

# Roofshield

THE AIR & VAPOUR PERMEABLE PITCHED ROOF UNDERLAY





The A. Proctor Group Ltd, a family-owned company for four generations has been providing solutions and products to the construction industry for over 50 years.

Roofshield is an air and vapour permeable, highly water resistant roofing underlay that has been made to the same high specification for nearly 20 years. It has consistently met the evolving demands of the roofing industry to be the first choice of most roofing contractors. 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.





Bondi Beach, Sydney

## THE NEED FOR BREATHER MEMBRANES

As Building Regulations demand ever higher thermal efficiency in both the commercial and domestic sectors, today's building envelopes are becoming increasingly airtight. While this is undoubtedly beneficial for building energy performance, it also makes careful consideration and management of moisture more critical than ever.

Since their introduction in the late 1980s, "breather membranes" have become an important part of the construction industry landscape, however the term itself is widely misunderstood. "Breather membrane" relates to membranes used in timber frame walls, with a vapour resistance of 0.6MNs/g or less, while for those membranes used on roofs, the term "vapour permeable underlay" is more appropriate, these membranes must have a vapour resistance of 0.25MNs/g or lower. It can be argued that higher performance, air permeable membranes such as Roofshield, are "breathable" in the truest sense.

All activities within a building, from initial construction and wet trades, to cooking and washing, generate substantial amounts of water vapour, which must be managed successfully to ensure the longevity of the building fabric and a healthy indoor environment. The vapour permeable structure used in these membranes allow this to be achieved without compromising temporary weather protection during construction, or requiring complex and expensive passive or active ventilation systems and accessories.

While such systems may once have seemed somewhat alien to the industry, non-ventilated roof constructions, with their speed, efficiency and lower cost are fast becoming the norm. The once radical building physics behind them now well understood and widely accepted across all sectors of the industry.

### Why Roofshield?

Roofshield is a vapour- and air-permeable underlay (VPU) for pitched roof applications. First launched in 1996, and with an unchanged specification since, its unique blend of physical properties has allowed it to consistently outperform not only competing vapour permeable underlays, but also traditionally ventilated roofs.

While the majority of VPUs in use today utilise an airtight VP film layer to achieve their performance, Roofshield's patented SMS (Spunbond Meltblown Spunbond) structure allows high levels of airflow in addition to the transport of moisture vapour, making the formation of condensation virtually impossible. It was this outstanding air-permeability powered performance in BRE trials that led to the granting of one of the first BBA certificates for non-vented cold roofs in 1999, and which today allows the NHBC to accept its use without high level vents, a position further reinforced by NFRC Technical Bulletin 6 in 2012. Independent studies of the effect of air permeability have confirmed that air change rates for lofts using Roofshield are 5-6 times higher than those found in lofts ventilated, according to

BS5250, so whatever side of the vents/no vents debate you sit on, Roofshield has it covered.

Developed and manufactured in Scotland, Roofshield has been widely used in some of the harshest climates on earth, from northern Canada to the Antarctic, and its superb resistance to wind loadings allow it to be used without restrictions on batten spacing in any UK exposure conditions, giving specifiers the flexibility to choose whatever configuration of outer roofcovering meets their requirements. Its heavyweight 175gsm three-layer structure is also fully hydrophobic, giving a Class W1 rating under the latest EN13859-1 specifications, and at Euroclass D offers the highest available fire rating in its class.

Over the last 20 years, we have undertaken projects from domestic housing to the refurbishment of historic castles. The performance and design flexibility of Roofshield provides a winning combination time and again. It has become recognised as one of the most dependable solutions for specifiers and contractors available globally.





### VAPOUR PERMEABLE

Roofshield has a vapour resistance of 0.065 MNs/g and an Sd-value of 0.013m, making Roofshield the highest-performing vapour-permeable membrane on the market.

### FULLY AIR PERMEABLE

Air permeable membranes allow air movement through the roof, as well as allowing moisture to escape by diffusion. This means that condensation is far less likely to form on the membrane itself, and also allows the membrane to deal with much higher moisture levels within the building, for example during the drying out period.

### 5x MORE AIRFLOW THAN VENTS

The air permeability of Roofshield means a non-ventilated roof fitted with Roofshield allows 5-6 times more air changes per hour than a roof ventilated as per BS5250, without expensive and time consuming ventilation hardware fitted to the roof.

### HIGHLY WATER RESISTANT

Roofshield is rated W1 under EN13859-1, and can support a water column of over a metre without leakage. The membrane can be left exposed to provide temporary weather protection to the building envelope for up to four months (see FAQs, page 10).

### UNRESTRICTED BATTEN SPACING

Developed for use in the Highlands of Scotland, the unique properties of Roofshield allow unrestricted spacing of tiling battens, regardless of exposure conditions. Roofshield has a 20 year track record in some of the world's wildest weather conditions from the Shetland Islands to Antarctica.

### FULLY BBA CERTIFIED

Roofshield is fully certified for use in non-ventilated warm or cold roof applications, and has been since 1996. In 1999, Roofshield became the first membrane certified for use in cold non-vented roofs. While the construction industry has changed considerably over the last 20 years, Roofshield is the same today as it has always been.

### NHBC ACCEPTANCE

With a certified air permeability of  $34.4\text{m}^3/\text{m}^2\text{h}$ .50Pa, Roofshield does not require additional high level ventilation when used on NHBC-approved projects. It also allows the same specification to be used across all your projects, regardless of the regulatory regime applied.

### NO VCL REQUIRED

Roofshield is the only vapour-permeable underlay available 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.



Forth Road Bridge

## NON-VENTILATED WARM ROOF CONSTRUCTION

A "warm roof" is a roof construction where the insulation layer is placed either over, or between the rafters, and follows the pitch of the roof from eaves to ridge. This configuration keeps the roof structure within the heated envelope of the building, and allows spaces within the roof to be used as habitable spaces, or easily converted at a later date. Warm roofs are typically insulated using rigid boards, and the underlay may be installed either fully supported, or draped, depending on the location of the insulation. Full details of warm roof design and site practice are given in BBA certificate No.96/3220.

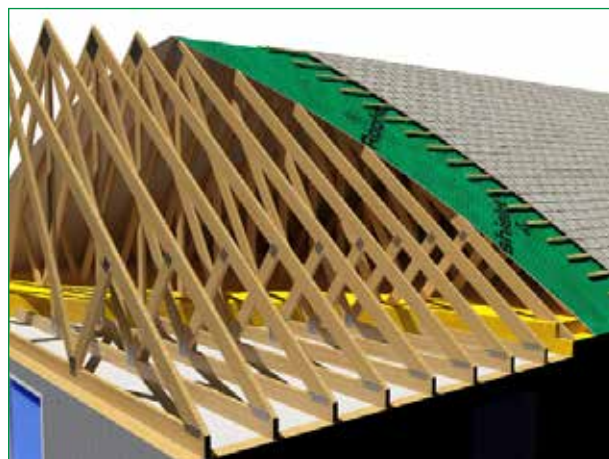
## NON-VENTILATED COLD ROOF CONSTRUCTION

In a cold pitched roof construction, the insulation is placed horizontally at ceiling level, running from eaves to eaves, leaving the loft and roof structure above the heated envelope of the building. Traditionally, this cold loft space would require ventilation, but this can be impractical for some roof configurations, and avoiding such ventilation has long been desirable.

Long term studies carried out by the BRE between 1997 and 2006 concluded that the moisture content found in non-ventilated Roofshield roofs were comparable with the moisture content found in a conventionally ventilated roof space, and following this research Roofshield has been certified for this use since 1999. The relevant BBA certificate for cold pitched roof and room-in-roof constructions is 99/3648.



Warm Roof Construction




Cold Roof Construction



Private House

## PHYSICAL PROPERTIES & PERFORMANCE

Property	Test Method	Mean Results	
Mass per unit area	EN 1849-2	175g/m <sup>2</sup> (+/- 10 g/m <sup>2</sup> )	
Reaction to Fire	EN 13501-1	Class D	
Water vapour resistance Sd	EN 12572	0.013m (+/- 0.005m)	
Vapour resistance	EN 12572	0.065 MNs/g	
Air permeability	EN 12114	34.4 m <sup>3</sup> /m <sup>2</sup> .h.50Pa	
Water penetration	EN 1928	Class W1 (before ageing) Class W1 (after ageing)	
Tensile Strength	EN 12311-1	MD 340N (-80N) MD 290N (-80N)	CD 230N (-60N) (before ageing) CD 190N (-60N) (after ageing)
Elongation	EN 12311-1	MD 45% (+/- 20%) MD 30% (+/- 20%)	CD 60% (+/- 20%) (before ageing) CD 45% (+/- 20%) (after ageing)
Tear resistance	EN 12310-1	MD 180N (-50N)	CD 175N (-50N)
Flexibility at low temperature	EN 1109	No cracking at minus 60°C	



Polypolypropylene is recyclable. Mechanical recycling is the primary option, depending of the requirements of the application and the intended article specification. It can also be valorised for energy recovery, its high calorific value is around 44 MJ/kg.

Polyolefins are neither biodegradable nor compostable.





Private House, Aberdeenshire

## BUILDING REGULATIONS

Condensation control is covered by Approved Document C in England & Wales, Section 3 in Scotland, and Technical Booklet C in Northern Ireland. All of these documents refer to BS5250: "Code Of Practice for Control Of Condensation in Buildings" for detailed guidance on how best to mitigate condensation risk in roof and wall constructions.

BS5250 defines two types of underlay membrane - high resistance type HR membranes (which includes traditional impermeable roofing felts and modern plastic equivalents) - and low resistance type LR membranes (vapour permeable underlays), and gives examples of appropriate ventilation strategies for each. BS5250 does not however deal directly with non-ventilated roof constructions, but does allow for their use, provided the proposed solution is covered by 3rd party certification.

Roofshield is covered by BBA certificates for both warm (no.96/3220) and cold (no.99/3648) pitched roof constructions. Roofs constructed in accordance with the certificates' conditions will therefore comply with the requirements of BS5250 and hence the building regulations.

## NHBC technical requirements

The NHBC operates its own parallel technical standards which differ from national Building Regulations. Although reference is still made to the BS5250 Code of Practice, Standard 7.2 Clause S11 has, since 2011, required high level ventilation equivalent to 5mm/m to be used with type LR underlays regardless of any recommendations given in 3rd party certification. Although not explicitly stated in the technical standards, an exception to this requirement is made where the underlay specified has third party certification of both vapour and air permeability. Having this certification, Roofshield is therefore exempt from this requirement, and can be specified as outlined in the BBA certification, without high or low level roof ventilation. As a result of this, some national housebuilders specify Roofshield on all their developments.

### NFRC Technical Bulletin 6

Released by the National Federation of Roofing Contractors in 2012, Technical Bulletin 6 outlines best practice for roof system installers. TB6 aligns itself with the NHBC technical standards by recommending high level ventilation where airtight type LR underlays are used. As with the NHBC standard however, it is recognised that this provision is unnecessary where the underlay is both vapour and air permeable, therefore Roofshield is once again exempt from this recommendation.







## FREQUENTLY ASKED QUESTIONS

### How “Breathable” is Roofshield?

While “Breathability” is a commonly used term, it is more technically accurate to refer to a material’s “vapour permeability” of a material. As Roofshield is air permeable as well as vapour permeable, it can certainly be argued that it does breathe, as it allows air movement, but this does not hold true for all “breathable” materials. In terms of vapour permeability, Roofshield, with a vapour resistance of 0.065MNs/g (Sd-value 0.013m) is the most permeable membrane on the market, with a vapour resistance 13% lower than the next best membrane currently available.

### What difference does air permeability make?

Roofshield, in addition to having the lowest vapour resistance available, is also air permeable. Industry research concluded that air permeability, combined with very low vapour resistance, inhibits the formation of condensation in a pitched roof to the point where it’s virtually impossible for condensation to occur under normal conditions.

Studies conducted by the BRE and Glasgow Caledonian University have concluded that not only does an air permeable roofing underlay outperform conventional airtight underlays, but also provides a higher air change rate (50-60ACH vs 10-12ACH) than a roof ventilated according to the recommendations in BS5250.

### Does Roofshield suffer from “tenting”?

As anyone who’s slept in a cheap tent can tell you, some vapour permeable fabrics can lose their water resistance if anything happens to touch the underside. Developed in Scotland, where the use of underlays fully supported on timber sarking board is standard practice, ensuring Roofshield does not suffer from this effect was always an important consideration for the A. Proctor Group. In fact while the first generation of VPU’s suffered from this problem, most modern roof underlays are unaffected by this phenomenon.

### So vents aren’t required?

Over the course of its almost 20-year lifespan, Roofshield has undergone extensive testing to prove that ventilation is not required to the underside of the underlay in both warm and cold roof applications, and is BBA certified to that effect. Roof features successfully assessed include duo-pitched, mono-pitched, hipped, mansard, gable-end, valleys, room in the roof, dormers and timber sarking. In more complex roof configurations, the use of Roofshield will provide a far more robust solution than a complex layout of ventilation openings.

The sole remaining situation where ventilation below the underlay is required is in a cold roof with Plywood or OSB sarking. If in doubt, our team of technical experts can assist specifiers in achieving the most appropriate solution for their specific project.

### How about high level vents?

Although non-ventilated roofs have been specified successfully for many years, recently BS5250, the NHBC technical standards and NFRC Technical Bulletin 6 have recommended that ridge only ventilation equivalent to 5mm per metre is used when vapour permeable underlays are specified. In both cases, the exception to this is where the underlay specified is both vapour AND air permeable. As Roofshield meets this requirement, this additional high level ventilation is not required when using Roofshield.

### Does Roofshield “chatter” in the wind?

Wind blowing up into the eaves of a roof can cause a ‘chatter’ type noise with some types of underlay. Roofshield is silent in such situations. As Roofshield does not suffer from this problem, the membrane does not have to be pulled taut and does not have any special fixing instructions compared to that of some underlays. Counterbattens can be provided to increase the air movement when used with close-fitting slates or tiles, or to provide drainage below the tile battens when used fully supported, but otherwise Roofshield may simply be draped between the rafters as normal.



### Can I use Roofshield with timber treatments?

All three layers of the Roofshield underlay have additives to increase the water hold out of the membrane. Timber treatments containing fungicides, insecticides and wood preservatives are extensively used in the building trade to protect rafters, sarking boards and tile battens. As such, a number of tests have been carried out to see if these timber treatments will affect the water hold out properties of Roofshield.

Four timber treatments were investigated - two water based micro-emulsions, a solvent-based treatment, and a CCA. Treatments were applied to the fabric and allowed to dry, then the water resistance of the material was tested. The water resistance of the Roofshield was not affected by these timber treatments.

### What is the “drying out period”?

This is the period immediately after the building is completed, during which there are significantly higher amounts of moisture within the building. These include moisture in damp timber, from wet trades (concrete, plaster etc) and moisture that may have found its way in, prior to the building shell being wind and watertight. Although this moisture will eventually dry out, condensation is more likely to occur as it does so. This will usually be most apparent in the first winter when the building is heated. Roofshield roofs are far less prone to this effect.

### Is Roofshield expensive?

In terms of the cost per roll, Roofshield is more expensive than a traditional non-breathable felt, however if we consider the costs associated with ventilation hardware then using Roofshield will save you money. Independent assessments carried out by Hardies Property and Construction Consultants of installed costs have shown that Roofshield can offer savings of between 4% and 6% when compared with either impermeable felt and full ventilation, or a lower specification VPU with high level ventilation only. The full cost report is available for download at [www.proctorgroup.com](http://www.proctorgroup.com).

### What about severe weather conditions?

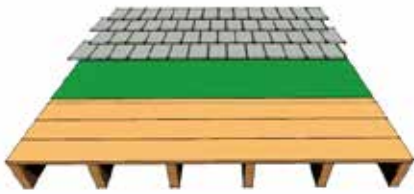
Although Roofshield is highly water resistant, the BBA, in its Site Practice Bulletin Number 2, states: “An underlay is not a total waterproof barrier and if used as a temporary waterproof covering, some rain penetration may occur. In certain conditions, particularly if there is persistent heavy rainfall combined with subsequent severe freeze/thaw conditions, an underlay should not be exposed for more than a few days.” If such conditions are expected, the temporary use of a tarpaulin covering is recommended.



Community Centre, Belfast

# TYPICAL ROOF CONSTRUCTIONS

## Cold Roof Slate Sarking Detail



1. Slate
2. Roofshield
3. Timber sarking / Board
4. Rafter

## Cold Roof Tile Detail



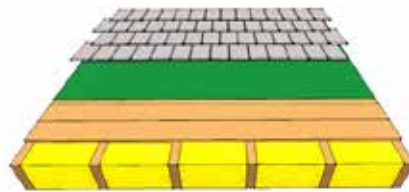
1. Tile
2. Batten
3. Roofshield
4. Rafter

## Metal Roof Profile Detail



1. Metal Cladding
2. Ventilation air space
3. Roofshield
4. Insulation
5. Vapour Control Layer
6. Metal Lining

## Warm Roof Slate Sarking Detail



1. Slate
2. Roofshield
3. Timber sarking / Board
4. Insulation
5. Rafter

## Warm Roof Tile Alternate Detail



1. Tile
2. Batten
3. Roofshield (draped)
4. Insulation
5. Rafter

## Warm Roof Tile Detail



1. Tile
2. Batten
3. Counter batten
4. Roofshield
5. Insulation
6. Rafter

## Warm Roof Tile with OSB Alternate Detail



1. Tile
2. Batten
3. Roofshield (draped)
4. Counter batten
5. OSB
6. Insulation
7. Rafter

## Warm Roof Tile with OSB Detail



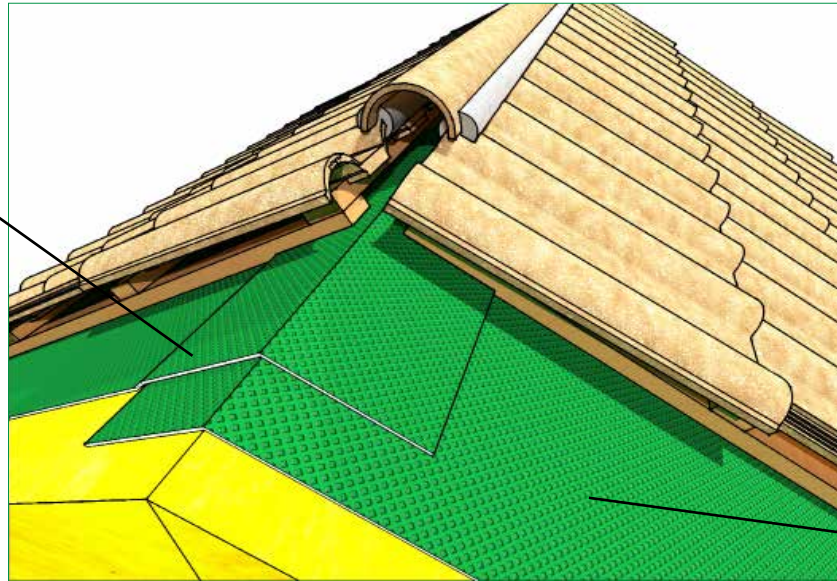
1. Tile
2. Batten
3. Counter batten
4. Roofshield
5. OSB
6. Insulation
7. Rafter



# ROOFSHIELD DETAILS

## DUOPITCH RIDGE DETAIL

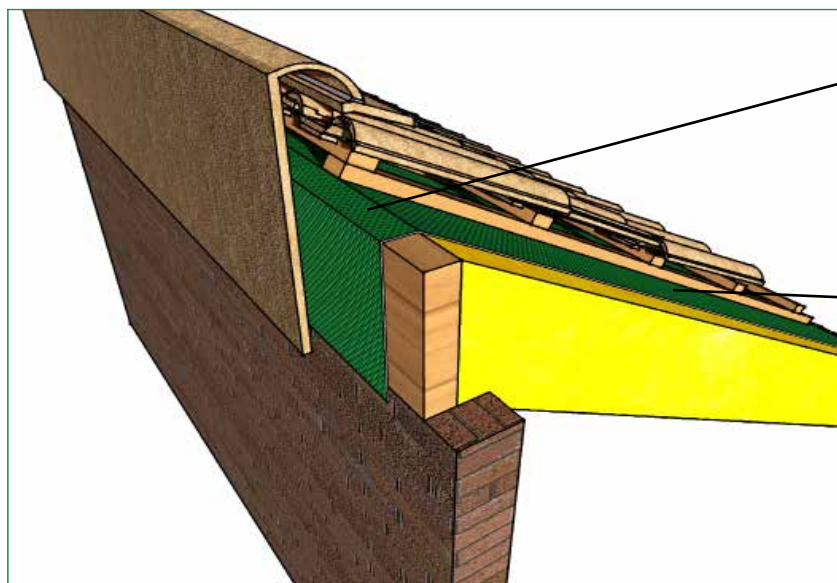
Roofshield overlapping minimum 150mm on both sides of ridge



Roofshield fully supported on insulation

## MONOPITCH RIDGE DETAIL

Roofshield taken over ridge board, minimum 150mm

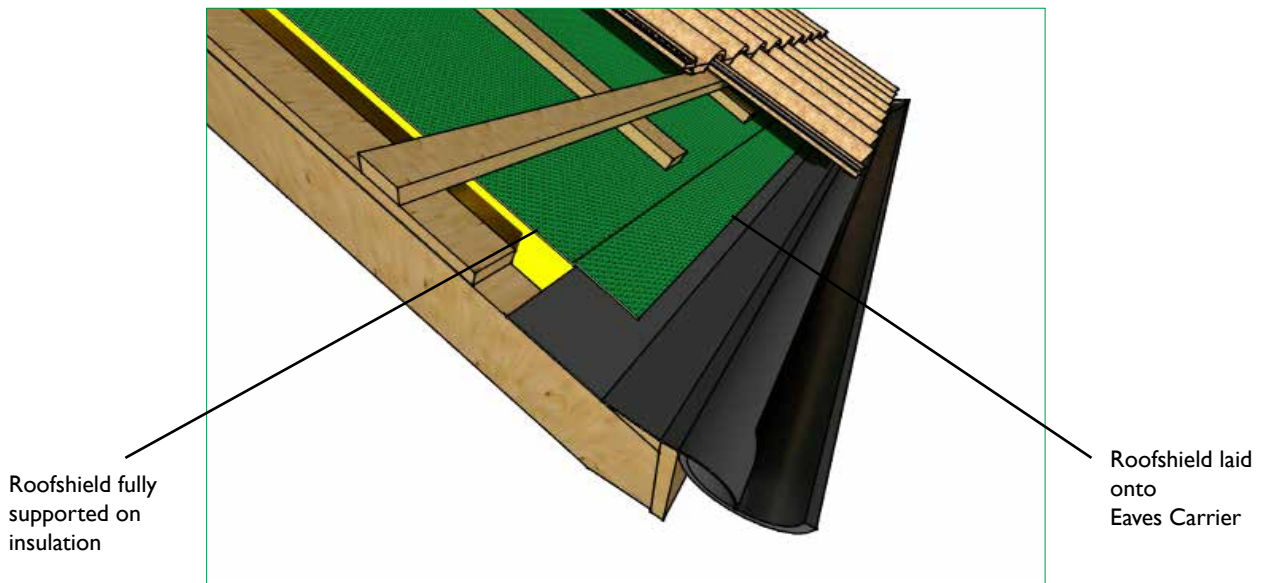


Roofshield

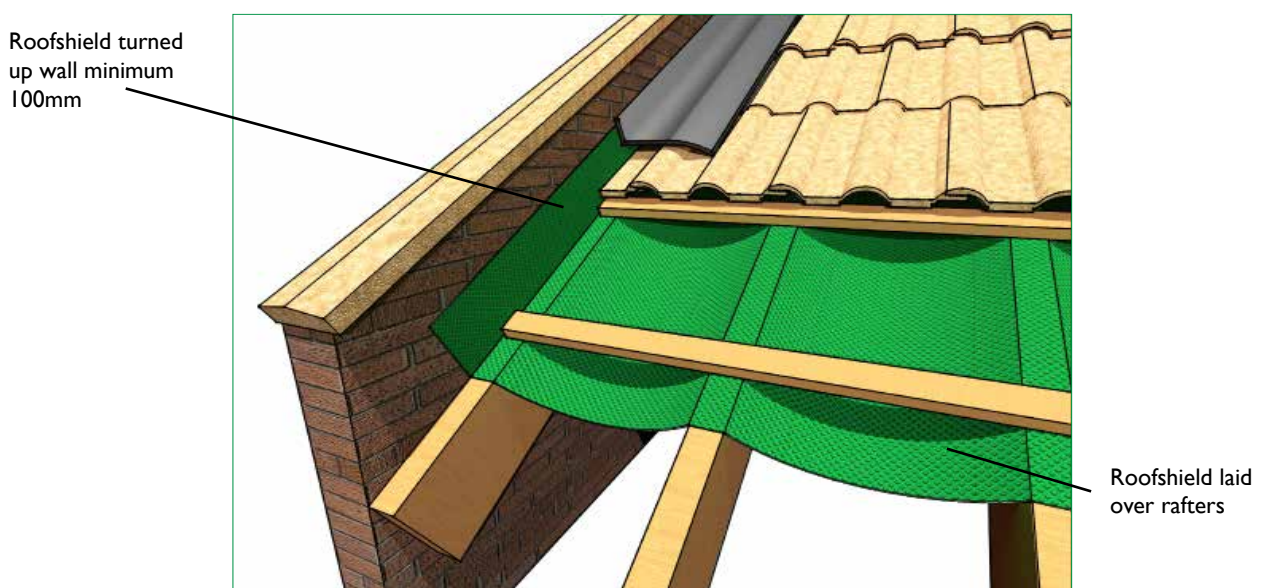


# ROOFSHIELD DETAILS

## EAVES DETAIL



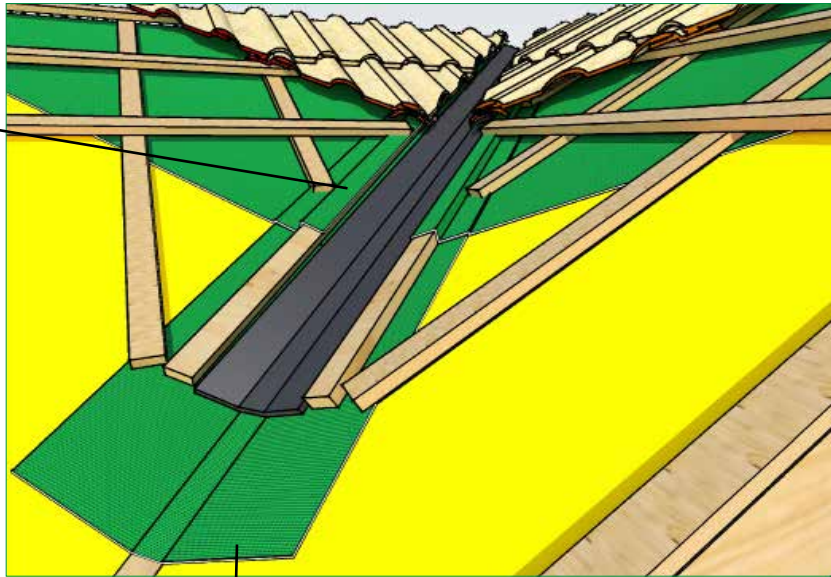
## VERGE-ABUTMENT DETAIL



# ROOFSHIELD DETAILS

## VALLEY DETAIL

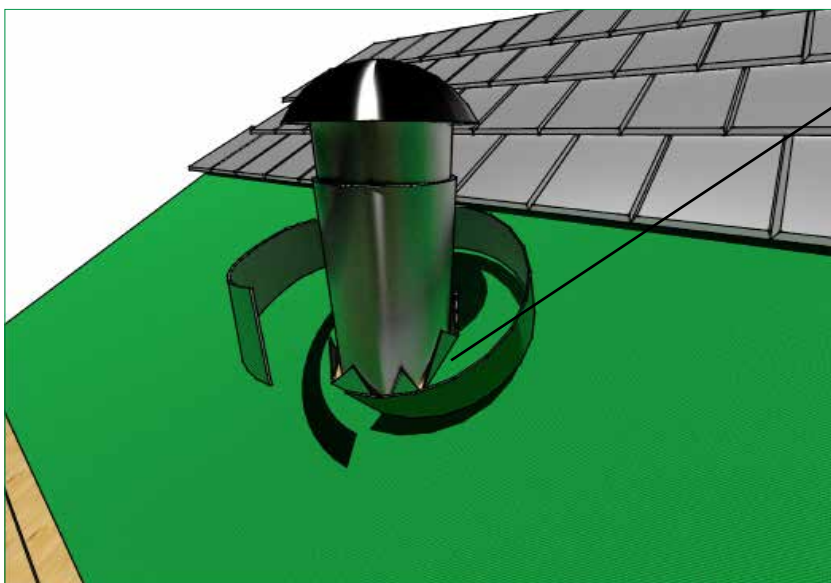
Roofshield taken  
over edge batten



Roofshield

Minimum 300mm

## PIPE DETAIL



Roofshield with star  
cut dressed up pipe and  
taped in position



## BELFAST CITY HALL

In 1888 Queen Victoria officially declared Belfast a city, and it was generally agreed that a new City Hall was needed to reflect this elevation in status. Belfast City Hall opened its doors on the 1<sup>st</sup> August 1906 during a time of great prosperity for the city.

Costing less than £500,000 to build, the City Hall was designed by Alfred Brumwell Thomas, who won a public competition with his neo-classical design, and was constructed by the local firm of H & J Martin.

During 2009 the historic City Hall underwent both internal and external refurbishment.

As an integral part of the roof refurbishment architects Consarc Design approved the use of Roofshield high performance breather membrane, and the main contractor Grahams of Dromore appointed roofing contractor D.Harkin Roofing Ltd to carry out the installation.

The project demonstrated how Roofshield's unique air and vapour permeability characteristics allow even the most complex of pitched roofs to breathe - without the need for traditional air gaps or secondary venting products. In addition, Roofshield is as easy to install as traditional roofing felt.

## PRIVATE HOUSE, SCOTLAND

An innovative private dwelling in Aberdeenshire employed Roofshield breather membrane to enable a unique split, dual sloped circular roof design. The construction form is based on a high thermal efficiency timber frame using Scotframes Val-U-Therm system. The roof geometry was particularly challenging, with 2.5 tonnes of Burlington Best random width slate used to cover the large, bowl-shaped structure.

On such a complex roof, the roofing contractors, John Rhind Slaters, wanted to make sure only the best underlay membrane was used, and the vapour and air permeability characteristics of Roofshield allowed the unusual roof design to proceed without the need for unsightly vents or their associated design complications.

Roofshield's very low vapour resistance of 0.065MNs/g combined with high air permeability, reduces the potential for interstitial condensation as far as is possible, without the requirement to use a vapour control layer; thus a robust and dependable solution was possible, even with a very unconventional roof design.





*"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



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