

Roofing design guide



Showing you the way

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Harvest Hardrow Slates Duets on Project Homes, Peterborough.

Efficiency in detail... ...let Forticrete show you the way

The roof is the most exposed area of any building and the one where incorrect detailing can have a major detrimental effect to both the exterior and interior.

This design guide sets out the correct detailing for each area of the roof when designing with Forticrete Roofing Products' extensive range of interlocking tile and slate products and double-lap Hardrow Slates, through illustrations which have been created in either 1:5 or 1:10 format. When used in conjunction with the Forticrete Roofing Products guide to the company's Dry Fix and Ventilation products, it will enable you to ensure successfully detailed roofs time after time.

Should you have need to create specific details which are not covered in this Guide, Forticrete's experienced technical advisory service will be delighted to offer assistance. They also provide a site-specific service for the calculation of wind lift, using specially developed software and can be contacted free on:

0800 262136 or by fax on 0151 524 1265
or e-mail at technical@forticrete.com



Certain products in the Forticrete Roofing Products range qualify as ECOSLATE or ECOTILE roofing products under Forticrete's unique eco-marking scheme, signifying that they conform to a specified range of environmental criteria.

Full information can be obtained by visiting www.forticrete.co.uk

General information

Fixing specification

Factors governing the mechanical fixing of Forticrete tiles and slates are contained in BS 5534 'Slating & Tiling'. Forticrete will be pleased to provide a written fixing specification for specific projects as they cannot be held responsible for fixings on projects where their own guidelines are not followed correctly. Visit www.forticrete.co.uk for a request form.

Table 1. Standard Concrete Products specifications

Product	Min Pitch	Max Pitch
Centurion	12.5°*	44.5°
Gemini	22.5°	90°
Minislate	22.5°	90°
Plain Tile	35°	90°
Senator	22.5°	70°
V2	17.5°	70°

*Note: On some simple roof designs Centurion can be laid down to a 10° pitch but this should not be attempted without prior consultation with the Forticrete Technical Department.

Table 2. Hardrow Slates specifications

Nominal slate size		Min Pitch	Max Pitch
(mm)	(inches)		
381x299	15x9	30°	90°
457x305	18x12	25°	90°
457x457	18x18	20°	70°
610x457	24x18	17.5°	70°

Zonal fixing method

The Zonal Fixing Method has been designed in conjunction with manufacturers, the NFRC, NHBC and Zurich Insurance as a simplified specification for the fixing of clay and concrete roof tiles. Information relating to each tile and slate in the Forticrete range is available to download by visiting www.forticrete.co.uk

Good site practice

All tiling and slating must comply with BS5534; BS 8000: Part 6, (Workmanship on Building Sites, Codes of Practice for Slating and Tiling of roofs and claddings) and Forticrete's fixing instructions.

Site practice must comply with relevant Health & Safety recommendations, as detailed in the Health & Safety in Roofing publication HSG33 and in the 'Working on Roofs' publication INDG284.

Mortars

Where mortar is to be used, the standard recommended mix is 1:3, sharp sand to cement. If any variation is preferred, reference must be made to BS 5534.

Underlay

Underlays should conform to the recommendations set out in BS 5534 Slating and Tiling, which states: The underlay provides a barrier to minimise the wind load generated under wind gusts acting on the slates or tiles. Contact should be avoided between the underlay and the underside of the slates or tiles to prevent the wind uplift load being transmitted to the slates or tiles. It also provides a barrier to prevent wind driven rain, snow or dust from entering the roof space.

In the Ridge Detailing section of this guide you will find solutions that use Low Resistivity (LR) underlays, which are air permeable and High Resistivity (HR) underlays, which are non-permeable.

Table 3. Recommended headlaps for underlay

	Rafter pitch	Minimum headlap
	Not fully supported (mm)	Fully supported (mm)
12.5° to 14°	225	150
15° to 34°	150	100
350 and above	100	75

Note: Refer also to NFRC Technical Bulletin No. 6 (2)



Autumn and Brindle Gemini on David Wilson Homes, The Chase, Newbury.

Battens

Table 4 shows the batten sizes conforming to BS 5534. It should be read in conjunction with notes 1-4 within the British Standard.

Table 4. Recommended timber batten sizes (roofing and vertical work)

Application	Basic size of batten			
	450mm span		600mm span	
	Width (mm)	Depth (mm)	Width (mm)	Depth (mm)
Slates (double lap)				
Natural: Sized or Random	50	25	50	25
Fibre cement or Concrete	38	25	50	25
Clay and concrete ties				
Double lap	38	25	50	25
Single lap	38	25	50	25

General information (continued)

Ventilation requirements

Effects of Condensation

Condensation within the roof space can cause severe damage to timber, unprotected metal and goods stored in the loft. Additionally, thermal efficiency can be reduced due to wetting of insulation at ceiling level, in severe cases this can lead ultimately to ceiling damage.

Building Regulation Approved Document Part C 'Condensation' and BS 5250 states that 'reasonable provision shall be made to prevent excessive condensation in a roof void above an insulated ceiling'. It provides guidance on how this requirement may be met.

For roofs with little or no eaves/ridges, the ventilation requirement is additionally defined as 0.6% of the roof plan area.

Additionally, document Part C states that the requirement may be met by following the relevant recommendations of BS 5250.

General leadwork

Open lead valleys are to be designed and detailed by the designer/specifier in accordance with the parameters set out in BS5534, BS 8000: Part 6: and by the Lead Sheet Association.

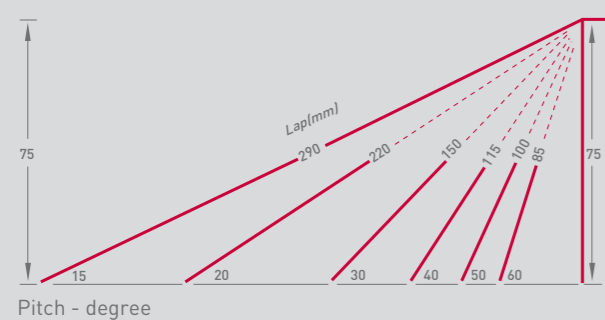
Tel: 01892 822 773 or visit www.leadsheetassociation.org.uk

It may be possible to use a proprietary GRP valley gutter, however the suitability for use with regards to the design rainfall rate and roof shape should be checked with The Forticrete Technical Department before specifying.

The information given by Forticrete informs the end user on how to fix their roof tiles at valleys and in no way constitutes a design in accordance with the above British Standards.

Joints between flashing pieces are usually laps. With abutment flashing, the laps should not be less than 100mm increasing to 150mm for locations that are exposed to high wind and rain. For secret gutters and pitched valley gutter linings the laps should conform to a vertical weathering height of not less than 75mm, see Fig 1.

Fig 1. Lap diagram



It should be noted that the pitch of a valley gutter is about 5° less than the roof pitches on either side.

All leadwork details need to be the recommendations of the Lead Sheet Association. Patination oil should be used on all exposed leadwork to avoid staining.

Detailing information

Reference to the following tables will offer additional information, when read in conjunction with the appropriate illustrations.

Tile	Height of fascia (based on 20mm wide fascia thickness)	
	Vented	Non-vented
Centurion/Senator	20mm	14mm*
Gemini/Minislate	20mm	40mm
Hardrow Slate	40mm	60mm
Plain Tile	25mm	45mm
V2	20mm	40mm

* Using eaves filler strips note: Figures given in this table are nominal

Rafter Pitch	Projection of ridge board above rafter								
	12.5°	15°	17.5°	22.5°	25°	30°	35°	40°	45°
Centurion	120	120	105	105	105	95	95	95	83
Gemini	-	-	-	105	105	95	80	80	70
Hardrow Slate	-	120	100	100	100	100	90	90	80
Minislate	-	-	-	105	105	95	80	80	70
Plain Tile	-	-	-	-	-	-	80	80	70
Senator	-	-	105	105	105	95	95	95	83
V2	-	-	105	105	105	95	80	80	7

Note: Figures given in this table are nominal

Rafter Pitch	Ridge batten specification								
	12.5°	15°	17.5°	22.5°	25°	30°	35°	40°	45°
Centurion	75	75	75	60	60	50	50	50	38
Gemini	-	-	-	60	60	60	38	38	25
Hardrow Slate	-	50	100	100	100	100	90	90	80
Minislate	-	-	-	105	105	95	80	80	70
Plain Tile	-	-	-	-	-	-	80	80	70
Senator	-	-	105	105	105	95	95	95	8
V2	-	-	105	105	105	95	80	80	70

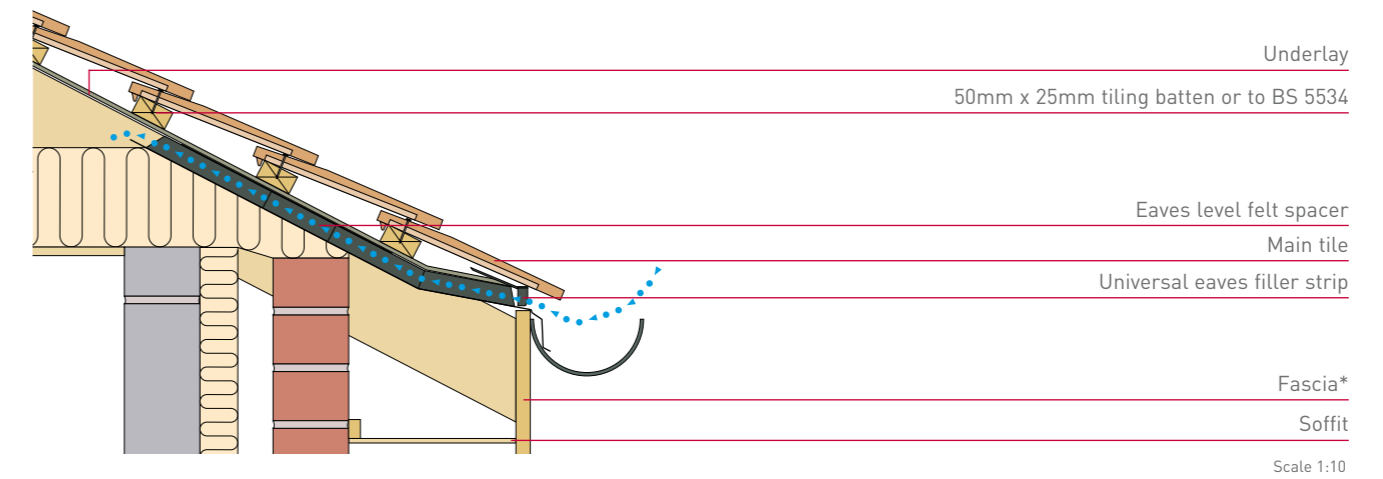
Note: Dimensions given are for batten height. In all cases batten width shall be 50mm. Figures given in this table are nominal

Tile	Minimum pitch	Free vent area
Centurion	20°	2,400 mm ² /m
Gemini	22.5°	7,860 mm ² /m
Hardrow Slate (lo-vent)	20°	4,426 mm ² /m
Hardrow Slate (hooded)	17.5°	4,426 mm ² /m
Minislate	22.5°	7,860 mm ² /m
Senator	22.5°	2,400 mm ² /m
V2	17.5°	9,875 mm ² /m

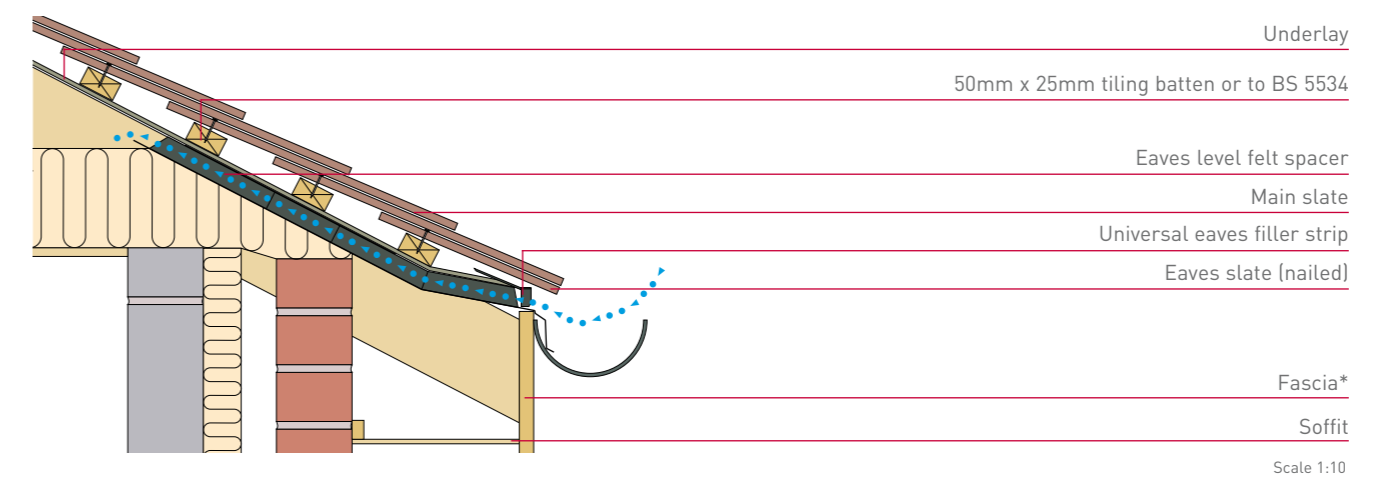
System	Free vent area	
	Air	Soil
Mono pitch dry ridge	5,000 mm ² /m	-
Half round nail hole ridge	5,000 mm ² /m	-
Hardrow Slates ridge	5,000 mm ² /m	-
Half round soil vent ridge	12,000 mm ²	7,850 mm ²
Hardrow Slate air/soil vent ridge	12,000 mm ²	7,850 mm ²

Eaves detailing

Traditional eave (interlocking tile)



Hardrow slates eave (double lap)

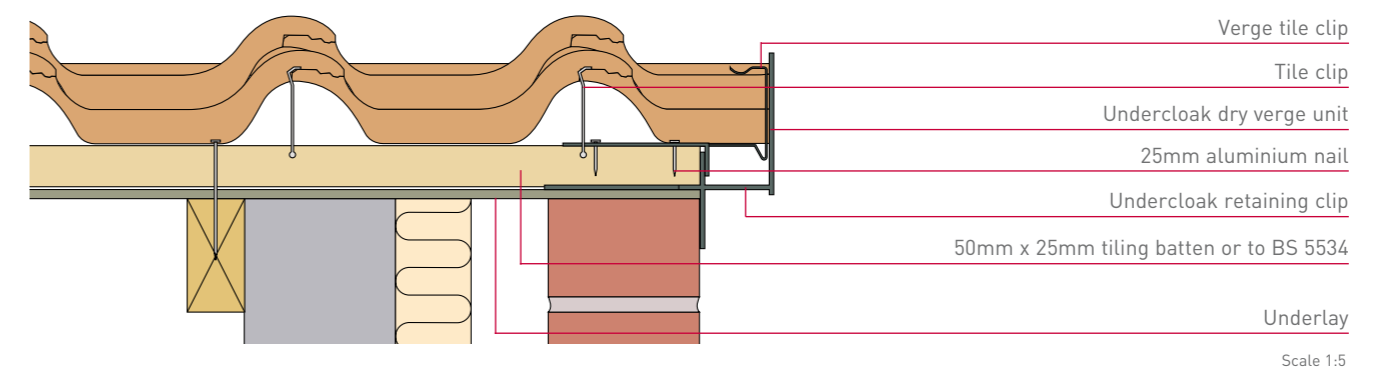


Guidance note: The eaves tile should project 50mm over the fascia board or into the centre line of the gutter, whichever is the lesser dimension.

*For recommended height of fascia above the rafter refer to page 2 Table 5

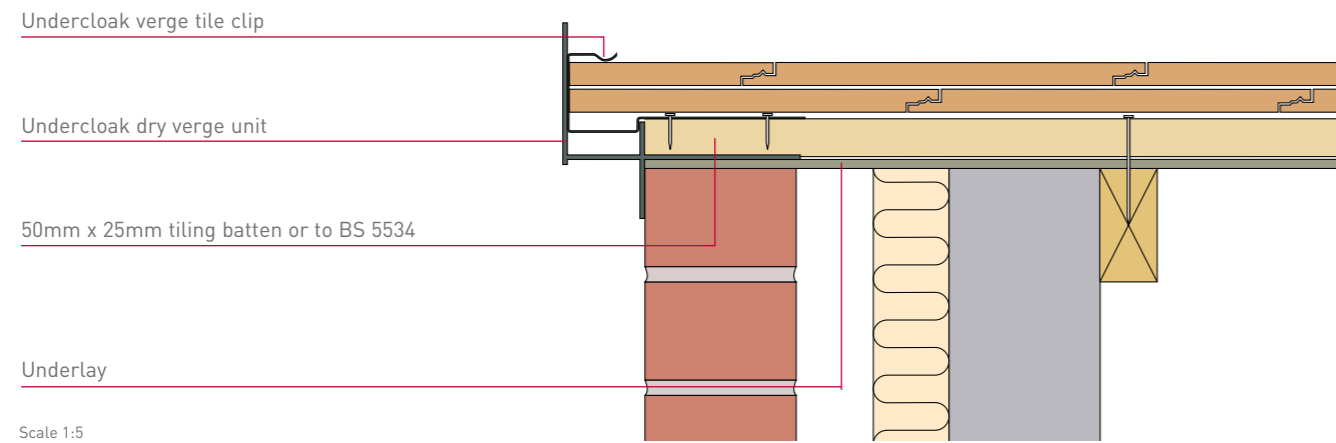
Verge detailing

Undercloak dry verge (profiled interlocking tile)

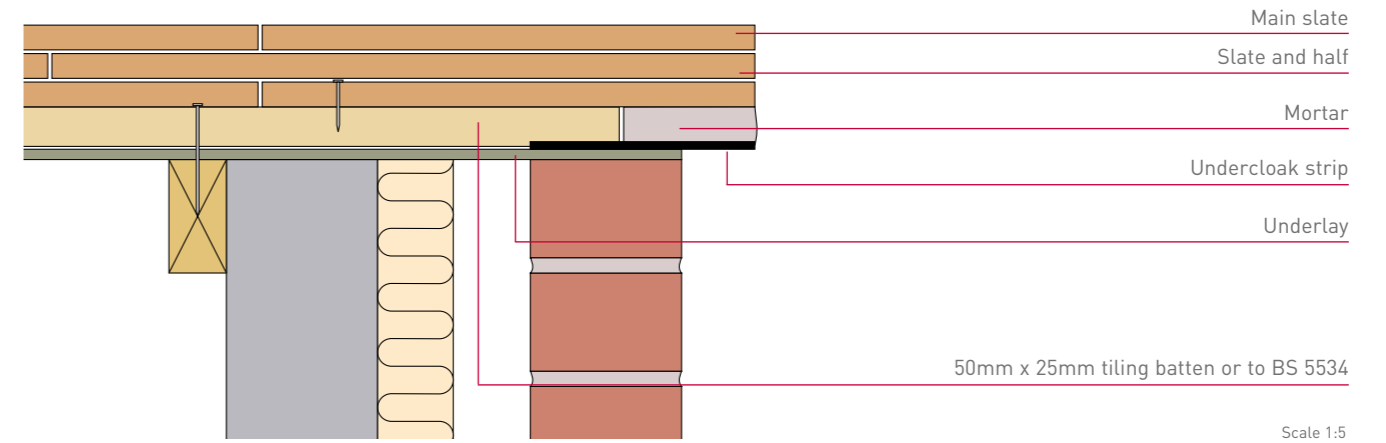


Verge detailing

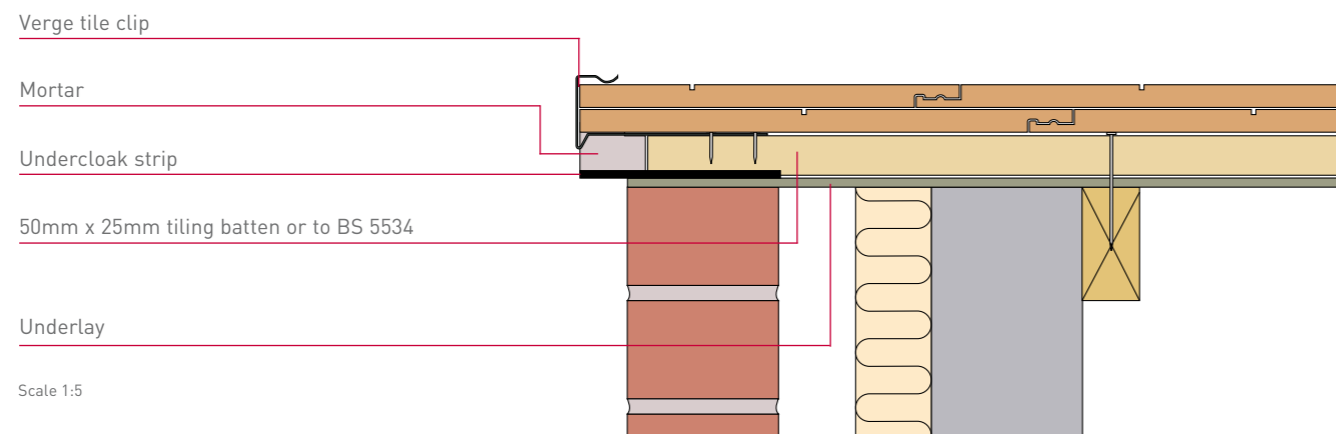
Undercloak dry verge (Gemini & Minislate)



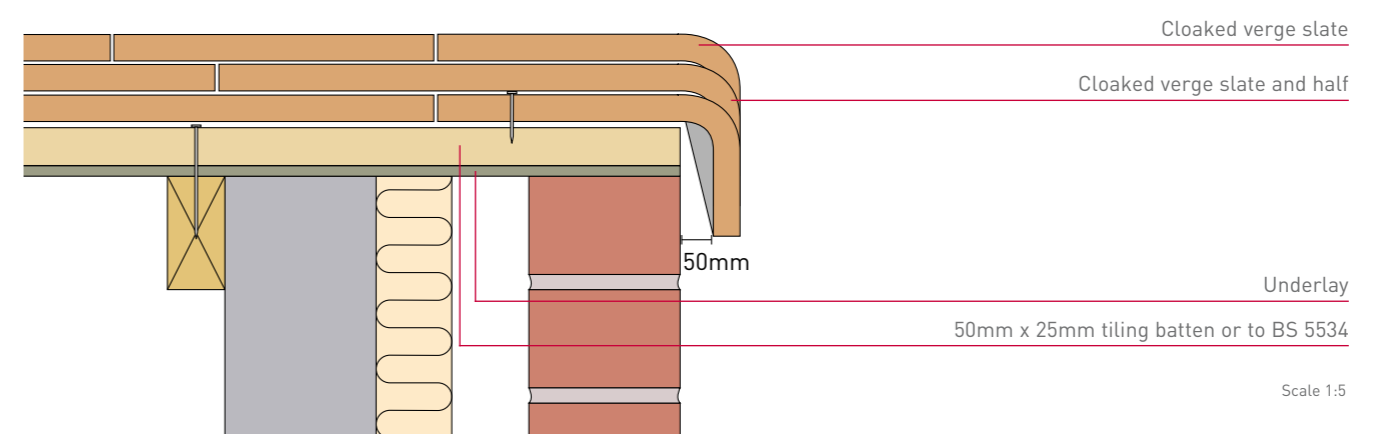
Hardrow mortar verge (double lap)



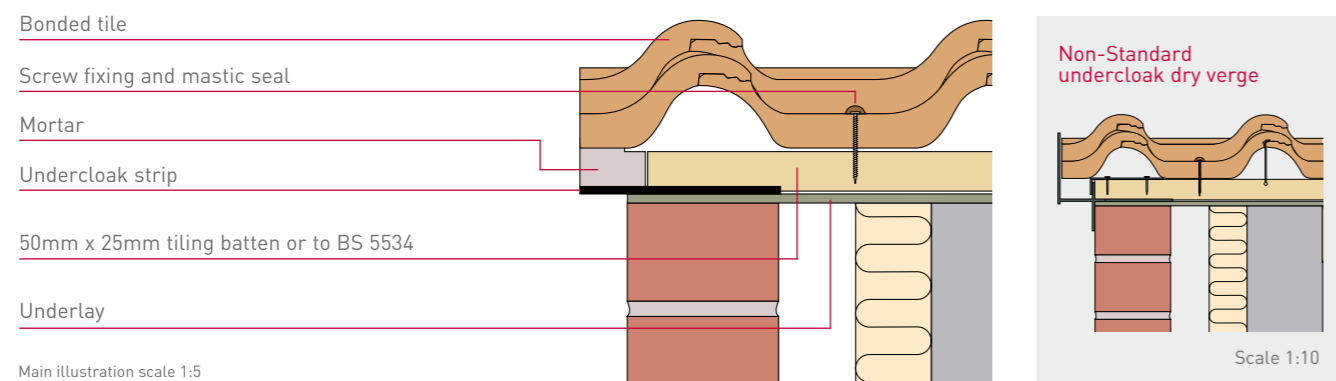
Standard wet bedded verge (interlocking tile)



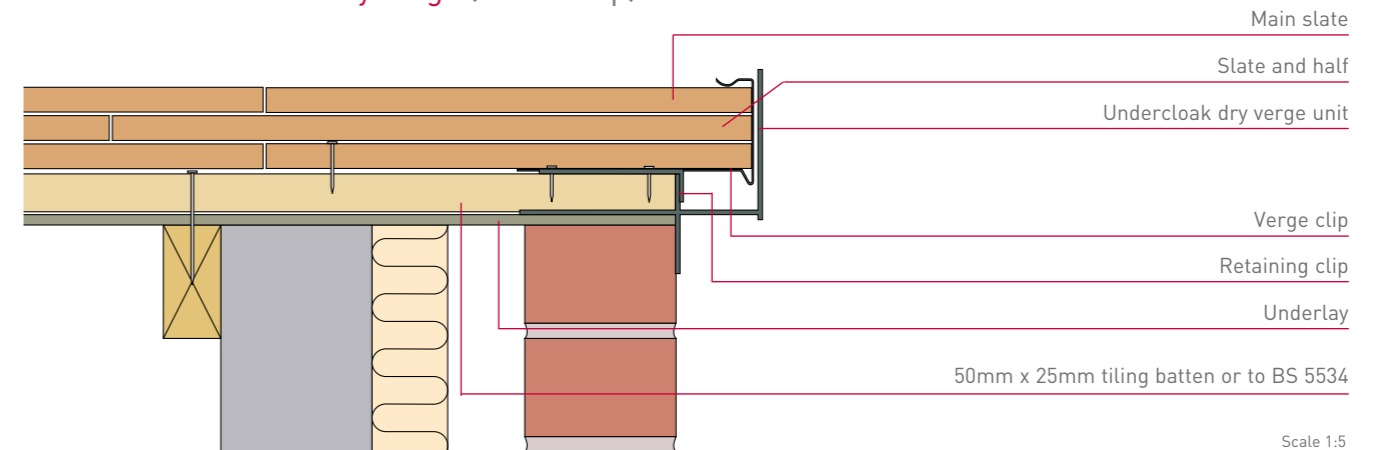
Hardrow cloaked verge (double lap)



Non-standard verge (profiled tile) (for use when it is not possible to secure using a verge clip)



Hardrow undercloak dry verge (double lap)

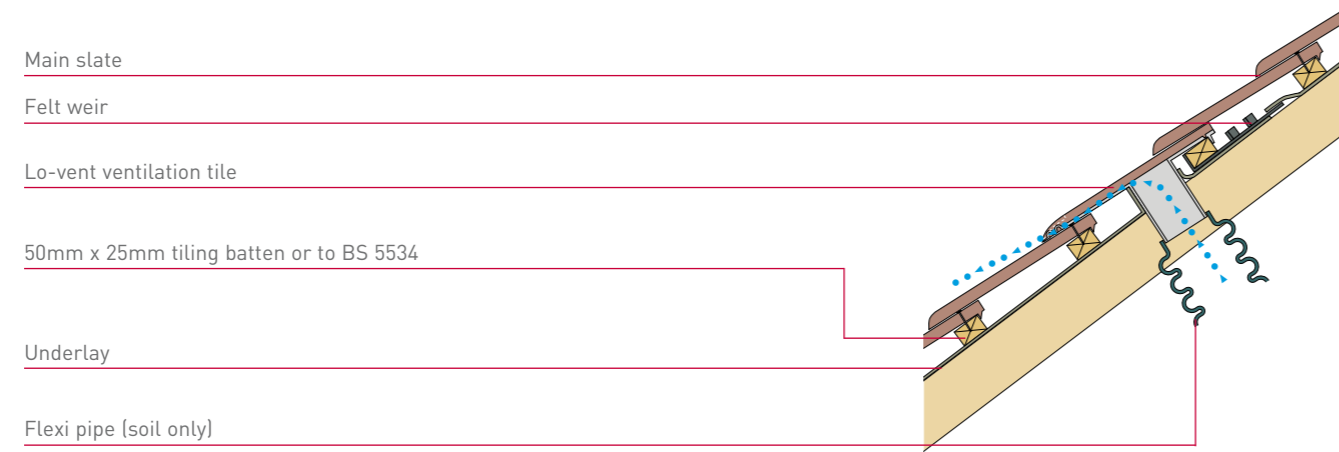


Guidance note: For the wet bedded verge, the tile overhang should be between 38-50mm

Guidance note: Hardrow verge slates are nailed into the batten in all cases. To achieve this when the main slates are hung, double battening at verges is will be necessary.

Ventilation detailing

Lo-vent air/soil vent tile (Gemini, Minislate and V2)



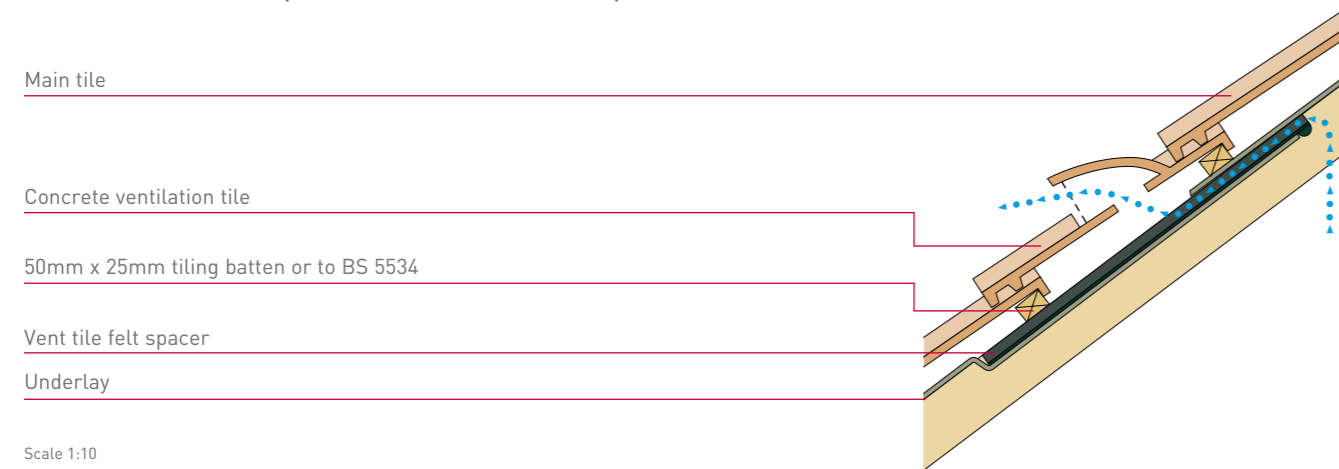
Scale 1:10

Hardrow lo-vent air/soil ventilation slate



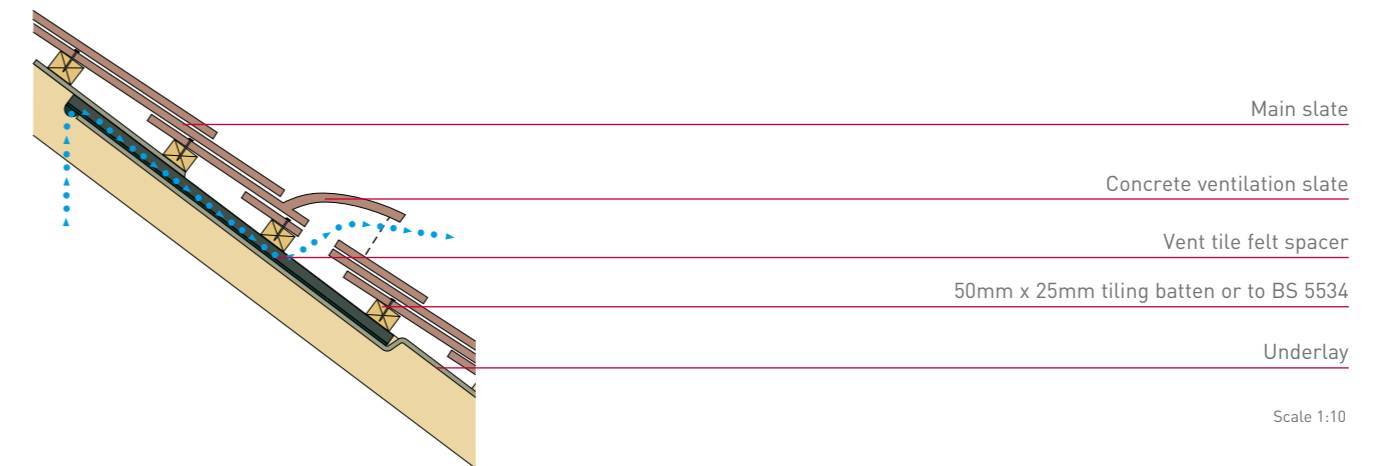
Scale 1:10

Air ventilation tile (Centurion and Senator)



Scale 1:10

Hardrow air ventilation slate (hooded)



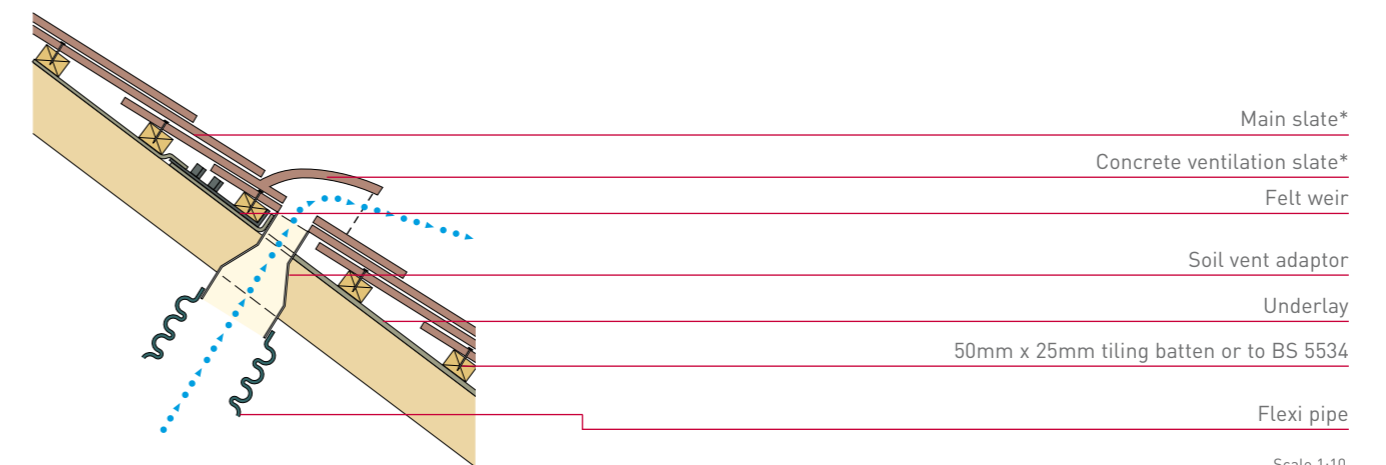
Scale 1:10

Soil ventilation tile (Centurion and Senator)



Scale 1:10

Hardrow soil ventilation slate (hooded)

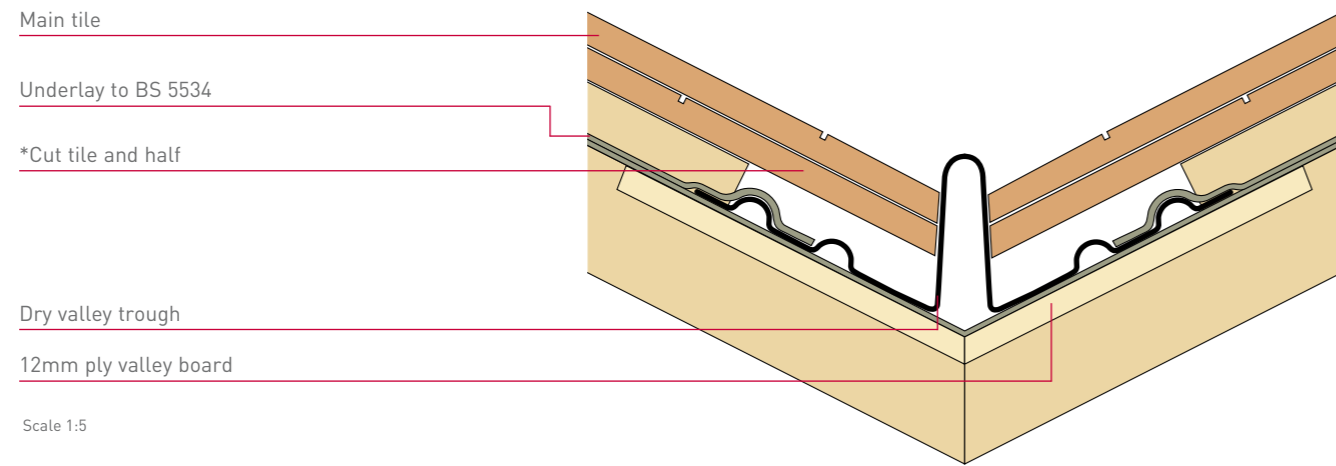


Scale 1:10

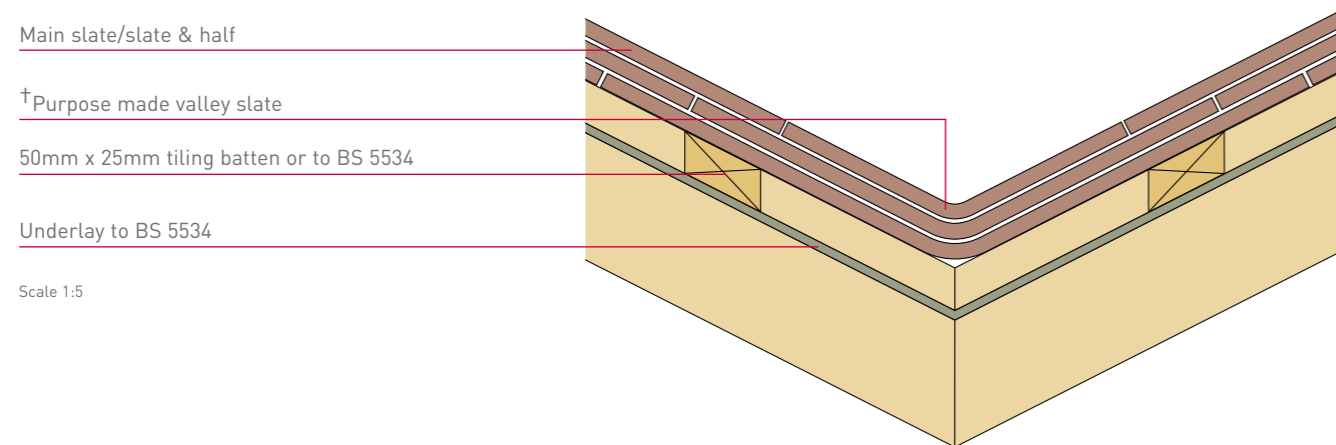
*Upper and lower slates must be ordered in pairs

Vally detailing

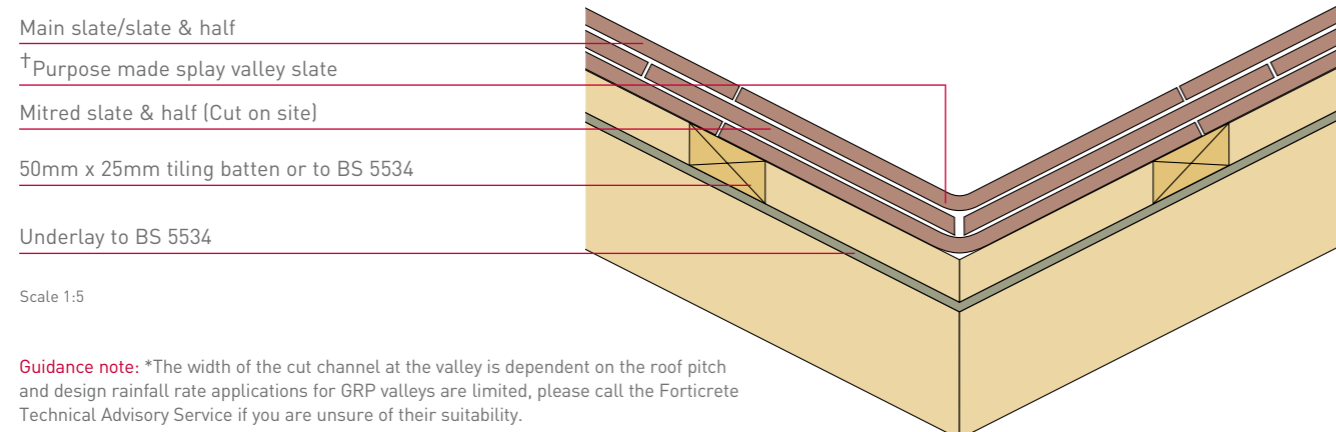
Dry vally (interlocking tile)



Hardrow slates vally (double lap)



Hardrow slates splay vally (double lap)

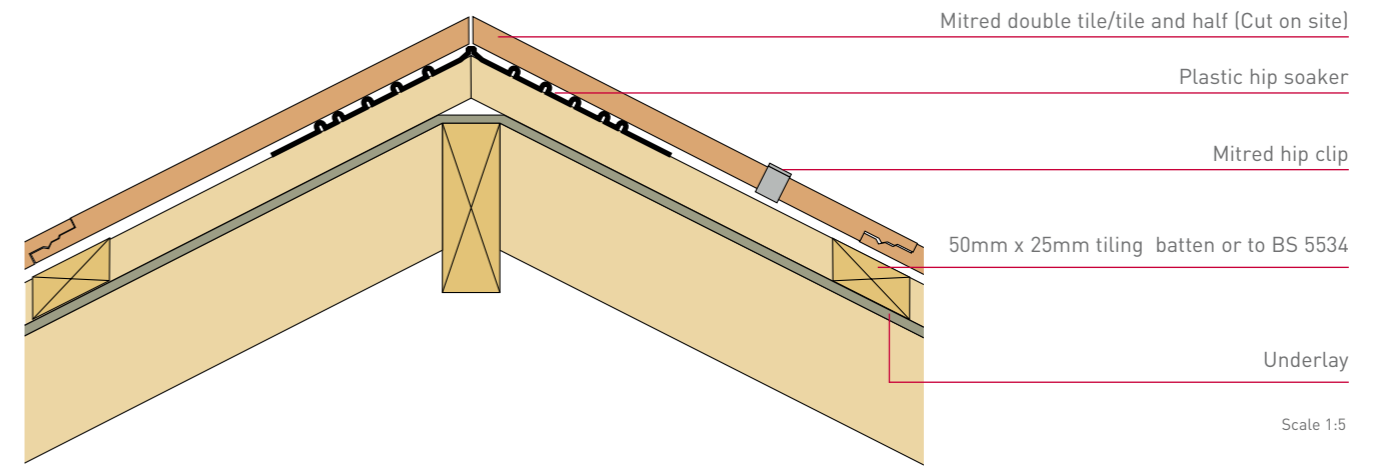


Guidance note: *The width of the cut channel at the vally is dependent on the roof pitch and design rainfall rate applications for GRP valleys are limited, please call the Forticrete Technical Advisory Service if you are unsure of their suitability.

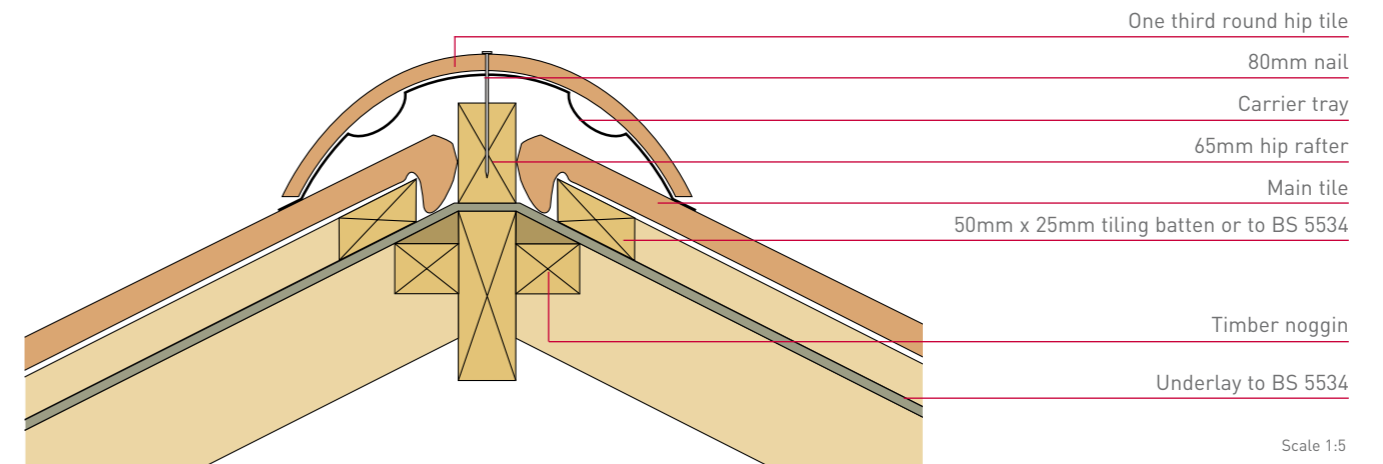
†Although Hardrow valley slates are not fixed mechanically, slates positioned next to the valley slates should be nailed into the batten in all cases. For lead valley details, please refer to the Lead Sheet Association.

Hip detailing

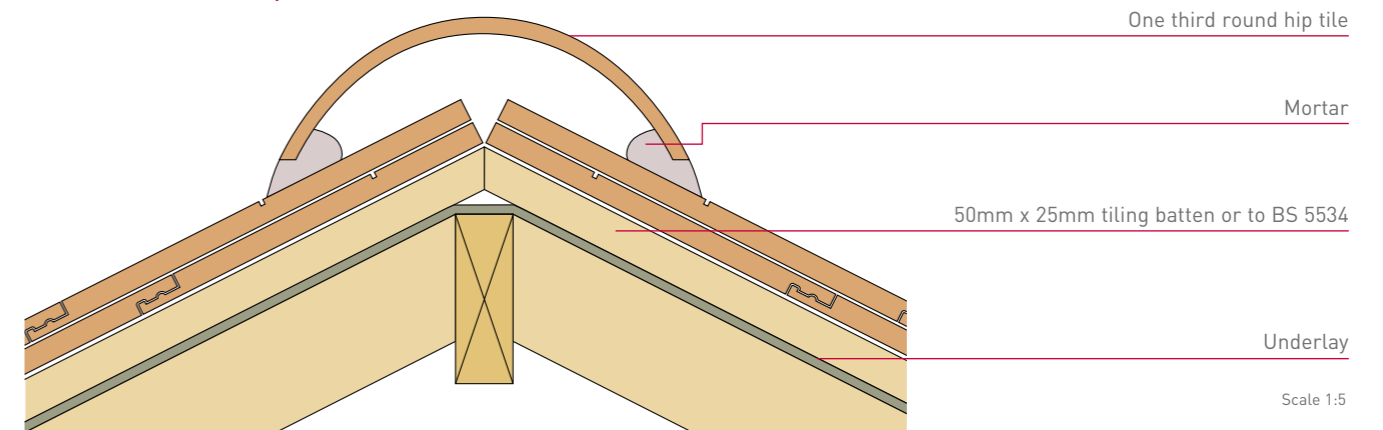
Mitred hip (90° & 135° on plan flat profile interlocking tiles)



Dry hip (22.5° & above flat profile interlocking tiles)



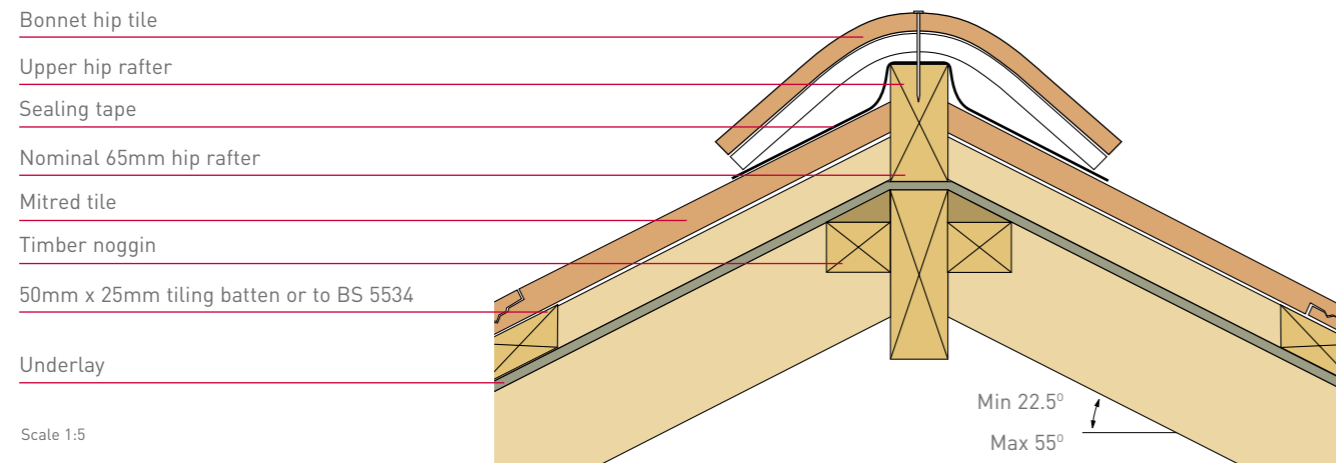
Traditional wet hip



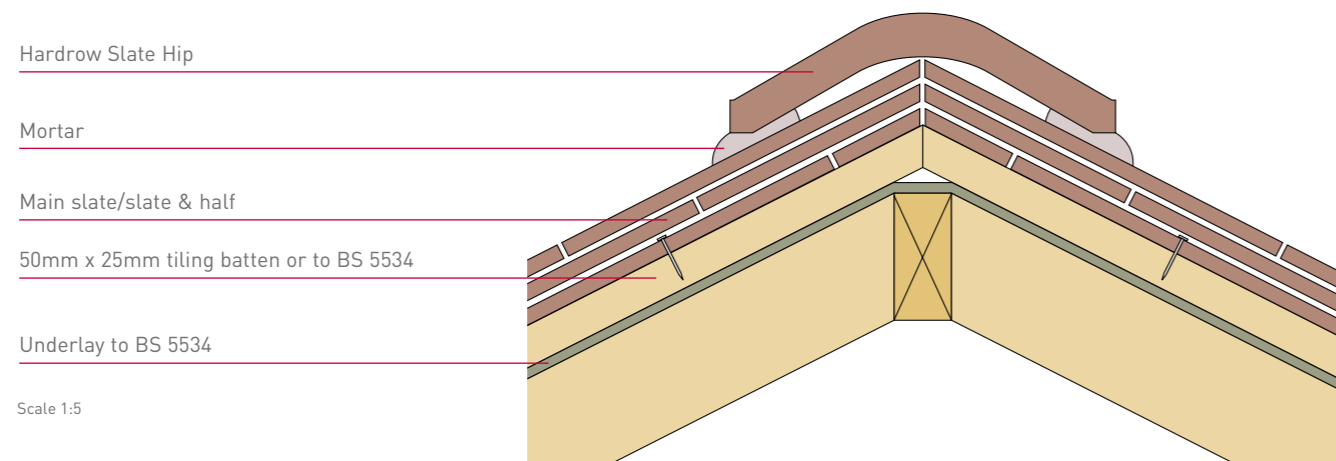
† Dentil slips are required for profiled tiles

Hip detailing

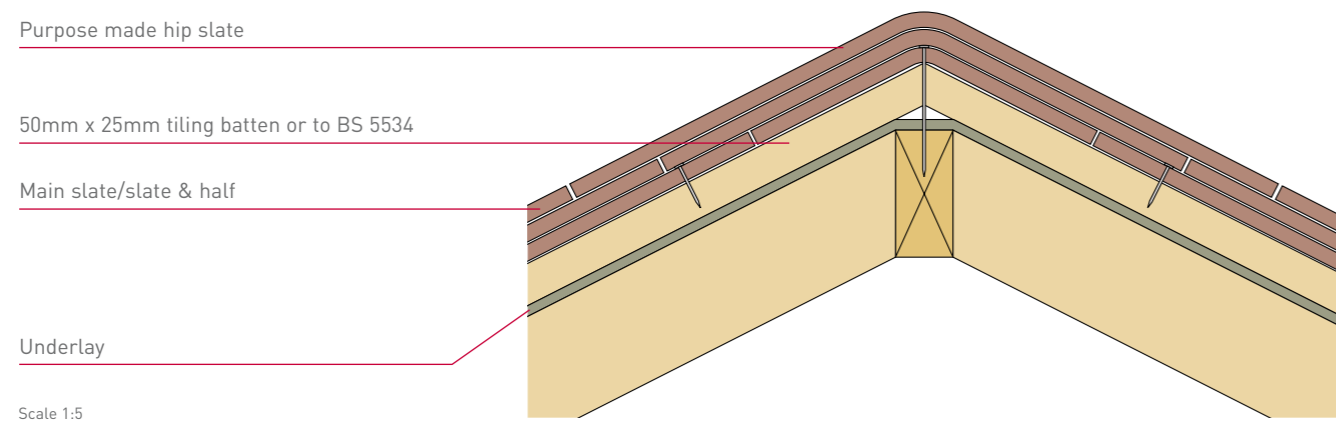
Bonnet hip (gemini and minislate)



Hardrow slate traditional wet hip

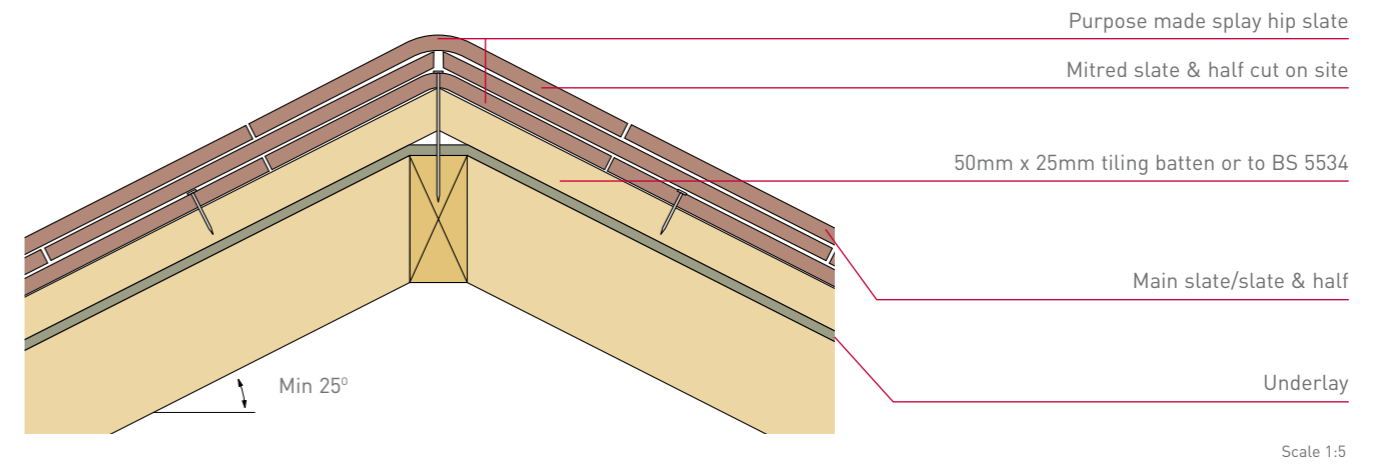


Hardrow slates purpose made hip (90° on plan)

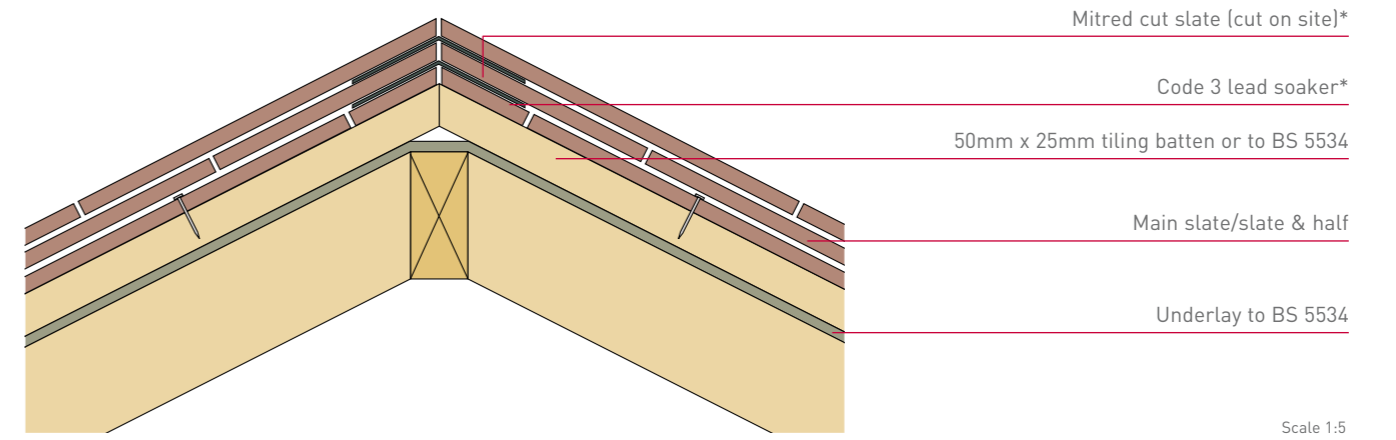


Hip detailing

Hardrow slates splay hip (over 90° on plan)



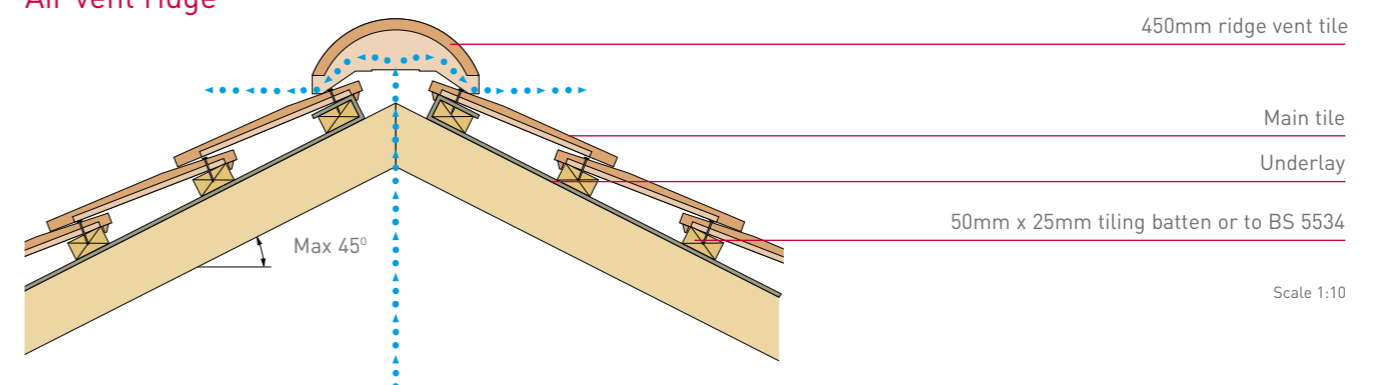
Hardrow slates mitred hip



*For sizes refer to the Forticrete Dry Fix and Ventilation Guide

Ridge detailing

Air vent ridge



Ridge detailing

Duo pitch dry ridge (ridge board)

Suitable for flat interlocking tiles

450mm concrete ridge tile (half round only)

Stainless steel screw nail and seal

Ridge board*

Top filler (Vented shown)

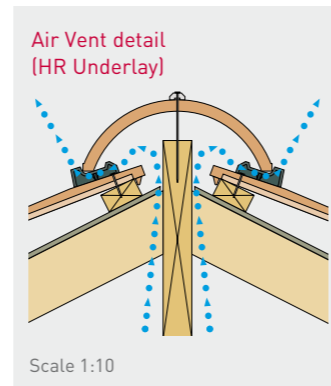
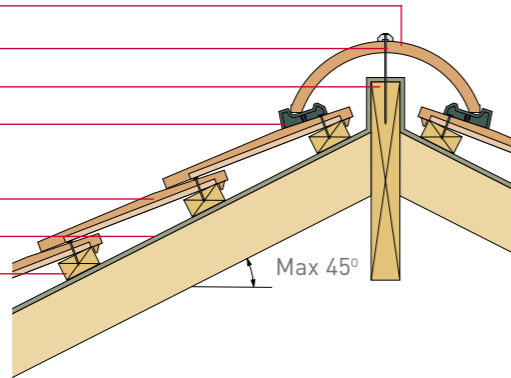
Main tile

LR Underlay

50mm x 25mm tiling batten or to BS 5534

Main illustration scale 1:10

*For details refer to page 2 table 6



Duo pitch dry ridge (trussed rafter)

Suitable for profiled interlocking tiles

450mm concrete ridge vent tile (half round only)

Stainless steel screw nail and seal

Ridge batten bracket*

Top filler

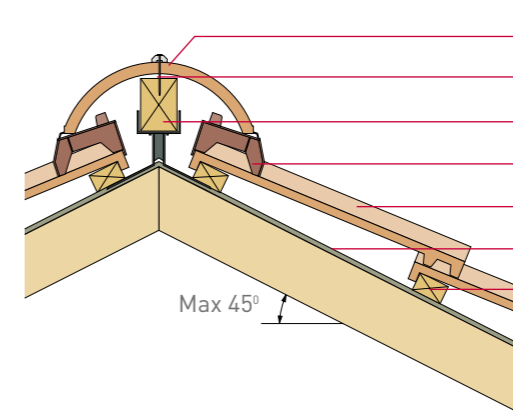
Main tile

LR Underlay

50mm x 25mm tiling batten or to BS 5534

Main illustration scale 1:10

*For details refer to page 2 table 7



450mm concrete ridge vent tile (half round only)

Stainless steel screw nail and seal

Ridge batten bracket*

Top filler

Main tile

LR Underlay

50mm x 25mm tiling batten or to BS 5534

Main illustration scale 1:10

*For details refer to page 2 table 7

Duo pitch dry ridge (trussed rafter)

Suitable for flat interlocking tiles

450mm concrete ridge tile (half round only)

Stainless steel screw nail and seal

Ridge batten bracket*

Top filler

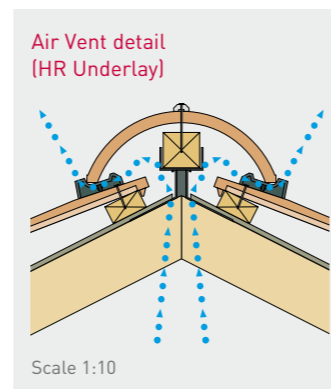
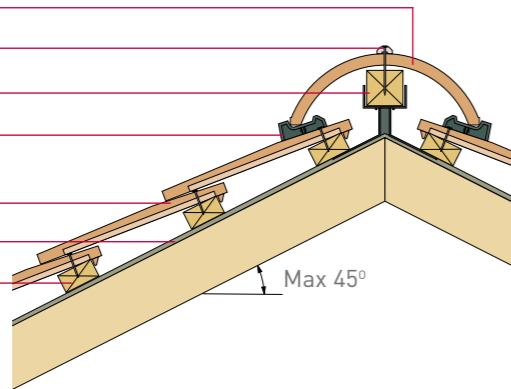
Main tile

LR Underlay

50mm x 25mm tiling batten or to BS 5534

Main illustration scale 1:10

*For details refer to page 2 table 7



Mortar bedded ridge

Alternative Universal Angle Ridge detailing

450mm half round ridge

Tile slip

Mortar*

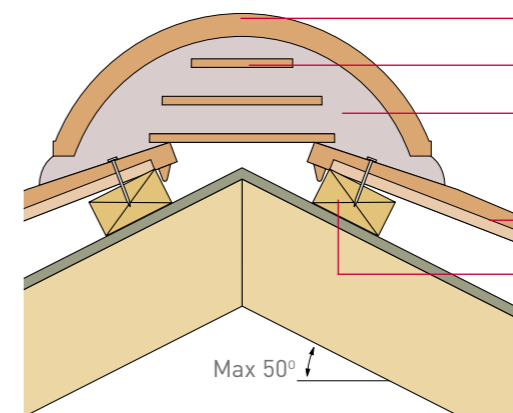
Main tile

50mm x 25mm tiling batten or to BS 5534

Underlay

Main illustration scale 1:5

*Ridges must be fixed mechanically 900mm from any perimeter † Dentil slips are required for profiled tiles



450mm half round ridge

Tile slip

Mortar*

Main tile

50mm x 25mm tiling batten or to BS 5534

Underlay

Main illustration scale 1:5

*Ridges must be fixed mechanically 900mm from any perimeter † Dentil slips are required for profiled tiles

Duo pitch dry ridge (ridge board)

Suitable for profiled interlocking tiles

450mm concrete ridge tile (half round only)

Stainless steel screw nail and seal

Ridge board*

Top filler

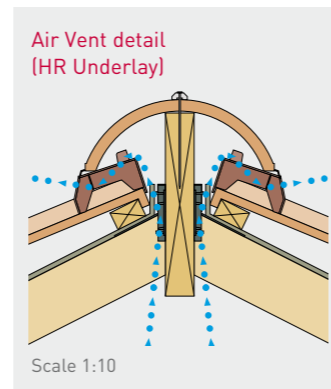
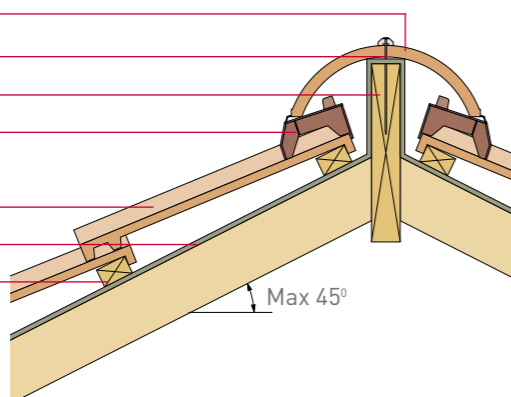
Main tile

LR Underlay

50mm x 25mm tiling batten or to BS 5534

Main illustration scale 1:10

*For details refer to page 2 table 6



Soil vent ridge

450mm concrete soil vent ridge (Wet fix only)

Dentil slip

Main tile

50mm x 25mm tiling batten or to BS 5534

Underlay

Trimming joist*

100mm R-type adaptor

Flexi pipe

Main illustration scale 1:10

*Applicable only where the ridge incorporates a ridge board

450mm concrete soil vent ridge (Wet fix only)

Dentil slip

Main tile

50mm x 25mm tiling batten or to BS 5534

Underlay

Trimming joist*

100mm R-type adaptor

Flexi pipe

Main illustration scale 1:10

450mm concrete soil vent ridge (Wet fix only)

Dentil slip

Main tile

50mm x 25mm tiling batten or to BS 5534

Underlay

Trimming joist*

100mm R-type adaptor

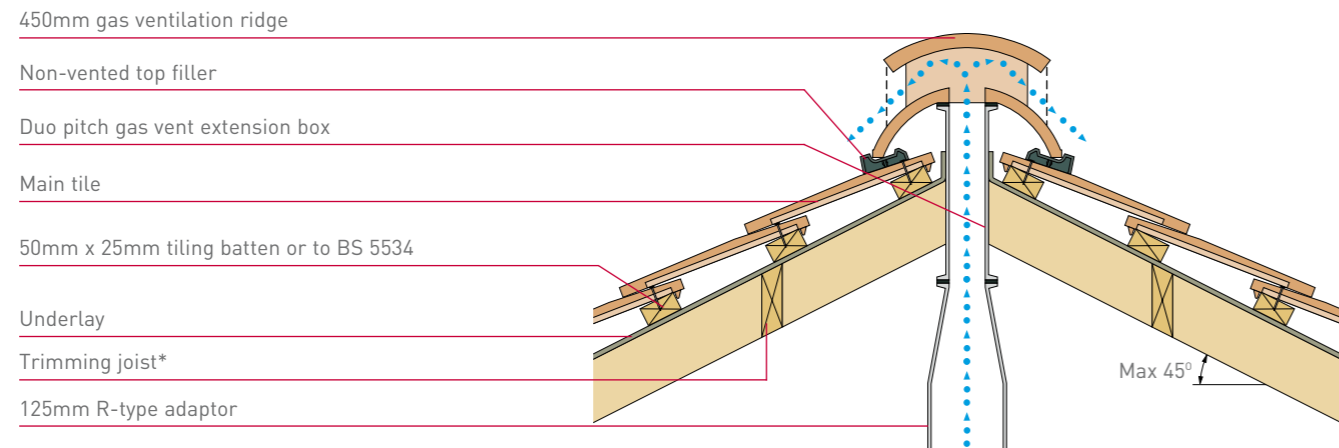
Flexi pipe

Main illustration scale 1:10

*Applicable only where the ridge incorporates a ridge board

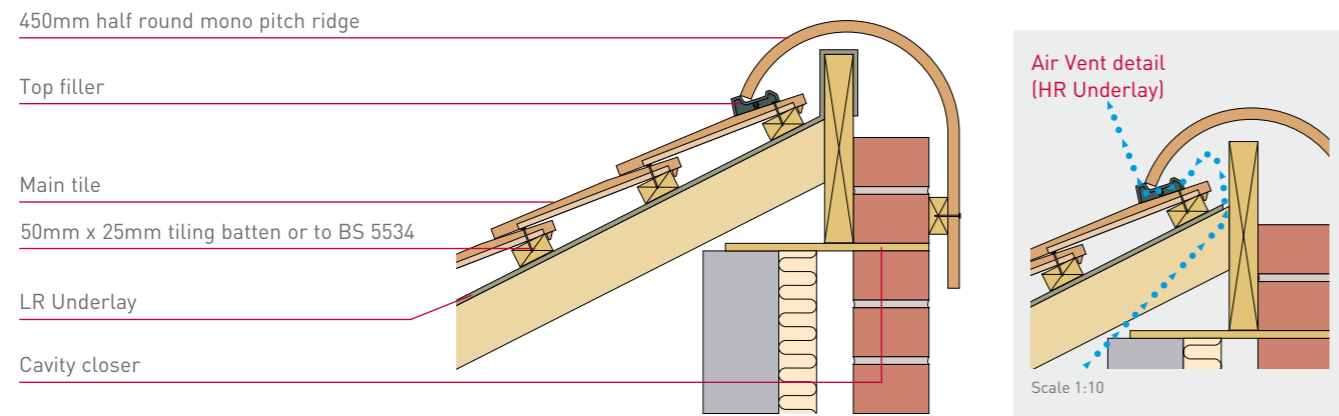
Ridge detailing

Dry fix gas vent ridge



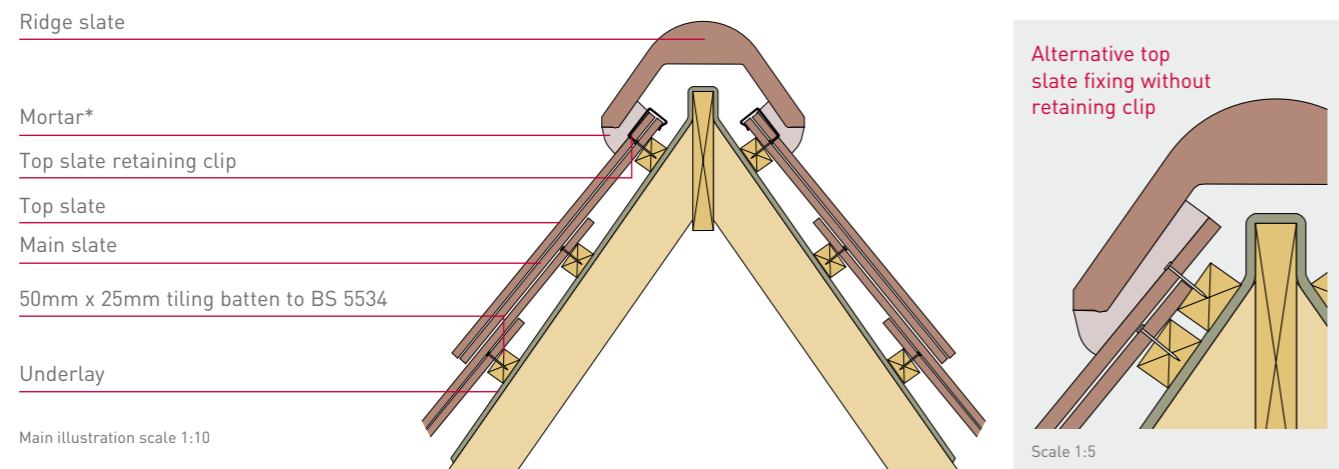
Scale 1:10
 *Applicable only where the ridge incorporates a ridge board

Mono pitch dry ridge



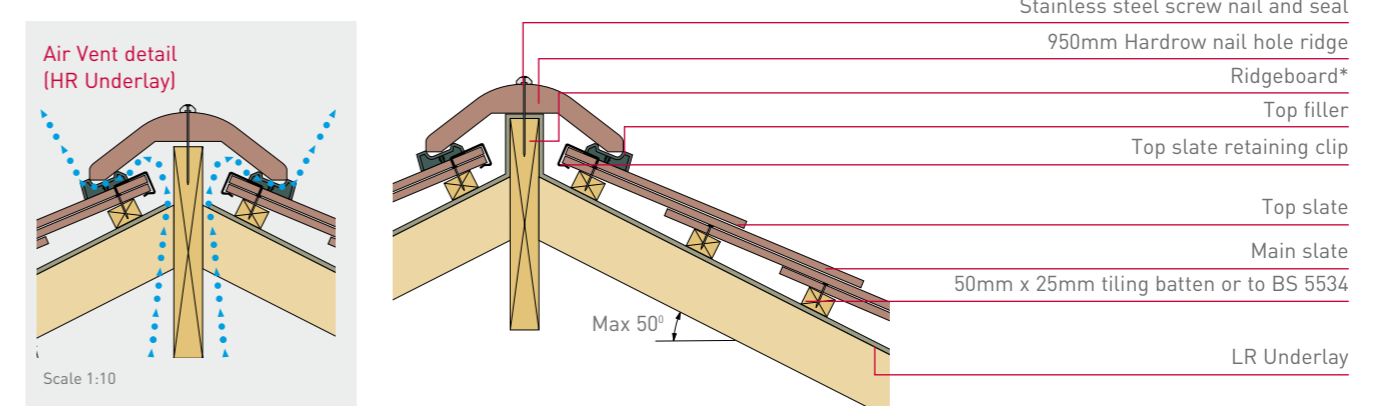
Main illustration scale 1:10

Hardrow slates mortar bedded ridge



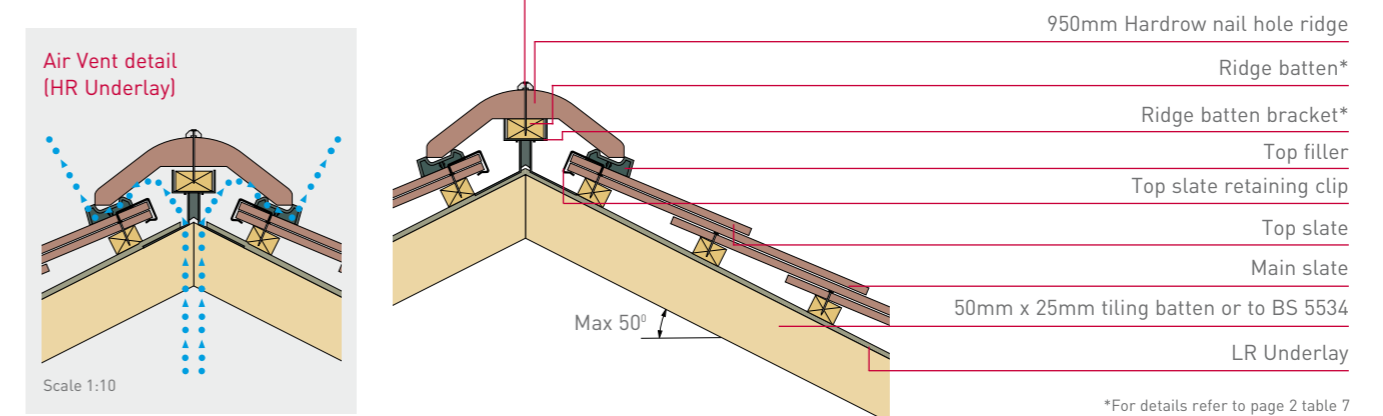
Main illustration scale 1:10
 *Ridges must be fixed mechanically 900mm from any perimeter

Hardrow slates dry ridge (ridge board)



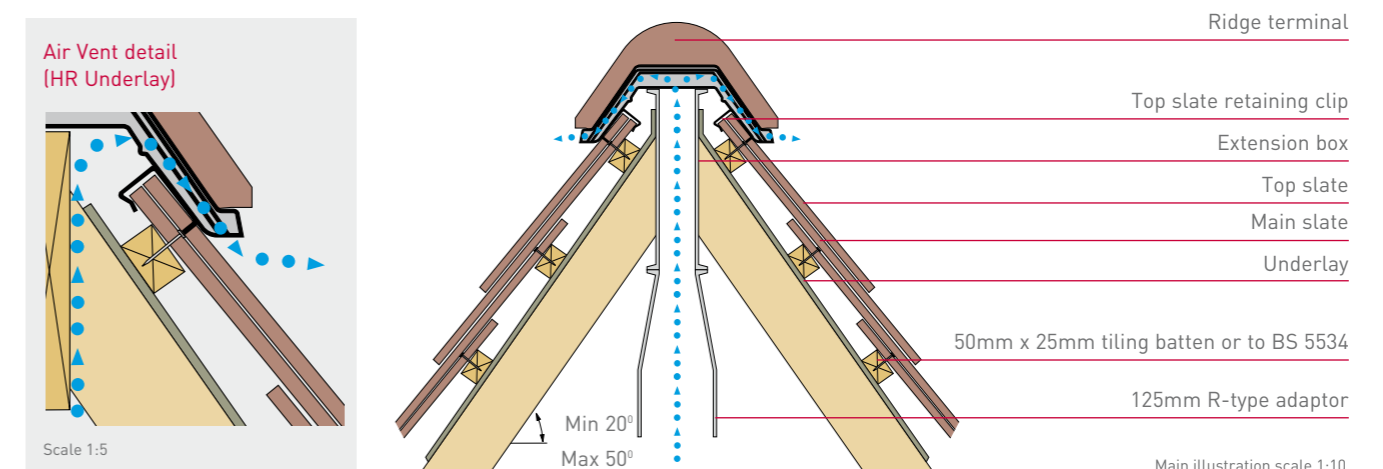
*For details refer to page 2 table 6
 Main illustration scale 1:10

Hardrow slates dry ridge (trussed rafter)



*For details refer to page 2 table 7
 Main illustration scale 1:10

Hardrow slates air/soil vent ridge

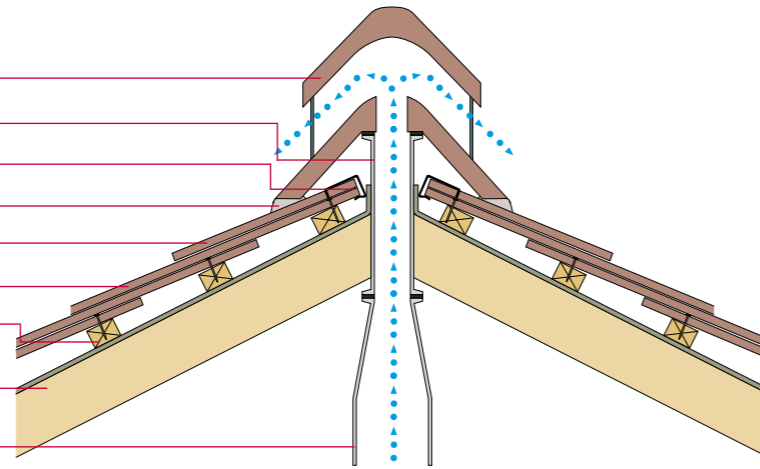


Guidance note: The Hardrow Angle Ridge is available in 5 versions as follows: 70° for use on pitches between 51° and 60°; 90° (43° to 50°); 105° (35° to 42.5°); 120° (23° to 35°) and 140° (17.5° to 22.5°)

Ridge detailing

Hardrow slates gas vent ridge

- 400mm concrete gas ventilation ridge terminal
- Duo pitch gas vent extension box
- Top slate retaining clip
- Mortar
- Top slate
- Main slate
- 50mm x 25mm tiling batten or to BS 5534
- Underlay
- 125mm R-type adaptor

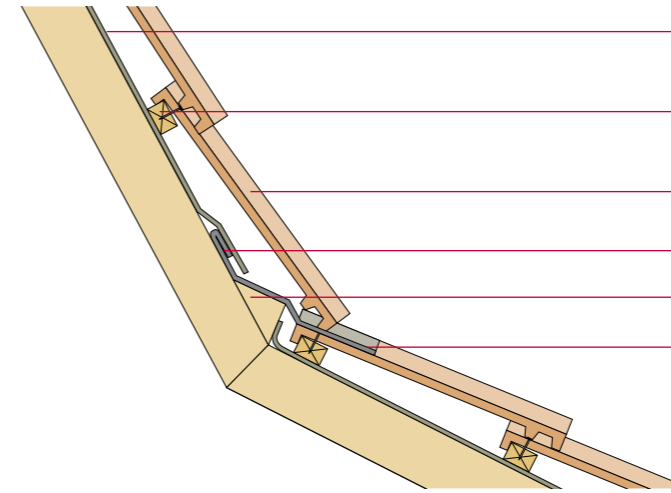


Scale 1:10

Sprocket/abutment detailing

Sprocket detail

- Underlay
- 50mm x 25mm tiling batten or to BS 5534
- Main tile
- Lead welt
- Timber fillet
- Code 4 Lead flashing

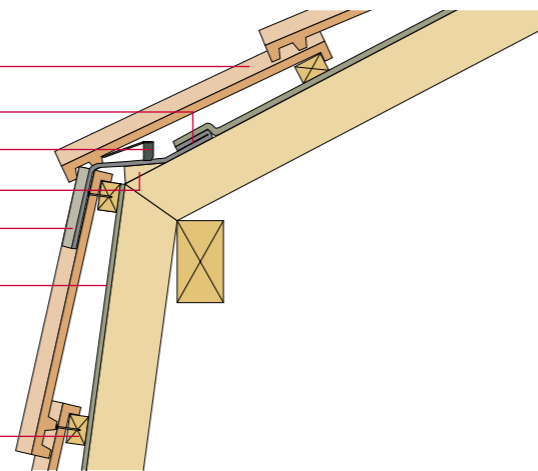


Scale 1:10

Mansard detailing

Mansard detail

- Main tile
- Lead welt
- Universal filler strip
- Timber fillet
- Code 4 Lead flashing
- Underlay

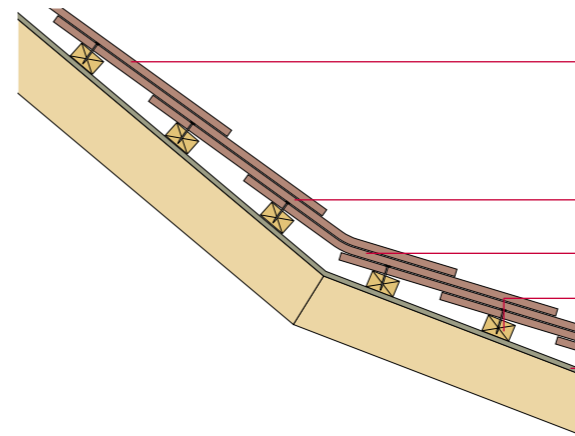


50mm x 25mm tiling batten or to BS 5534

Scale 1:10

Hardrow slates reverse mansard

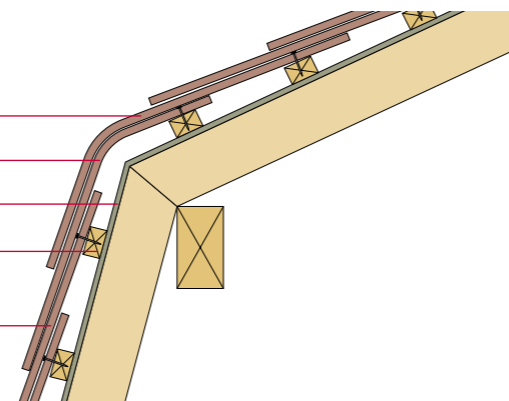
- Main slate
- Purpose made reverse mansard upper slate
- Purpose made reverse mansard lower slate
- 50mm x 25mm tiling batten or to BS 5534
- Underlay



Scale 1:10

Hardrow slates mansard

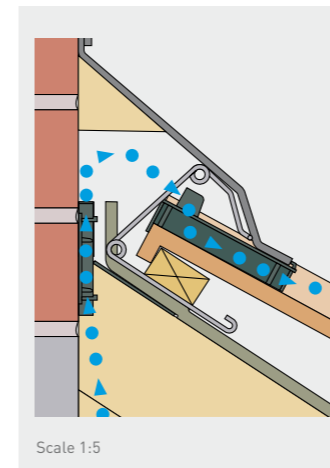
- Purpose made mansard upper slate
- Purpose made mansard lower slate
- Underlay
- 50mm x 25mm tiling batten or to BS 5534
- Main slate



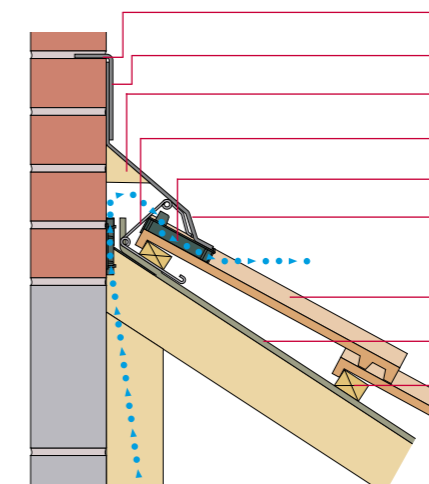
Scale 1:10

Head abutment

- Lead plug
- Code 4 lead cover flashing
- Timber fillet
- Abutment clip
- Vented top filler
- Code 4 lead apron



Scale 1:5



- Main tile
- Underlay
- 50mm x 25mm tiling batten or to BS 5534

Main illustration scale 1:10

Individual product brochures are available giving details of: Centurion; Gemini; Minislate; Senator; V2; Hardrow Slates Solos; Hardrow Slates Duets; Europe Twin Tiles and Clay Plain Tiles. In addition, there is a comprehensive Guide to Dry Fix and Ventilation products, to assist in detailing and specifying the full range of Forticrete Roofing Products.

Each of these brochures and product samples are available by calling **01525 244900**

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Information on the complete range of Forticrete products can be found on the Internet at www.forticrete.co.uk

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