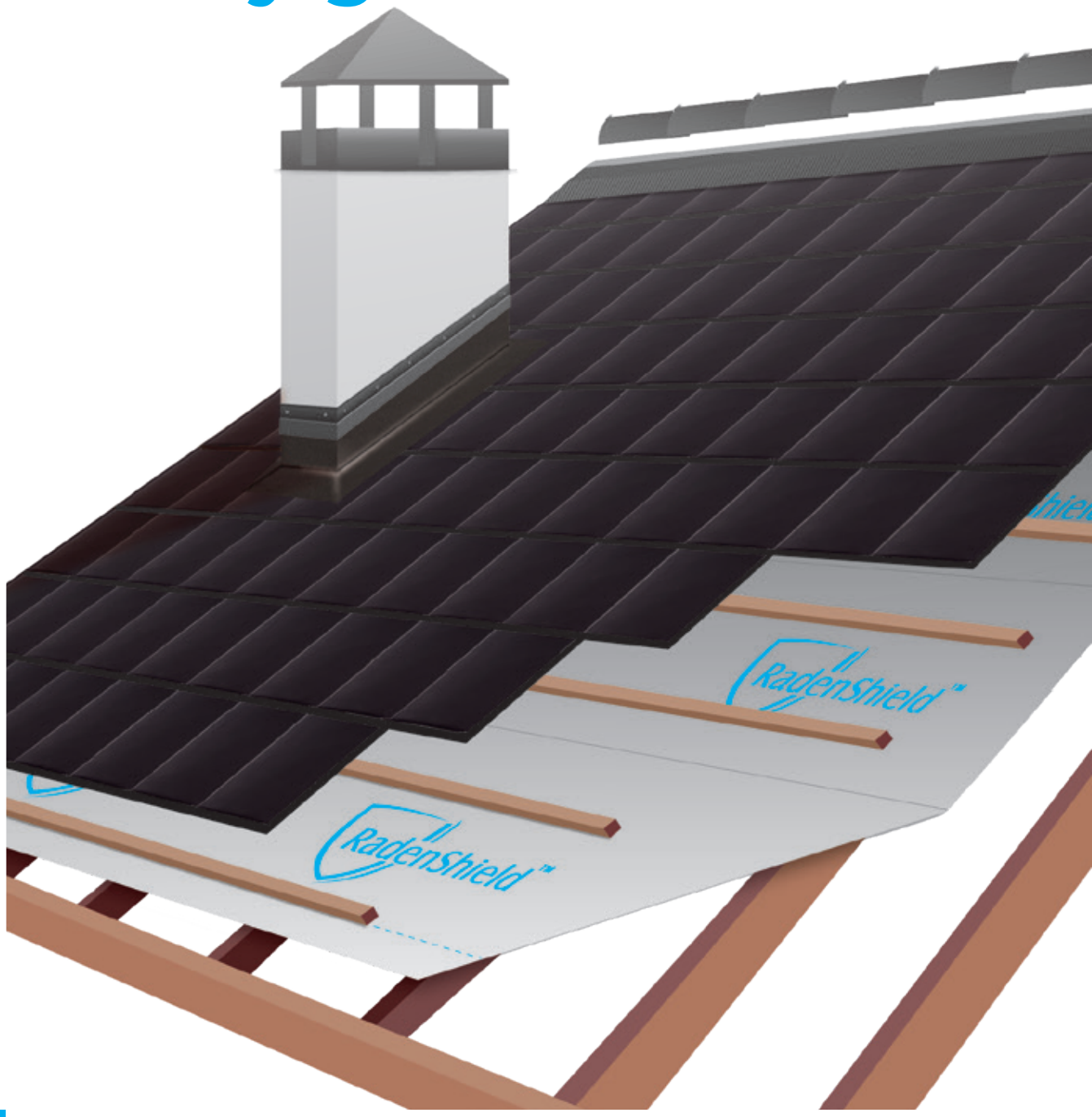
Windloading and underlay guide



BMI Coverland

Adhering to the use of good roofing practices

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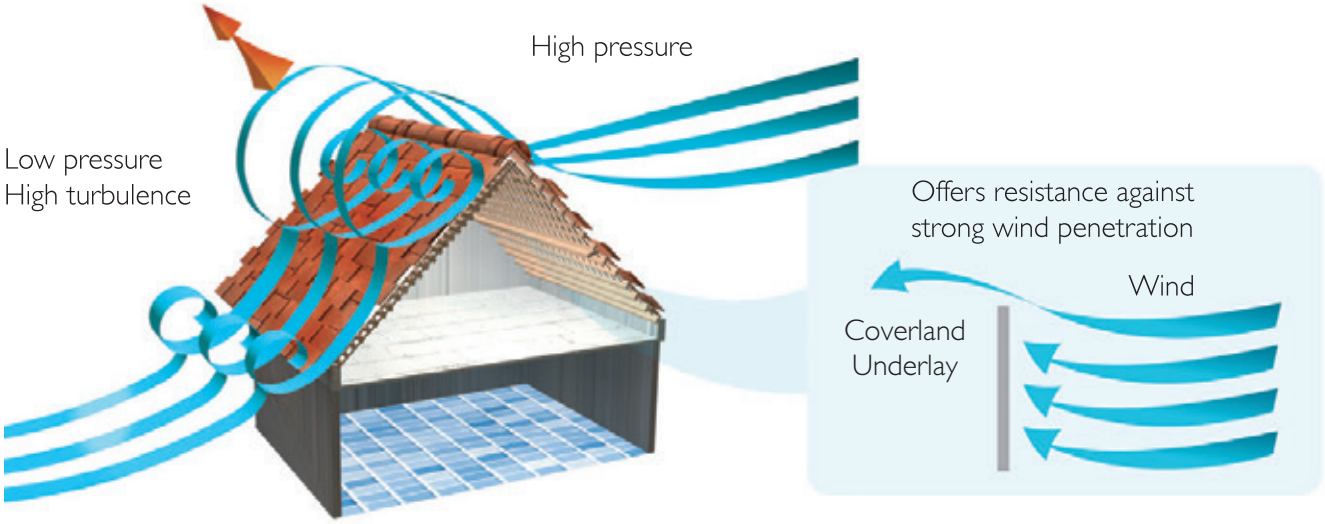
The most important environment factor which affects the satisfactory performance of roofs is wind gusting. During short-term wind gusts, pressure differences occur between the roof space (loft) and the outside of the roof covering. The result is a wind force that causes the total or partial removal of the roof covering allowing further damage by natural elements.



The working performance of the roofing undertile membrane substantially reduces the lifting forces on the roof covering. In addition the undertile membrane brings definite advantages to the building. In essence an undertile membrane is an essential component of a pitched roof and should be considered an investment and an insurance for a weather-tight roof. If a roof structure is fitted with an undertile membrane of suitable quality and is tiled according to the required specifications, it will withstand excessive wind speeds.

Under strong wind gusts the uplift on the roof covering may be far in excess of the dead mass of these coverings, requiring both the roof covering and the total roof structure to be securely fixed to prevent the roof and/or covering from being lifted and torn from the building. Roof pitches below 30° results in suction on both the windward and leeward sides of the roof. This suction or lifting force, particularly on a low pitched roof, is often the most severe wind load experienced by any part of a building. Wind tunnel tests and practical evidence have shown that the satisfactory performance of a roof, and a tiled roof in particular, depends on the complementary function of the roof covering and the undertile membrane.

A SUITABLE ROOFING UNDERTILE MEMBRANE WILL AFFORD

- An increase in thermal insulation resulting in energy savings during winter and summer.
- Reduced dust contamination in the loft space, hence allowing it to be utilised as a storage area.
- Minimised water ingress and damage resulting from hailstones melting in valleys, concealed gutters, etc.
- Protection against roof leaks in the event of damage to the roof covering.

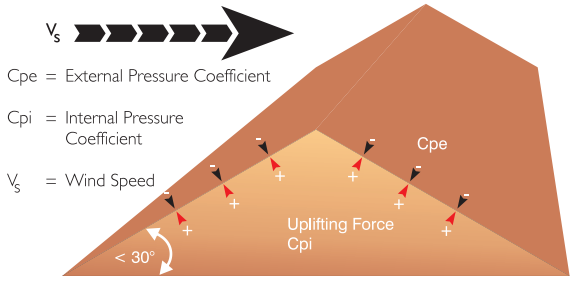


Figure A

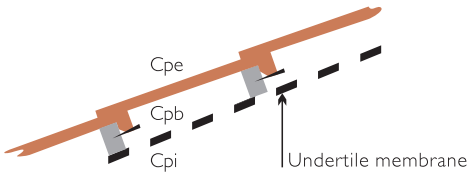


Figure B

Figure A

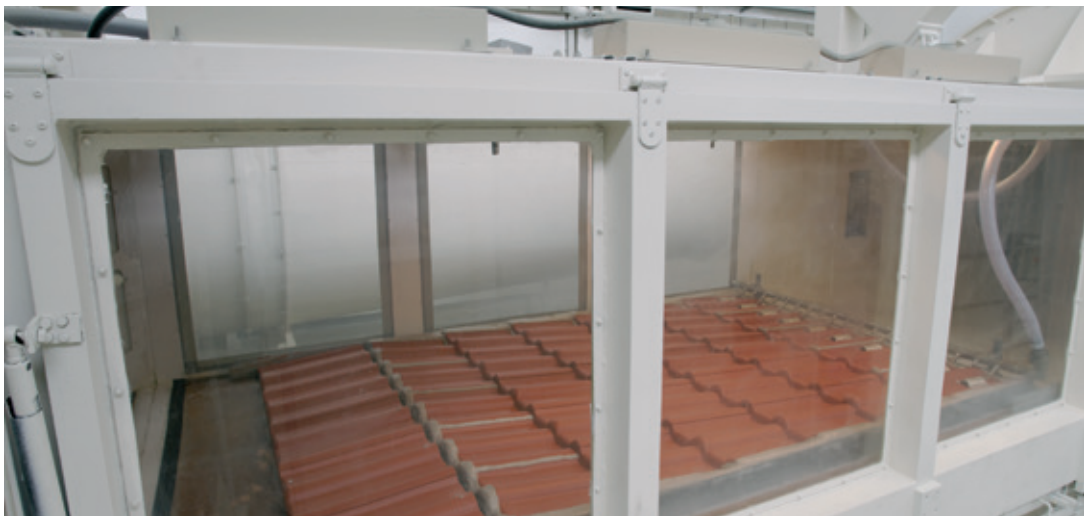
A roof with a pitch of less than 30° is experiencing a wind of velocity (Vs) metres per second horizontal and at right angles to the ridge line. The kinetic energy of the wind is transformed into a dynamic pressure q through the interaction of the roof as obstruction with the moving wind:

q (Newtons per m^2) = $\rho \frac{V_s^2}{2}$ where ρ = Density of air

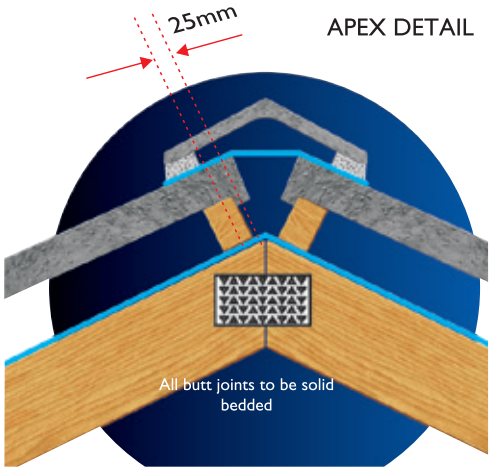
Figure B

A roofing undertile membrane (high tensile strength/ tear resistance), performs a critical function in preventing roof coverings from being removed under high wind gusting and in some instances reduces the need for mechanical fixing. In areas of high driving rain, e.g. coastal regions, an undertile membrane will minimize the risk of rain penetration on all roof pitches that may occur as a result of the reversal of the internal/external pressure relationship caused by the other dominant roof openings. In order to withstand high wind loads it is necessary for all horizontal overlaps to be held down properly. One method is to use an additional batten over the overlap where necessary.

Our roofing products are tested in a wind tunnel unique to the industry. The wind tunnel can simulate wind and rain conditions found in a wide range of climate zones worldwide. The simulations even include situations which typically arise only every 50 years. Only when the new roofing materials have passed the wind tunnel trials as well as several other hardness tests and long-term ageing tests, does BMI release its innovations for sale.



FIXING THE UNDERTILE MEMBRANE AND BATTENS



Distance between rafter apex and first batten

The undertile membrane in all cases should be fixed between rafters and battens (except at the lower edge of a bottom course of tiles where it overlaps the tilting batten and/or fascia board into the gutter), and must overlap horizontally and vertically by at least 150mm at all joints (Work normally carried out by a qualified carpenter).

Eaves overhang

Determine the specified eaves overhang and cut the rafters/trusses accordingly.

Tilting batten

A tilting batten (or fascia board) must be used at the bottom end of the rafters, rising above the batten line to ensure that the first course of tiles will be on the same plane as the following courses. The average tilting dimension is plus-minus 14mm higher than the battening being used.

Valley undertile membrane

If the roof has valleys, start by fixing a strip of undertile membrane at least 600mm wide, centred on the valley's full length, overlapping the ridge on the top and carrying it well into the gutter at the bottom. Secure the undertile membrane on the edges with clout nails.

Eaves undertile membrane

Lay the first horizontal strip over the rafters starting from the eaves, ensuring that it will carry over the fascia board. Secure this first strip to the rafters with clout nails in the upper half only, leaving the lower half free for draping over the tilting batten and well into the gutter. Care should be taken to ensure that the undertile membrane does not form any troughs where water may be trapped. To achieve this the undertile membrane must be taut or supported, if necessary, behind the fascia board/tilting batten. If the roof is to have open soffits, it is good practice to install a thin covering (fibre-reinforced cement or other weather-resistant sheet) on top of the rafters for the extent of the eaves or verges overhang before proceeding.

Positioning the bottom and top battens

Fix the batten, which is to carry the first course of tiles on top of the undertile membrane. The distance of this batten from the fascia board should allow sufficient overhang of the tiles over the fascia board/tilting batten, enabling rainwater to discharge efficiently into the gutter (normally 350mm from the outside of the fascia board to the top of the first batten.) Fix the apex batten temporarily, but accurately, at a distance of 25mm from the apex of the rafters, which is adequate for most pitches.

Calculating the batten gauge

Determine the pitch of the roof and the appropriate batten gauge. Measure the full rafter length and read off the spacings on the table on the following pages. Set the tilting batten and first batten, then proceed to batten at the centres shown in the table. Make sure that the battens run parallel to each other at all times.

Split apex

A split apex is a design feature. When calculating the batten gauge, the higher apex should always be used. A short course can occur at the lower level apex.

Roof undertile membrane and battening
Proceed with fixing undertile membrane horizontally with clout nails, observing the recommended overlaps. Batten up simultaneously to the apex ensuring that the batten joints are always located on a rafter. It is bad practice to join all the battens on the same rafter.

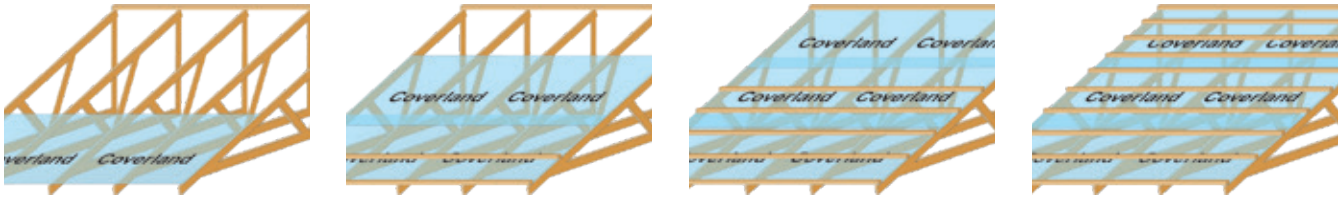
Valleys

At valleys, the horizontal strips of underlay shall overlap undertile membrane previously fitted. Determine the width of the valley flashing to be used. Secure the valley counter battens along both sides of the valley to the rafters securing the undertile membrane. Horizontal battens are now mitred and secured to the valley counter battens.

Hips

At hips, the undertile membrane may be cut close to the hip rafter, or may overlap one another on both sides of the hip rafter. A strip of 600mm wide undertile membrane is then placed over the full hip length, overlapping the ridge at the apex and carrying down into the gutter at the bottom. The hip counter battens are secured to the rafters as close to one another as possible along the length of the hip, securing the undertile membrane. Horizontal battens are now mitred and secured to the hip battens.

APPLICATION OF TILED-ROOF BUILDINGS WITH TIMBER CONSTRUCTION (RADENSHIELD™ AND UNDERTILE MEMBRANE)



1. Unroll underlay and install horizontally, from left to right, across the rafters and starting at the eaves. Work towards the ridge of the roof (1a). The upper side of the underlay is marked with the Coverland logo and a dotted line indicating the minimum overlap between layers of 150mm.
2. Ensure each horizontal layer is placed across the rafters in such a way as to avoid sagging, creases and/or gaps. Tack-nail into position and secure using through-nail horizontal battens. Avoid unnecessary tears/penetrations through the underlay.
3. Minimum recommended width of horizontal overlap is 150mm (1b). Horizontal overlaps should be secured under a batten. Ensure vertical joints overlap by a minimum of 150mm and that they are secured to a rafter (2a). Corrosion-resistant staples or EP clout nails are recommended. If the building is in a high wind area, it is recommended that the underlay is nailed to the underside of the tiling battens.
4. The underlay between the trusses must be sufficiently taut, while allowing a shallow through to facilitate run-off beyond the wall or into the gutter, should rain water penetrate the tiles (2b).
5. Layers of underlay that run over a hip should overlap by a minimum of 150mm. Each layer should overlap the layers of underlay on the adjacent elevation of the roof.
6. Ensure that a layer of damp-proof course is applied over the underlay at roof ridges, hips and at the roof's apex.
7. Ensure that a layer of underlay at least 600mm wide is laid in the roof's valleys before the final layers of underlay are laid. Secure these strips beneath valley battens, ensuring that the final underlay layer is laid over these battens.
8. Where holes need to be cut for ventilation and soil pipes use the following procedure:
   - Underlay must be star-cut carefully to prevent tears, ensuring the tabs face downward and that the pipes fit closely through the holes.
   - Fit a proprietary collar over the pipe to protect the underlay.

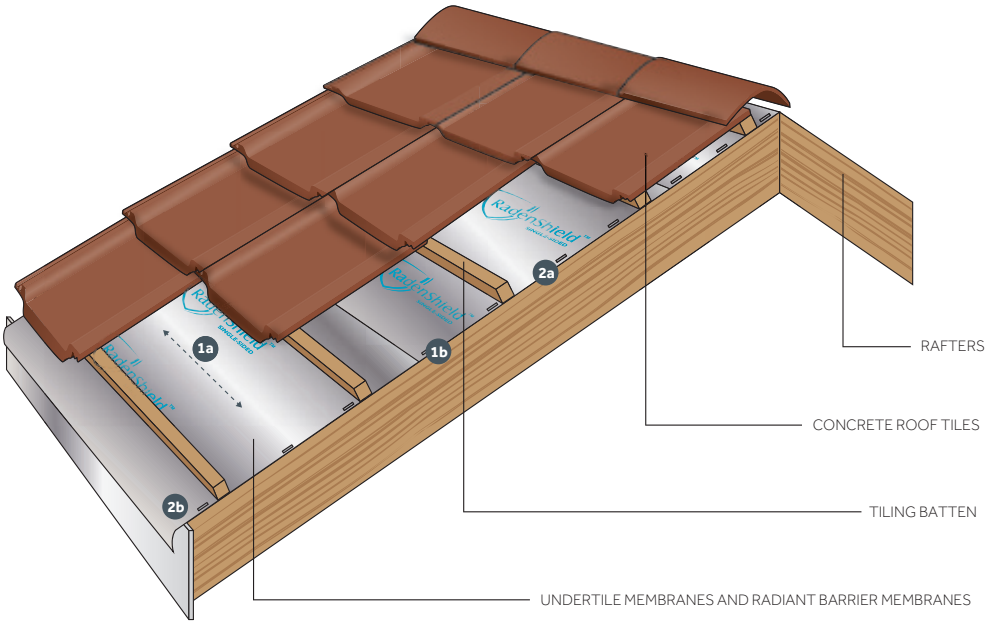


Diagram illustrating steps to laying undertile membranes and radiant barrier membranes over the roof truss under the tiles

APPLICATION OF INDUSTRIAL RADENSHIELD™ FOR BUILDINGS WITH GALVANISED SHEET CLADDING

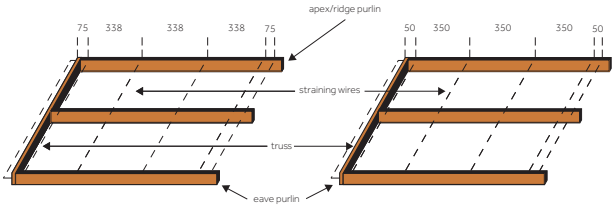


Fig 4.1: Diagram A – 150mm sidelap joint. Straining wire central to overlapping.

Fig 4.2: Diagram B – 100mm sidelap joint. Straining wire central to overlapping

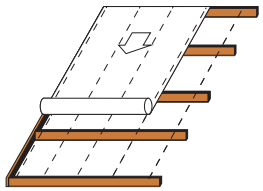


Fig 4.3: Diagram C – Laying over the straining wire and fixing to the apex

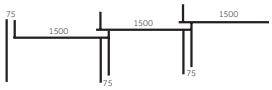


Fig 4.4: Diagram D – Laying

1. Refer to diagrams A, B, C and D. Polyvinyl chloride (PVC) coated straining wires are secured from the top apex purlin, over intermediate purlins to the bottom eave purlin at 338mm centres (1b).
2. The first straining wire is secured 75mm away from the gable end. All wires are evenly tensioned ensuring that cut ends face downwards.
3. Note: All other applications to comply with the National building regulations and codes of practice.
4. RadenShield™ is laid over the straining wires (2a) ensuring that it is squared off to the underlay and is secured to the apex purlin using double-sided tape (2b). The underlay is evenly tensioned and secured to the eaves purlin again using double sided tape.
5. All subsequent layers of RadenShield™ are to be fixed as above with a not less than 100mm overlap over the previous sheet. Straining wires must be positioned at the centre of the overlaps and not less than 50mm from the sheet edges.

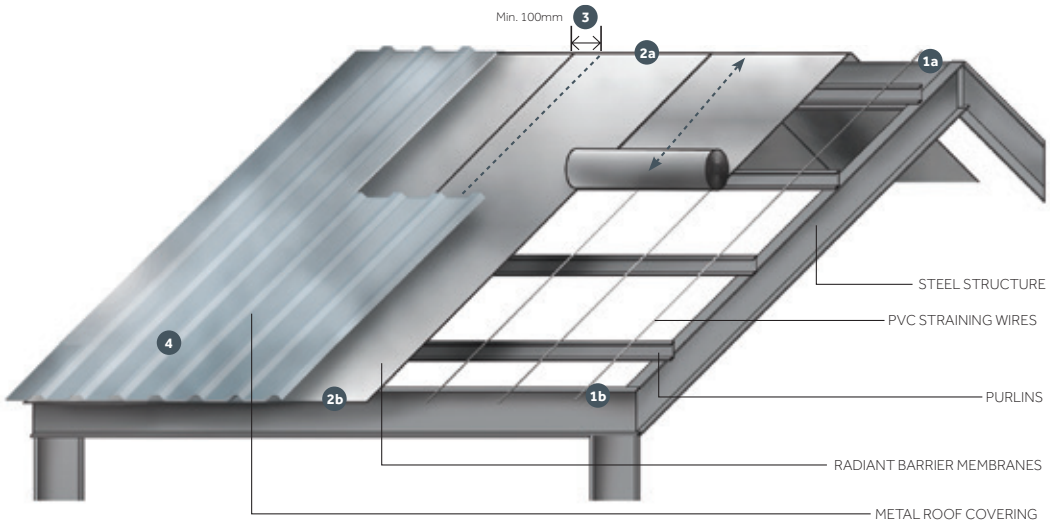


Diagram of laying RadenShield™ on straining wires

Recommended products

ENERGY EFFICIENT ALUMINIUM MEMBRANES

An undertile membrane with added energy-saving Cool Roof benefits. Reflects 97% of radiant heat, keeping the building up to 10° cooler in summer.

UNDERTILE MEMBRANES/UNDERLAYS

Water impermeable; removes risk of tile upliftment in poor weather conditions; keeps the roof cavity free of dust and insects.

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As of April 2017, Coverland forms part of the BMI Group. The BMI Group, a Standard Industries company, is the largest manufacturer of flat and pitched roofing and waterproofing solutions throughout Europe. With 128 production facilities and operations in Europe, parts of Asia and South Africa, the company brings more than 165 years of experience. For more information visit **www.bmigroup.com**

Our expertise and innovations are bringing advantages in sustainability, performance and architectural design to residential, commercial, and public sector projects. Our product offering integrates functionality, energy efficiency and aesthetics for the homeowner. As the largest concrete roof tile manufacturer in Southern Africa, our reach expands across 8 production facilities and 4 depots nationally.

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