CI/SfB		
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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					
slate size	Min Pitch	Max Pitch			
(inches)					
15x9	30°	90°			
18x12	25°	90°			
18x18	20°	70°			
24x18	17.5°	70°			
	Hardrow Slate slate size (inches) 15x9 18x12 18x18 24x18	Hardrow Slates specifications slate size Min Pitch (inches) 30° 15x9 30° 18x12 25° 18x18 20° 24x18 17.5°			

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 Not fully supported	Minimum headlap Fully supported			
	(mm)	(mm)			
12.5° to 14°	225	150			
15º to 34º	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	Basic size of batten				
	450mm spa	n	600mm sp	an		
Slates (double lap) Natural: Sized or	Width (mm)	Depth (mm)	Width (mm)	Depth (mm)		
Fibre cement or Concrete	38	25	50	25		
Clay and concrete ties Double lap	38	25	50	25		
Single lap	38	20	JU	20		

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.



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.

Table 5. Eaves Ventilation

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

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

Table 6. Dry Ridge (Ridge Board)Projection of ridge board above rafter

Rafter Pitch	12.5º	15º	17.5º	22.5°	25°	30º	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

Table 7. Dry Ridge (Trussed Rafter)

Ridge batten specification

Rafter Pitch	12.5º	15º	17.5º	22.5°	25º	30º	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

Table 8. Ventilation Tiles

Tile	Minimum pitch	Free vent area
Centurion	20°	2,400 mm ² /m
Gemini	22.5°	7,860 mm²/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 mm²/m
Senator	22.5°	2,400 mm²/m
V2	17.5°	9,875 mm²/m

Table 9. Ridge Air/Soil Ve	ntilation terminals Free ver	nt area
System	Air	Soil
Mono pitch dry ridge Half round nail hole ridge Hardrow Slates ridge Half round soil vent ridge Hardrow Slate air(5,000 mm ² /m 5,000 mm ² /m 5,000 mm ² /m 12,000 mm ²	- - 7,850 mm ² 7,850 mm ²
Hardrow Slate air/ soil vent ridge	12,000 mm*	7,850 mm²

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)



Underlay

50mm x 25mm tiling batten or to BS 5534

Eaves level felt spacer Main tile Universal eaves filler strip

Fascia*

Soffit

Scale 1:10

Underlay

50mm x 25mm tiling batten or to BS 5534

Eaves level felt spacer Main slate

Universal eaves filler strip

Eaves slate (nailed)

Fa	scia*
	Soffit
Scal	e 1:10

	Verge tile clip
4	Tile clip
-	Undercloak dry verge unit
	25mm aluminium nail
	Undercloak retaining clip
50	mm x 25mm tiling batten or to BS 5534
	Underlay

Scale 1:5

Verge detailing

Undercloak dry verge (Gemini & Minislate)



Standard wet bedded verge (interlocking tile)

Verge tile clip	-		
Mortar			
Undercloak strip			
50mm x 25mm tiling batten or to BS 5534			
Underlay)		
Scale 1:5)		

Hardrow mortar verge (double lap)



Hardrow cloaked verge (double lap)



Non-standard verge (profiled tile)

(for use when it is not possible to secure using a verge clip)



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



Hardrow undercloak dry verge (double lap)



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.

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Main slate

Slate and half

Mortar

Undercloak strip

Underlay

50mm x 25mm tiling batten or to BS 5534

Scale 1:5

Cloaked verge slate

Cloaked verge slate and half

Underlay

50mm x 25mm tiling batten or to BS 5534

Scale 1:5

Main slate Slate and half Undercloak dry verge unit Verge clip Retaining clip Underlay 50mm x 25mm tiling batten or to BS 5534 Scale 1:5

Ventilation detailing

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



Scale 1:10

Scale 1:10

Air ventilation tile (Centurion and Senator)

Main tile	
Concrete ventilation tile	
50mm x 25mm tiling batten or to BS 5534	
Vent tile felt spacer	
Underlay Scale 1:10	

Soil ventilation tile (Centurion and Senator)

Main tile	
Felt weir	
Soil vent adaptor	
Concrete ventilation tile	
50mm x 25mm tiling batten or to BS 5534	
	2:32
Underlay	
Flexi pipe	~ ~ ~

Hardrow lo-vent air/soil ventilation slate



Hardrow air ventilation slate (hooded)



Hardrow soil ventilation slate (hooded)



Felt weir

Main slate

Lo-vent ventilation slate

50mm x 25mm tiling batten or to BS 5534

Underlay

Flexi pipe (soil only)

Scale 1:10

Main slate

Concrete ventilation slate

Vent tile felt spacer

50mm x 25mm tiling batten or to BS 5534

Underlay

Scale 1:10

Main slate*
Concrete ventilation slate*
Felt weir
Soil vent adaptor
Underlay
50mm x 25mm tiling batten or to BS 5534
Flexi pipe

Scale 1:10

*Upper and lower slates must be ordered in pairs

Vally detailing

Dry valley (interlocking tile)



Hardrow slates valley (double lap)



Hardrow slates splay valley (double lap)

Main slate/slate & half	
[†] Purpose made splay valley slate	
Mitred slate & half (Cut on site)	
50mm x 25mm tiling batten or to BS 5534	
Underlay to BS 5534	
Scale 1:5	
Guidance note: *The width of the cut channel at the valley is dep and design rainfall rate applications for GRP valleys are limited, Technical Advisory Service if you are unsure of their suitability.	endent on the roof pitch please call the Forticrete
⁺ Although Hardrow valley slates are not fixed mechanically, sl	ates 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



One third round hip tile
80mm nail
Carrier tray
65mm hip rafter
Main tile
50mm x 25mm tiling batten or to BS 5534
Timber noggin
Underlay to BS 5534
Scale 1:5

One third round hip tile

Mortar

50mm x 25mm tiling batten or to BS 5534

Underlay

Scale 1:5

+ Dentil slips are required for profiled tiles

Hip detailing

Bonnet hip (gemini and minislate)

Hip detailing



Purpose made splay hip slate

Mitred slate & half cut on site

50mm x 25mm tiling batten or to BS 5534

Main slate/slate & half

Underlay

Scale 1:5

Mitred cut slate (cut on site)*

Code 3 lead soaker*

50mm x 25mm tiling batten or to BS 5534

Main slate/slate & half

Underlay to BS 5534

Scale 1:5

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

450mm ridge vent tile

Main tile

Underlay

50mm x 25mm tiling batten or to BS 5534

Scale 1:10

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Ridge detailing

Duo pitch dry ridge (ridge board) Suitable for flat interlocking tiles



Duo pitch dry ridge (trussed rafter) Suitable for flat interlocking tiles



Duo pitch dry ridge (trussed rafter) Suitable for profiled interlocking tiles



Mortar bedded ridge



Soil vent ridge



Duo pitch dry ridge (ridge board) Suitable for profiled interlocking tiles

450mm concrete ridge tile (half round only)





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 half round ridge

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

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	

Scale 1:10

*Applicable only where the ridge incorporates a ridge board

Ridge detailing

Dry fix gas vent ridge



Hardrow slates dry ridge (ridge board)



*Applicable only where the ridge incorporates a ridge board

Mono pitch dry ridge



Main illustration scale 1:10

Hardrow slates mortar bedded ridge



Air Vent detail (HR Underlay) Scale 1:10

Hardrow slates dry ridge (trussed rafter)



Hardrow slates air/soil vent ridge





Stainless steel screw nail and seal

950mm Hardrow nail hole ridge

Ridgeboard*

Top filler

Top slate retaining clip

Top slate

						М	ain	slat	e
50n	nm x	25mm	tiling	batten	or	to	BS	553	4

LR Underlay

*For details refer to page 2 table 6

Main illustration scale 1:10

Stainless steel ring shank nail and seal

950mm Hardrow nail hole ridge Ridge batten* Ridge batten bracket* Top filler Top slate retaining clip Top slate Main slate 50mm x 25mm tiling batten or to BS 5534 LR Underlay *For details refer to page 2 table 7

Main illustration scale 1:10

Ridge terminal

Top slate retaining clip

Extension box

Top slate

Main slate

Underlay

50mm x 25mm tiling batten or to BS 5534

125mm R-type adaptor

Main illustration scale 1:10

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



Sprocket/abutment detailing

Sprocket detail



Mansard detailing

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 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	

Hardrow slates reverse mansard



Head abutment





Underlay

50mm x 25mm tiling batten or to BS 5534

Main tile

Lead welt

Timber fillet

Code 4 Lead flashing

Scale 1:10

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

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

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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For technical information, call the Forticrete Technical Hotline: FREEPHONE 0800 262136, Fax: 0151 524 1265 or email at technical@forticrete.com



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In order to maintain its position as a market leader, Forticrete operates a policy of continuous product development and therefore reserves the right to alter specifications without notice.





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