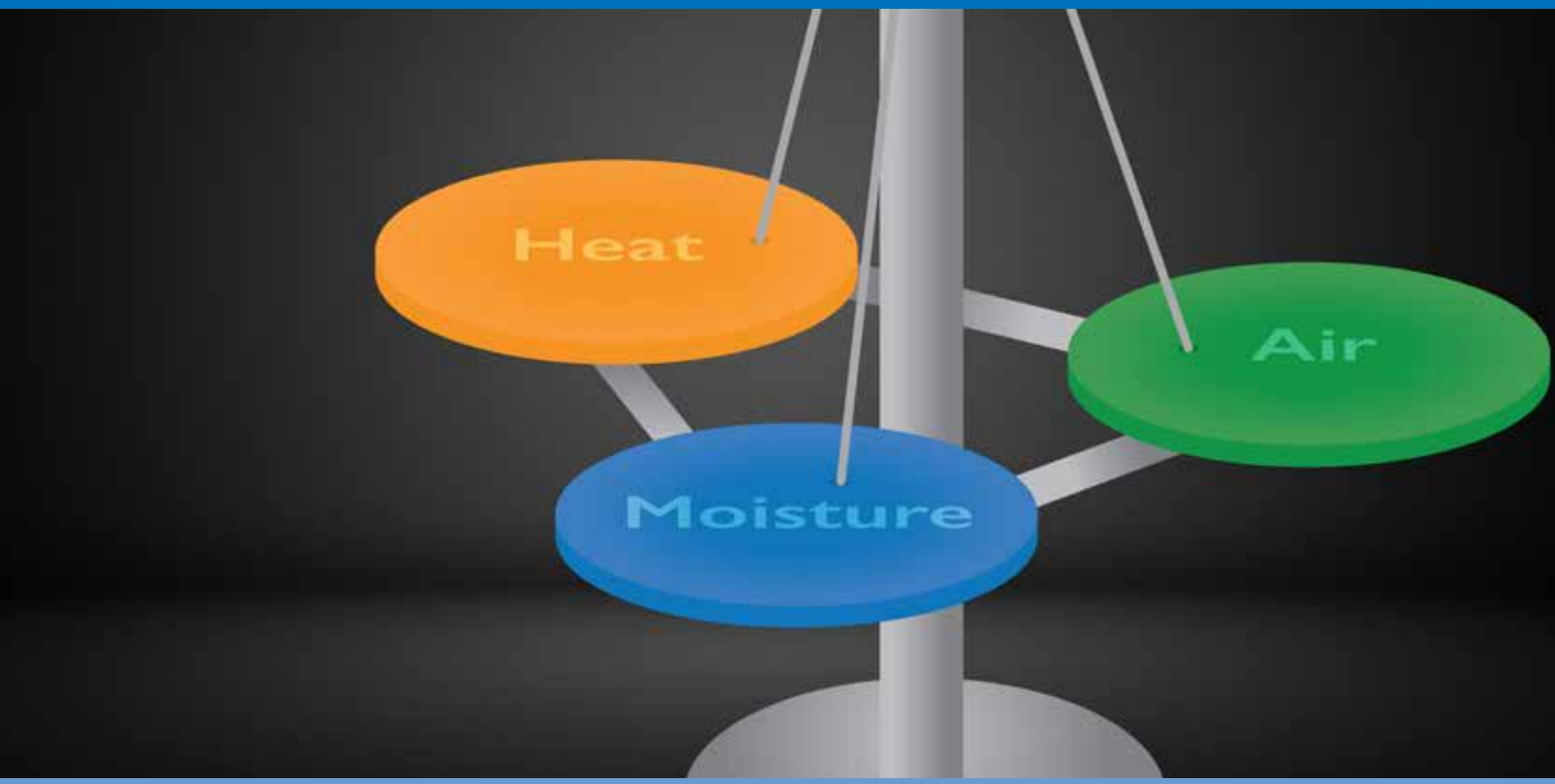
HAMM Principles

THE BALANCE OF HEAT, AIR & MOISTURE MOVEMENT IN BUILDINGS

A HOLISTIC APPROACH TO A HEALTHY BUILDING ENVELOPE



Heat | Air | Moisture
Movement

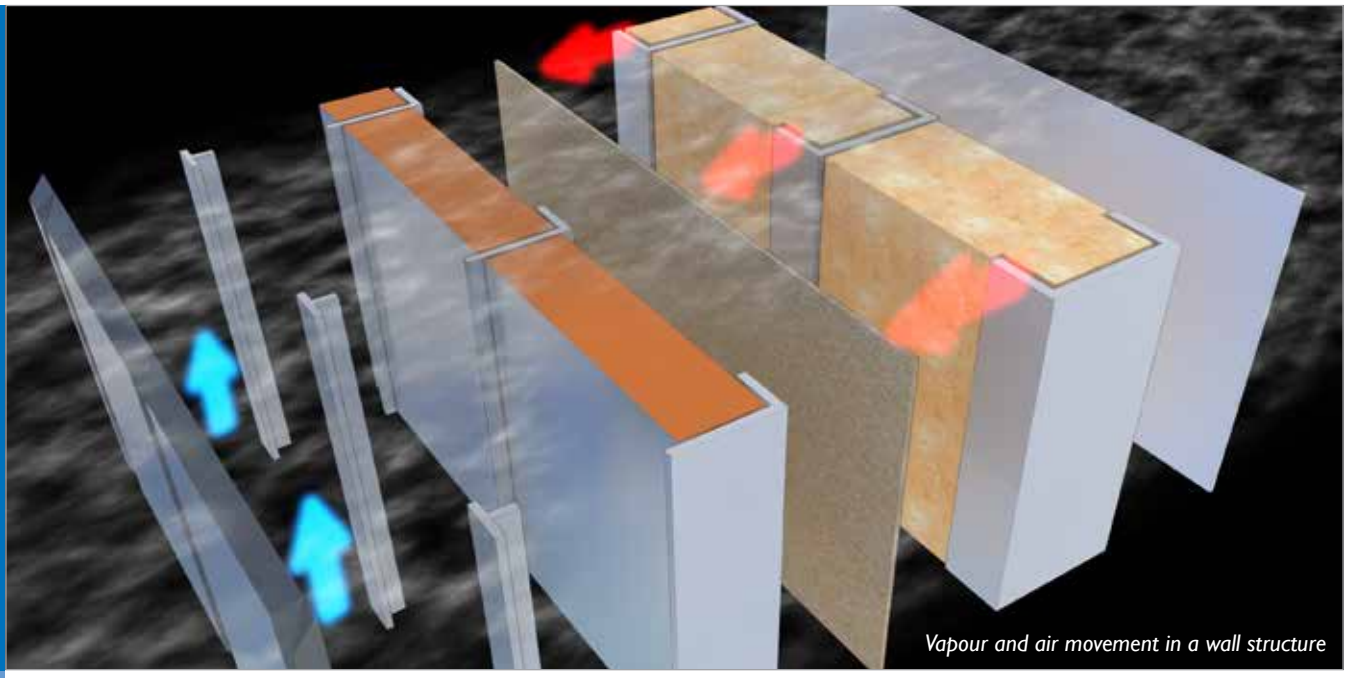
Proctor
Group


Brand New Launch:
ADELPHI WHARF
PHASE 3
fortis
1, 2 & 3 Bed
Luxury Waterfront
Apartments from:
£119,995

For any building to have an energy efficient, healthy, moisture free building envelope there is a clear need to manage the balance of Heat, Air and Moisture movement (HAMM) throughout the building's life cycle from design, construction, completion and use.

Understanding the importance of these key elements on the building envelope is crucial to the successful construction and operation of a building. Architects, designers, and building product manufacturers must seek to ensure that they fully understand the science behind our buildings, managing the external and internal forces which impact on the quality of the completed building, its performance in use, as well as the health of it's occupants and the wider environment.

The A. Proctor Group Ltd, a family owned company in its fourth generation, has been providing solutions and products to the construction industry for over 50 years. They have been developing vapour permeable membranes and vapour control layers for over 25 years, and can provide condensation control and air barrier solutions for all areas of the building envelope, across a variety of projects.



Vapour and air movement in a wall structure

Heat Air and Moisture Movement – Managing the balance

Heat (Thermal insulation and airtightness)

Depending on climate and location "heat" is keeping heat in or keeping heat out, therefore when we are considering heat we are mainly concerned with thermal insulation. The effects of heat flow can have a significant impact on the energy efficiency of a building. Managing energy efficiency from design to construction is increasingly important.

The Impact of Heat Flow

To maximise the design of a building's energy efficiency a holistic approach is required to provide a total system which fully embraces the principles of HAMM, considering an integrated approach to airtightness and condensation control.

An incorrect specification or installation of effective thermal barriers will lead to unmanaged heat loss, impacting directly on the energy efficiency of the building and its systems. In recent years, schemes by UK and European governments have sought to improve the energy efficiency of buildings, driven by the need to reduce carbon emissions and energy costs. In many cases insulation has been a "silver bullet" to address these needs. However, whilst insulation has a key part to play, the most effective solutions will demand a total system approach from the outset.

Air (Air permeability & airtightness)

Air movement is important in the building envelope both in infiltration and escape. There is a requirement to control interior conditioned air escaping (whether heated or cooled) and exterior air infiltrating which puts more pressure on heating or cooling mechanisms internally. Airtight membranes are an obvious choice in this area whether vapour and air open/closed or variable.

Air Leakage Control Strategies

As Building Regulations have imposed more stringent energy performance criteria on the building envelope, improvements have often been driven through higher standards of insulation for roofs, walls, windows and floors. In the drive for higher standards the significance of localised areas of reduced insulation or thermal bridging leading to air leakage has become even more crucial.

Air leakage through cracks, gaps, holes and improperly sealed elements such as doors and windows can cause a significant reduction in the performance of even well insulated envelopes, in some cases reducing their effectiveness by up to 70%. As thermal insulation requirements increase, this reduction in performance is becoming a critical issue; a consensus having emerged in the industry that discrepancies between 'as built' and 'as designed' performance are largely attributable to uncontrolled air leakage. Architects and developers are increasingly turning to air barrier membranes as an essential part of the design process in achieving the most effective means of controlling and reducing air leaks.

The Impact of Air Flow

Unmanaged or uncontrolled air flow can act as a carrier for moist air, drawing it in from outside, or pulling it from inside, into walls, ceilings and roofs. The impact of this uncontrolled moist air movement can have a long term detrimental effect on the durability and life of the building.

Impact on energy efficiency

Uncontrolled air flow will influence the energy efficiency of the building. Initial heat load calculations for heating and cooling equipment will usually make an allowance for a level of natural infiltration or uncontrolled air flow. The higher the infiltration rate, the lower the energy efficiency of the building. Efficiency levels can be affected by both natural and mechanical air movements. The forces of wind and stack effects will lead to an increased level of air filtration and subsequent energy efficiency loss. Sealing the shell of the building and any undesigned holes reduces the impact of wind and stack effects and improves the overall energy efficiency.

Air flow within building cavities can also lead to a reduction in the energy efficiency of the building. Ensuring that all potential air pathways are identified and tightly sealed against both the building's exterior as well as the interior will help to mitigate any loss and reduce costs.

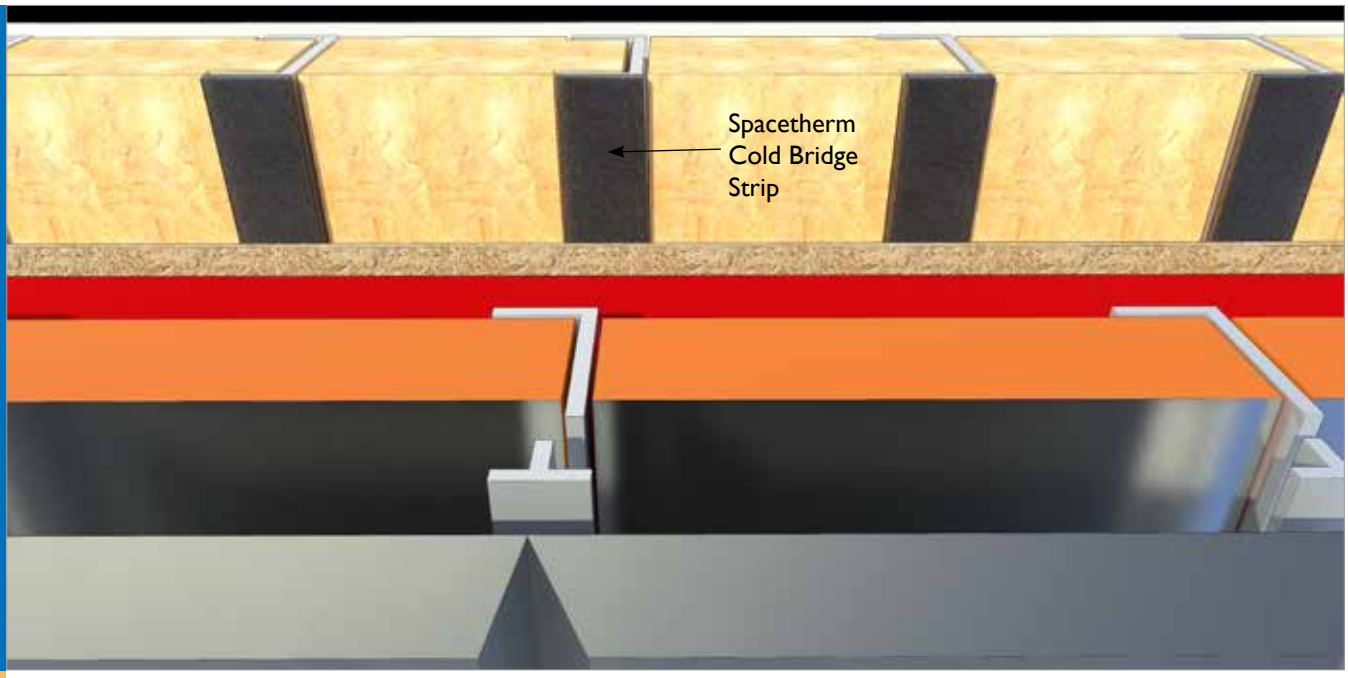
Moisture (Condensation control)

Moisture vapour will pass through the various layers of any construction by both convection and diffusion. The objective is to ensure, by design, that the moisture vapour can disperse to the outside atmosphere without being cooled to below the dewpoint temperature, thus eliminating condensation and associated problems such as mould growth.

Controlling the moisture flow in a building is fundamental to the core principals of HAMM and to maintaining the durability of the building envelope. Well managed moisture maximises energy efficiency by reducing adverse effects on fabric insulation, in addition to protecting the health and safety of the occupants.

The Impact of Moisture Flow

To avoid the occurrence of excess condensation, which can result in mould growth and damage to the building fabric and/or contents, designers should assess the amount of water vapour likely to be generated within the building and determine the resultant increase in internal vapour pressure above that of external air. They should then consider the physical properties of the construction.



SPACETHERM®

Spacetherm Aerogel offers specifiers a flexible yet robust insulation blanket solution. Combining a silica aerogel with a fibre matrix, it is a superior material which is suitable for a wide range of challenging applications where thermal performance is crucial. Spacetherm has **European Technical Approval & a CE Mark** giving specifiers and contractors confidence in the products performance.

With a thermal conductivity of 0.015 W/mK, Spacetherm Aerogel's **class-leading performance** qualifies it as one of the best insulation materials available worldwide. Engineered for unsurpassed thermal performance ensuring **minimum loss of space**, this **vapour permeable** product offers low thermal conductivity and compressive strength, plus **breathability** allied to **hydrophobic** characteristics which **repel moisture**. Its flexibility and ease of use has proven it as the insulation material of choice in many unique applications and for a wide variety of projects. It is also comforting for specifiers to know **it retains its thermal properties for over 50 years**. The A. Proctor Group works closely with clients to establish requirements and deliver effective, tailored solutions.

PHYSICAL PROPERTIES

Property	Mean Results
Thickness	5mm / 10mm or multiple increments of
Density	150 kg/m^3
Weight	5mm = 0.8 kg/m^2 10mm = 1.6 kg/m^2
Thermal Conductivity	0.015 W/mK
Vapour Resistivity	Sd 0.05m 25 MNs/gm (μ = 5)
Reaction to fire	C - sl - d_0

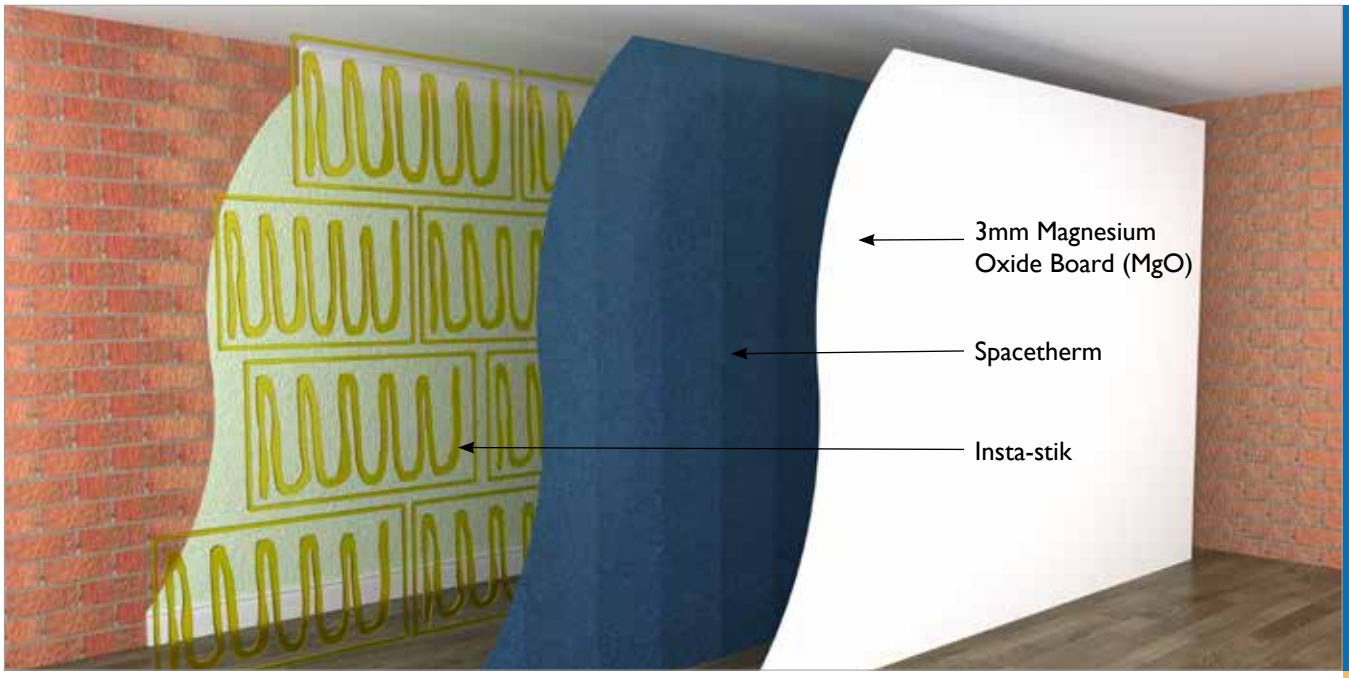
Key Benefits

- Low thermal conductivity compared to other insulants
- Space saving solution
- Allows installation in areas that are susceptible to moisture e.g. adjacent to solid walls without requirement for cavity
- No loss of thermal performance due to ageing.
- ETA & CE Marks ensure fitness for purpose and credibility
- Allows the envelope to breathe
- Flexible for use in awkward areas i.e. window reveals
- Easy installation

PRODUCT RANGE

- Spacetherm Multi
- Spacetherm Wallboard
- Spacetherm Directfix
- Spacetherm Cold Bridge Strip
- Spacetherm Blanket
- Spacetherm WL (Wall Liner)
- Spacetherm Window Reveal Board

Full product brochure available to download www.proctorgroup.com



SPACETHERM WL

Spacetherm WL (Wall Liner) is an internal **thin insulation system for hard to treat walls** and is specifically designed to be installed to internal surfaces of existing solid walls **without the need for mechanical fixings.** Spacetherm WL, which overall **thickness is 13mm**, consists of 10mm Spacetherm Aerogel insulation blanket bonded to 3mm Magnesium Oxide Board (MgO). Spacetherm WL is a **non-hazardous material** for use in applications where improved thermal performance is required with limited space. Spacetherm WL can achieve similar performance to traditional plasterboard laminates, but at a fraction of the thickness, allowing specifiers greater flexibility and higher performance for refurbishment projects.

With a **low thermal conductivity of 0.015 W/mK,** Spacetherm Aerogel's **class-leading performance** qualify it as one of the best insulation materials available worldwide. **It's constant long term thermal performace is proven to last 50 years+.**

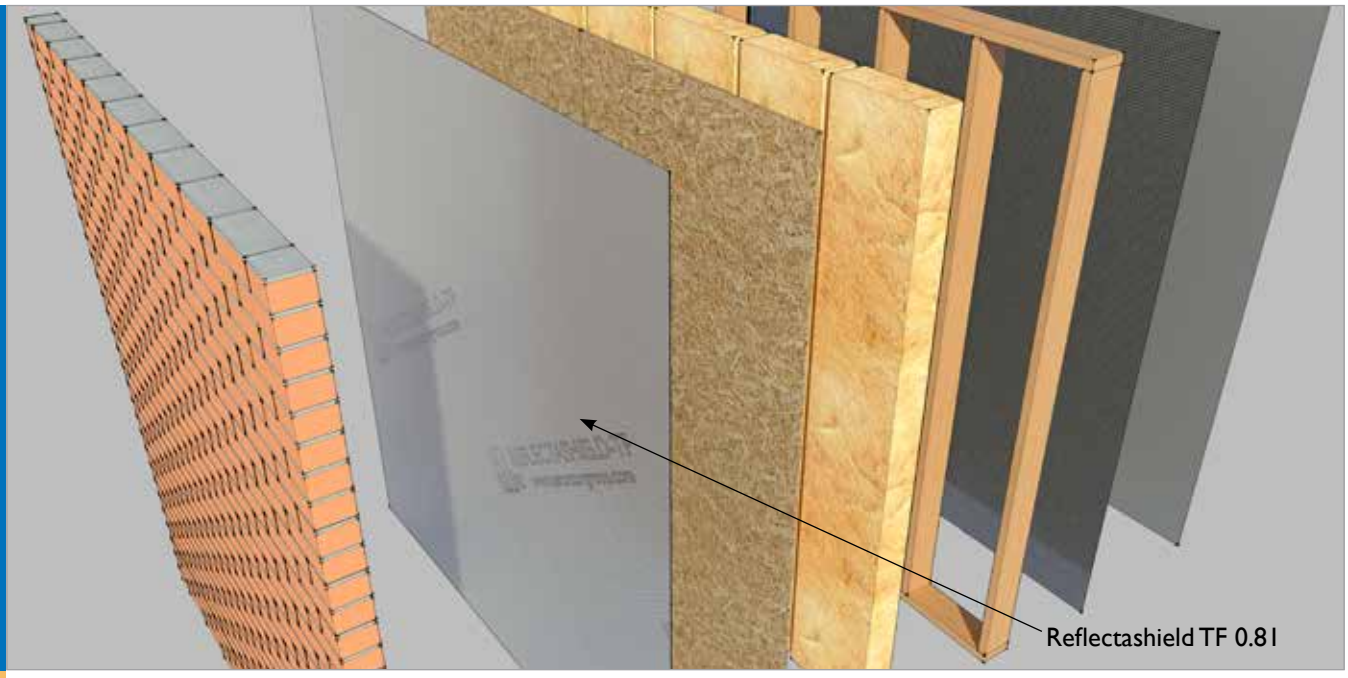
Full product data and details available to download at www.proctorgroup.com.

PHYSICAL PROPERTIES

Property	Mean Results
Dimensions	1200 x 600mm
Thickness	13mm (10mm Aerogel + 3mm MgO)
Weight	4.9 kg/m^2
Fire Resistance	Aerogel (Class C-s1, d0) Magnesium Oxide board (Class A1)
Thermal Conductivity	Aerogel 0.015 W/mK Magnesium Oxide board 0.19 W/mK
Vapour Permeability	Aerogel Sd 0.050m Magnesium Oxide board Sd 0.062m

Key Benefits

- Minimum loss of room space
- Ideal for window reveals, skirtings and cornices
- Allows wall to breathe
- Easy refurbishment
- No specialist trades required
- No mechanical fixings
- Reduced cold bridging
- Mould resistant



REFLECTASHIELD TF 0.81

CPS-012

Reflectashield TF 0.81 is a **water resistant**, non-woven polypropylene foil faced laminate with a **unique patented three layer composition**, providing excellent breathability, as well as secondary protection to the building during construction. Reflectashield TF 0.81 is vapour permeable, has low emissivity and an **enhanced foil surface** designed to **improve the thermal resistance** of timber and steel frame structures. It has a **high strength to weight ratio.** The product is installed on the external face of the timber frame, foil side face out, similar to that of a traditional breather membrane but with added thermal benefits.

Reflectashield TF 0.81 complies with the **low vapour resistance** requirements set out by BS 4016, TRADA and the NHBC. The existing legislation requires a breather membrane in walls to have a vapour resistance not greater than 0.60 MNs/g. Reflectashield TF 0.81 has a vapour resistance of 0.41 MNs/g.

The A. Proctor Group can provide a range of solutions, with U-values down to as low as 0.17W/m^{2}K in standard timber frame walling applications.

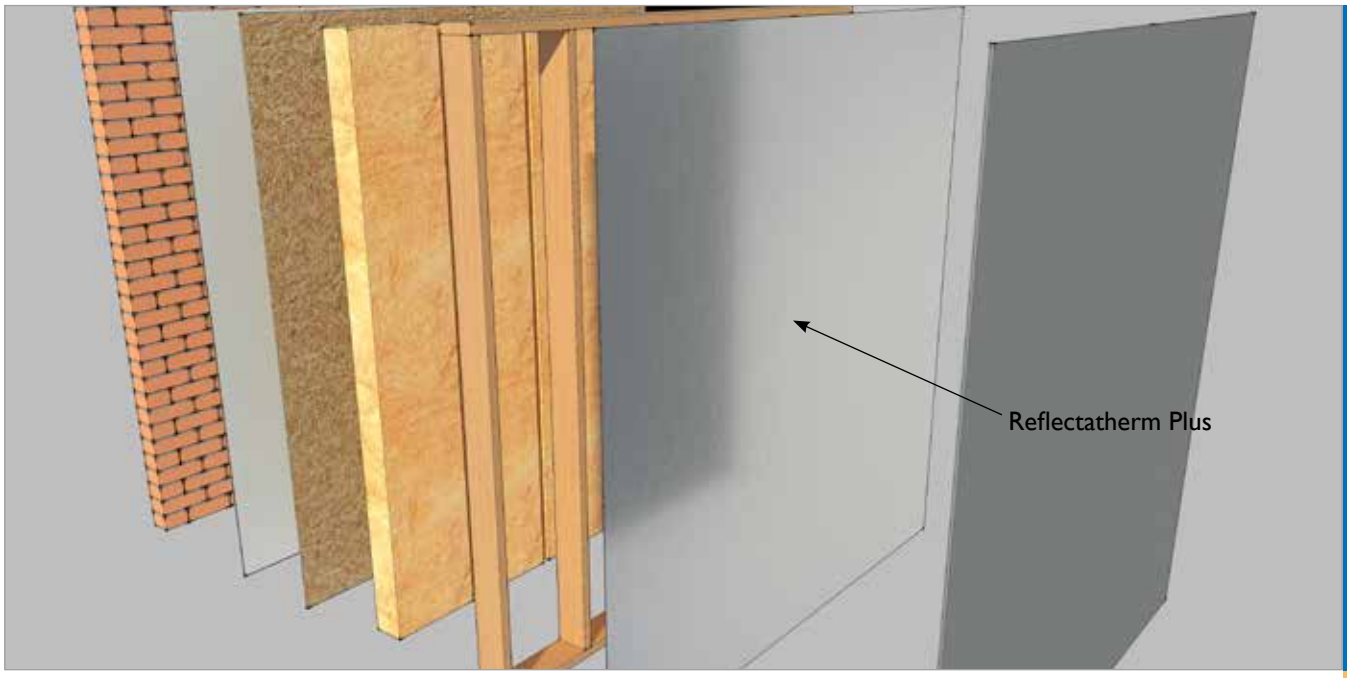
PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll Sizes	n/a	1.45m x 50m 2.7m x 100m 2.9m x 100m
Mass per unit area	EN 1849-2	134g/m^2
Reaction to Fire	EN 13501-1	Class D*
Water vapour resistance Sd	EN 1931	0.083 m
Water penetration	EN 1928	Class W2 (Before and After ageing)
Air Permeability	EN 12114	11.4 m^3/m^2/hr (at 50 Pa)
Thermal performance (R)	BS EN ISO 8990:1996	0.81 m^{2}K/W

* When tested to EN 11925-2

Key Benefits

- Ensures breathability of building envelope
- Protects structure during construction
- Class leading thermal performance reducing insulation requirements
- Maximises emissivity whilst providing robustness
- Can be 'own' branded for client
- 3rd party approved for use behind ventilated façades
- UK manufactured
- Achieves R-value of 0.81m^{2}K/W when facing ≥19mm cavity



CPS-016

REFLECTATHERM PLUS

Reflectatherm Plus is a reflective, **high resistance vapour barrier** for internal walls, ceilings and floors, specifically designed to **improve the thermal performance and airtightness** when placed on the warm side of the insulation.

The membrane should be installed with the foil side facing the cavity. In ceilings the product is placed between the underside of the rafters and the ceiling lining. In floors the product is placed on top of the structural decking or insulation (where present) and below any screed or sensitive floor coverings. Adjacent sheets should be lapped by 150mm and sealed with Profoil Tape. Penetrations caused by services must be minimised to ensure effectiveness, and all joints need to be sealed.

Reflectatherm Plus will **help meet the requirements of the new ' Part L' in England and Wales and 'Section 6' in Scotland.**

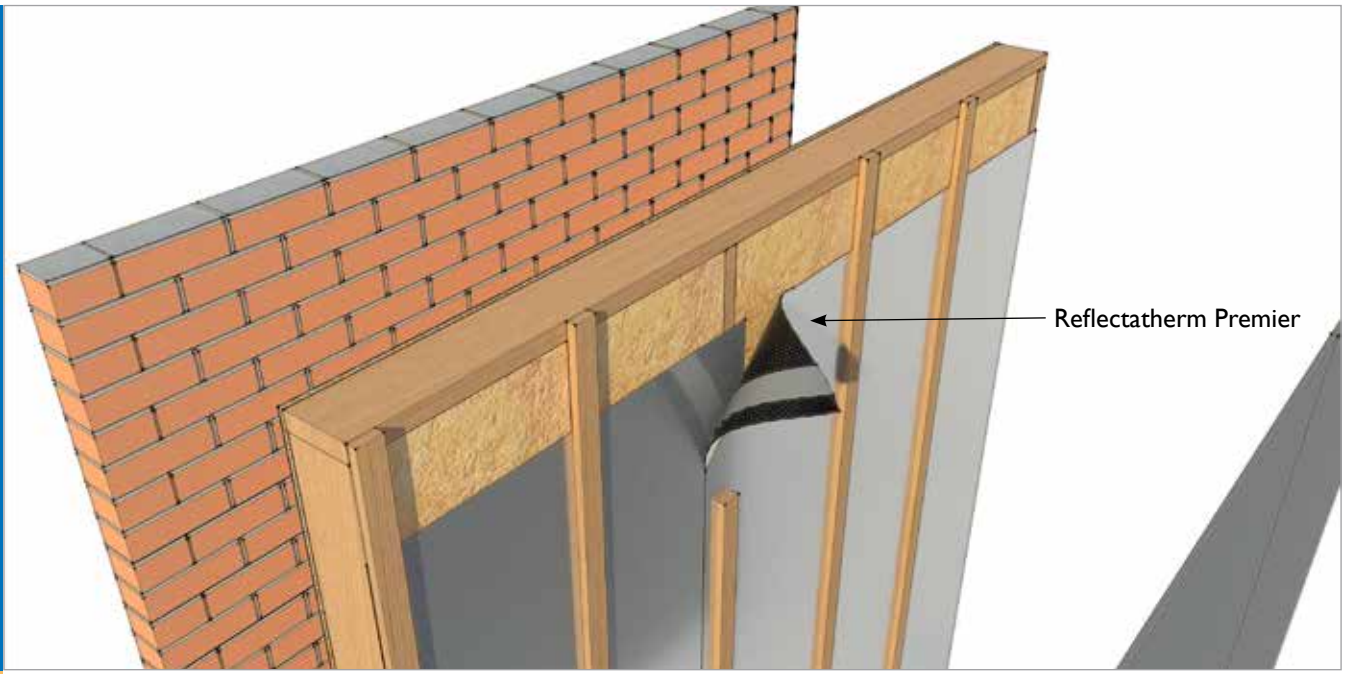
PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll Size	n/a	1.5m x 50m 2.7m x 100m 3m x 100m
Mass per unit area	EN 1849-2	150g/m^2
Reaction to Fire	EN 11925-2	Class E*
Water vapour resistance Sd	EN 1931	150m
Vapour resistance	EN 1931	750 MN/sg
Water penetration	EN 1928	Class W1 (Before and After ageing)
Thermal Performance		
Vertical air cavity - horizontal heat flow	BS EN ISO 8990:1996	0.78 (m^{2}K)/W
45 degree air cavity - upward heat flow	BS EN ISO 8990:1996	0.61 (m^{2}K)/W
Horizontal air cavity - upward heat flow	BS EN ISO 8990:1996	0.58 (m^{2}K)/W
Horizontal air cavity - downward heat flow	BS EN ISO 6946 Annex B	1.41 (m^{2}K)/W
Emissivity	BS EN 15976:2011	0.02

*When tested to EN 11925-2 over a rock wool substrate

Key Benefits

- Low emissivity
- Reduces condensation risk within the building envelope
- Certified highest performing reflective VCL
- Can be own branded
- Improves airtightness



REFLECTATHERM PREMIER

Reflectatherm Premier is a reflective vapour control layer with integrated tape for ease of installation. Reflectatherm Premier is for internal walls, ceilings and floors, specifically designed to enhance the thermal performance when placed on the warm side of the insulation. The integrated tape, which is a key feature of Reflectatherm Premier, ensures an efficient, consistent, continuous and well sealed membrane to protect the structure from vapour and air movement. The quick and efficient installation, utilising the integrated tape, reduces time and labour on site as well as increasing the quality of the joints in the membrane.

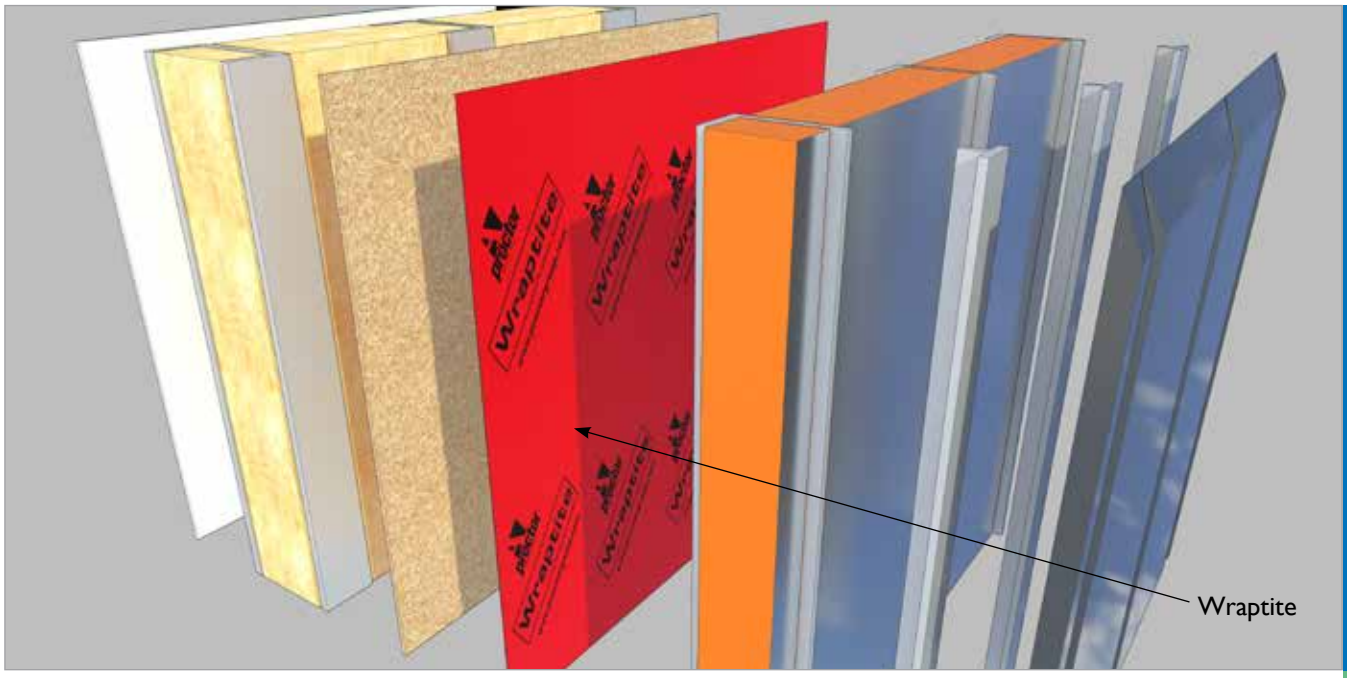
PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll Size	n/a	1.5m x 50m
Base Membrane		
Mass per unit area	EN 1849-2	150g/m^2
Reaction to Fire	EN 11925-2	Class E*
Water vapour resistance Sd	EN 1931	150m
Vapour resistance	EN 1931	750 MN/sg
Water penetration	EN 1928	Class W1 (Before and After ageing)
Tensile strength	EN 12311-2	MD 255N/50mm CD 200N/50mm
Elongation	EN 12311-1	MD 59% CD 70%
Tear resistance	EN 12310-1	MD 164N CD 157N
Flexibility at low temperature	EN 1109	No cracking at temperature minus 40°C
Emissivity	BS EN 15976:2011	0.04
Tape		
Adhesive	UV stabilised pressure sensitive	
Release Liner	60mm wide PET film	
Width of adhesive coating	50mm	
Installation Temperature Range	1°C to 85°C	
Bonded Product Temperature Range	-30°C to +85°C	

When tested to EN 11925-2 over a rock wool substrate

Key Benefits

- Integrated Tape reduces the requirement for additional tapes on site.
- Faster installation than using separate tapes.
- Reduction in labour and time costs.
- Improved adhesive bond between membrane and Integrated Tape.
- Improved Vapour Resistance due to Integrated Tape.
- R value of 0.78 m2K/W when used with a minimum 19mm service cavity.
- High vapour resistance.
- Improved airtightness.
- Creates service void.
- Creates an unbroken vapour control layer.
- Sd Value of 150m.
- Vapour Resistance 750 MNs/g.
- Help meets the requirements of the Part L in England and Wales, Section 6 in Scotland.



WRAPTITE®

Wraptite is a unique patented **external airtight and vapour permeable,** self-adhered membrane which **solves the problem of reliably achieving airtightness in buildings.** Applying Wraptite to the outside of the building will mean there are **fewer penetrations for services** therefore the **likelihood of expensive remedial work is greatly reduced.** Wraptite is **lightweight and easy to install** and fully bonds to virtually any substrate, with a key benefit being its **speed and ease of installation**, negating any requirement for sealants or tapes. This new approach saves on both the labour and material costs associated with meeting the demands of modern **energy efficiency** requirements in both commercial and residential buildings.

Wraptite has BBA certification for use in both roofs and in walls behind rain screen cladding, making it an ideal choice for commercial projects with large uninterrupted façades.

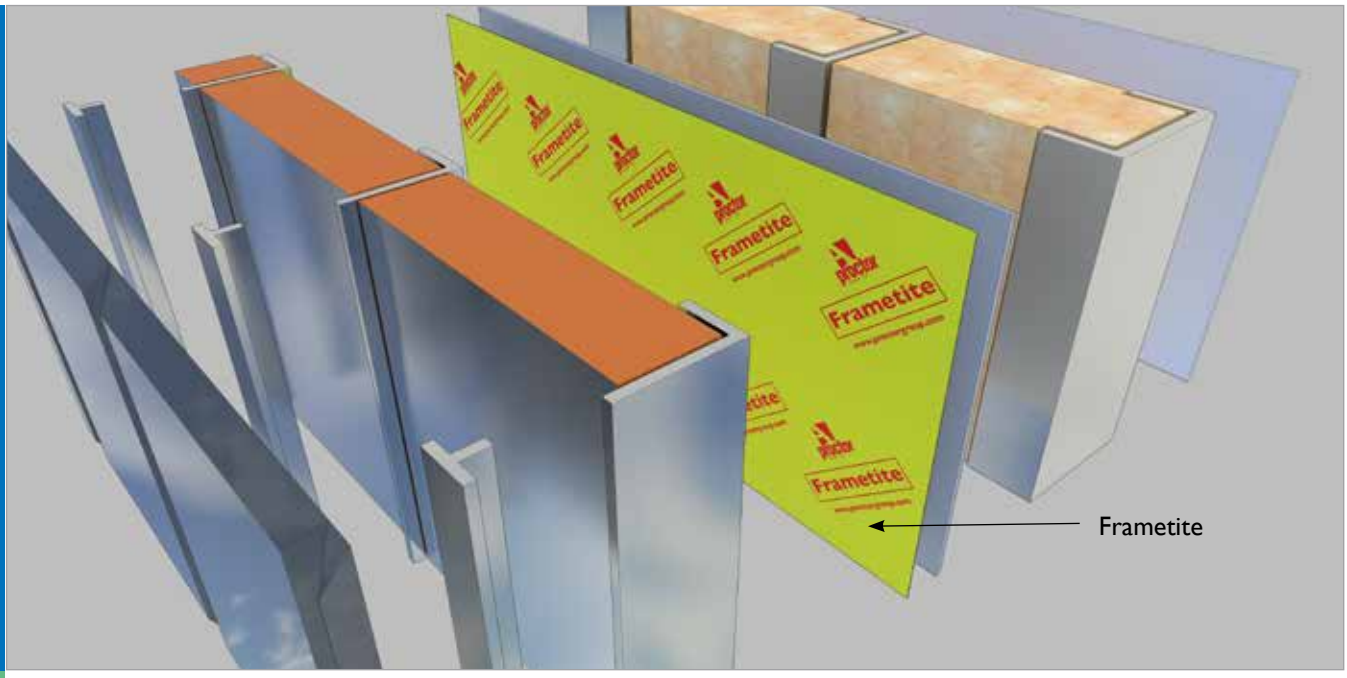
PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll sizes	-	1.5m x 50m
Nominal Thickness	Calibrated Deadweight Micrometer	0.65mm
Basis Weight	Electronic Weigh Scale	292 g/m^2
Application Temperature	-	Air & surface: minimum -6°C maximum 60°C
Service Temperature	-	-40°C to +100°C
Water Penetration	EN 1928 : 2000 Method A	Class W1 (before ageing) Class W1 (after ageing)
Air Permeance	EN 12114	0.01 m^3/m^2.h.50 Pa
Water Vapour Resistance Sd	EN 12572	0.039m
Water Vapour Transmission	BS 3177:1959	893 g/m^2.24hr
Peel Adhesion	EN 1939	5.01 N/10mm
Tensile Strength	EN 12311-1	Mean MD 417N Mean XD 252N
Tear Resistance	EN 12310-1	Mean MD 412N Mean XD 286N
Reaction to Fire	EN 11925-2 EN 13501-1	Class D Class B, s1, d0*

**tested over 12mm Calcium Silicate Board as per BS EN 13238:2010*
All tests carried out to EN 13859-2 standard

Key Benefits

- Water resistant yet vapour permeable membrane
- Continuous airtight seal
- Can reduce wall thickness
- Leading airtightness performance
- Simple detailing at junctions
- Removes requirement for complex internal detailing
- Reduces thermal by-pass
- Allows temporary protection until primary external covering
- Provides durability and reduced risk of tears and subsequent remedial work
- UK Patented



FRAMETITE®

Frametite is a **vapour permeable, airtight** wall underlay, which is durable, flexibile and lightweight allowing for easy installation. Frametite is **water resistant** and has a **resilient composition, which resists punctures and tears during installation.**

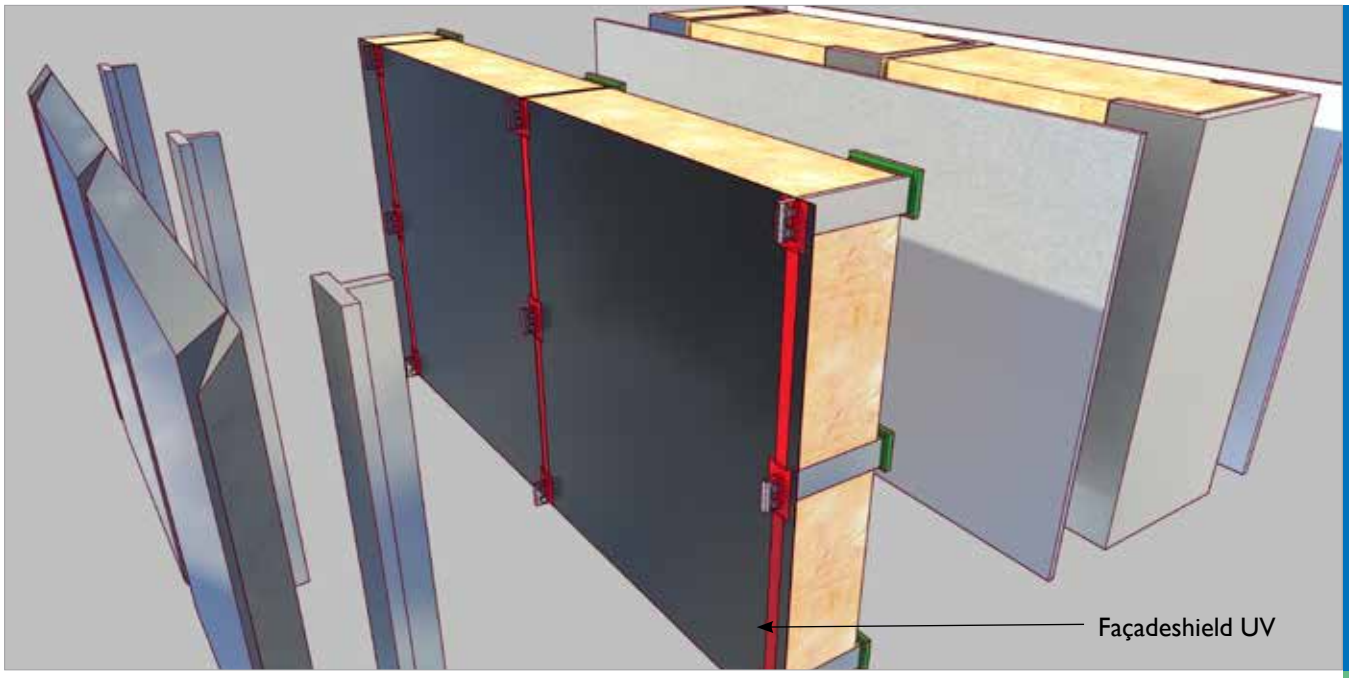
Frametite can be utilised with Wraptite Tape to provide a simplified and robust method of achieving low air leakage rates, particularly when installed on site, as is typical with large scale rain screen construction, or when sealing junctions between prefabricated building components. By reducing the likelihood of failures to meet designed airtight levels, Frametite helps ensure "as designed" performance is achieved. This helps to narrow the performance gap between as designed and actual energy performance. Frametite is designed to cost effectively replace conventional breather membranes whilst increasing airtightness.

PHYSICAL PROPERTIES

Property	Test Method	Mean Results	
Roll sizes	-	1.5m x 50m	
Mass per unit area	EN 1849-2	92 g/m^2	
Reaction to Fire	EN 13501-1	Class D,d2	
Water vapour resistance Sd	EN 12572	0.029m	
Water Penetration	EN 1928	Class W1 (before ageing) Class W1 (after ageing)	
Tensile Strength	EN 12311-1	MD 230N MD 190N	CD 125N (before ageing) CD 100N (after ageing)
Tear Resistance	EN 12310-1	Mean MD 75N Mean CD 80N	

Key Benefits

- Increased airtightness over traditional breather membranes
- Allows temporary protection until primary external covering
- Provides durability and reduced risk of tears and subsequent remedial work
- Airtight and vapour permeable



FAÇADESHIELD® UV

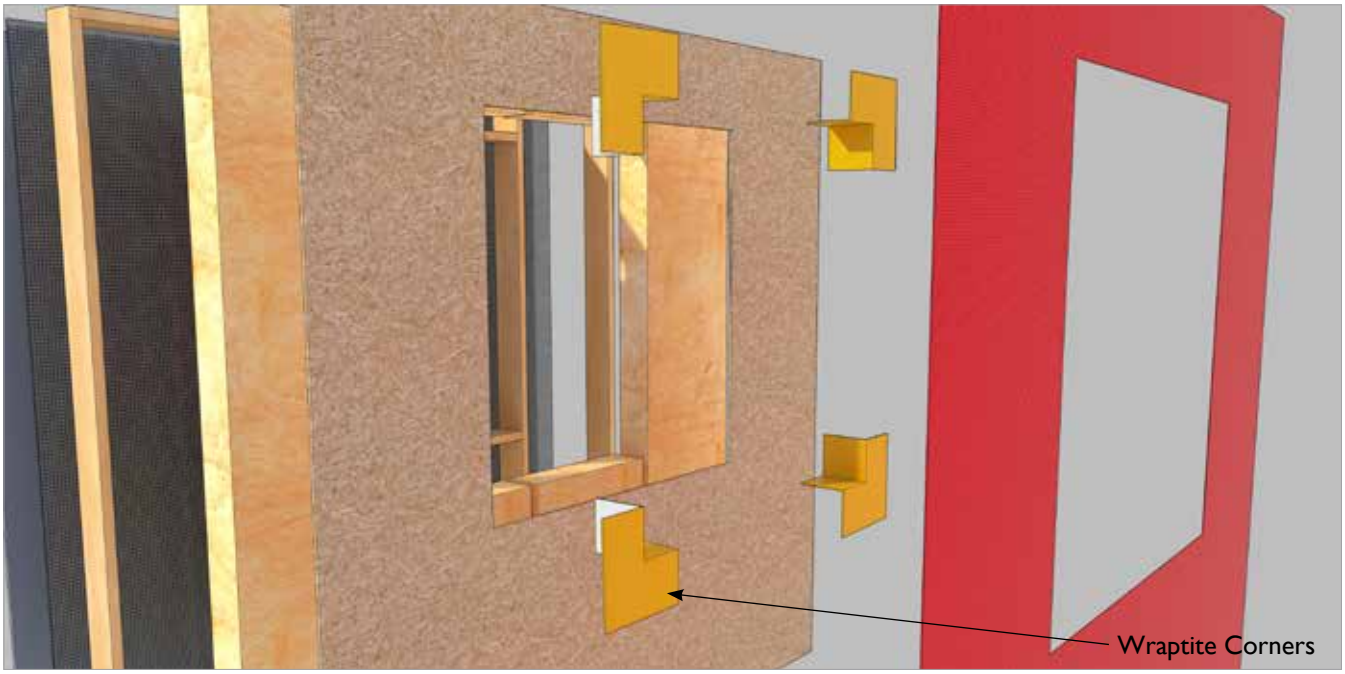
Façadeshield UV is designed specifically to ensure the building fabric maintains good water resistance and breathability when used behind **open jointed façades**. It is a breathable membrane that combines **exceptional water and UV resistance** with the aesthetically pleasing **anti-glare** dark colour which provides a "shadow" appearance within open rainscreen façades. Façadeshield UV enhances the airtightness of the building whilst reducing the risk of condensation due to its' **high vapour permeability, yet airtight fabric**. Façadeshield UV is **robust, with good tear resistance and tensile strength**.

PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll size	EN 1848-2	1.4m x 50m
Roll weight	EN 1848-2	14 kg
Thickness	EN 1849-2	0.35 mm
Colour		Black
Weight per unit area	EN 1849-2	220g/m^2
Sd-value	EN ISO 12572	0.11 m
Temperature resistance	EN 13859-2	- 40°C to +80°C
Fire performance	EN 13501-1 / EN ISO 11925-2	B-s2, d0
Resistance to water permeability	EN 1928	W 1
UV resistance uncovered		12 months (Climate-Central Europe)

Key Benefits

- Provides secondary protection to open jointed & perforated façades
- Aesthetically pleasing behind open façades
- Provides externally applied airtight layer for continuity of air barrier
- Has long term durability
- Class B fire performance
- Can be fully exposed for up to 12 months



WRAPTITE® CORNERS

Wraptite Preformed Airtight Corners have been developed for the **difficult areas** around doors and windows where maintaining **good air barrier continuity** is difficult and time consuming. Wraptite corners' **simple design and installation** process makes sealing openings against air leakage simple, just peel off the release liner, stick the corners in place, then install the Wraptite membrane as normal. This helps achieve the best possible results in the **shortest possible time.**

Once installed, the corner sections provide the same vapour permeable air barrier performance as the Wraptite membrane itself, ensuring **air leakage and water ingress are minimised** without trapping construction moisture or causing condensation.

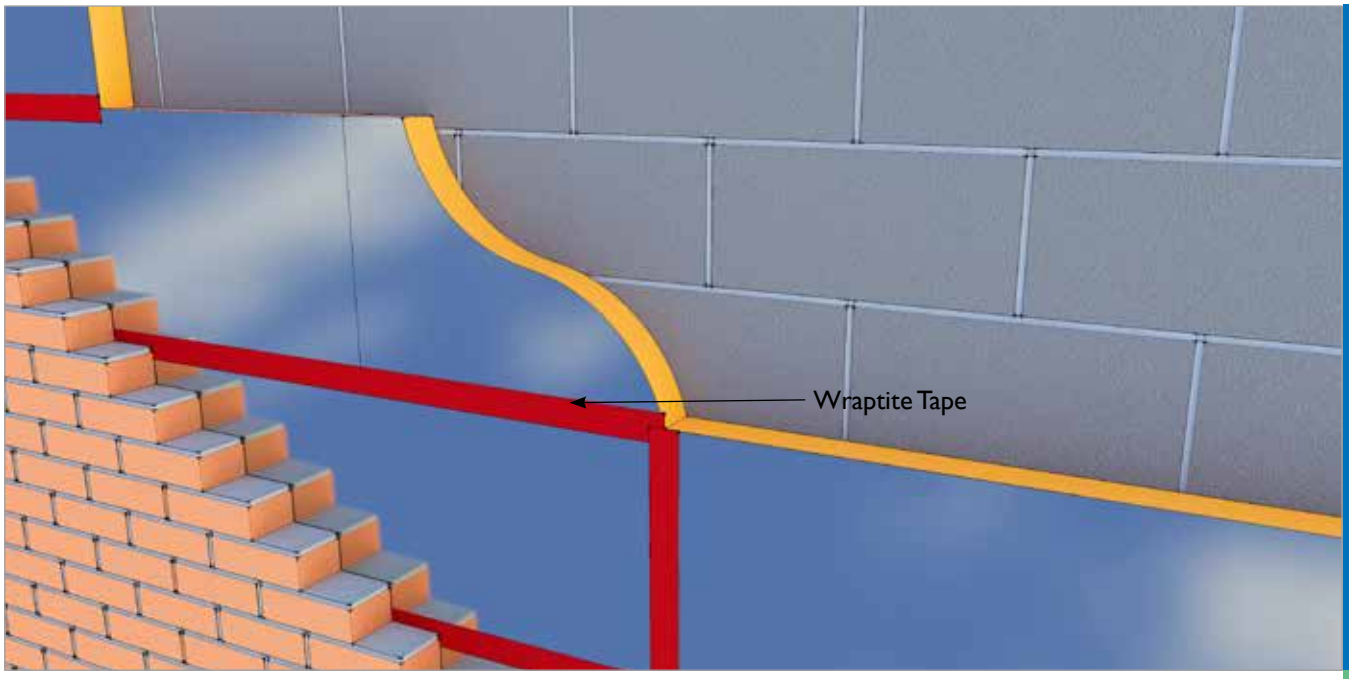
PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Size	-	One size can be adapted to fit any corner
Nominal Thickness	Calibrated Deadweight Micrometer	0.65mm
Basis Weight	Electronic Weigh Scale	292 g/m^2
Application Temperature	-	Air & surface: minimum -6°C maximum 60°C
Service Temperature	-	-40°C to +100°C
Water Penetration	EN 1928 : 2000 Method A	Class W1 (before ageing) Class W1 (after ageing)
Air Permeance	EN 12114	0.01 m^3/m^2.h.50 Pa
Water Vapour Resistance Sd	EN 12572	0.039m
Water Vapour Transmission	BS 3177:1959	893 g/m^2.24hr
Peel Adhesion	-	>0.26N/mm
Tensile Strength	EN 12311-1	Mean MD 417N Mean XD 252N
Tear Resistance	EN 12310-1	Mean MD 412N Mean XD 286N
Reaction to Fire	EN 11925-2 EN 13501-1	Class 'D' Class B, s1, d0*

All tests carried out to EN 13859-2 standard
**tested over 12mm Calcium Silicate Board as per BS EN 13238:2010*

Key Benefits

- Easy installation
- Ensures continuity of airtightness measures
- Simplifies complex detailing
- Faster installation



WRAPTITE® TAPE

A useful way of stopping unnecessary air leakage around openings and overlaps is to use Wraptite Tape, an **airtight**, tear resistant tape with **high vapour permeability** for internal and external applications. Wraptite Tape's **flexibility facilitates ease of application and detailing**, while its' **resilient composition resists punctures and tears during construction.** It **can be left exposed for up to 120 days during construction** and has a **wide operating temperature range (-40°C to +100°C).**

It fully bonds to all standard substrates, with **no primer required**, suppressing air leakage around joints, openings and penetrations. It is also suitable for permanent airtight sealing of membrane overlaps. Wraptite Tape's high vapour permeability allows damp sheathing to dry quickly and moisture vapour to escape. This ensures good indoor air quality and reduces the likelihood of mould, mildew, condensation, timber distortion and metal corrosion. Wraptite Tape contains **no VOC's.**

PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll sizes	-	75mm x 50m 100mm x 50m 150mm x 50m
Nominal Thickness	Calibrated Deadweight Micrometer	0.65mm
Basis Weight	Electronic Weigh Scale	292 g/m^2
Application Temperature	-	Air & surface: minimum -6°C maximum 60°C
Service Temperature	-	-40°C to +100°C
Water Penetration	EN 1928 : 2000 Method A	Class W1 (before ageing) Class W1 (after ageing)
Air Permeance	EN 12114	0.01 m^3/m^2.h.50 Pa
Water Vapour Resistance Sd	EN 12572	0.039m
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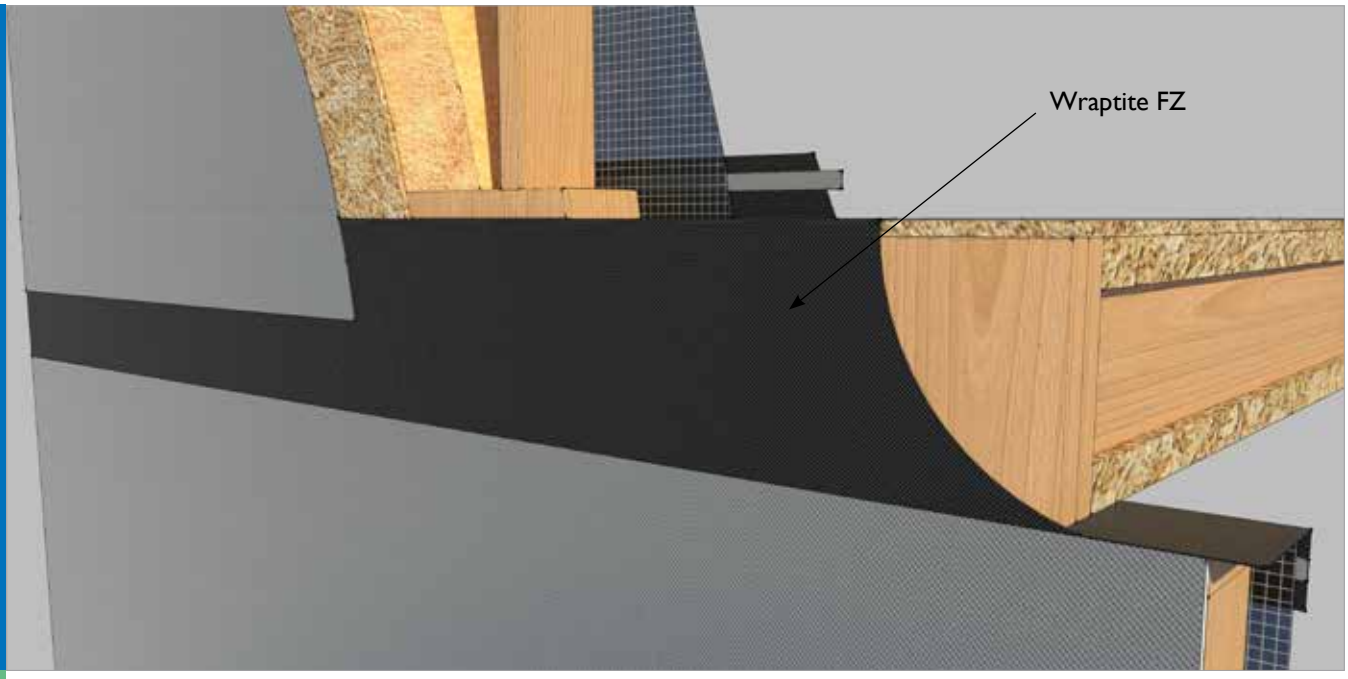
Reaction to Fire	EN 11925-2 EN 13501-1	Class D Class B, s1, d0*

*tested over 12mm Calcium Silicate Board as per BS EN 13238:2010
All tests carried out to EN 13859-2 standard

Key Benefits

- Vapour permeable tape used to protect exposed joints in insulation
- Easy to use when detailing joints
- Ultimate airtightness accessory
- Can seal joints in mechanically fastened air barrier
- Airtight



WRAPTITE® FZ

Wraptite FZ (Floor Zone) is a **vapour permeable, airtight and water resistant** membrane for use at floor junctions. It is durable, flexible and lightweight, and offers temporary protection against wind driven rain, snow and dust. Wraptite-FZ is supplied in **750mm roll widths** for easy site handling. Wraptite-FZ conforms with Regulation (EU) No. 305/2011 and is manufactured under control of an ISO9001 quality management system.

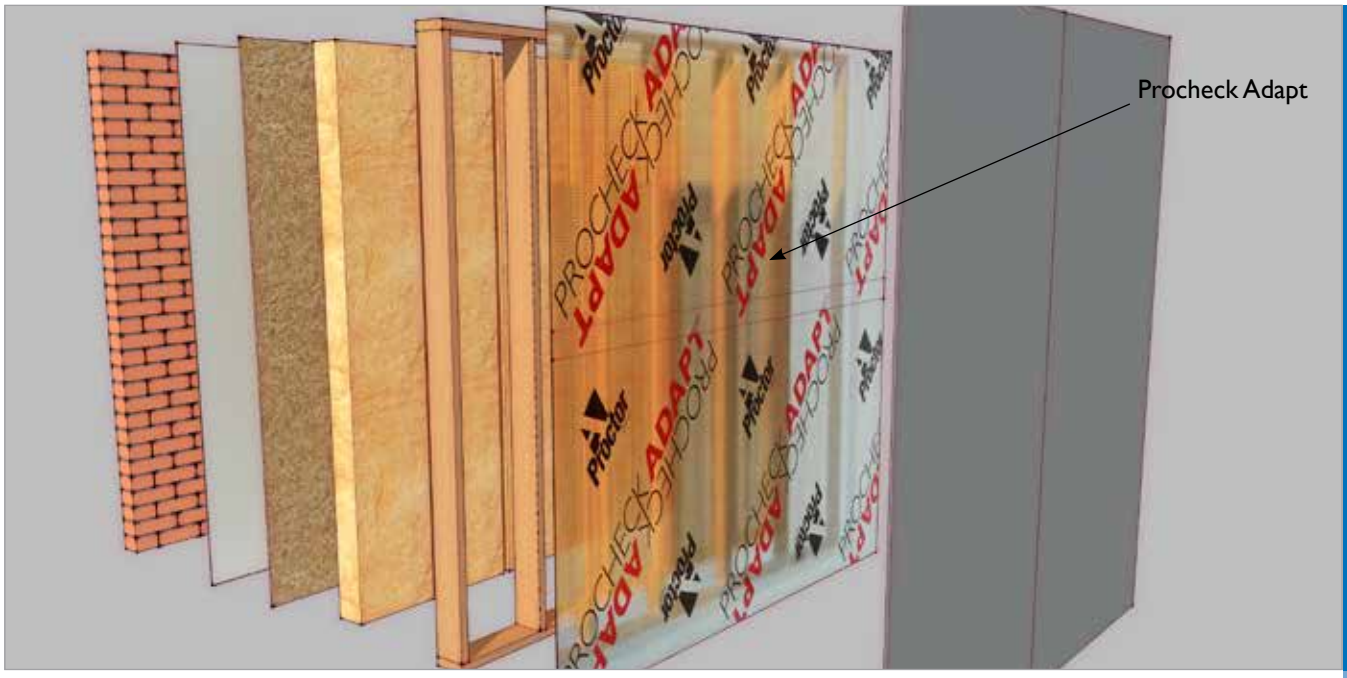
PHYSICAL PROPERTIES

Property	Test Method		Mean Results
Roll size	-		750mm x 50m 1m x 50m
Mass per unit area	EN 1849-2		170 g/m^2
Reaction to fire	EN13501-1		Class D, d2*
Water vapour resistance Sd	EN 12572		0.029 m
Water penetration	EN 1928	Before ageing After ageing	Class W1 Class W1

*When tested to EN 11925-2

Key Benefits

- Provides continuity of internally applied air barriers around floor zone junctions in new build developments
- Allows temporary protection to the floor zone during construction
- Reduces risk of condensation within the floor cassette



PROCHECK ADAPT

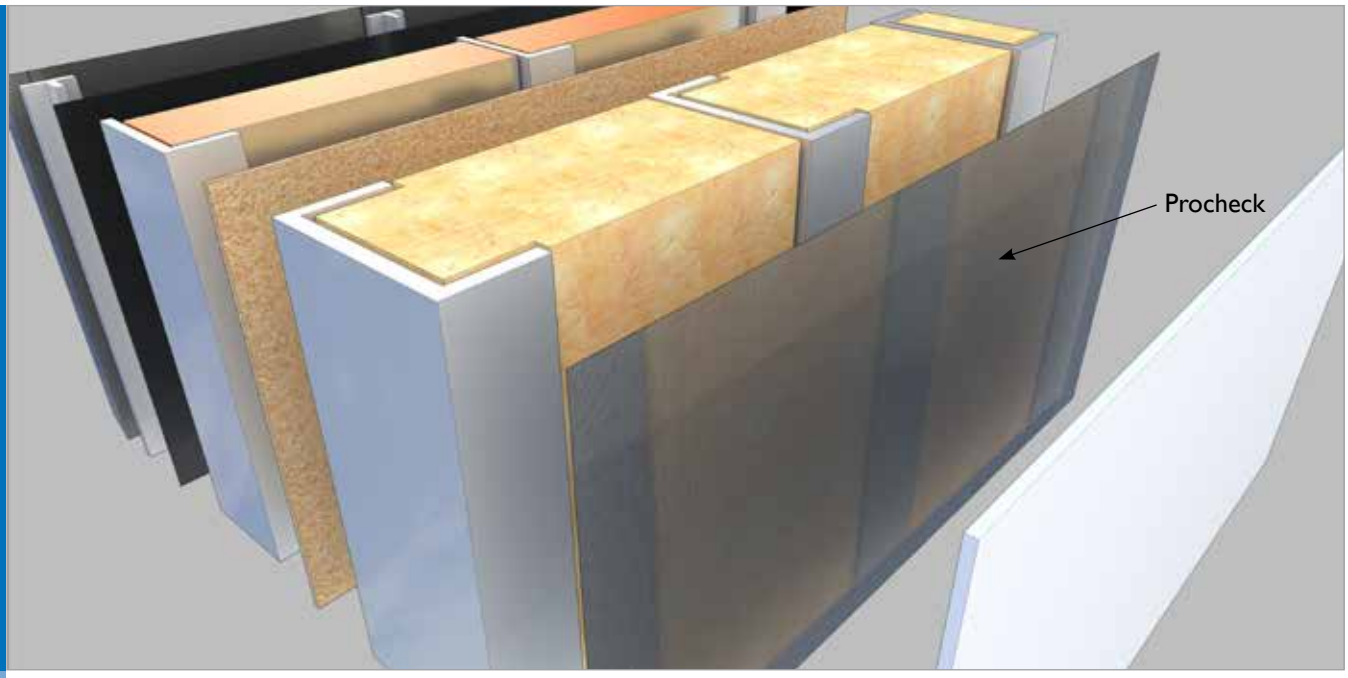
Procheck Adapt is a high performance variable-permeability vapour control layer for use in a variety of commercial and residential applications. It is designed to protect the building fabric from potential risks of condensation and it will also act as an airtight barrier. Its variable permeability adapts to changes in humidity levels becoming more resistant in Winter and more permeable in Summer. This means the building fabric is protected from damaging moisture levels during cold, wet months of the year and it will allow the fabric to dry out effectively in warmer, drier months. Procheck Adapts' translucent structure eases fixing to structural frames and in conjunction with its integral tape allows for a fast installation time.

PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll Size	-	1.5m x 50m
Weight	ISO 536	110 gsm
Nail Tear Resistance	EN 12310-1	MD 350N CD 375N
Tensile Strength	EN 12311-1	MD 350N/50mm CD 315N/50mm
Elongation	EN 12311-1	MD 20% CD 20%
Vapour Resistance	EN 12572	Sd 0.4m - 90m
Reaction to Fire	EN 13501-1	Class E

Key Benefits

- Variable permeability adapts to changes in humidity
- Wide Sd range guarantees performance in demanding climatic conditions
- Ensures effective drying out of building materials
- Suitable for variety of commercial and residential applications
- Provides airtightness to structure as well as vapour control
- Translucent material allows for ease of installation onto framework



PROCHECK 125

Procheck 125 is a lightweight reinforced polyethylene vapour control layer which can be utilised in a variety of commercial applications. **Procheck 125 vapour resistance of Sd 25m means it can be utilised where high vapour resistance is not a necessity but a strong, durable airtight membrane is.**

Key Benefits

- Durable VCL for low to medium risk applications
- Reinforced, ensuring minimal tears and robustness to withstand tough site conditions
- Translucent, allowing visibility to substructure for ease of installation

PROCHECK FR200

Procheck FR200 is a fire retardant vapour control layer used in roof and wall structures in both new build and renovation projects. Procheck FR200 has a **smoke development index of zero (ASTM E84) and flame spread index of 10 (ASTM E84) which provides independent assurance of fire performance**. Procheck FR200, **air and vapour tight membrane improves energy efficiency and reduces the condensation risk, and has a vapour resistance of Sd 44m.**

Key Benefits

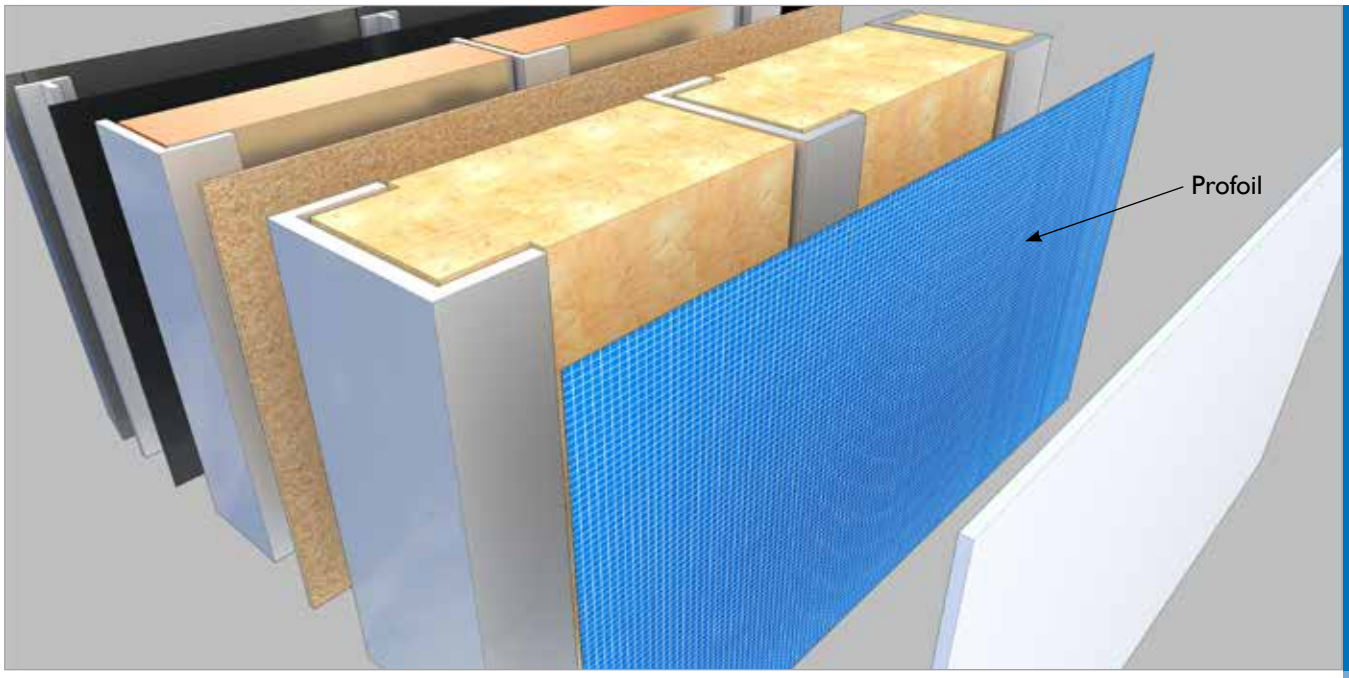
- Independent assurance of fire performance (Class O to BS 476 parts 6 & 7 and EN 11925-2 Bs1,d0)
- Improved energy efficiency
- Reduced condensation risk
- Reinforced and robust

PROCHECK 300

Procheck 300 is a lightweight, reinforced, polyethylene vapour control layer for use within roof and wall constructions to prevent warm, moist air escaping from inside the building and condensing within the insulation. The woven, polypropylene, multifilament scrim **reinforcement provides excellent resistance to tears and punctures to withstand tough site conditions** and is **unaffected by chlorine. Procheck 300's vapour resistance of Sd 64m makes it the ideal choice for applications such as heated warehouses, schools and shops. Its translucent colour allows visibility to the substructure.**

Key Benefits

- Suitable for low risk applications e.g. heated warehouses
- Minimal tears due to reinforcement
- Robust to withstand tough site conditions
- Visibility to substructure for ease of installation



PROCHECK 500

Procheck 500 is a strong reinforced polyethylene vapour control layer with a **vapour resistance of Sd 100m, making it suitable for low to medium risk applications e.g. offices, schools & housing.** The woven extruded polypropylene multifilament scrim **reinforcement provides improved nail tear resistance and robustness to withstand tough site conditions.** The sheet is **transparent allowing visibility to the substructure to ease the installation**. Procheck 500 is the grade utilised by many leading system manufacturers. It is **UV stabilised** and **unaffected by chlorine**.

Key Benefits

- Suitable for low to medium risk applications e.g. offices, housing
- Reinforced, ensuring minimal tears
- Robust to withstand tough site conditions
- Visibility to substructure

PROFOIL 861

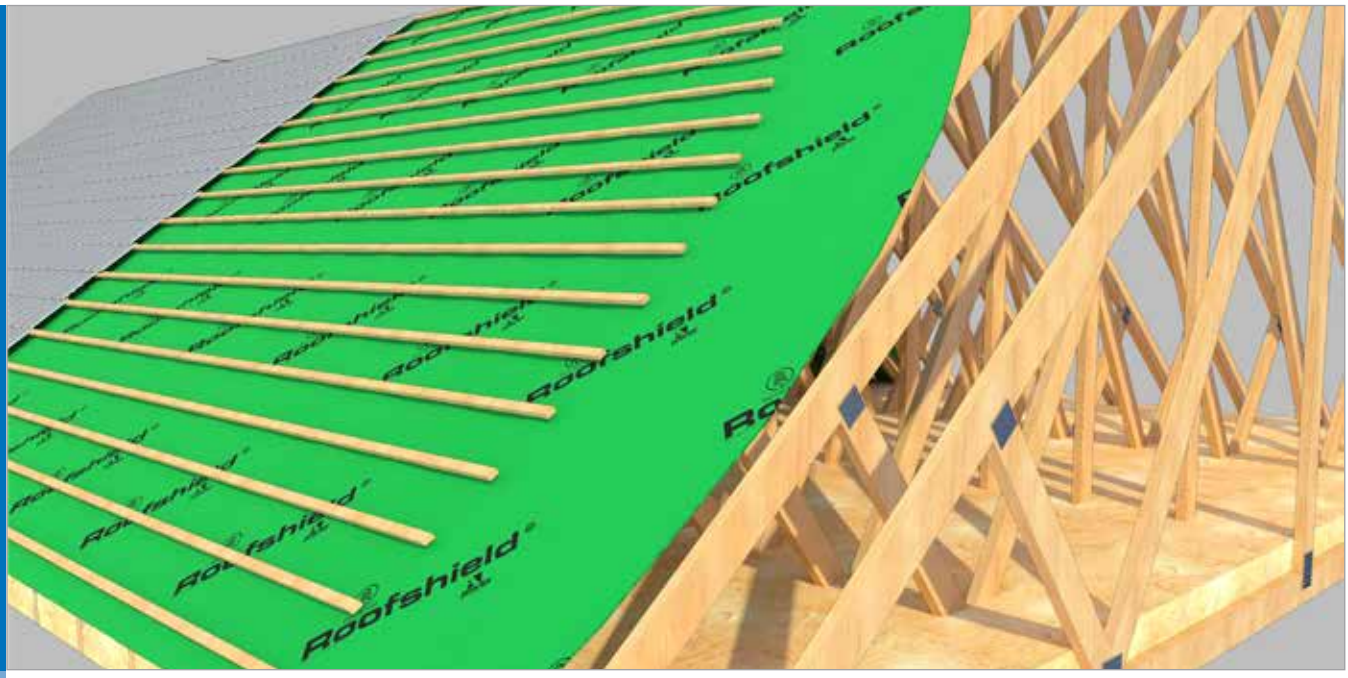
Profoil 861 is a heavyweight, reinforced, **UV stabilised** vapour control layer with an aluminium foil core which gives a high water **vapour resistance of Sd 1700m. This makes it ideal for high risk applications such as swimming pools (unaffected by chlorine) and textile factories.** The aluminium foil is protected on both faces by polyethylene for corrosive situations. The **reinforced scrim ensures minimal tears and robustness to withstand tough site handling while the encapsulated foil ensures high vapour resistance.**

Key Benefits

- Ideal for high risk applications e.g. leisure centres, textile factories
- Minimal tears
- Robust to withstand tough site conditions
- Unaffected by chlorine
- High vapour resistance

PHYSICAL PROPERTIES

Property	Procheck 125	Procheck FR200	Procheck 300	Procheck 500	Profoil 861
Thickness	0.35mm	0.16 mm	0.3 mm	0.5 mm	0.4mm
Weight	90g/m^2	94g/m^2	151g/m^2	236 g/m^2	310 g/m^2
Roll Size	2m x 50m	1.6m x 50m	2m x 50m	2m x 50m	2m x 50m
Colour	Translucent	Black / white	Translucent	Translucent	Blue / Silver
Vapour Resistance	126MNs/g Sd 25m	220MNs/g Sd 44m	>300MNs/g Sd 64m	>500MNs/g Sd 100m	>7000 MNs/g Sd 1700m
Condensation Classification	Low	Low / Medium	Low	Low / Medium	High



ROOFSHIELD

Roofshield is an **air and vapour permeable** pitched roof underlay for installation beneath tiles and slates. It is **highly water resistant**, providing a secondary barrier to the ingress of rain, wind and snow and reduces interstitial condensation. It has been made to the same high specification for 21 years, and has consistently met the evolving demands of the roofing industry to be the first choice for most roofing contractors. It **complies with BS5534**.

The underlay's reliable performance has been demonstrated in the toughest locations around the world. Its characteristics allow even very complex pitched roofs to breathe, without the need for air gaps or secondary venting.

The unique, patented meltblown core at the heart of Roofshield allows natural air movement to 'supercharge' the passage of moisture vapour from the roofspace, making the formation of condensation in the roofspace virtually impossible.

With a certified air permeability of 34.4m^3/m^2h.50Pa, Roofshield does not require additional high level ventilation when used on **NHBC-approved** projects. This allows the same specification to be used across all your projects, regardless of the regulations applied. The elimination of openings in the temporary roof covering also reduces the potential for water ingress during construction, and the possibility of installation errors.

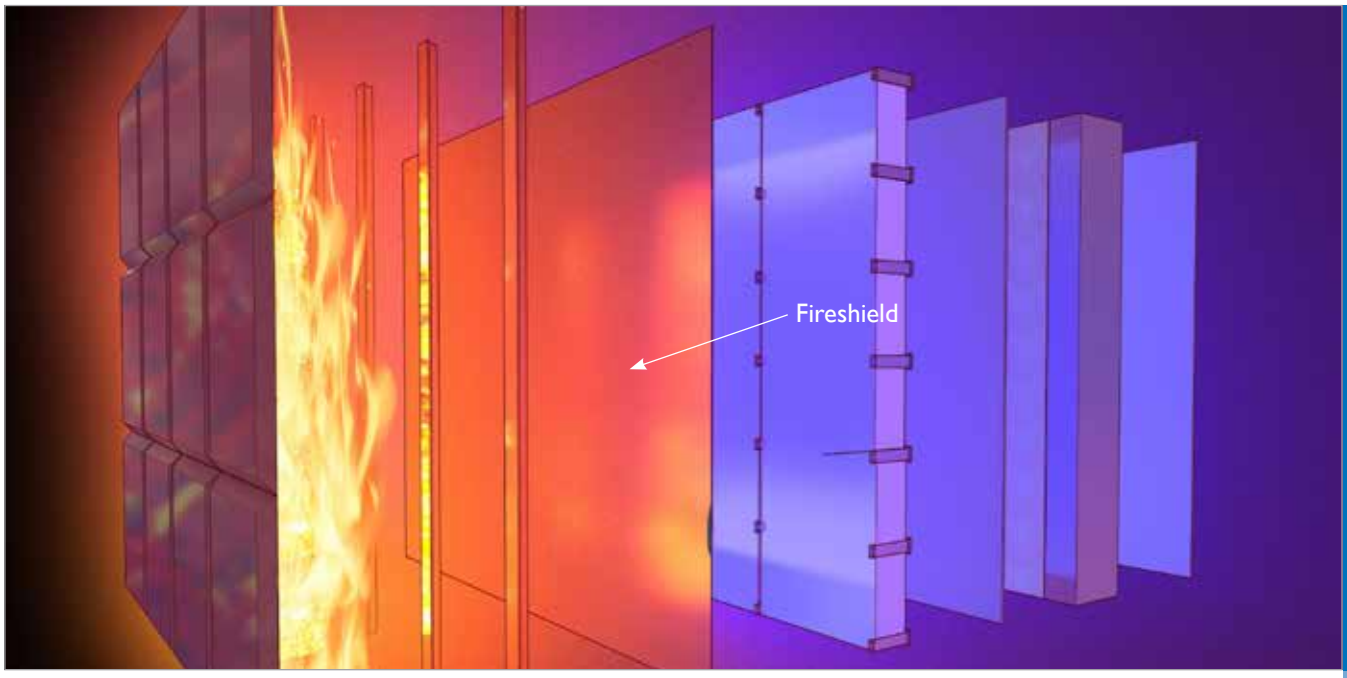
Roofshield is the only vapour permeable underlay which the BBA puts enough trust in to explicitly state in their certificate that a **vapour control layer is not required** for non-ventilated, cold pitched roof constructions.

PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll size	-	1m x 50m
Mass per unit area	EN 1849-2	185 g/m^2
Reaction to Fire	EN 13501-1	Class D
Water vapour resistance Sd	EN 12572	0.013m
Vapour resistance	EN 12572	0.065 MNs/g
Air permeability	EN 12114	34.4 m^3/m^2.h.50Pa
Water penetration	EN 1928	Class W1 (before ageing) Class W1 (after ageing)

Key Benefits

- No ventilation required
- More uniform airflow than vents
- High degree of vapour permeability greatly reduces the risk of condensation
- Significantly reduces condensation risk and negates requirement for ridge ventilation
- Ensures continuity of air movement in loft
- Gives protection to the building until primary water shedding layer, e.g. slates or tiles, is installed
- Ensures approval of non-ventilated roof and no ridge ventilation
- No reliance on different trades to install VCL
- Fully air permeable



FIRESHIELD®

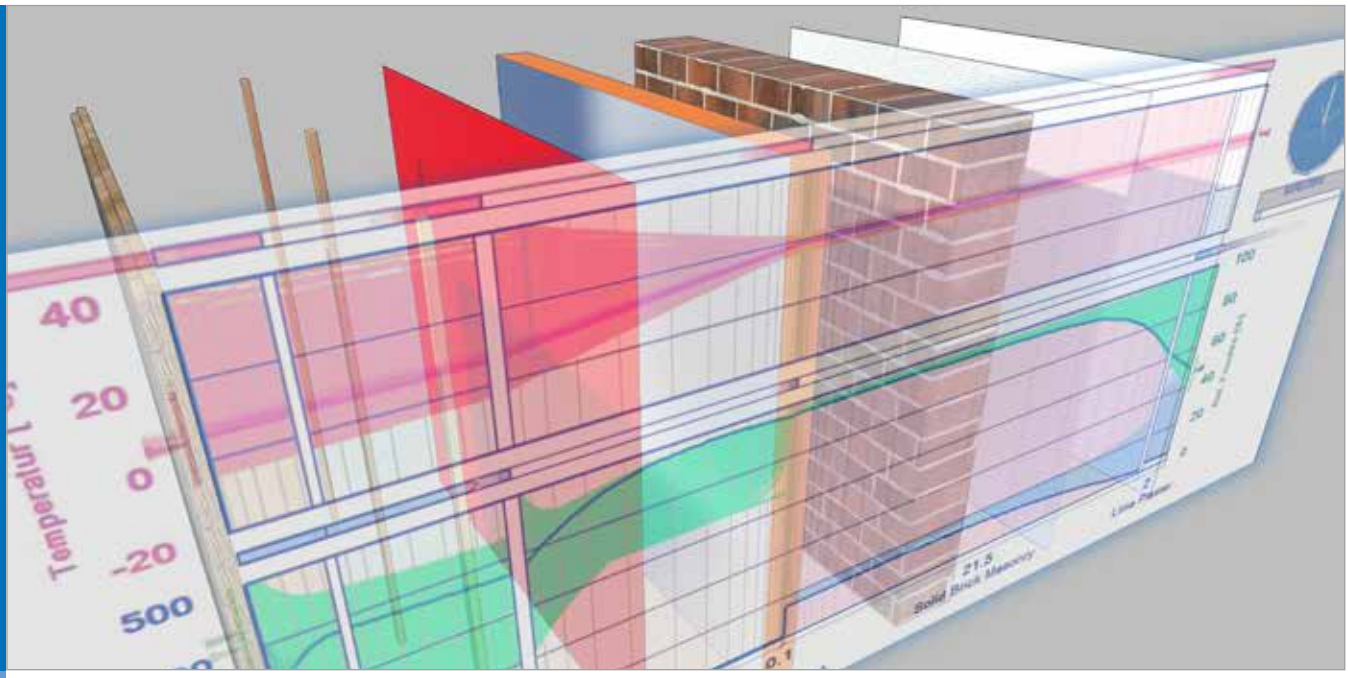
Fireshield is a vapour permeable walling underlay with a fire proof surface. Fireshield is suitable for all walling applications including those in multiple storey buildings. Its unique coating doesn't just resist fire, but eliminates fire spread. It is installed and fixed to the substrate in the same manner as standard breather membranes using mechanical fixings.

PHYSICAL PROPERTIES

Property	Test Method	Mean Results
Roll Size	-	1.1m x 20m
Weight	EN 1849-2	720gsm
Thickness	EN 1849-2	1.2mm
Nail Tear Resistance	EN 12310-1	MD 180N CD 220N
Resistance to water penetration	EN 13859-1	Class W1
Tensile Strength	EN 12311-1	MD 300N/5cm CD 275N/5cm
Elongation	EN 12311-1	MD 2-3% CD 2-3%
Water impermeability	EN 20811	Minimum value: 2m
UV resistance	Internal method, UVB	12 months
Water vapour transmission properties	EN ISO 12572 conditions C	Sd=0,08m
Flexibility at low temperature	EN 1109	-20°C
Reaction to Fire	EN 13501-1 Test method: EN 11925-2 and EN 13823 (SBI)	B, s1, d0
Resistance to air penetration	EN 12114	<0.3m³/m²/hr@50Pa

Key Benefits

- Unique composition actively reacts to prevent fire taking hold
- Vapour permeable walling underlay for use either directly onto sheathing or insulation
- Class B, s1-d0 but performs differently to other similar class products
- Complies with BS5250, BS4016 & NHBC requirements for vapour permeable walling underlays
- Ideal for use in rainscreen / façade construction
- Suitable for applications over 18m high



WUFI **CALCULATIONS**

WUFI is a dynamic hygrothermal assessment software which is an important tool for designing high performance buildings. Hygrothermal assessment is based upon the analysis of heat and moisture transfer through elements of a building. The traditional method of assessing condensation risks in buildings is the Glaser method – a static moisture movement calculation. The Glaser approach is a simplified method of assessing lightweight constructions however it assumes water vapour only moves in one direction and it ignores the effects of precipitation and convection.

The data obtained from a WUFI assessment provides an accurate measurement of the temperature, relative humidity, and water content within the elements of a building measured over a specified time period. WUFI simulations help to analyse different construction assemblies in various climates globally and determine the risks of interstitial condensation, which could lead to subsequent risks of mould growth and timber rot in associative building materials, and how to eliminate these risks.

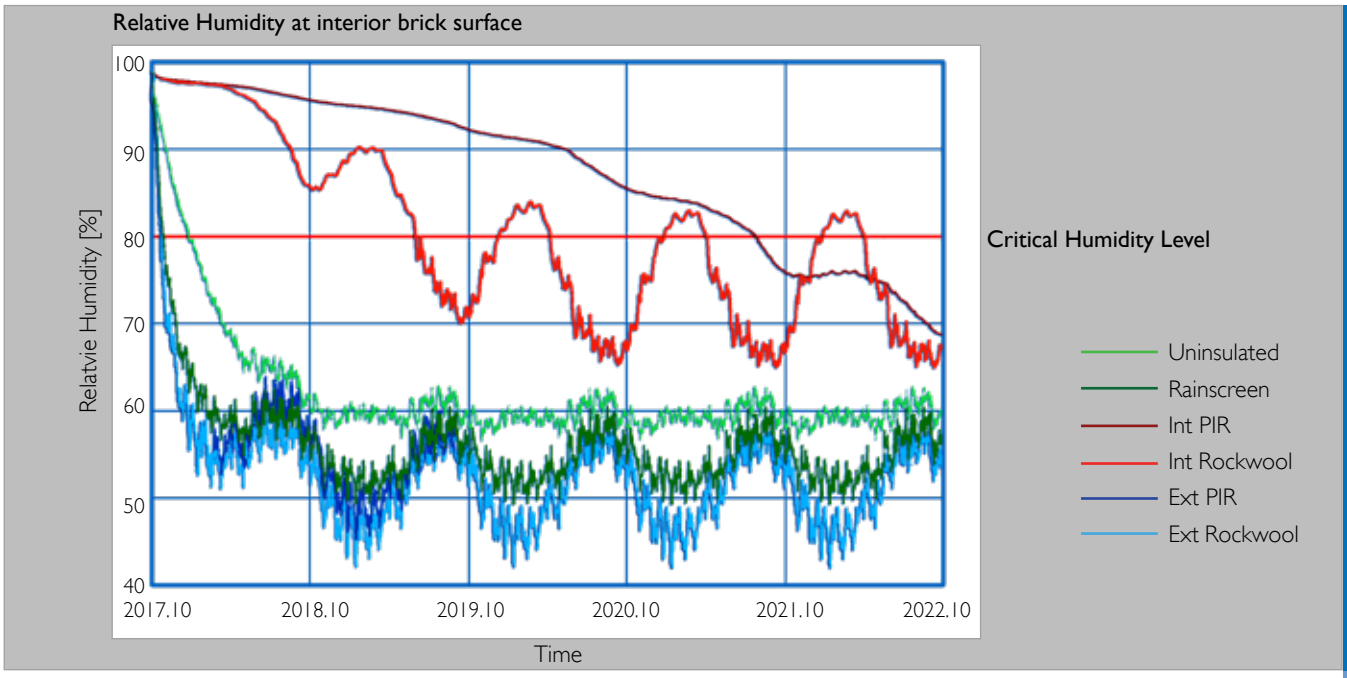
As the government strives to improve energy efficiency in the UK housing stock, solid wall upgrades can cause problems which are not adequately modeled by the commonly used Glaser method of condensation prediction. These unaccounted for moisture issues necessitate a new approach for hard to treat properties.

A. Proctor Group which is renowned for providing high quality, innovative solutions for the construction industry is now leading the way investing in training and software to accurately predict the condensation risk in situations where the Glaser steady state software has limitations.

WUFI software, which is fully compatible with BS EN 15026, dynamically predicts moisture movement and storage as well as condensation for each location. The designer is able to achieve a minute-by-minute prediction over a given period of years, as specified by the designer. The programme considers a worst-case scenario with the injection of air and/or moisure leaks at the source to predict the robust drying out of the fabric build up.

A further enhancement of using the WUFI software is that external weather including driving rain and solar radiation is predicted in a cycle and the designer can choose the specific internal environment that the building will be exposed to. This has proven invaluable when assessing the correct position for high performance vapour control and vapour permeable membranes to ensure a healthy building fabric, whether it be roofs or walls.

BS 5250:2011 Code of Practice for the Control of Condensation in Buildings was revised in 2016 (+A1:2016) to include Table G.3 Methods for assessing moisture risks in walls and this standard now requires that solid masonry walls with internal insulation must be modelled to BS EN 15026 to satisfy Building Regulations. WUFI can be used to carry out this modelling.



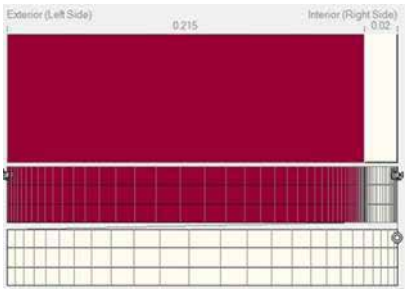
TYPICAL **WUFI CALCULATIONS**

BS 5250 explains the WUFI calculation method (BS EN 15026) as the most appropriate method of determining the condensation risk in solid walls with internal insulation.

Solid walls with internal insulation can be problematic because the insulation prevents internal heating from drying the brickwork, which can result in moisture and mould growth between the insulation and the wall surface.

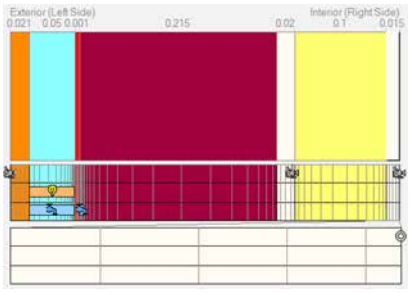
The graph shows the results of analysis at the interior brick surface of the assemblies provided. This highlights the moisture risk with internal insulation and that external insulation would be more appropriate. It also shows that using a vapour permeable insulation internally as opposed to a vapour resistant insulation will greatly reduce the humidity at the brick surface.

Solid Brick Wall Uninsulated



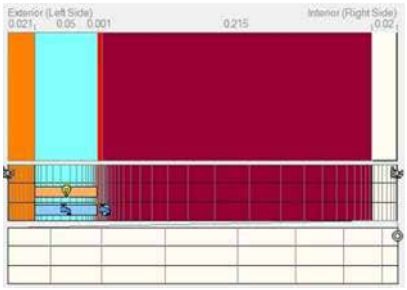
Assembly
215mm Solid Brick Masonry
20mm Lime Plaster

Rainscreen Brick Wall with internal PIR /Rockwool



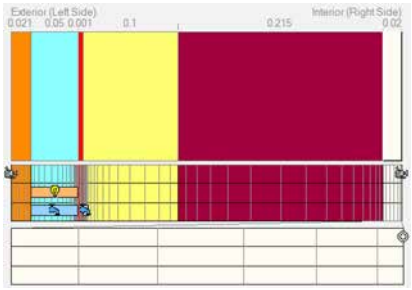
Assembly
21mm Timber Rainscreen
50mm Ventilated Cavity
Wraptite
215mm Solid Brick Masonry
20mm Lime Plaster
100mm Rockwool Insulation
125mm Plasterboard

Brick Wall with Rainscreen Uninsulated



Assembly
21mm Timber Rainscreen
50mm Ventilated Cavity
Wraptite
215mm Solid Brick Masonry
20mm Lime Plaster

Rainscreen Brick Wall with external PIR/Rockwool



Assembly
21mm Timber Rainscreen
50mm Ventilated Cavity
Wraptite
100mm Rockwool Insulation
215mm Solid Brick Masonry
20mm Lime Plaster

"I believe the success of the A. Proctor Group is down to a solid foundation of innovation backed up by an excellent, loyal and committed team, every one of them playing an important role in our continued success. Scotland provides us with a unique platform to launch our ideas, systems and products. I am fiercely proud of this heritage and our brand."

Keira Proctor
Managing Director, A. Proctor Group Ltd

Proctor Group

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