

AlphaCore[®] Pad

Premium performance insulation for use behind rainscreen and brick façades



- Premium performance microporous silica-based insulation – thermal conductivity of 0.020 W/mK
- A2-s1, d0 Euroclass
- Ideal for new build and refurbishment

Typical constructions

Assumptions

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.

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

All calculations are undertaken using the method detailed in ISO 6946: 2017 (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).

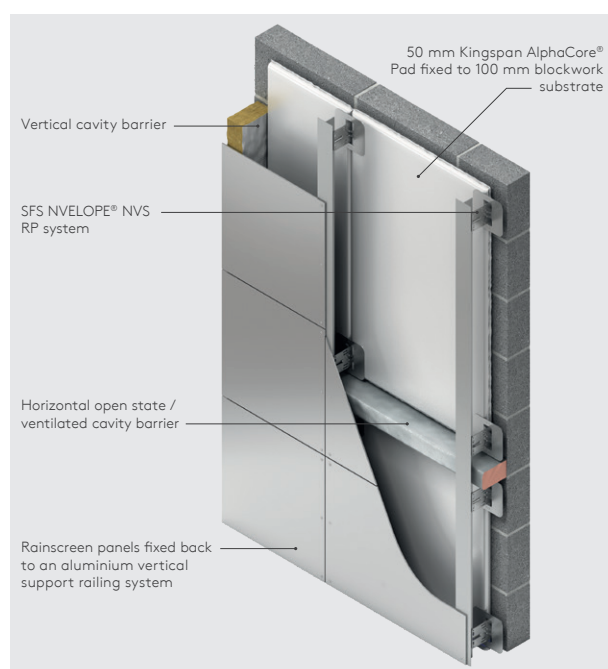


Figure 1: Rainscreen panel and masonry blockwork

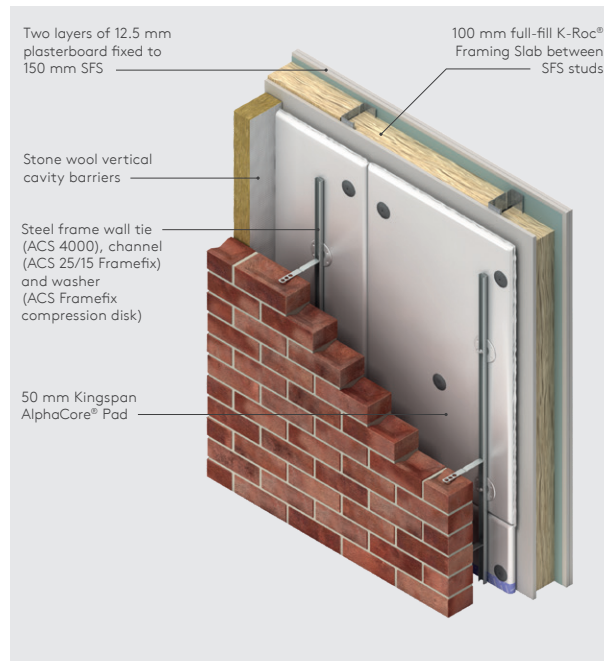


Figure 2: Brickwork facing and SFS

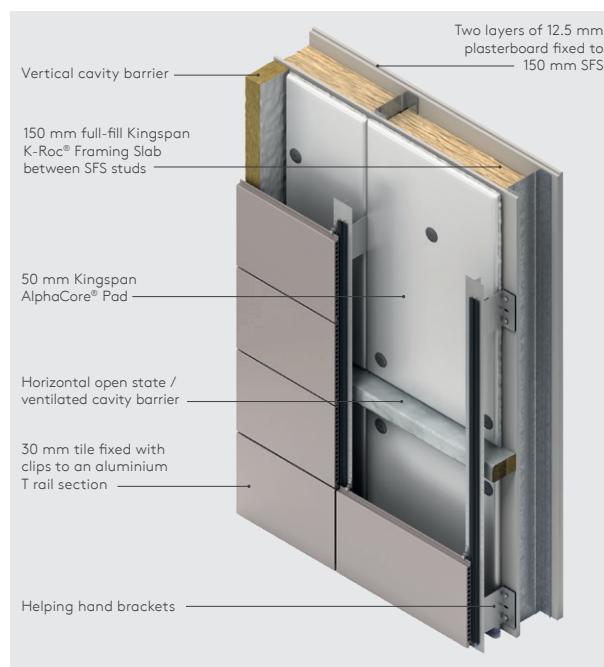


Figure 3: Terracotta tile cladding and SFS

Design considerations

Linear thermal bridging at junctions & 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) or Dwelling Energy Assessment Procedure (DEAP) that are used to assess the operational CO_2 emissions and, where applicable, the Primary or Delivered Energy and 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. However, these losses can be significant and so these losses should be addressed through good thermal detailing at junctions in order to reduce the overall energy demands of these buildings.

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) per square metre (m^2) of wall area and their associated point thermal losses. These losses are measured in W/mK , referred to as a ' χ -values' and expressed as ' 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 / I.S. EN ISO 10211: 2017 (Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations). Fixing and bracket manufacturers may be able to assist with calculated χ -values for their products.

Reducing linear & point thermal bridging

Heat typically flows through the easiest path. For a wall insulated with Kingspan AlphaCore® Pad, 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 this cannot be achieved, 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 Kingspan AlphaCore® Pad 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.
- For junctions between walls and the ground floor in existing buildings, good practice wherever possible is to extend the insulation below ground level, so that wall and floor insulation layers overlap. Best practice would be to excavate and insulate below DPC below ground level (ideally by at least 300 mm below finished floor level) with appropriate insulation e.g. Kingspan GreenGuard® GG300, to increase 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. A minimum 25 mm thick insulated upstand should be used 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 the 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 that are appropriate for the application, 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 stainless steel ‘helping hand’ brackets can help to reduce 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. Please contact the Kingspan Insulation Technical Service Department (see rear cover) for further information.

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

Design considerations

Responsible sourcing

Kingspan AlphaCore® Pad produced at Kingspan Insulation's Pembridge, Herefordshire manufacturing facility is manufactured under a management system certified to ISO 14001: 2015 (Environmental management systems).

NB The above information is correct at the time of writing. Please confirm at the point of need by visiting the **Kingspan Insulation website**, from which copies of Kingspan Insulation's certificates can be obtained.

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 upon request from literature@kingspaninsulation.co.uk.

Specification clause

Kingspan AlphaCore® Pad should be described in specifications as:-

The façade insulation shall be Kingspan AlphaCore® Pad _____ mm thick: comprising a water-repellent, microporous silica-based core and sewn into glass fibre fabric. The product shall have a thermal conductivity of 0.020 W/mK. The product shall be manufactured under a management system certified to ISO 9001: 2015, ISO 14001: 2015, ISO 37301: 2021, ISO 45001: 2018 and ISO 50001: 2018; by Kingspan Insulation Limited; and installed in accordance with the instructions issued by them.

Product classifications

Uniclass UK

Pr_25_71_70_78 Silica-based insulation boards
Pr_25_57_06/310 Insulation products generally

CAWS

H11_780 Thermal insulation
H92_776 Thermal insulation
H92_775 Thermal insulation

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

Fire safety

For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, 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.

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 5250: 2021 (Management of moisture in buildings. Code of practice). The Kingspan Insulation Technical Service Department can provide this service.

Sitework

Installation

The installation guidance for Kingspan AlphaCore® Pad 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 boards should be staggered where possible and board edges butted and in such a manner to achieve a close fit between the board and substrate interface so as to avoid gaps behind or between the boards.
- Kingspan AlphaCore® Pad panels must be fitted flush with the back wall by pushing the panels so that the brackets and their fixings embed into the panels.
- The SFS NVELOPE® NVS RP system has been designed for use with Kingspan AlphaCore® Pad in order to reduce thermal bridging, optimise thermal performance and reduce the thickness of insulation needed. For more information please visit the [SFS website](#).
- For all other fixings, a minimum of 8.3 fixings per m² are required to secure the insulation board to the wall structure.
- The requirement for additional fixings should be 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)).
- The fixings should be evenly distributed over the whole area of the board.
- Refer to the next column for recommended fixing patterns.

- Fixings at board edges must be located > 50 mm and < 100 mm from edges and corners of the board and not overlap board joints.

Refer to:

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

Fixfast +44 (0) 1732 882 387
www.fixfast.com

SFS Group Fastening Technology Ltd +44 (0) 3300 555 888
www.uk.sfs.com

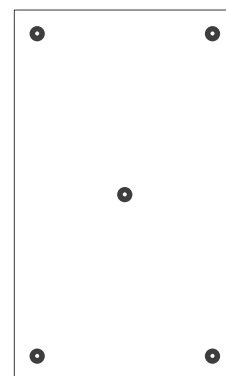
- For brickwork cladding fixings, an approved restraint system from ACS should be used. This will ensure that loadings to the brickwork are applied to the substrate through the fixings.

For more information, please refer to:

ACS Stainless Steel Fixings Ltd +44 (0) 113 391 8200
www.acsstainless.co.uk

Recommended fixing patterns

- When using the SFS NVS RP solution, no other additional fixings are required, unless required as part of the construction phase or for particular areas of detailing. For all other fixing providers, the image below shows the recommended fixing pattern, the number of fixings used and the resulting fixing density (number of fixings per m²).



5 No. per board
(1 m x 0.6 m board - 8.3 fixings / m²)

- Five fixings per board is recommended, with a minimum head diameter of 70 mm.
- Where multiple layers of Kingspan AlphaCore® Pad are required, the layers should be fixed at staggered joints where possible.
- All boards will need at least one metal fixing (including spreader plate).

Sitework

Helping hand brackets

- It is recommended to consider the use of stainless steel helping hand brackets positioned at 600 mm centres vertically to reduce the requirement to cut the insulation boards around the brackets. Consultation with the rainscreen cladding manufacturer and design team should be undertaken to understand the type of bracket systems that could be used.

General

Cutting

- It is recommended that a separate work station is set up away from the wall structure to allow for accurate cutting and taping of the insulation boards.
- Kingspan AlphaCore® Pad can be cut to the desired dimensions using ordinary box cutters for insulating materials. It is recommended to use blades with small or no serrations to prevent dust formation.
- When cutting, make sure the board is on a non-slip, cut-resistant underlayment. Use a suitable guide in order to make a straight cut.
- Ensure accurate trimming to achieve close butting joints and continuity of insulation.
- Always cut and tape as you go (see 'Taping' section below).
- Never cut more than two edges of any one board.

Taping

- Maximum two edges of a single board should be cut and taped.
- Cut edges can easily be taped using a suitable self adhesive breathable tape. The recommended tape to be used with Kingspan AlphaCore® Pad is Pro Clima's 'Compego' tape. Please contact sales@kingspaninsulation.co.uk or sales@kingspaninsulation.ie to place an order.
- A maximum 4.2 m length of tape should be used per 1 m² of any cut board. Please be aware that using more than the recommended maximum length per m² could invalidate the fire performance of Kingspan AlphaCore® Pad.
- Make sure that tape is applied in a smooth and wrinkle-free manner, and along with the fabric, overlaps sufficiently (at least 20 mm per side).
- Avoid continuous runs of tape when installing cut boards alongside each other.
- It is recommended to use mineral wool around any gaps in sections which have been cut for pipes, windows etc., or small sections where board cannot be fitted.

NB Please contact the Kingspan Insulation Technical Service Department (see rear cover) for further information and design service.

Handling & storage

- Carry boards upright by two edges.
- Care should be taken when handling the product.
- Keep boards in their protective box until needed.
- Ideally, boards should be stored inside a building. If, however, outside storage cannot be avoided, then the boards should be stacked clear of the ground.

NB: Please visit the **Kingspan Insulation website** to download the Handling Advice and further guidance on cutting, taping, handling and storage.

Daily working practice

- Protect boards from inclement weather at the completion of each day's work, or whenever work is interrupted for extended periods of time.

Availability

- Kingspan AlphaCore® Pad is available through specialist insulation distributors and selected builders' merchants throughout Great Britain and Ireland.

Health & safety

- 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.
- Kingspan Insulation advises installers to use personal protective equipment. Please refer to the Safety Information Data Sheet for further details.

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

Product awareness training & guidance

- Build your team's knowledge with on-site visits, training and support from one of our experienced Product Technicians.
- Presentations include product overview, suitable applications, handling advice, sitework and detailing advice.

Contact technicaladvice@kingspaninsulation.co.uk, or technical@kingspaninsulation.ie for more information.

Product details

The product

Kingspan AlphaCore® Pad consists of a water-repellent, microporous silica-based core, which is sewn into glass fibre fabric.

Standards & approvals

Kingspan AlphaCore® Pad is manufactured under a management system certified to ISO 9001: 2015 (Quality management systems), ISO 14001: 2015 (Environmental management systems), ISO 37301: 2021 (Compliance management systems), ISO 45001: 2018 (Occupational health and safety management systems) and ISO 50001: 2018 (Energy management systems).

The use of the Kingspan AlphaCore® Pad is covered by ETA Certificate No. ETA-22/0736.

Standard dimensions

Kingspan AlphaCore® Pad is available in the following standard size(s):

Nominal dimension		Availability
Length	(mm)	1000
Width	(mm)	600
Insulant thickness	(mm)	20 – 50

Compressive strength

The average compressive strength of Kingspan AlphaCore® Pad exceeds 75 kPa at 10% compression when tested to EN 826: 2013 (Thermal insulating products for building applications. Determination of compression behaviour).

Water absorption

Kingspan AlphaCore® Pad achieves a water absorption (long term partial immersion) of $W_{lp} \leq 0.95 \text{ kg/m}^2$ when tested to EN 12087: 2013 (Thermal insulating products for building applications. Determination of long term water absorption by immersion).

Thermal properties

The λ -values and R-values detailed below are quoted in accordance with BS EN 12667: 2001 (Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods Products of high and medium thermal resistance).

Thermal conductivity

Kingspan AlphaCore® Pad achieves a thermal conductivity (λ -value) of 0.020 W/mK.

Thermal resistance

Thermal resistance (R-value) varies with thickness and is calculated by dividing the thickness of the board (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 ($\text{m}^2\text{K/W}$)
20	1.00
25	1.25
30	1.50
40	2.00
50	2.50

NB Kingspan Insulation's maximum available single insulation thickness is subject to alteration without notice. Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

Fire performance

Kingspan AlphaCore® Pad achieves European Classification (Euroclass) A2-s1, d0 when classified to EN 13501-1: 2018 (Fire classification of construction products and building elements - Classification using data from reaction to fire tests).

Kingspan AlphaCore® Pad is assessed under Assessment and Verification of Constancy of Performance (AVCP) System 1 for Reaction to Fire.

Certificate of Constancy of Performance	0800-CPR-23-1570-4
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Further fire test data for Kingspan AlphaCore® Pad may be obtained by contacting the Kingspan Insulation Technical Service Department at technical@kingspaninsulation.co.uk (for GB) or technical@kingspaninsulation.ie (for Ireland).

NB Using more than the recommended maximum length per m^2 of Compego Tape could invalidate the fire performance of Kingspan AlphaCore® Pad (please refer to 'Taping' section on page 7).

About Kingspan Insulation

Company details

Kingspan Insulation Ltd is part of the Kingspan Group plc., one of Europe's leading construction product manufacturers. The Kingspan Group was formed in the late 1960s and is a publicly quoted group of companies headquartered in Kingscourt, County Cavan, Ireland.

Kingspan Insulation Ltd is a leading manufacturer of premium and high performance rigid insulation products and insulated systems for building fabric and building services applications.

Products & solutions

Optimum, premium and high performance rigid insulation products for building fabric applications, including roofs, walls and floors.

- Kingspan OPTIM-R® – optimum performance vacuum insulation panel (VIP) systems.
- Kingspan AlphaCore® – premium performance microporous silica-based insulation.
- Kingspan Kooltherm® – premium performance phenolic insulation.
- Kingspan Therma™ – high performance PIR insulation.
- K-Roc® – rock mineral fibre insulation.
- Kingspan GreenGuard® – extruded polystyrene insulation (XPS).
- Kingspan TEK® – structural insulated panels (SIPs).
- Cavity closers – PVC-U extrusions with an insulation core.
- Membranes – for pitched roofs and walls.

Services

Our support services provide fast and accurate advice no matter what your role is. Visit our website to access the following services.

- U-value calculations - free, quick and easy U-value calculations with our U-value Calculator.
- Help and advice on your projects, including stockists, how to guides, regulatory guidance and e-learning.
- Building Information Modelling (BIM) – download BIM objects for our products.
- Tapered roofing service – Kingspan Insulation's tapered roofing systems come with a supporting design service to ensure the most cost-effective solution for a roof is identified.
- CPDs – Kingspan Insulation offer a number of free CPD seminars for architects and specifiers covering a wide range of industry topics. CPDs can be booked or a range of online learning courses can be found online.

Planet Passionate

Through Planet Passionate we are determined to reduce our manufacturing carbon (CO₂e) emissions to as close to zero as technically possible, together with reducing carbon intensity in our primary supply chain. To learn more about our latest progress and targets, as well as our partnerships and global commitments, visit the global **Planet Passionate Hub**.

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