Roofing design guide

Showing you the way

Forticrete® roofing
Redefining traditional products
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 designed with either 1:50 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

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

Underlay

Underlays should conform to the recommendations set out 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

<table>
<thead>
<tr>
<th>Product</th>
<th>Min Pitch</th>
<th>Max Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centurion</td>
<td>12.5º*</td>
<td>44.5º</td>
</tr>
<tr>
<td>Gemini</td>
<td>22.5º</td>
<td>30º</td>
</tr>
<tr>
<td>Minislate</td>
<td>22.5º</td>
<td>30º</td>
</tr>
<tr>
<td>Phase Tie</td>
<td>22.5º</td>
<td>30º</td>
</tr>
<tr>
<td>Senator</td>
<td>22.5º</td>
<td>30º</td>
</tr>
<tr>
<td>V2</td>
<td>17.5º</td>
<td>30º</td>
</tr>
</tbody>
</table>

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

Table 2. Hardrow Slates specifications

<table>
<thead>
<tr>
<th>Nominal slate size</th>
<th>Min Pitch</th>
<th>Max Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>361x299</td>
<td>15º</td>
<td>30º</td>
</tr>
<tr>
<td>457x305</td>
<td>12º</td>
<td>30º</td>
</tr>
<tr>
<td>457x457</td>
<td>9º</td>
<td>70º</td>
</tr>
<tr>
<td>610x457</td>
<td>6º</td>
<td>70º</td>
</tr>
</tbody>
</table>

Table 3. Recommended timber batten sizes (roofing and vertical work)

<table>
<thead>
<tr>
<th>Application</th>
<th>Basic size of batten</th>
</tr>
</thead>
<tbody>
<tr>
<td>450mm span</td>
<td>Width (mm)</td>
</tr>
<tr>
<td>Slates (double lap)</td>
<td>Natural</td>
</tr>
<tr>
<td>Fibre cement</td>
<td>38</td>
</tr>
<tr>
<td>Clay and concrete tiles</td>
<td>38</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Application</th>
<th>Basic size of batten</th>
</tr>
</thead>
<tbody>
<tr>
<td>600mm span</td>
<td>Width (mm)</td>
</tr>
<tr>
<td>Slates (double lap)</td>
<td>Natural</td>
</tr>
<tr>
<td>Fibre cement</td>
<td>38</td>
</tr>
<tr>
<td>Clay and concrete tiles</td>
<td>38</td>
</tr>
</tbody>
</table>
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 0.1% 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. Patination oil should be used on all exposed leadwork.

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.

Gutter linings

Joints between flashing pieces are usually laps. With abutment flashing, the laps should conform to a vertical weathering height of not less than 75mm, increasing to 150mm for locations that are exposed to high wind and rain. For secret gutters and pitched valley gutter linings the laps should be 50mm. Figures given in this table are nominal.

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

For roofs with little or no eaves/ridges, the ventilation requirement is additionally defined as 0.1% of the roof plan area.

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

Table 5. Eaves Ventilation

<table>
<thead>
<tr>
<th>Tile</th>
<th>Vented</th>
<th>Non-vented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centurian/Senator</td>
<td>20mm</td>
<td>16mm*</td>
</tr>
<tr>
<td>Gemini/Minislate</td>
<td>20mm</td>
<td>16mm</td>
</tr>
<tr>
<td>Hardrow Slate</td>
<td>40mm</td>
<td>60mm</td>
</tr>
<tr>
<td>Plain Tile</td>
<td>25mm</td>
<td>45mm</td>
</tr>
<tr>
<td>V2</td>
<td>20mm</td>
<td>30mm</td>
</tr>
</tbody>
</table>

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

Table 6. Dry Ridge (Ridge Board)

Projection of ridge board above rafter.

Table 7. Dry Ridge (Trussed Rafter)

Ridge batten specification.

Table 8. Ventilation Tiles

Minimum pitch | Free vent area
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>20°</td>
<td>2,600 mm²/m²</td>
</tr>
<tr>
<td>20° (so-vent)</td>
<td>7,860 mm²/m²</td>
</tr>
<tr>
<td>17.5°</td>
<td>4,426 mm²/m²</td>
</tr>
<tr>
<td>22.5°</td>
<td>7,860 mm²/m²</td>
</tr>
<tr>
<td>22.5° (hooded)</td>
<td>2,600 mm²/m²</td>
</tr>
<tr>
<td>22.5°</td>
<td>9,875 mm²/m²</td>
</tr>
</tbody>
</table>

Table 9. Ridge Air/Soil Ventilation terminals

Free vent area

System | Air | Soil
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mono pitch dry ridge</td>
<td>5,000 mm²/m²</td>
<td>7,850 mm²/m²</td>
</tr>
<tr>
<td>Half round nail head ridge</td>
<td>5,000 mm²/m²</td>
<td>7,850 mm²/m²</td>
</tr>
<tr>
<td>Hardrow Slate ridge</td>
<td>5,000 mm²/m²</td>
<td>7,850 mm²/m²</td>
</tr>
<tr>
<td>Half round soil vent ridge</td>
<td>12,000 mm²/m²</td>
<td>7,850 mm²/m²</td>
</tr>
<tr>
<td>Hardrow Slate air</td>
<td>12,000 mm²/m²</td>
<td>7,850 mm²/m²</td>
</tr>
</tbody>
</table>

Verge detailing

Undercloak dry verge (profiled interlocking tile)

Underlay

Undercloak dry verge unit

25mm aluminium nail

Undercloak retaining clip

50mm x 25mm timber batten or to BS 5534

Underlay

Scale 1:5
Verge detailing

**Undercloak dry verge (Gemini & Minislate)**

- Undercloak verge tile clip
- Undercloak dry verge unit
- 50mm x 25mm tiling batten or to BS 5534
- Underlay

Scale 1:5

**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

**Non-standard verge (profiled tile)**

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

- Bonded tile
- Screw fixing and mastic seal
- Mortar
- Undercloak strip
- 50mm x 25mm tiling batten or to BS 5534
- Underlay

Main illustration scale 1:5

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

**Hardrow mortar verge (double lap)**

- Main slate
- Slate and half
- Mortar
- Undercloak strip
- Underlay

50mm x 25mm tiling batten or to BS 5534

Scale 1:5

**Hardrow cloaked verge (double lap)**

- Cloaked verge slate
- Cloaked verge slate and half
- Underlay

50mm x 25mm tiling batten or to BS 5534

Scale 1:5

**Hardrow undercloak dry verge (double lap)**

- 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

**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)

Main slate
Felt weir
Lo-vent ventilation tile
50mm x 25mm tiling batten or to BS 5534
Underlay
Flexi pipe (soil only)

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
Underlay
Flexi pipe

Scale 1:10

Hardrow lo-vent air/soil ventilation slate

Hardrow lo-vent air/soil ventilation slate

Main slate
Felt weir
Lo-vent ventilation slate
50mm x 25mm tiling batten or to BS 5534
Underlay
Flexi pipe (soil only)

Scale 1:10

Hardrow air ventilation slate (hooded)

Hardrow air ventilation slate (hooded)

Main slate
Concrete ventilation slate
Vent tile felt spacer
50mm x 25mm tiling batten or to BS 5534
Underlay

Scale 1:10

Hardrow soil ventilation slate (hooded)

Hardrow soil ventilation slate (hooded)

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

Scale 1:10

*Upper and lower slates must be ordered in pairs

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Vally detailing

**Dry valley (interlocking tile)**
- Main tile
- Underlay to BS 5534
  - Cut tile and half
- Dry valley trough
- 12mm ply valley board

**Hardrow slates valley (double lap)**
- Main slate/slate & half
  - Purpose made valley slate
  - 50mm x 25mm tiling batten or to BS 5534
- Underlay to BS 5534

**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

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Hip detailing

**Mitred hip (90° & 135° on plan flat profile interlocking tiles)**
- Mitred double tile/tile and half (Cut on site)
- Plastic hip soaker
- Mitred hip clip
- 50mm x 25mm tiling batten or to BS 5534

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

**Traditional wet hip**
- One third round hip tile
- Mortar
- Underlay to BS 5534

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Guidance note: *The width of the cut channel at the valley 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

**Bonnet hip (gemini and minislate)**
- Bonnet hip tile
- Upper hip rafter
- Sealing tape
- Nominal 65mm hip rafter
- Mitred tile
- Timber noggin
- 50mm x 25mm tilting batten or to BS 5534
- Underlay

Scale 1:5

Min 22.5°
Max 55°

**Hardrow slate traditional wet hip**
- Hardrow Slate Hip
- Mortar
- Main slate/slate & half
- 50mm x 25mm tilting batten or to BS 5534
- Underlay to BS 5534

Scale 1:5

**Hardrow slates purpose made hip (90° on plan)**
- Purpose made hip slate
- 50mm x 25mm tilting batten or to BS 5534
- Main slate/slate & half
- Underlay

Scale 1:5

**Hardrow slates splay hip (over 90° on plan)**
- Purpose made splay hip slate
- Mitred slate & half cut on site
- 50mm x 25mm tilting batten or to BS 5534
- Main slate/slate & half
- Underlay to BS 5534

Scale 1:5

**Hardrow slates mitred hip**
- Mitred cut slate (cut on site)*
- Code 3 lead soaker*
- 50mm x 25mm tilting 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

**Ridge detailing**

**Air vent ridge**
- 450mm ridge vent tile
- Main tile
- Underlay
- 50mm x 25mm tilting batten or to BS 5534

Max 45°

Scale 1:10
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 (vent shown)
- Main tile
- LR Underlay
- 50mm x 25mm tiling batten or to BS 5534

Max 45°

Scale 1:10

*For details refer to page 2 table 6

**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

Max 45°

Scale 1:10

*For details refer to page 2 table 7

**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

Max 45°

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 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

Max 45°

Scale 1:10

*For details refer to page 2 table 7

**Mortar bedded ridge**

- 450mm half round ridge
- Mortar
- Main tile
- LR Underlay
- 50mm x 25mm tiling batten or to BS 5534

Main illustration scale 1:5

*Ridges must be fixed mechanically 900mm from any perimeter

*Dentil slips are required for profiled tiles

**Soil vent ridge**

- 450mm concrete soil vent ridge (Wet fix only)
- Dentil slip
- Main tile
- LR Underlay
- 50mm x 25mm tiling batten or to BS 5534

Underlay
- Trimming joint
- 100mm R-type adaptor
- Flexi pipe

Max 45°

Scale 1:10

*Applicable only where the ridge incorporates a ridge board

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**Ridge detailing**

**Dry fix gas vent ridge**
- 450mm gas ventilation ridge
- Non-vented top filler
- Duo pitch gas vent extension box
- Main tile
- 50mm x 25mm tiling batten or to BS 5534
- Underlay
- Trimming joint
- 125mm R-type adaptor

Scale 1:10

*Applicable only where the ridge incorporates a ridge board

**Mono pitch dry ridge**
- 450mm half round mono pitch ridge
- Top filler
- Main tile
- 50mm x 25mm tiling batten or to BS 5534
- LR Underlay
- Cavity closer

Main illustration scale 1:10

**Hardrow slates dry ridge [ridge board]**
- Stainless steel screw nail and seal
- 950mm Hardrow nail hole ridge
- Ridge batten*
- 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 4
Main illustration scale 1:10

**Hardrow slates dry ridge [trussed rafter]**
- 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

**Hardrow slates mortar bedded ridge**
- Ridge slate
- Mortar*
- Top slate retaining clip
- Top slate
- Main slate
- 50mm x 25mm tiling batten to BS 5534
- Underlay

Main illustration scale 1:10

*Ridges must be fixed mechanically 180mm from any perimeter

**Hardrow slates air/soil vent ridge**
- Ridge terminal
- Top slate retaining clip
- Extension box
- Top slate
- Main slate
- Underlay
- 50mm x 25mm tiling batten or to BS 5534

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
- 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

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 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

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

Hardrow slates reverse mansard
- 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

Head abutment

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

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