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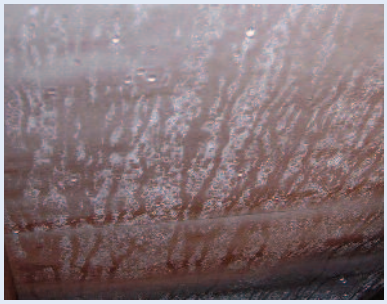
IMPORTANT INFORMATION ON THE USE OF INTERNALLY INSTALLED ROOF UNDERLAY LAP VENTILATORS

glidevale

INTRODUCTION

As recent winters have become milder, the lessons learnt about the importance of adequate ventilation to avoid the risk of harmful condensation during the prolonged cold spell in 2010 are in danger of being forgotten.

Research has shown that about 20% of the air that enters buildings, and in particular dwellings, leaves via the roof with an additional moisture load. Typically 80% of any water vapour transfer into the roof is by convection through the ceiling via gaps and cracks, especially in older properties.

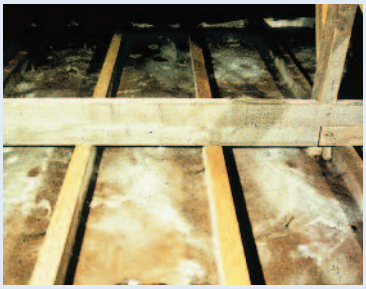


Vapour permeable underlay (type LR) with smooth underside showing condensate run-off and dripping

Condensation will occur as soon as the moist air meets a cold surface. This can occur even in properties that have been built for a number of years without experiencing any previous problems.

Impermeable underlay (type HR) with flocked underside showing condensate being held

Ensuring adequate roofspace ventilation is installed in both new build and in particular refurbished properties (insulation upgrade schemes where the balance of thermal and vapour characteristics have been altered) can prevent the formation of harmful condensation and problems for the future.



Considering the life of a building and the potential number of hard winters, it is a very small price to pay.

INTERNALLY INSTALLED UNDERLAY 'VENTILATORS'

In existing buildings there is a growing interest in the use of internally fitted 'ventilators' designed to open the laps of the underlay to transfer the condensation risk to the batten cavity to reduce the costs of external works retro-fitting tile and slate ventilators. But do they actually work?

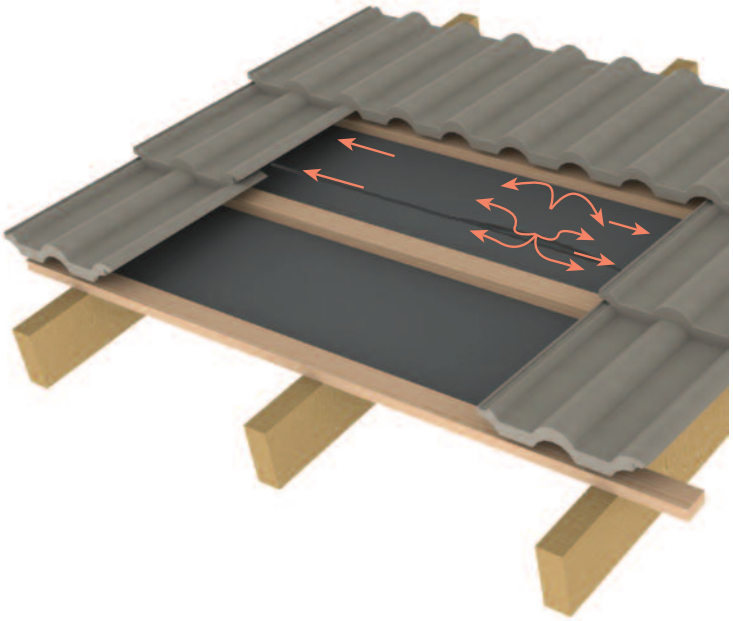
All such devices suffer from a lack of guaranteed ventilation performance.

Whilst some may have a known ventilation free area of the unit itself, this may well not be continued to the outside atmosphere as required by BS 5250. It will be very dependent upon the type/style of roof covering and the depth of available batten space. BS 5250 describes different types of roof covering and whether they are defined as 'sufficiently air open' or not and it is critical that this be considered during the specification process otherwise insufficient ventilation may well be the consequence.

This is because the ventilation provision will be dependent on the equivalent free area through the tiles or slates in a single course. Whilst one may think that air would escape above and below the tile battens, it is very tile or slate dependent and the battens will provide a sufficient restriction to this flow to make it virtually irrelevant for calculation purposes.

A typical interlocking tile tested by Building Product Design was found to have 874mm^2 of ventilation around its perimeter. Therefore in a single course of tiles an internally fitted ventilator, even one with a free area of around 11,000mm^2, would need between 10-12 tiles to ventilate out, a spacing of about 3.6m. This will only achieve 3,000mm^2 per metre. With close fitting roof coverings such as interlocking and double lap slates and plain tiles, this would be even less. Whilst plain tiles may seem to have a significant number of joints from which air can escape it must be remembered that they are set on 38mm battens at 100mm centres which will significantly restrict a large portion of the 'ventilation' area. Closer spacing of the internal units won't help as the air cannot escape through the roof covering in sufficient quantity and one cannot count the same ventilation gap twice.

As these products are designed for installation in the laps of the underlay, the next opportunity to install up-slope would be between 1m and 1.5m depending on the width of the underlay. Ventilation provision at low level should be **10,000mm² per metre.**



Another practical issue is that the first opportunity to install in an underlay lap would be at least 1m up from the eaves. At this point it could be practically impossible from inside owing to the restricted headroom in the loft space, not to mention balancing on ceiling joists in a non-boarded roofspace with the associated safe working issues it creates. The next opportunity would be at least another metre up-slope so the ventilation provision is not now at low level where it needs to be, to effectively ventilate at eaves in line with Building Regulation requirements.

Implications of wind loading on the roof covering

It is also important to understand the issues that using internally installed roof underlay lap ventilators can create on the management of wind loading and weather resistance of the roof covering.

Building Regulation Approved Document A1:2004 states:

(1) The building shall be constructed so that the combined dead, imposed and wind loads are sustained and transmitted by it to the ground:

safely; and…

(2) In assessing whether a building complies with sub paragraph (1) regard shall be had to the imposed and wind loads to which it is likely to be subjected in the ordinary course of its use for the purpose for which it is intended.

Section 0.2b Loading states that '…and wind load should be in accordance with the current Codes of practice referred to in Section 1'.

The wind loading on a dwelling is calculated to BS EN 1991-1-4:2005 + A1:2010 and each dwelling will have had a specific wind load calculation for the roof based on its location, orientation, roof pitch, height etc. From the expected wind load results, the roof tile manufacturer will provide a fixing pattern or specification to ensure that the roof covering will be able to remain in place in the occurence of the worst case 1 in 50 year wind event.

The roof covering fixing specification is based on BS 5534: 2014+A1:2015, which assumes that the roof covering and the underlay manage the wind load pressures equally. Previously (BS 5534: 2003) it was assumed that the roof underlay only managed 33% of the wind load; this change places yet more onus on the correct function of the roof underlay and its overlaps.

The underlay contributes to the wind load on the roof because the laps which are not sealed under normal conditions effectively close when under wind gust conditions, preventing transfer of wind load pressures to the loft space.

Installing products that permanently open the laps of the underlay irrespective of external conditions, in an attempt to disperse moisture vapour from the loftspace, effectively stops the underlay acting as a wind deflector. Opening the laps of the underlay reduces the pressure differential either side of the underlay to zero, which means that **all** of the wind pressure has to be dealt with by the roof covering.

The original fixing specification of the roof covering will have been determined based on closed underlay laps. With open laps, the roof covering itself has a much greater risk of being forcefully removed by the increased wind loads causing localised damage and possibly fatal injuries.

In addition, there is a greater risk of tiles chattering at lower wind speeds which will increase the incidence of tiles cracking / shearing and falling off the roof slope. This danger will occur far more frequently than the 1 in 50 year occurrence, and should not be ignored.

Implications on weather resistance of the roof covering

The driving rain resistance of the majority of roof coverings especially interlocking tiles and slates is very dependent upon the integrity of the underlay barrier underneath. A change in the batten space pressure by opening up the underlay laps, especially on the windward side of a roof, will detrimentally affect the ability of the roof covering to resist driving rain.

BS 5534: 2014+A1:2015, section 4.15.7 states that:

Ventilation products should:

a) Provide an effective weatherproof air path from the external environment into and / or out of the roofspace or roof construction zone for the design life of the building;

b) Provide the free air space as recommended in BS 5250 for eaves, slate / tile or ridge applications;

c) Prevent access by wildlife, e.g. birds, rodents or large insects.

Users should pay particular attention to the resistance to wind loads, deluge and driving rain, durability and effective performance of ventilation products.

It is for this reason that BS 5534 specifically recommends against such products. Section 5.9.2 states:

Devices that form holes through the underlay, sarking or insulation to promote ventilation from the roof space to the batten space (in contrast to ventilation tiles or slates which ventilate the roof to the outside air) can adversely affect the driving rain resistance of slates, tiles or shingles, as well as increase the wind uplift forces acting on them.

The specifier should confirm with the device manufacturer and the slate or tile manufacturer that the performance of the roof will not be unacceptably impaired. In particular, the specifier or user should ensure that the relevant wind uplift calculations demonstrate that slate or tile fixings will be adequate.'

BS 5534 and manufacturer's literature all put the onus on the specifier to ensure that the device will not affect the weather and wind load resistance of the roof covering.

Installation issues

The increase in popularity of internally installed devices is a combination of ease and cost of installation and perceived advantages over working with external ladders which many consider to be a problem under health and safety.

Safe and practical guidance on the use of ladders can be found in The Work at Height Regulation 2005: A brief guide produced by the HSE. Routine maintenance tasks regularly require the use of ladders - good working practices and a simple risk assessment policy document easily overcome any health and safety issues.

It is sensible to consider the longer-term risk associated with condensation, wind uplift and weather resistance issues which can potentially cause serious and lasting damage over the life of the building; not to mention the possible damage or injury caused by falling tiles or slates.

The safe solution

The safe, secure solution is to install purpose designed slate or tile ventilators with integral throat or purpose designed extension sleeve to ensure the hole is sleeved for the depth of the roof covering, underlay and battens to meet the design requirement of BS 5250: clause H.5.4. Correctly installed slate or tile ventilators will remain weatherproof and fit for function for the life of the building **- simply fit and forget.** They can be easily installed as part of the normal slating or tiling process or retrofitted.

Glidevale offers a wide range of universal and profile dedicated slate and tile ventilators which are designed to ventilate through the roof slope and form an integral part of the roof covering. They are supplied with underlay opening protector, integral 4mm insect screen and ventilator throat or extension sleeve to meet all the design requirements of BS 5250 and can be colour matched. They are driving and deluge rain resistant.

Glidevale has over 30 years experience in roofing products in the UK and Ireland. Our aim is to manufacture and supply only products that are fit for function and to help educate the industry of the issues they should bear in mind when drawing up specifications or purchasing products.

Glidevale's slate and tile ventilators offer one simple, unobtrusive method of providing adequate roof ventilation to comply with current Building Regulations. As part of our free site survey service we can provide a full specification that itemises quantities and types of vents required, broken down by individual property. Glidevale's unique site survey service is designed to save valuable time and resources for property maintenance managers involved in energy upgrade schemes.

Further information

For further advice or detailed information regarding a specific project, please contact our Technical Services Team on **0161 905 5700**

CPD seminars on BS 5534 wind uplift and BS 5250 control of condensation can be provided on request. Please contact our sales team for further information.

References

Building Regulations Approved Document A1:2004 (incorporating 2010 and 2013 amendments)

BS 5534:2014+A1:2015

BS 5250:2011 +A1 2016 Code of Practice for control of condensation in buildings

Safe use of Ladders, HSE

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