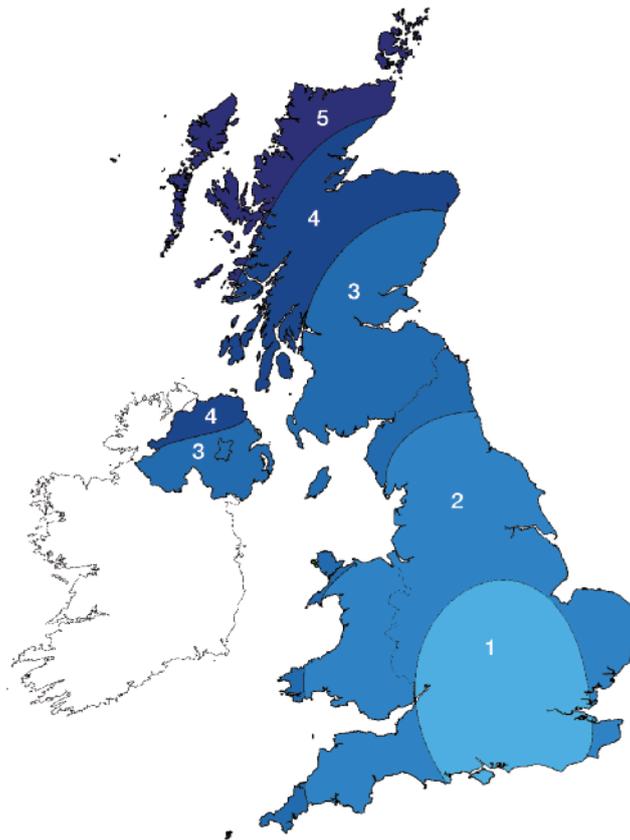


BS 5534: 2014 ROOF UNDERLAYS & WIND UPLIFT



Winds of Change

Some 200,000 buildings are damaged by high winds in the UK every year, costing the British economy up to £800+ million.

With a predicted increase in the frequency and severity of storms in the UK and Ireland, and the increase in wind speeds it is now more important than ever to recognise the part that roofing underlays play in preventing tiles or slates being dislodged from roofs.

Wind uplift is one of the main causes of roof covering failure. Wind blowing over the roof can cause pressure differentials and where negative pressure or suction occurs, the roof underlay plays a crucial role in acting as a primary line of defence.



The Role of Roofing Underlays

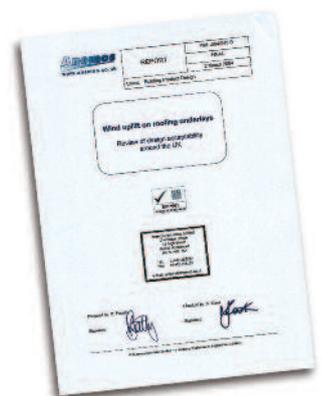
In unsupported applications, some 50% of the total wind load has to be absorbed by the underlay, the remaining 50% by the correctly fixed roof covering. (BS 5534: 2014). Type 1F and 5U reinforced bitumen have been the traditional roofing underlays for this country for decades and have been shown by site experience and by testing to resist the worst wind uplift conditions expected in the UK and Ireland without extending unduly under load. However the disadvantages of the BS 747 underlay types are well documented including weight and useability. If an underlay has too much inherent elongation or extensibility under load it will deflect upwards to such a degree that it comes into contact with the underside of the roof covering and can dislodge the slates and tiles. Underlays that are air leaky are often unable to resist all of the windload pressure. Whatever windload pressure that escapes through the underlay will be transferred onto the roof covering requiring higher frequency of fixing of the slates or tiles or additional measures to restrain the underlay. With the trend towards vapour permeable (type LR) underlays and the modern lighter weight impermeable, (non-breathable or type HR) alternatives to 1F and 5U, the issue of wind uplift has been largely overlooked.

Independent Report

In 2004 Building Product Design Ltd commissioned an independent report on wind load calculations "Wind Uplift on Roofing Underlays", produced by RWDI Anemos. This showed the extent of the issue relating to many modern underlays in regards to their 'poor' wind uplift performance.

BPD and Anemos went on to develop software which enabled specifiers and contractors to obtain site specific information regarding the suitability of an underlay in terms of wind uplift for all post code locations in the UK. Following on from this, it was decided that BS 5534 should review this information and develop a new more representative wind uplift test method for underlays incorporating an underlay lap, the most vulnerable part of any underlay system. This was designed to replace the alternative wind uplift test methods used by the independent certification bodies which all had their own limitations. At the same time and based on further research work, the historic assumptions of load sharing between roof covering and roof underlays were reviewed and revised.

The culmination of this work is published in BS 5534: 2014 along with revised performance requirements for underlays.



BS 5534: 2014

Many pitched roof underlays available in the UK today when tested to the new methods laid down in BS 5534 have restrictions on their use in regard to maximum batten gauge. It is important to ensure that such published test information by manufacturers is independently verified. This information should be contained within such underlays independent certification such as BM TRADA, BRE or BBA approvals.



BS 5534 Wind Uplift Test Rig

The test uses 600mm rafter centres and a range of batten gauges from 345mm for most interlocking roof tiles, 310mm for single pantile and standard pattern interlocking tiles and 250mm for the most common double lap and interlocking slates.

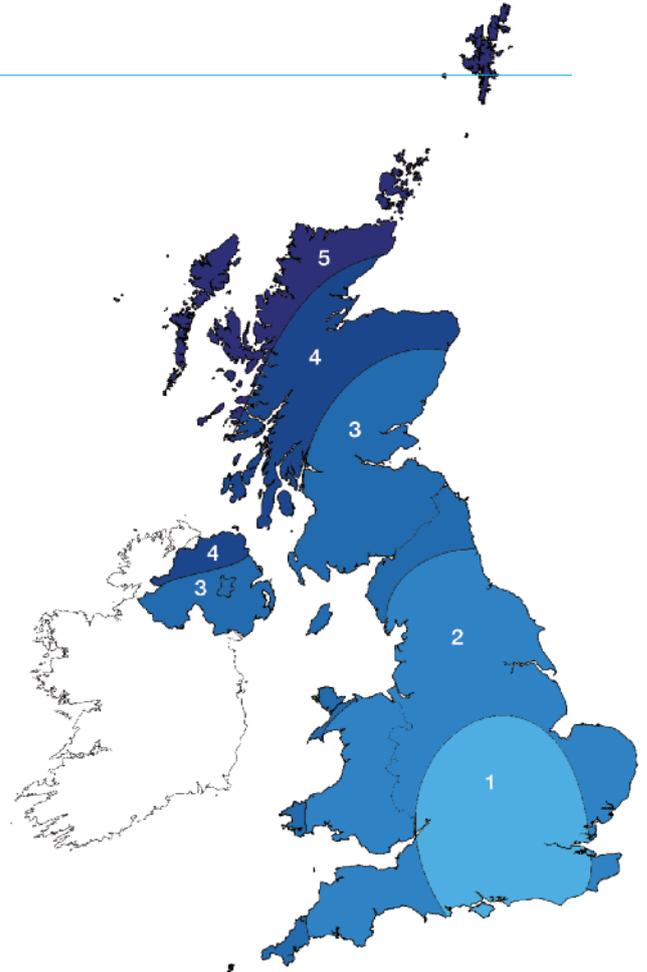
The test includes for an underlay lap which is the most vulnerable part of the underlay system. For over 37 years it has been required to be restrained under one of the tile or slate battens or where it does not fall under the regular batten gauge, an additional batten. If this is not seen as desirable by the roofer then the underlay lap can be increased to the next nearest batten.

Unrestrained underlay laps have been shown to cause premature failure of roofs in combination with inadequately fixed roof tiles and slates.



The results from the test method now enable any underlay to be categorised into use by zone (1-5) across the country for the given batten gauge tested.

The zone suitability applies to roofs with well sealed ceilings, ridge heights not greater than 15m, roof pitches between 12.5° and 70°, site altitude not greater than 100m and no significant topography. Other applications might require underlays with greater wind uplift resistance and for further advice please contact our Technical department.



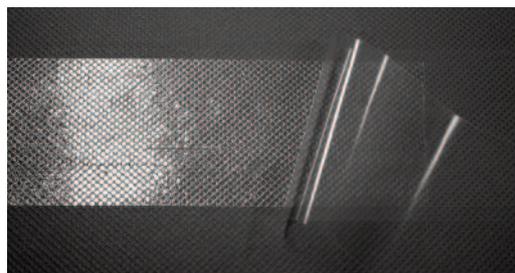
Geographical wind zone	5	4	3	2	1
Design wind pressure for underlay (Pa)	1600	1330	1150	975	820

Use of Sealing Tapes to restrain underlay laps

Some underlay manufacturers have resorted to recommending the use of adhesive tapes to seal the overlap in the underlay in order to improve the poor performance of their underlays.

This raises a number of issues;

1. Long term durability of such tapes has to be proved by independent testing to last at least as long as the underlay.
2. The ability of tapes that are not an integral part of the underlay as sold to always seal even in damp or wet weather.
3. Fully sealing the overlaps of any underlay type will affect the balance of roofspace ventilation required as unsealed laps do provide a water vapour route out of the roof and to remove that route will require consideration to be given to replacing that which has been lost. The ventilation provisions as set out in BS 5250 are all based on unsealed underlay laps.



Adhesive tape applied to underlay

Protect Roofing Underlays

Protect VP400 Plus LR, Protect A1 T3 and Protect A1 all have unrestricted use from zones 1-5 at the maximum batten gauges of 345mm.

Protect Zytec and Protect Wunderlay have unrestricted use from zones 1-4 at the maximum batten gauge of 345mm and zones 1-5 at the maximum batten gauge of 310mm.

Protect VP300 has unrestricted use from zones 1-3 at the maximum batten gauge of 345mm, zones 1-4 at 310mm batten gauge and zones 1-5 at 250mm batten gauge.

No adhesive tapes are required for any Protect underlay to restrain the overlaps.

Protect Membranes have over 20 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 to the issues they should bear in mind when drawing up specifications or purchasing products.

For further advice or detailed information regarding a specific project please contact our Technical Services Team on 0161 950 5700. A CPD seminar on Wind Uplift can be provided on request, subject to numbers. Please contact our Marketing Team for further information.

References

BS 5534: 2014 Slating and Tiling for pitched roofs and vertical cladding- Code of Practice.

BS 5250: 2011 Code of Practice for control of condensation in buildings.

The Vulnerability of UK Property to Windstorm Damage - the Association of British Insurers July 2003.

Wind Uplift on Roofing Underlays - a review of design acceptability around the UK. RWDI Anemos March 2004.

NHBC Standards Extra April 2005.

BRE Information Paper IP05/06 Modelling condensation and airflow in pitched roofs.

Partners in Innovation Project: 2005 Improved thermal and moisture performance in pitched roofs.



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Protect Membranes Limited maintains a policy of continuous development and reserves the right to amend product specifications without notice.



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