



# Roof space ventilation

## Introduction

Building Regulation Approved Document C2 refers to BS 5250; the British Standard Code of practice for Control of condensation in buildings, as a means of compliance with a general requirement that adequate provision be made to prevent excessive condensation in a roof or roof void above an insulated ceiling.

The advice given in BS 5250 is subdivided into cold roofs (insulation laid directly over a horizontal ceiling) and warm roofs (insulation laid between and/or above sloping rafters). Roof constructions are further divided into those with *high resistance* (HR) underlays; ie *vapour impermeable*, and *low resistance* (LR) underlays; ie *vapour permeable* underlays such as Sandtoft Koramic VPM Classic and Super.

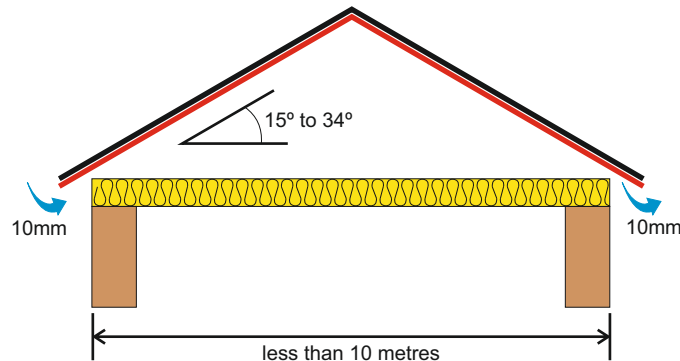
## NHBC Standards

NHBC Standards require that where a vapour permeable underlay is installed without eaves to eaves ventilation high level ventilation equivalent to a continuous opening of 5mm must be provided. This requirement overrides the advice given in some underlay manufacturers' BBA certificates. This does not apply to vapour permeable underlays that are third party assessed as being vapour **and** air permeable.

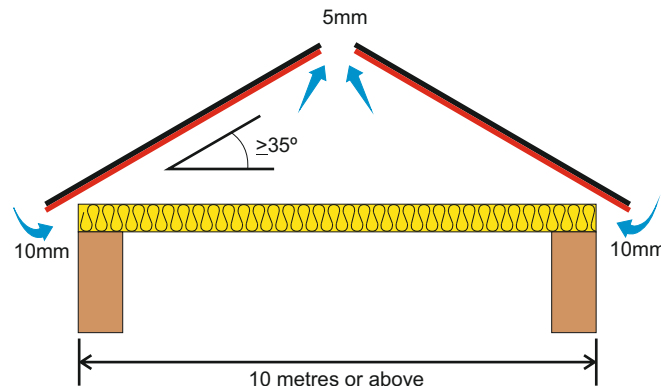
The following drawings illustrate how to comply with the advice given in BS 5250.

## Cold roof with impermeable (HR) underlay

If a building is less than 10 metres wide and the roof pitch is less than 35 degrees, then 10mm eaves ventilation is required.



If a building is 10 metres wide or more or the roof pitch 35 degrees or above, then 10mm eaves ventilation is required together with 5mm ridge ventilation.

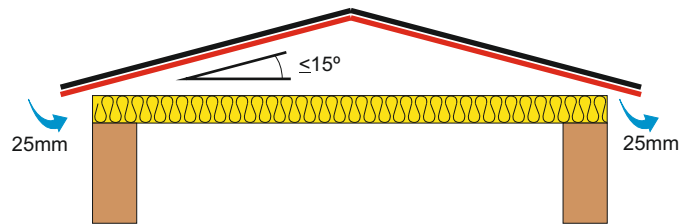




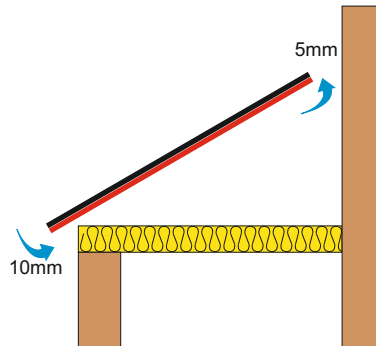
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## Cold roof with impermeable (HR) underlay - cont

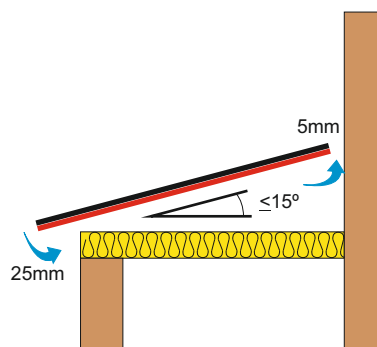
If the roof pitch is 15 degrees or less then 25mm eaves ventilation is required.



In the case of a mono pitch or lean-to roof 10mm eaves ventilation is required together with 5mm ridge or top edge ventilation.



If the roof pitch of a mono pitch or lean-to roof is 15 degrees or less then 25mm eaves ventilation is required together with 5mm ridge or top edge ventilation.



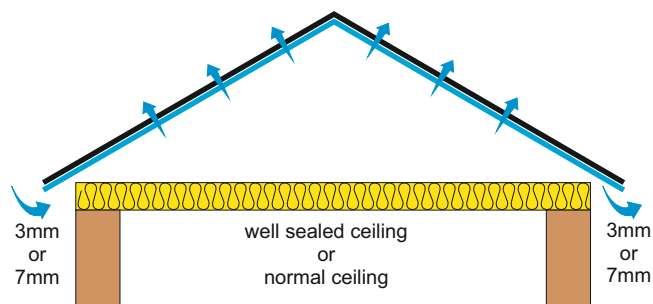


## Cold roof with vapour permeable (LR) underlay

If a building has a well sealed ceiling\* then 3mm eaves ventilation is required.

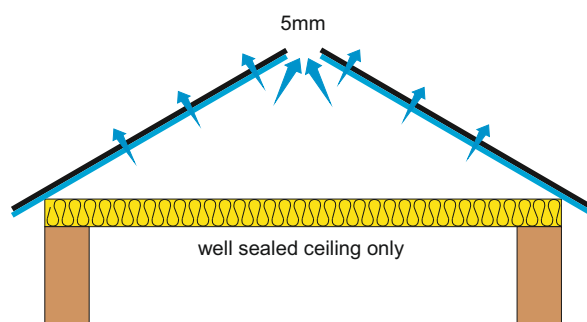
If a building has a normal ceiling then 7mm eaves ventilation is required.

In practice, a commercially available 10mm eaves ventilation system would normally be used.



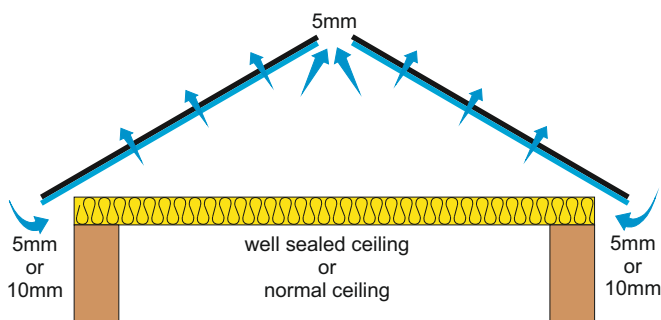
OR

Alternatively, 5mm ridge ventilation can be used if the building has a well sealed ceiling - making the use of a dry ridge system an ideal solution.



Note: As from 1st January 2011 NHBC Standards require that where a vapour permeable (LR) underlay is installed without eaves to eaves ventilation, high level ventilation equivalent to a continuous opening of 5mm must be provided. This requirement does not apply to vapour permeable underlays that are third party assessed as being vapour **and** air permeable.

For buildings larger than dwellings, 5mm eaves ventilation is required with a well sealed ceiling or 10mm eaves ventilation with a normal ceiling in addition to 5mm ridge ventilation.

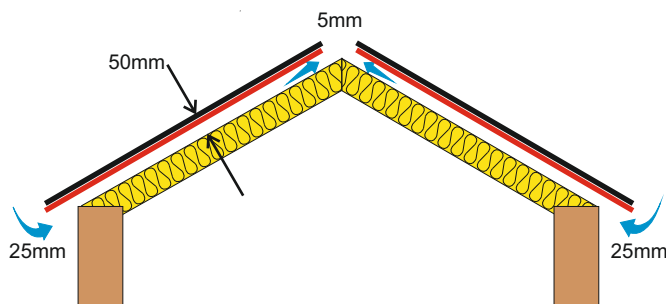


\* See back page for explanation of a well sealed ceiling.

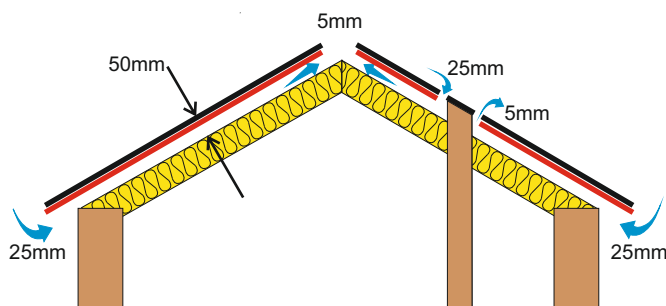


## Warm roof with impermeable (HR) underlay

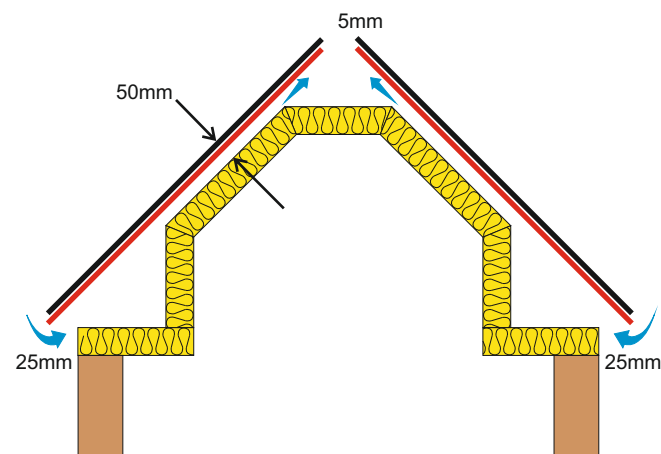
A well sealed ceiling with an air & vapour control layer (AVCL) should be installed. There should be a 50mm gap between the underlay and insulation, reducing to no less than 25mm at the centre of the underlay drape. 25mm eaves ventilation and 5mm ridge ventilation is required.



Where there are obstructions to the air flow, such as at firewalls or valleys etc additional gaps of 5mm below and 25mm above the obstruction are required.



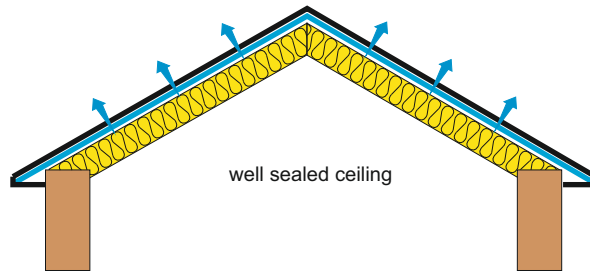
Where the insulation only partially follows the roof slope, such as dormer windows etc 25mm eaves ventilation and 5mm ridge ventilation is required.



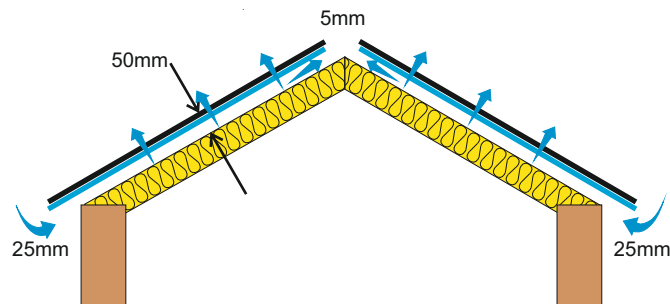


## Warm roof with vapour permeable (LR) underlay

If the building has a well sealed ceiling and an efficient AVCL then ventilation is not required.



If the building has a normal ceiling then 25mm eaves ventilation and 5mm ridge ventilation is required.



## Notes

### Eaves ventilation

Eaves ventilation means an air gap into the roof space over the fascia or underneath, for example in the soffit, if present. It can be in the form of a continuous gap or, alternatively, tile vents spaced at appropriate intervals in the lowest practical tile course to give the equivalent of the required gap. For example, a continuous gap of 10mm gives 10,000mm<sup>2</sup> per metre run. Tile vents with a free vent area of 10,000mm<sup>2</sup> spaced at 1 metre intervals will provide this.

### Ridge ventilation

Ridge ventilation means an air gap into the roof space at the ridge or nearest to it. It can be in the form of a continuous gap; for example using a dry fix ridge system or, alternatively, tile vents spaced at appropriate intervals in the highest practical tile course to give the equivalent of the required gap. For example, a continuous gap of 5mm gives 5,000mm<sup>2</sup> per metre run. Tile vents with a free vent area of 10,000mm<sup>2</sup> spaced at 2 metre intervals will provide this.

### Cold Roof

A cold roof is one where the insulation is laid over a horizontal ceiling and there is a large space above; for example an uninhabited cold loft space.

### Warm roof

A warm roof is one where the insulation is laid between and/or above the rafters and so there is no space, or only a small space, above the insulation; for example where there is a habitable room in the roof space.

### Impermeable underlay

An impermeable underlay - also referred to as 'high resistance' (HR) - allows little or no passage of water vapour through its structure. The technical definition of an impermeable underlay is when the vapour resistance is more than 0.25 MN s/g.

### Vapour permeable underlay

A vapour permeable underlay - also referred to as 'low resistance' (LR) - allows the passage of water vapour through its structure. The technical definition of a permeable underlay is when the vapour resistance is not more than 0.25 MN s/g.

### Air & vapour control layer (AVCL)

An air and vapour control layer (AVCL) is a single layer or membrane designed to restrict air movement and resist the passage of water vapour through a structure such as a ceiling. To be effective the vapour resistance should be greater than 200 MN s/g.

### Well sealed ceiling

A well sealed ceiling is designed to limit the passage of air through its structure by avoiding construction gaps, particularly at wall/ceiling junctions and those around pipe and cable penetrations. Loft access hatches must not be located in rooms where large amounts of moisture may be generated, such as kitchens and bathrooms. Air leakage through an access hatch should not exceed 1 m<sup>3</sup>/hour at a pressure difference of 2 Pascals. Total air leakage through downlighters should not exceed 0.06 m<sup>3</sup>/hour/m<sup>2</sup> at a pressure difference of 2 Pascals. Recommendations for the construction of a well sealed ceiling are given in BS 9250: 2007.

### Scottish practice

In traditional Scottish construction boards are fixed over rafters. If sawn softwood boards, laid with gap's not less than 2mm, are used with a vapour permeable membrane, then the details shown in this data sheet for vapour permeable membranes can be applied.

### Roof coverings and batten spaces

All Sandtoft slates and tiles are sufficiently 'air open' to allow the adequate air movement through the void between the slate/tiles and the underlay. For other roof coverings, if the air flow is not known, either roof space ventilation should be installed as per an impermeable underlay, or, alternatively, batten space ventilation is required; ie 25mm gap at eaves and 5 mm gap at ridge, with 25mm deep counterbattens.

Updated April 2013



Dr John's technical notes