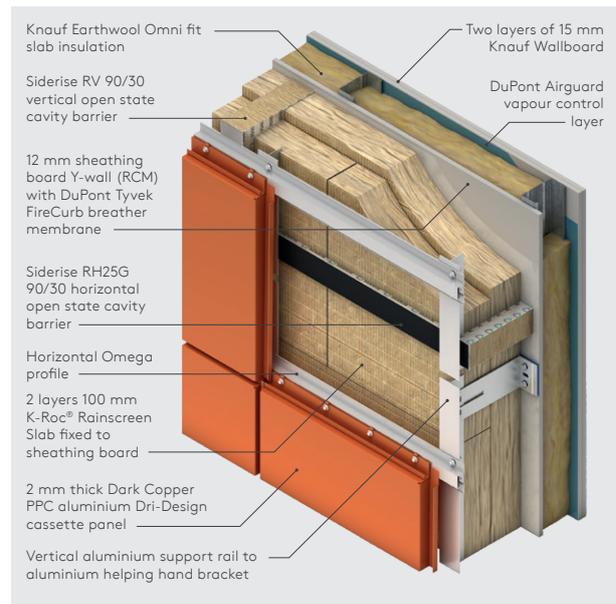


Figure 4 - Aluminium Dri-Design cassette & SFS

The test report detailing the construction is available for download on [our website](#) or further information can be provided by emailing highrisetechnical@kingspan.com.

For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards in Great Britain, refer to the relevant Technical Bulletins and links to Government websites at www.kingspaninsulation.co.uk/fireregulations (for GB) or contact technical services at technical@kingspaninsulation.ie (for Ireland).

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