



TILCOR

roofmakers to the world

INSTALLATION MANUAL



TUDOR / SHAKE / ROYAL

These installation details are provided to demonstrate the recommended installation methods for Tilcor products and accessories.

The details and information in this document reflect current roofing practices used in New Zealand. Consult with Tilcor Roofing Systems Ltd for additional information.

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1. General Information

1.0 Description

- 1.1 Tilcor products are manufactured in accordance with Part 2 of NZS 4217: 1980 New Zealand Standard for "Pressed Metal Tiles" and provided our roof products are installed in accordance with our specifications they will meet the requirements of the New Zealand Building Code.
- 1.2 Manufactured to ISO9001, NZS3604 and NZS 4217.
- 1.3 Tilcor currently have three roofing profiles available: Tudor, Shake, Royal covered by this manual.
- 1.4 The roofing tiles are printed on the underside with the brand name.
- 1.5 The following flashings form an integral part of the roofing system:
 - **2m flashings (effective cover 1.9 m)**
 - Standard Barge Flashing
 - Standard Ridge (for Hip and Ridge capping)
 - Standard Side Flashing
 - A.E. Barge and A.E. Apron Flashings are also supplied with alloy edging.
 - **400mm flashings (effective cover 370mm):**
 - Barrel Trim
 - V-Ridge
- 1.6 50 x 3.05mm ring shank nails are used for fixing the roofing tiles. Where tiles have to be fixed on top of a rib, e.g. at the fascia, eaves, barges or on top of flashings, 50 x 3.05mm ring shank nails fitted with neoprene washers are used or can be alternatively sealed with a MS type sealant.

2.0 Materials

- 2.1 Zinalume consists of steel hot-dip coated with an aluminium/zinc alloy complying with NZS 344J. The steel is G300 (Structural Drawing) grade 0.4mm thick. To the topside of the Zinalume coated steel formed profile, one of the following coating systems is applied:
 - Textured Coating - an acrylic base-coat which binds a layer of stone granules covered with an acrylic overglaze, or
 - Satin Coating - an acrylic topcoat

3.0 Colours

- 3.1 **Tudor** is supplied in the following colours:
 - Textured - Autumn, Brown Bark, Cedar, Charcoal, Coffee Brown, Greenstone, Olive, Silver Grey, Slate, Terracotta
 - Satin - Beige, Ebony, Grey Friars, Ironsand, Karaka, Mist Green, New Denim Blue, Permanent Green, River Gum, Scoria, Terracotta, Wizard
- 3.2 **Shake** is supplied in the following colours:
 - Textured - Ashwood, Beechwood, Brown Bark, Ember, Cedar, Charcoal, Coffee Brown, Forest, Greenstone, Mesquite, Walnut, Weathered Timber, Copper Brown.
 - Satin - Ebony, Grey Friars, Ironsand, Karaka, New Denim Blue, River Gum.
- 3.3 **Royal** is supplied in the following colours:
 - Textured - Charcoal, Forest, Mesquite, Weathered Timber, Copper Brown.

4.0 Packing

- 4.1 The tiles are packed on wooden pallets protected with temporary waterproof covering for delivery to the site.
- 4.2 Flashings, V - Ridge, Barrel Trim and other accessories are packed separately.

5.0 Handling and Storage

- 5.1 The product must be transported and handled with care to avoid damaging the surfaces.
- 5.2 Long-term storage of roofing must be under dry, ventilated cover.
- 5.3 For short-term storage on site, pallets should be placed separately on level ground.
- 5.4 The products must be left covered with the waterproof covering on, when stored short-term on site in order to avoid water stains.

6.0 General Design Information

- 6.1 Tilcor Roofing Systems are pressed-metal roof cladding products suitable for use on new or existing roofs when fixed to timber battens.
- 6.2 New roofs must be designed and constructed in accordance with NZS 3604 or to a specific structural design.
- 6.3 Roof design must take into account any requirements for areas subject to regular snowfalls (as per the requirements of Acceptable Solution E2/AS1 Paragraph 1.2), the need to minimise roof cavity condensation, e.g., in skillion roofs, and specific flashing details.
- 6.4 Existing roofs must be inspected for soundness and the capability of resisting likely structural loads.
- 6.5 Minimum roof pitch for Tudor profile is 12.5 degrees and 15 degrees for the Shake and Royal profiles.
- 6.6 Note must also be taken of the requirements of Acceptable Solution E2/AS1 Paragraph 1.4(ii) for antiponding boards when the roof pitch is less than 15 degrees.
- 6.7 The flashings supplied by Tilcor Roofing Systems Ltd are acceptable alternatives to those specified in Figure 1 of Acceptable Solution E2/AS1.
- 6.8 The designer must also provide weathersealing details for situations not covered by the manufacturer's information. The designer is responsible for ensuring that all of his/her details are incorporated into the roof design, and that those details are followed by the installer.
- 6.9 Batten size and fixing must be in accordance with the requirements of NZS 3604 for the relevant rafter spacing (maximum 1200mm).

6.10 Uplift resistance requirements

Windzone		V(m/s)	q ₁ (kPa)	V(m/s)	q ₁ (kPa)	V(m/s)	q ₁ (kPa)	V(m/s)	q ₁ (kPa)
Windzone		Low 32	0.61	Med 37	0.62	High 44	1.16	Very High 50	1.50
		Main	fixing kN k ₁ Periphery	Main	fixing kN k ₁ Periphery	Main	fixing kN k ₁ Periphery	Main	fixing kN k ₁ Periphery
purlin size (mm)	s p a n (mm)	1.0	1.5	1.0	1.5	1.0	1.5	1.0	1.5
50x40	900	0.2	0.3	0.2	0.4	0.3	0.5	0.5	0.7
50x50	1200	0.2	0.4	0.3	0.5	0.5	0.7	0.6	0.9

$C_{pz} = 0.9$ $(C_{pz} = C_{pi} + C_{pe})$ $C_{pi} = 0$ $C_{pe} = 0.9$

*Periphery is 20% of width of building, as shown in NZS 3604

6.11 Uplift resistance achieved by using fasteners below

Gun Nail	90x3.15	1	0.4
Ringshank Nail (gun/hand)	90x3.2	1	0.6
Gun Nail	90x3.15	2	0.7
Twist Shank Nail	90x3.3	1	0.9
Purlin Screw c/s head	10gx100	1	2.5
Type 17 screw	14gx100	1	7.3

*Data obtained using 45mm thick battens

7.0 General Installation Information

- 7.1 Tilcor Roofing Systems must be installed in accordance with the manufacturer's instructions as contained in this document.
- 7.2 Care must be taken when handling, cutting, bending, and installing the roofing in order to avoid damage to the surface. In particular, the roofing surface must be kept clean of dirt and other substances such as metal swarf.
- 7.3 Flat, rubber-soled shoes must be used when working on the roof, and protective padding used on tools. Loads must be applied only over battens and the installed roofing protected from other construction and finishing work being carried out on or above the roofing, such as cladding materials, plaster and paint.

8.0 Roof Framing

- 8.1 Roof framing should provide support and fixing for the tile battens that will satisfy the design load wind requirements.
- 8.2 Installers should check that the framing has been erected to an accurate and even line before roof fixing is started.
- 8.3 An inspection and any rectification to the framing alignment must be carried out before roof fixing is commenced.

9.0 Tiling Battens

- 9.1 Battens must be treated, sized, and fixed according to NZS 3604. On new roofing underlay, e.g. as given in Acceptable Solution E2AS1 Paragraph 1.3, must be fixed in place first in accordance with the instructions of the underlay manufacturer.
- 9.2 A row of battens is fixed directly behind the fascia board. The next row of battens is generally fixed 320mm from the front of the fascia board, and subsequent rows are fixed at 368mm centres and 370 centres (satin).
Battens shall span at least three rafters or trusses at the edge of all roof planes. The installer is to select tiling battens from pack and reject any unsuitable battens that may not support his/her weight when spanning 900mm centres. Tiling battens are required to support tiles.
- 9.3 In reroofing situations when counter-battens are used, they must be sized, installed and fixed in accordance with the requirements of NZS 4217. This must be done in low, medium and high NZS 3604 building wind zones.
- 9.4 In very high wind zones, counter battens must be spaced at 600mm maximum centres when the existing purlin spacing is 750mm, and 450mm maximum centres when the existing purlin spacing is 900mm.
- 9.5 Where the counter batten sits directly on the purlin behind the fascia, two 75mm x 3.15mm skew driven nails may be used, as per NZS 4217 section 202.4.4 Preparation of roof.

10.0 Flashings and Fixings

- 10.1 To comply With E2/AS1 8.2.4
In all applications the choice of flashing/fixing material shall take into account NZBC B2 Durability, specific conditions of use and consideration of the surrounding material.
Durability requirements for flashings:
a) 50 years, where flashings are completely hidden behind claddings, or not accessible.
b) 15 years, where flashings are exposed, or accessible.

11.0 Special Flashings

- 11.1 Special flashings are made as required by the manufacturer from uncoated steel and subsequently factory coated using the same coating process as used for tiles or alternatively manufactured on site by the roofer using factory finished tiles and accessories and cutting and bending to the desired shape.

12.0 Durability

- 12.1 Tilcor warrants that each Zinalume roofing tile comprised in the roof fitted to the purchaser's property, will carry an appropriate weatherproof warranty. This warranty does not cover damage due to improper handling, installation or damage occurring after installation.
Please refer to Country Warranty for further information.
- 12.2 Installation must be in accordance with instructions of Tilcor Roofing Systems Ltd.
- 12.3 Where the roof space is not completely closed-off to the elements, the underside of the roof must be completely shielded with roofing underlay or sheathing such as fibre cement, hardboard or plywood.

Limitations on use

- 12.5 Tilcor Roofing Systems must not be used in high alkaline environments, (such as on intensive animal shelters or other buildings with high ammonia or urea concentrations), and/or contact with fresh concrete or plaster must be avoided.
- 12.6 The roofing must not be used in contact with permanently damp materials, on industrial buildings in which corrosive processes occur, or over swimming pools.
- 12.7 Copper in any form must not be allowed to contact the roofing, and care must be taken to ensure that runoff from copper overflow or down pipes does not come into contact with the tiles.
- 12.8 Lead or lead edged flashings must not be used with Tilcor Roofing Systems unless a suitable barrier paint system is applied to both surfaces to ensure there is no metal to metal contact, or contact through water runoff. The manufacturer supplies flashings that are suitable for use with the roofing products.

Weathering

- 12.9 With granule-coated products, some loss of granules and overglaze can be expected over time.
- 12.10 Acrylic-coated tiles may fade and chalk as time passes. This may be more noticeable with some colours than others, and is an expected part of the weathering process.

Maintenance

- 12.11 Tilcor pressed metal roofing tiles require minor maintenance to ensure the continued performance of the roof over its life.
- 12.12 Where possible a visual ground inspection of your roof should be performed every year, or after any significant storm, for the following items. Maintenance or repairs to these items should help prevent any major problems occurring:
 - Damaged or displaced tiles or flashings.
 - Blocked valleys, spouting or downpipes with debris such as leaves, other plant matter or foreign objects such as toys.
 - Wash down any roof areas not effected by rain washing (see Cleaning below).
- 12.13 In certain environmental conditions moss, mould or lichen may present itself on areas of the roof. To maintain the integrity of the coating and for aesthetic reasons this can easily be removed with a generic roof wash treatment, such as Mossboss, applied by low pressure spraying. When the roof is used for collection of potable water, ensure that the downpipes are disconnected for the period stated in the spraying instructions. Failure to maintain the roof in this manner will void the coating warranty.
- 12.14 When repairs or maintenance are needed we recommend that you consult a metal tile roofing specialist, as additional damage to the roof tiles can be caused by inexperienced foot traffic (If you must access the roof follow these instructions, to avoid denting or damaging the roof tiles, you should wear soft sole shoes & place your foot on the lowest point of the tile and at the front edge of the tile). Also, house holders unfamiliar with working at height pose considerable risk of injury to themselves by falling from ladders or the roof.

Cleaning

- 12.15 Tilcor roofs must be washed down regularly with fresh water in all areas not washed by rain, such as those areas sheltered by the eaves overhang of a higher roof. In areas near the sea, where salt deposition is noticeable on windows and similar surfaces, or near areas of industrial pollution, washing down should be carried out every 2-3 months. In other areas, washing down every 6 months should suffice.
- 12.16 Lichen and mould growth must be removed with chemical cleaners recommended by Tilcor Roofing systems Limited, such as Mossboss. Tilcor Roofing Limited recommends to chemically clean the roof once every 2-4 years to maintain a good appearance and prevent the growth of algae, moss and lichen. Failure to carry out this maintenance program will void the coating warranty (see Tilcor coating Warranty).

13.0 Dissimilar Metals

- 13.1 To avoid adverse corrosion effects caused by dissimilar metals, COPPER and LEAD flashings should not be used with Tilcor roofing products and accessories. Under no circumstance should these materials be in contact or allow water runoff from these materials to flow on to the roof. Failure to comply with this will void the weatherproof warranty.

14.0 Touch-Up Kit

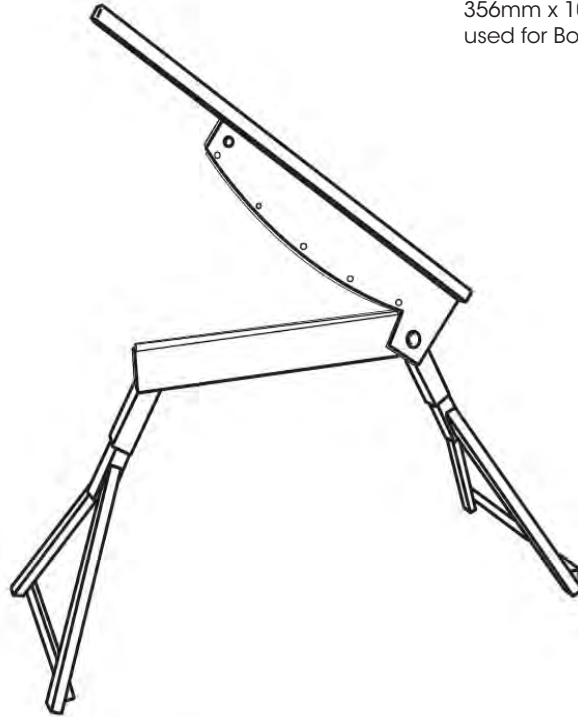
- 14.1 Minor scuffing of the tiles can be repaired with the Touch-Up kit from Tilcor. Use the Acrylic Touch-Up kit from Tilcor (not sealants). Coloured aerosol paints should never be sprayed on tiles or accessories made by Tilcor.

2. Recommended Tools

Tilcor Roofing Systems are installed with standard construction tools. The tiles may be cut with tin-snips, or the Guillotine (cutter) supplied as part of the Tilcor installation kit that consists of; 1 Guillotine (cutter), 1 Bender, 1 Top Course Bender.

Guillotine (also known as a Cutter)

356mm x 1016mm x 76mm 17.7kg. This Guillotine is used for Bond, Classic, Roman, Shake & Shingle.

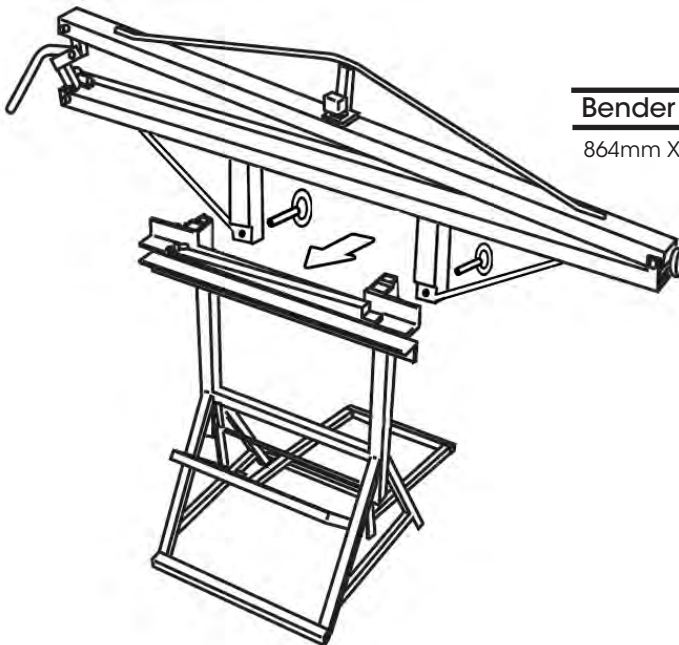


Top Course Bender

1549mm X 457mm X 101mm 28.1kg

Bender


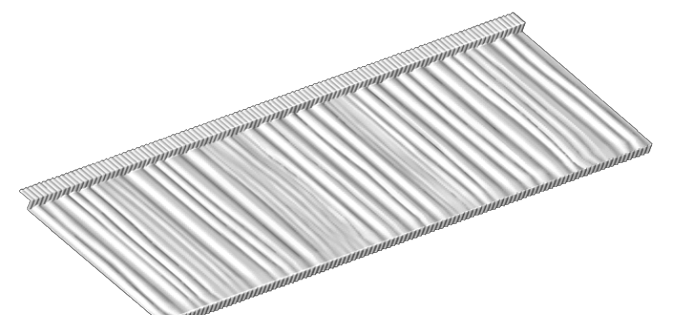

864mm X 508mm X 406mm 20.9kg



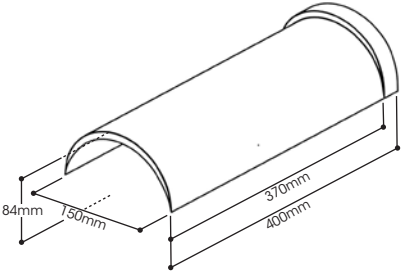
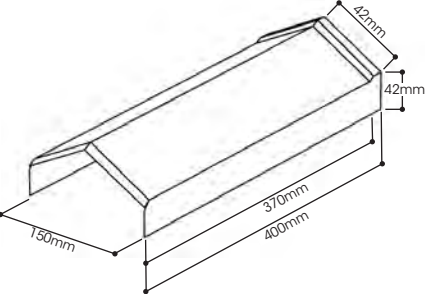
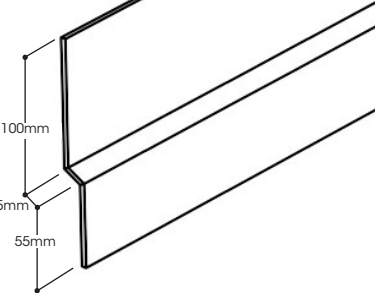
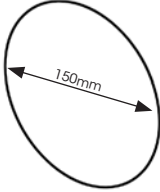
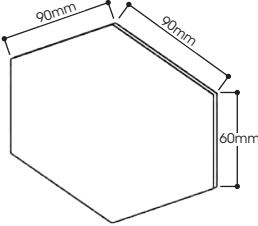
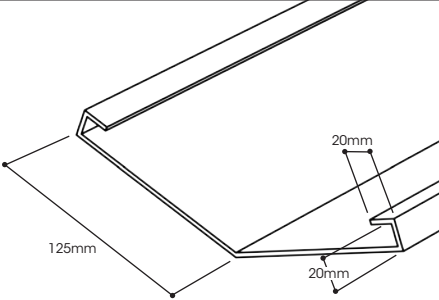
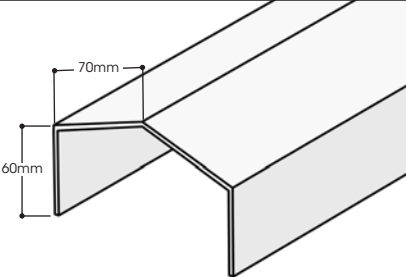
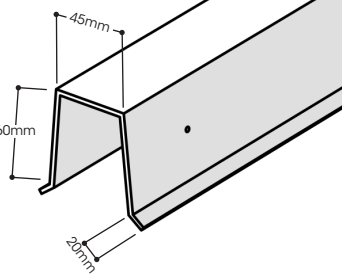
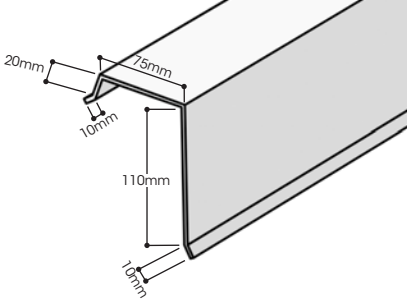
Recommended Tools Continued

<p>Impact or Screw Gun</p> 	<p>Hand Bender</p> 
<p>Hand Scribe</p> 	<p>Measuring Tape</p> 
<p>Nail Gun</p> 	<p>Tin Snips</p> 
<p>Set-out Rod</p> 	<p>Bevel</p> 

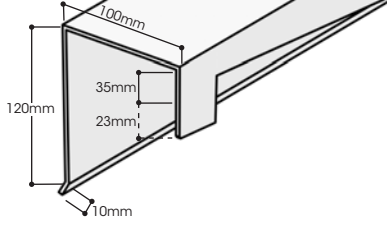
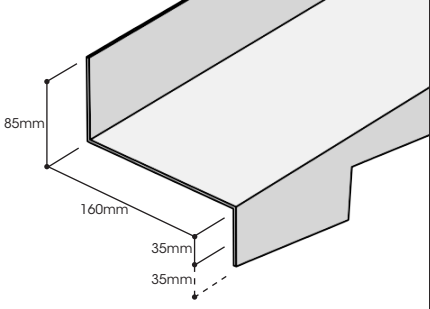
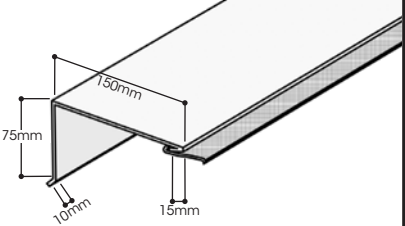
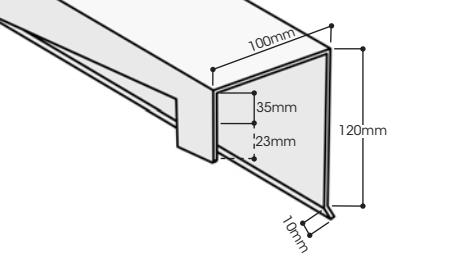
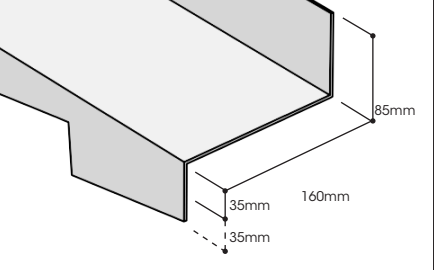
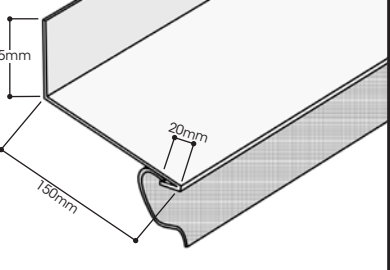
Profile Specifications

	<p>Tudor</p> <p>Overall Length: 1335mm Length of Cover: 1265mm Width of Cover: 368mm Roof Cover / Tile: 0.46m² Tiles / m2: 2.15 Minimum Roof Pitch: 12.5° Nailing Points Per Tile: 4</p> <table border="0"> <thead> <tr> <th></th> <th>Textured</th> <th>Satin</th> </tr> </thead> <tbody> <tr> <td>Weight / Tile:</td> <td>3.0kg</td> <td>2.0kg</td> </tr> <tr> <td>Weight / m2:</td> <td>6.4kg</td> <td>4.4kg</td> </tr> </tbody> </table>		Textured	Satin	Weight / Tile:	3.0kg	2.0kg	Weight / m2:	6.4kg	4.4kg											
	Textured	Satin																			
Weight / Tile:	3.0kg	2.0kg																			
Weight / m2:	6.4kg	4.4kg																			
	<p>Shake</p> <p>Overall Length: 1325mm Length of Cover: 1265mm Width of Cover: 368mm Roof Cover / Tile: 0.46m² Tiles / m2: 2.15 Minimum Roof Pitch: 15° Nailing Points Per Tile: 4</p> <table border="0"> <thead> <tr> <th></th> <th>Textured</th> <th>Satin</th> </tr> </thead> <tbody> <tr> <td>Weight / Tile:</td> <td>3.0kg</td> <td>2.1kg</td> </tr> <tr> <td>Weight / m2:</td> <td>6.4kg</td> <td>4.5kg</td> </tr> </tbody> </table>		Textured	Satin	Weight / Tile:	3.0kg	2.1kg	Weight / m2:	6.4kg	4.5kg											
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	<p>Royal</p> <table border="0"> <thead> <tr> <th></th> <th>Textured</th> </tr> </thead> <tbody> <tr> <td>Overall Length:</td> <td>1330mm</td> </tr> <tr> <td>Length of Cover:</td> <td>1260mm</td> </tr> <tr> <td>Width of Cover:</td> <td>368mm</td> </tr> <tr> <td>Roof Cover / Tile:</td> <td>0.46m²</td> </tr> <tr> <td>Tiles / m2:</td> <td>2.15</td> </tr> <tr> <td>Weight / Tile:</td> <td>3.0kg</td> </tr> <tr> <td>Weight / m2:</td> <td>6.4kg</td> </tr> <tr> <td>Minimum Roof Pitch:</td> <td>15°</td> </tr> <tr> <td>Nailing Points Per Tile:</td> <td>4</td> </tr> </tbody> </table>		Textured	Overall Length:	1330mm	Length of Cover:	1260mm	Width of Cover:	368mm	Roof Cover / Tile:	0.46m ²	Tiles / m2:	2.15	Weight / Tile:	3.0kg	Weight / m2:	6.4kg	Minimum Roof Pitch:	15°	Nailing Points Per Tile:	4
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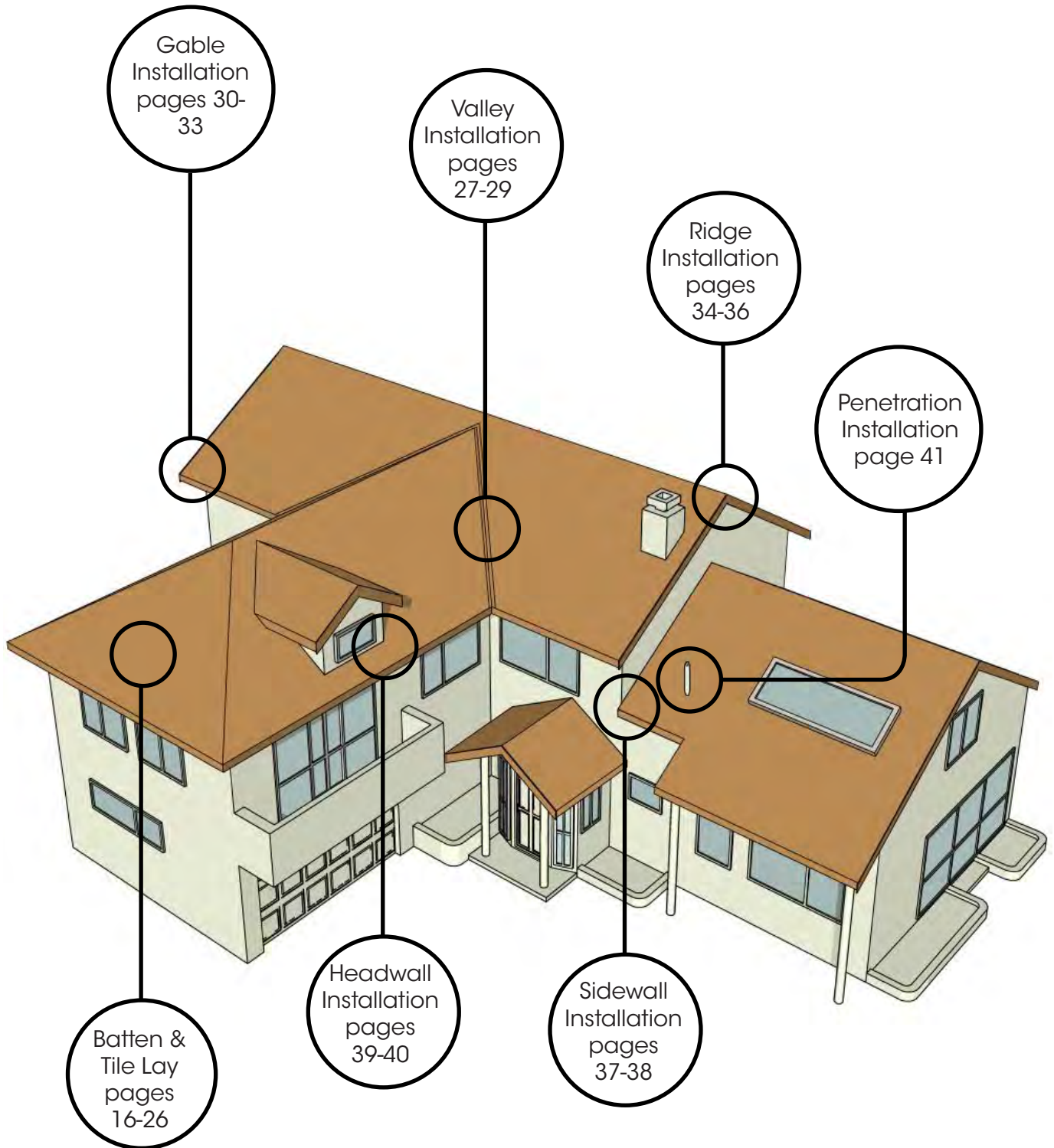
4. Flashing Specifications

<p>100. Barrel Trim</p> <p>Dimensions 400mm X 150mm Cover Length 370mm Weight (textured) 0.462kg Weight (satin) 0.324kg</p>	<p>101. V Ridge</p> <p>Dimensions 400mm X 150mm Cover Length 370mm Weight (textured) 0.472kg Weight (satin) 0.316kg</p>	<p>104. Standard Side Flashing</p> <p>Overall Length 2000mm Cover Length 1900mm Weight (textured) 1.50kg Weight (satin) 1.01kg</p>
		
<p>105. End Cap Trim</p> <p>Dimensions 150mm x 150mm Weight (textured) 0.082kg Weight (satin) 0.058kg</p>	<p>106. End Cap V Ridge</p> <p>Dimensions 150mm x 150mm Weight (textured) 0.074kg Weight (satin) 0.052kg</p>	<p>116. Metal Tile Valley</p> <p>Overall Length 2000mm Cover Length 1900mm Weight (satin) 3.50kg</p>
		
<p>107. Angle Ridge</p> <p>Overall Length 2000mm Cover Length 1900mm Weight (satin) 1.63kg</p>	<p>102. Standard Ridge</p> <p>Overall Length 2000mm Cover Length 1900mm Weight (textured) 1.72kg Weight (satin) 1.20kg</p>	<p>103. Standard Barge</p> <p>Overall Length 2000mm Cover Length 1900mm Weight (textured) 1.98kg Weight (satin) 1.45kg</p>
		

Flashing Specifications Continued

108. Notched Barge LH	110. Notched Sidewall LH	113. A.E. Barge
Overall Length 2000mm Cover Length 1900mm Weight (textured) 2.50kg Weight (satin) 1.75kg	Overall Length 2000mm Cover Length 1900mm Weight (textured) 2.35kg Weight (satin) 1.64kg	Overall Length 2000mm Cover Length 1900mm Weight (textured) 2.54kg Weight (satin) 1.81kg
		
109. Notched Barge RH	111. Notched Sidewall RH	112. A.E. Apron
Overall Length 2000mm Cover Length 1900mm Weight (textured) 2.50kg Weight (satin) 1.75kg	Overall Length 2000mm Cover Length 1900mm Weight (textured) 2.35kg Weight (satin) 1.64kg	Overall Length 2000mm Cover Length 1900mm Weight (textured) 2.56kg
		

6. Detail Reference Guide



Preparatory Installation

1. Batten Spacing

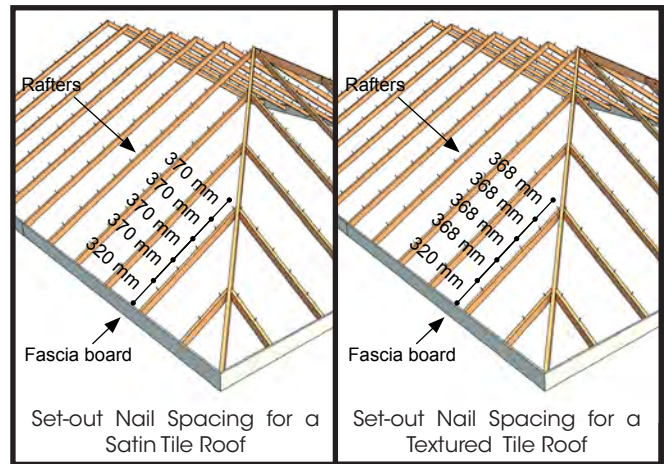
Disclaimer: For purposes of uniformity, we have demonstrated 50x40mm battens as this is the most common batten size. This may be substituted for 50x25mm or 50x50mm for different rafter/truss spacings (see Tiling Batten Specifications).

A 50x40mm batten is placed directly behind the fascia around the entire roof. This will serve as the eave batten.

The next batten is placed 320mm from the outside edge of the fascia material to the front edge of the batten. Battens are then placed every 370mm (Satin) or 368mm (Textured) measured from the front edge of each batten continuing up the roof.

The set out can be done using a setout rod, which is made from a 50x40mm batten or measuring rod of similar thickness.

Measure every 370mm (Satin) or 368mm (Textured) measured up the setout rod and saw notches in the material, making sure the notches are accurate and that the bottom of the notch is square to the rod. The rod is then placed on the rafter and nails are placed in every notch so that you have a series of nails at 368mm or 370mm centres running up each rafter.



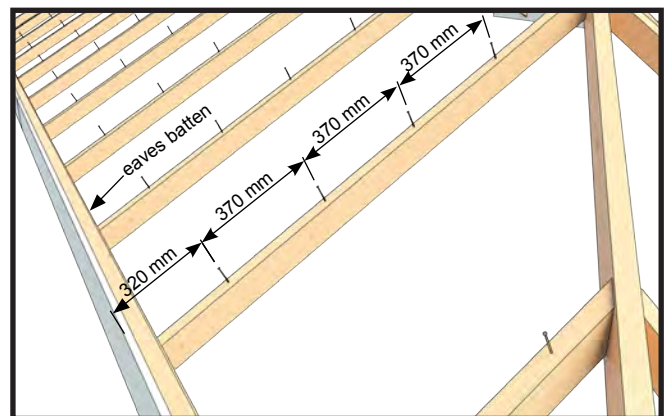
Set-out Nail Spacing for a Satin Tile Roof

Set-out Nail Spacing for a Textured Tile Roof

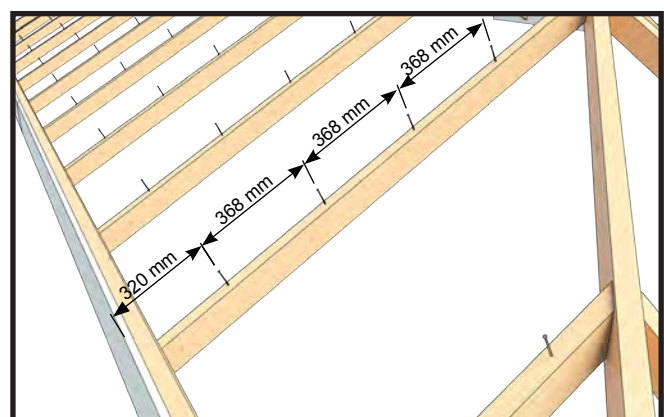
2. Batten Cutting

When placing the battens on the set out nails, care should be taken to stagger the joints across several rafters and not to have multiple joints on the same rafter going up the roof truss.

Place the battens on the setout nails mitring each batten onto the hip and valley boards. Make sure joining battens are centred on the rafters and cut ends off that are not straight. Then cut all other joints on the centre line of each rafter where each batten extends to. Then mitre cut each batten onto the hip and valley boards.



Set-out Nail Spacing for a Satin Tile Roof



Set-out Nail Spacing for a Textured Tile Roof

Preparatory Installation

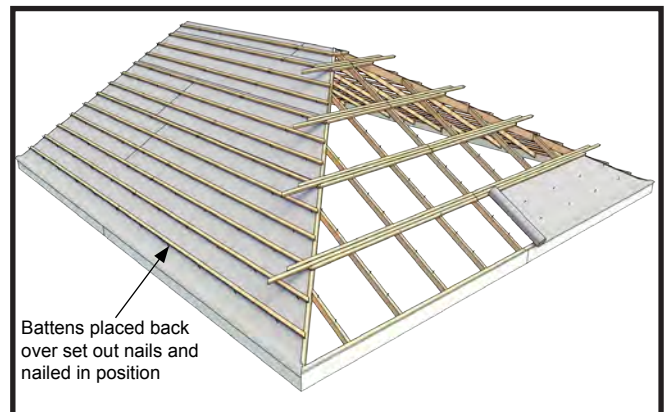
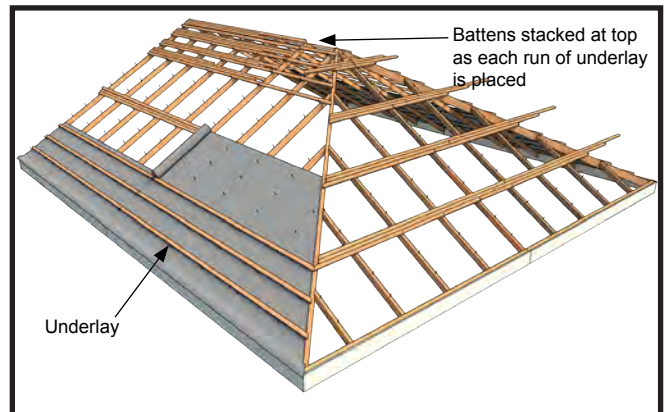
3. Underlay Installation

Once the battens are cut in completely the battens can be moved up to allow the underlay to be rolled out.

Self-supporting breather type building paper must be used. Starting at the bottom, roll out the underlay horizontally across the roof, ensuring that the lower edge of the underlay overhangs the outside edge of the fascia by a minimum of 40mm.

Once each run of underlay is run out, move the battens down to rest on pinout nails. This will enable the installer to continue up the roof plane by walking along these battens. Paper the whole roof, horizontal to the fascia line ensuring that each lap is no less than 150mm, unless it occurs directly underneath a batten, in which case it can be reduced to 75mm. Underlay is to be lapped over each hip and ridge line at least 150mm.

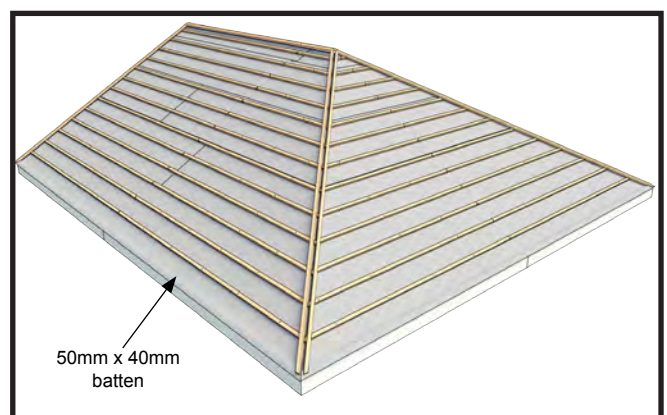
Where the roof meets a wall, the underlay must be folded and run up the wall no less than 200mm.



4. Batten Fastening

Battens shall be nailed through to the rafter with one 90 x 3.15mm nail at each intersection unless greater wind uplift resistance is necessary as stipulated in table 5.10 page 5.

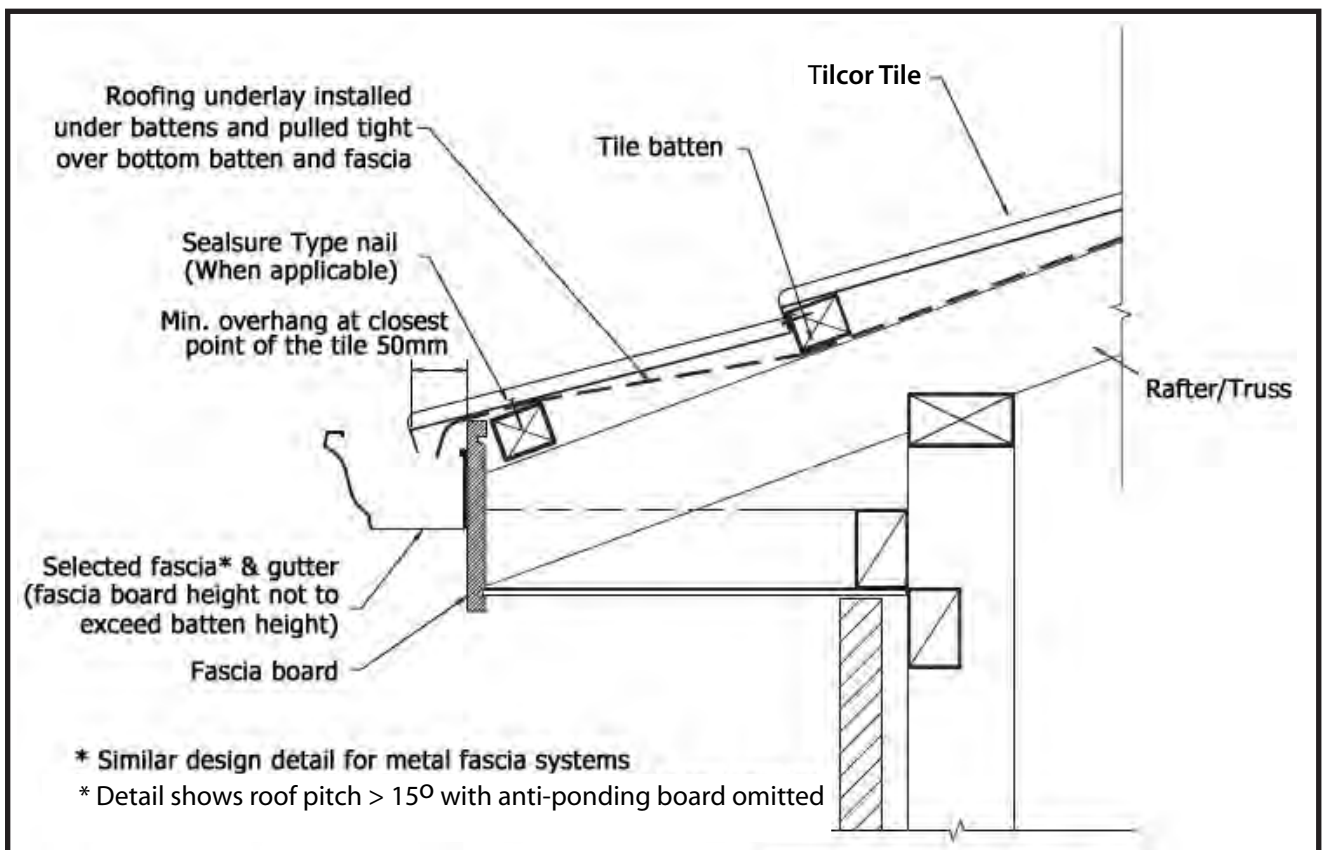
Refer to section 9.0 Tiling Battens on page 6 of the manual, within General Information.



Preparatory Installation Continued

Tiling battens must be:

- H1.2 treated
- Douglas fir of moisture content <20%
- 50 x 25mm for 450mm rafter/truss spacing,
- 50 x 40mm for 900mm rafter/truss spacing
- 50 x 50mm for 1200mm rafter/truss spacing



Tile Laying (Tudor Specific)

Tile Laying

Tiles can be interlocked either right over left or vice versa but should be laid with the laps facing away from prevailing winds or from discharging rain water pipes or valleys. Where possible the tiles should also be laid with the laps facing away from the normal line of sight. (Fig. 1.1)

Tiles are laid by lifting both tiles in the course above and sliding the next course under the nose of the tiles already in place. (Fig. 1.2)

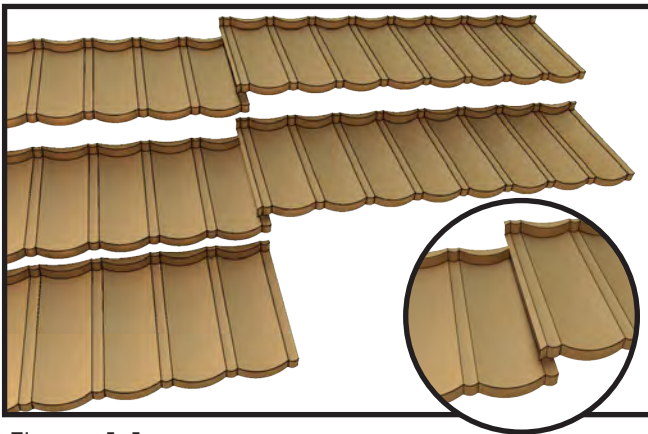


Figure 1.1

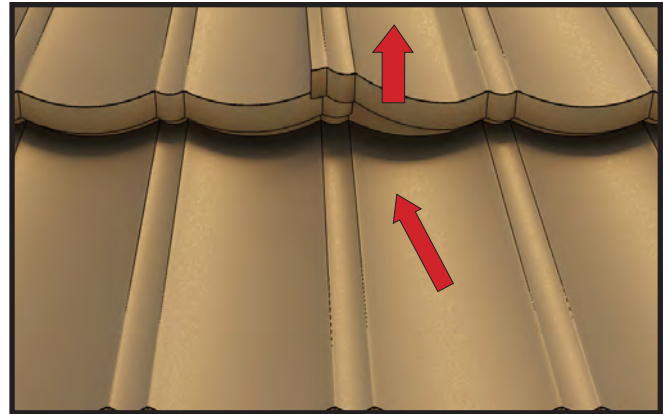


Figure 1.2

Tile Installation Procedure - Hip Roof

General instructions for tile laying as detailed above. On the second to top course (the higher most full tile course), lay the top corner of the first tile 150mm from the hip board. Continue to lay tiles towards the other hip until the last full tile will fit.

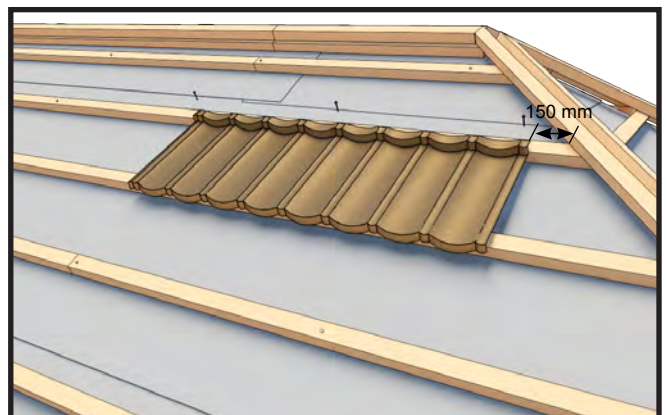


Figure 1.3

Secure these tiles by tacking through the back flange (Fig 1.3). Lay subsequent courses two at a time, both starting about the same distance from the hip board. (Fig 1.4 & 1.5)



Figure 1.4

Tile Lay Continued

Care should be taken to line up the corrugations. To reduce waste, use part tiles to complete rows within approximately 150mm of hip board (Fig 1.6). This allows each end of a full tile to be cut and bent to fill the gaps.

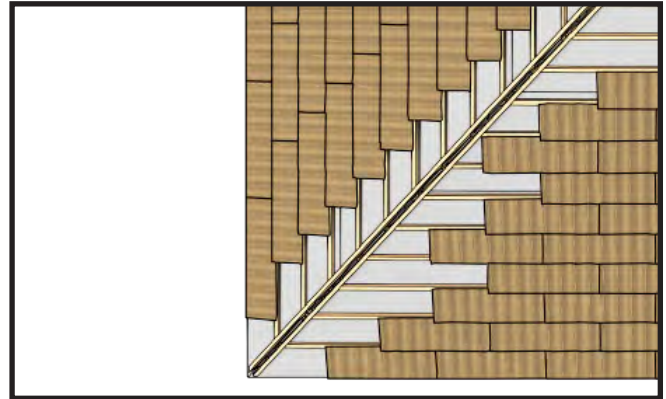


Figure 1.5

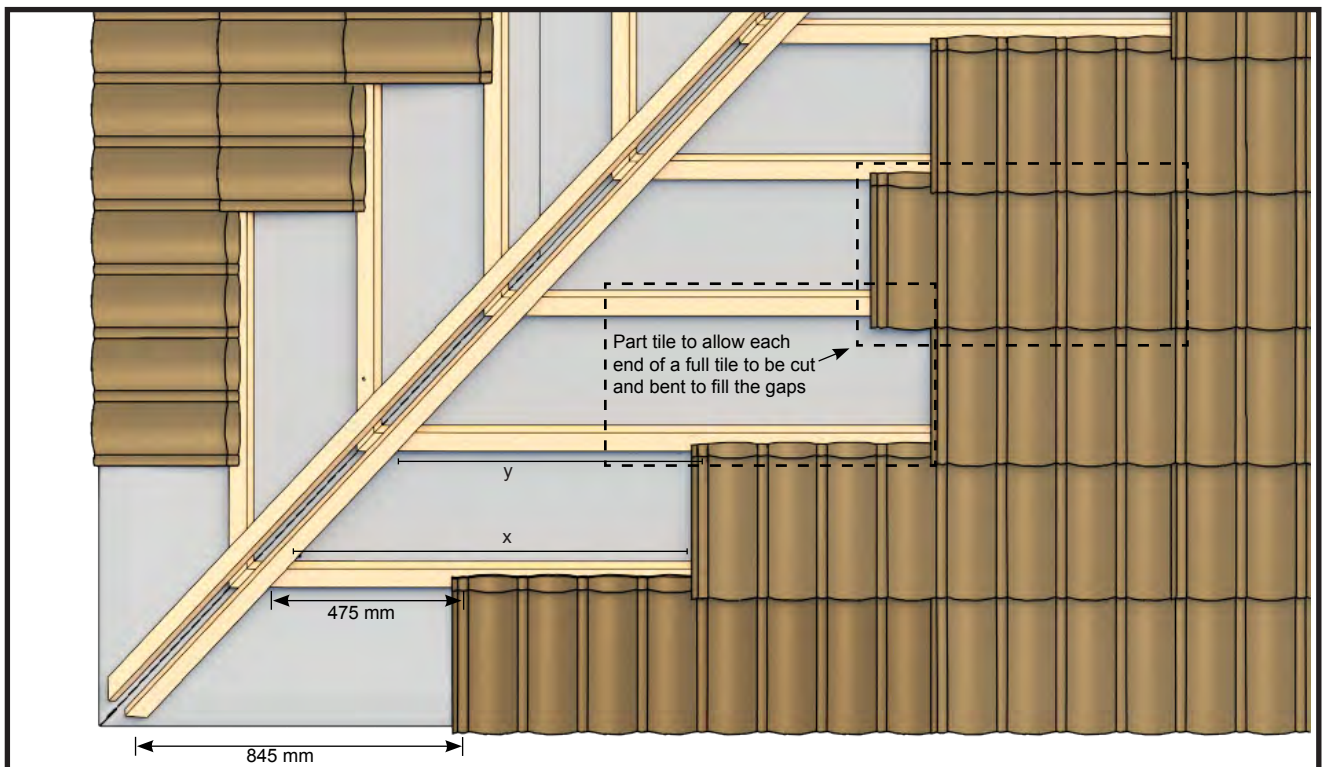


Figure 1.6

Measurements and Marking

Measurements are made on the roof, but tiles are normally marked, cut, bent and stacked on the ground.

To save time marking, cutting and bending each tile, it is best done by two installers - one to measure and the other to write the measurements down on a board or piece of paper as shown (Fig 1.7). To avoid confusion, cut, bend and stack tiles in strict order.

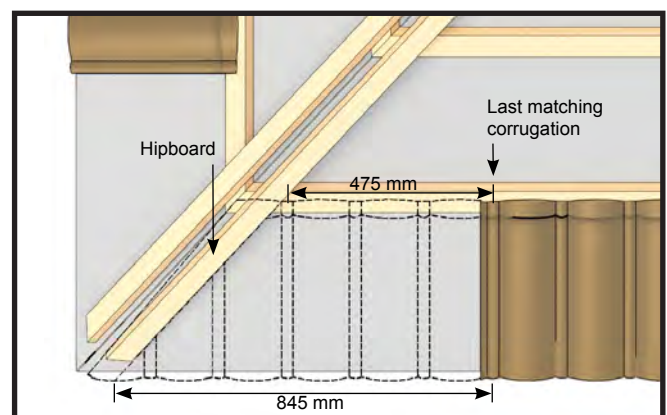


Figure 1.7

Tile Lay Continued

Note the following steps:

- (i) The basic measurement (recorded on paper or board) is taken from the last corrugation on the bottom corner of the last full tile, to the hip board, along the front edge of the batten (Fig 1.7).
- (ii) Measure and mark on the tiles with chalk or similar, the required measurements taken from the roof, ensuring the MATCHING corrugation of the overlapping tile to be cut, is taken as the measure starting point (Fig 1.7). This forms the BENDING line (Fig 1.9).

Add to the bending line measurement the height of the ridge board projection above the tile line 40mm. Mark on the tiles with chalk or similar. This forms the cutting line. (Fig. 1.9)

ALTERNATIVELY - Set a bevel to the angle formed by the hip board and tile batten. Place the bevel on the tile so that the measuring mark on the front of the tile lines up with the inside of the bevel. Mark along the inside of the bevel to give the BENDING line. Scribe the other side of the bevel to form the CUTTING line.

Each tile should supply two cut pieces leaving a minimum of wastage. Preferably a hip and valley cut from each tile will minimize this waste (Fig 1.9). However, two hip cuts will also provide a lower wastage factor.

Left-Hand Side Example

Top	475mm
Bottom	845mm

Top	x mm
Bottom	y mm

Top e.g.	342mm
Bottom e.g.	710mm

Right-Hand Side Example

Top	530mm
Bottom	900mm

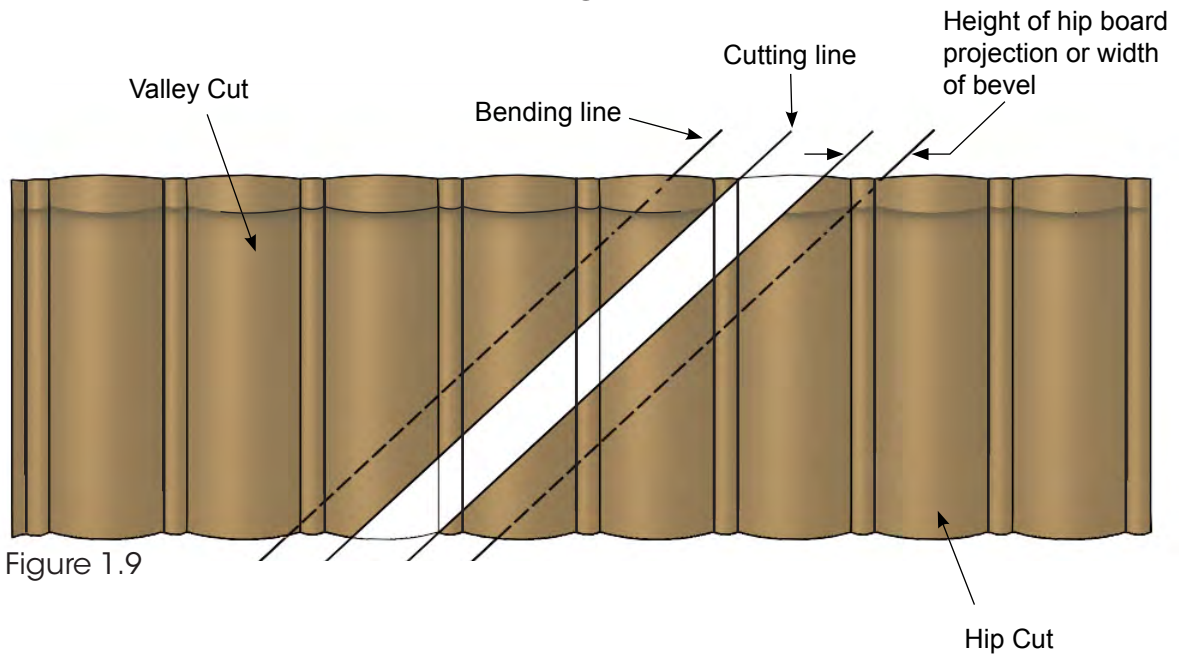
Top	600mm
Bottom	970mm

Top	380mm
Bottom	750mm

Figure 1.8

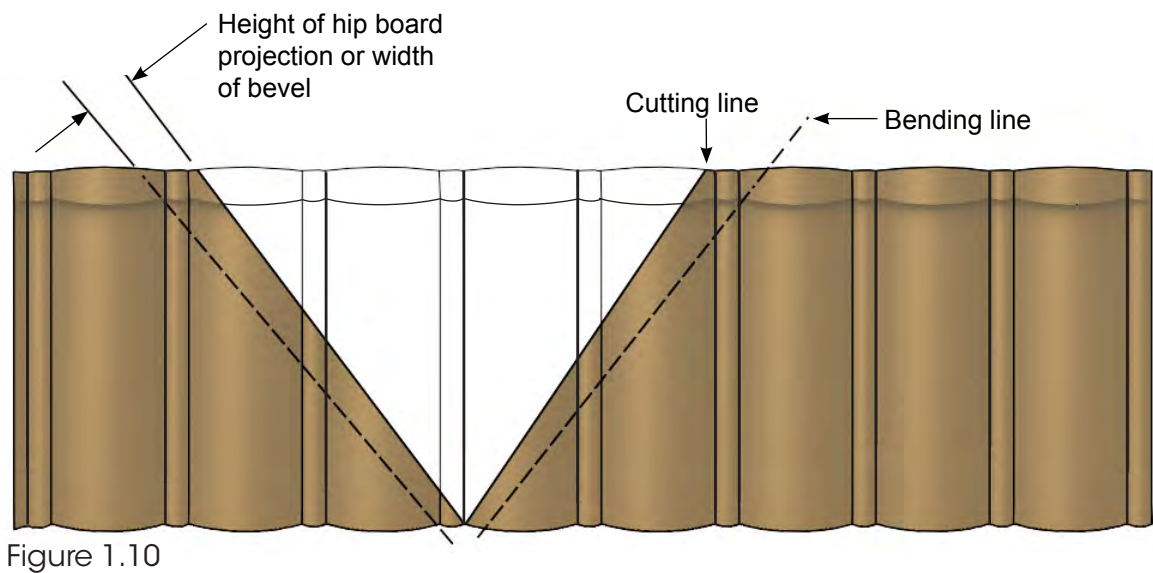
Tile Lay Continued

Preferred and Low Waste Usage



OR

Two Hip Cuts Per Tile



Tile Lay Continued

Hip Cutting

Use the guillotine to cut along the pre-marked cutting lines.

Hip Bending

Place the tile in the bender and line up the marks showing the bend line. Operate the foot controlled vice mechanism to hold the tile firmly, and bend the tile upwards.

Each cut tile will vary slightly in size, and as cutting and bending are done on the ground, it is very important not to mix up the individually cut tiles. Stack them in the sequence that they will be used. A simple practice is to cut off tiles in order and re-stack in order and then move to bending, repeating the process (Fig 1.8).

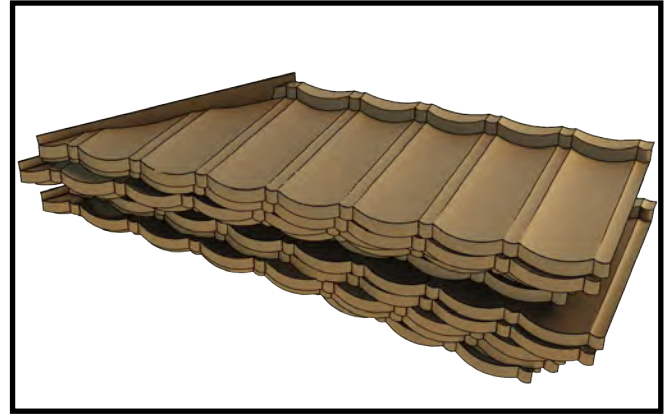


Figure 1.8

Installation of Cut Tiles

Start installing the cut tiles from the bottom course and work up the hip. Sometimes it is necessary to nail into the head of the tile to hold it in place before the next cut above is installed.

Install all cut tiles by nailing through the turn-up into the hip board, and one or more nails through the front edge into the battens (Fig 1.9).

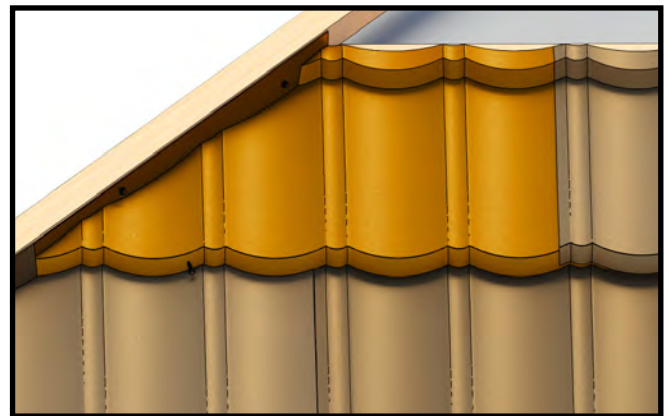


Figure 1.9

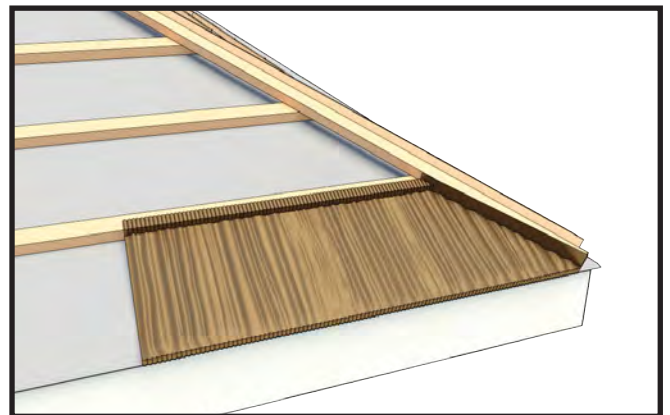
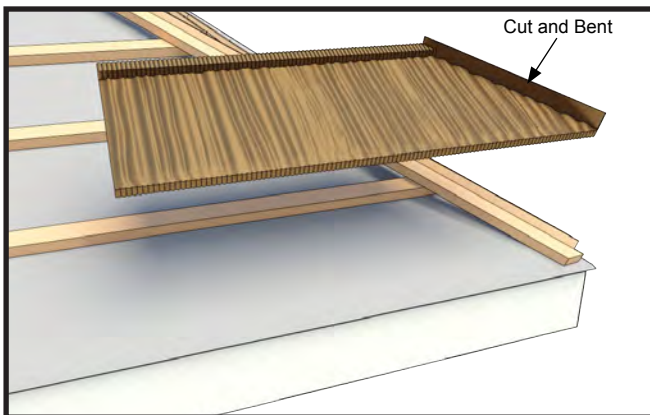
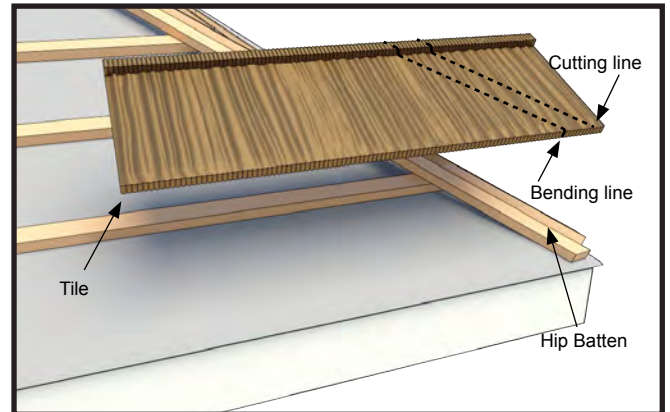
Tile Laying (Shake and Royal specific)

As the Shake and Royal profiles have a straight head and nose, the tiles can be laid anywhere along the length of the tile.

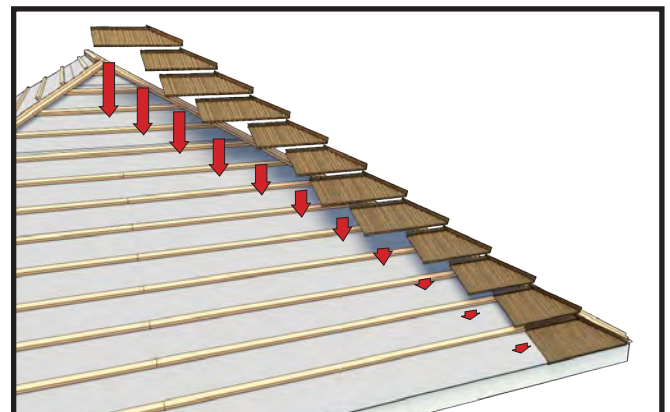
1.
Use a bevel to set the angle of the hip by placing the bevel in line with the batten and moving the bevel to meet the hip batten. Mark on the tile the cut and bend line allowing 40mm upturn. Proceed to cut and bend up enough cut tiles for the number of courses up the hip.

To minimise waste, it is advisable to use approximate half the tile for each cut so you can use the other half for a valley cut or another hip cut at the other end of the roof plane. These cut tiles should vary a little in size to try to avoid a pattern.

Note: Tiles must be turned up a minimum of 40mm against the hip battens, hip board or where they butt against a vertical or inclined surface.



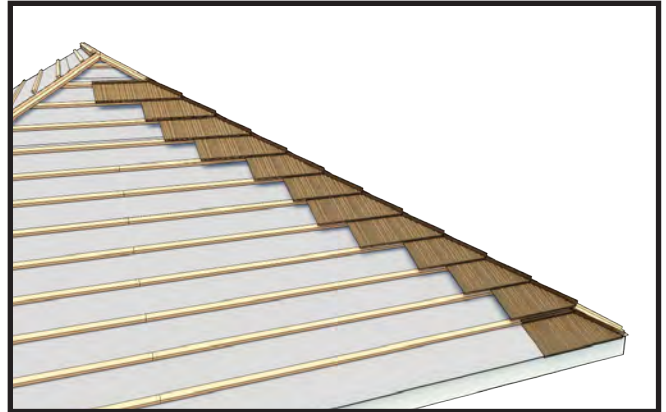
2.
Install the cut tiles by starting at the bottom course and nailing the cut tiles to the hip batten. Proceed up the hip length one tile at a time.



Tile Lay Continued

3.

Secure tiles down on batten, ensuring that they butt against hip batten as shown in step 2.



4.

In some instances it is desirable to cut and lay a half tile to ensure a cut tile is a desirable size.

Proceed to lay and secure all tiles out across length of roof.



On the second to top course, continue to lay tiles towards the other hip until the last full tile will fit.



Then continue to lay tiles down to the fascia and then across the roof to complete the roof plane with full tiles.

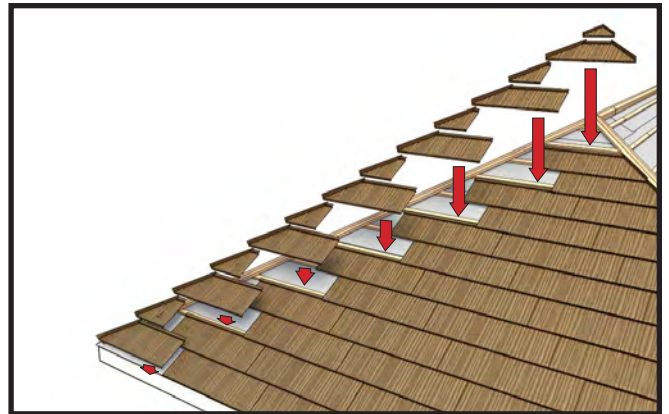


Tile Lay Continued

5.

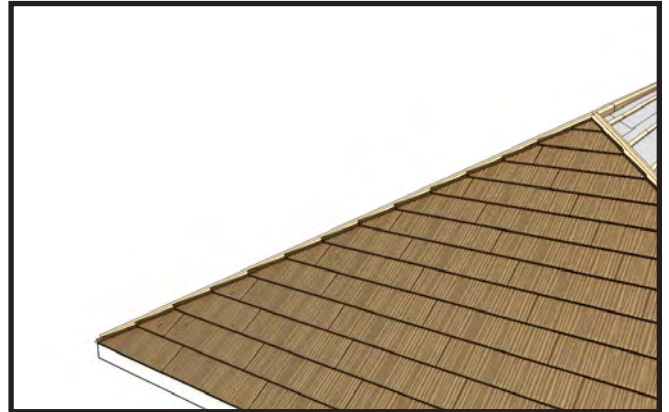
Measure the bottom length of each cut from the centre of the lap to the hip batten for each cut for the full length of the hip. Mark with bevel, cut and bend similar to the other side of the hip.

Fit cut tiles once again starting from the bottom course. Care should be taken to ensure the cut tile fits underneath the full tile above.



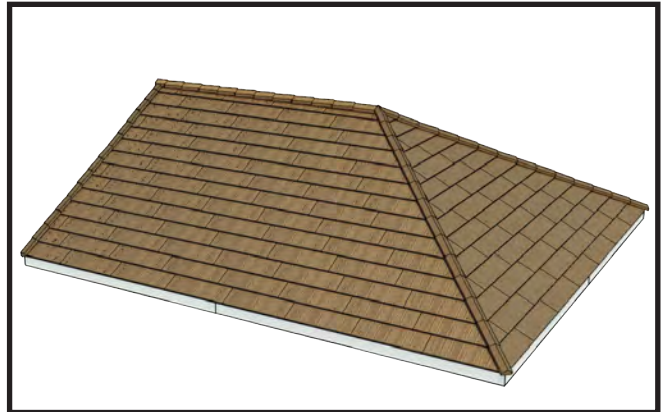
6.

Place in position and secure each tile at the lap, into the hip board and along the nose of the tile as required depending on the cut tile length.



7.

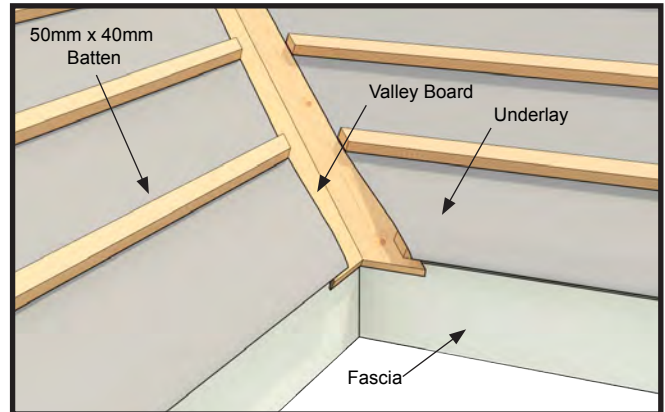
Once complete, The hip battens are then ready to be covered with V Ridge Caps.



Valley Installation (Tudor, Shake and Royal)

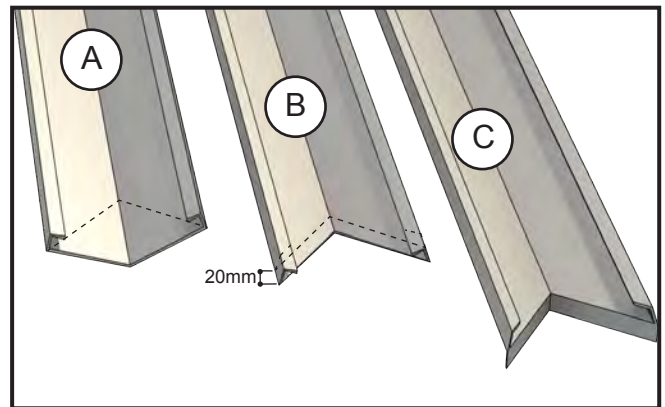
1.

The valley boards are installed between the valley jack rafters and flush with the roof plane to support the Metal Tile Valley. Valley boards are required to be set with their outer edge a minimum of 150mm (fig 1.11 pg 28) from the centre line of the valley. Valley boards are required to support a point load of 1.1.kN, which is taken to be the weight of a tradesperson with a bag of tools. Valleys are installed so that water discharges over the back of, and into, the eaves gutter.



Valley Tray

The valley tray is cut to match the angle of the fascia boards (A). It is then further cut to create a downturn of 20mm (B). The valley end is then corrected to discharge in to eaves gutter (C). The valley tray should protrude into the gutter in line with the bottom row of tiles (50mm).



Fastening

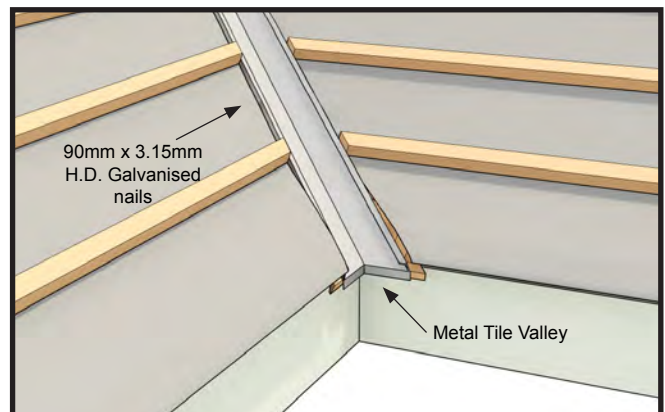
First run out a strip of roofing underlay over the valley board to prevent the valley tray from coming into direct contact with the valley board.

Valleys shall be secured by 90mm x 3.15mm H.D. Galvanised nails fixed into the valley board at no more than 1.0m centers and bent over the top lip of the valley to hold the valley tray in place.

2.

Under no circumstances must the fasteners penetrate the valley surface.

Where joins occur the minimum overlap is to be no less than 200mm.

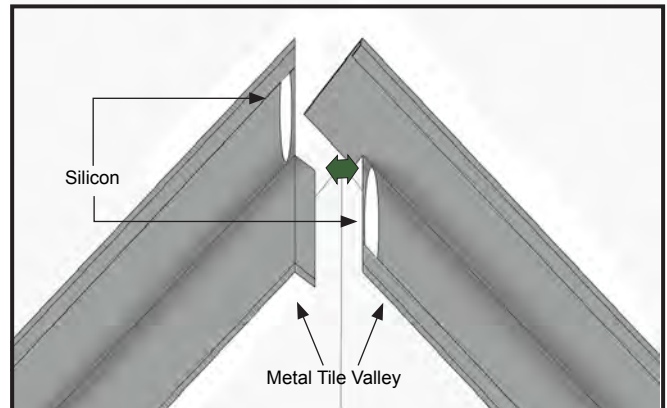


Valley Installation Continued

3.

Valley trays should be cut at the apex of the valley, as depicted in the right-hand picture. Silicon is placed on both trays before they are sealed in place.

The top end of the valley should be turned up against the hip or ridge battens to the height of the batten. Where two valleys meet over a dormer they are cut, shaped, joined and sealed so that they form a continuous valley.



Tile Measuring, Cutting and Bending

Tile measuring, cutting and bending for valleys is carried out as for hips, except that the bends are downwards.

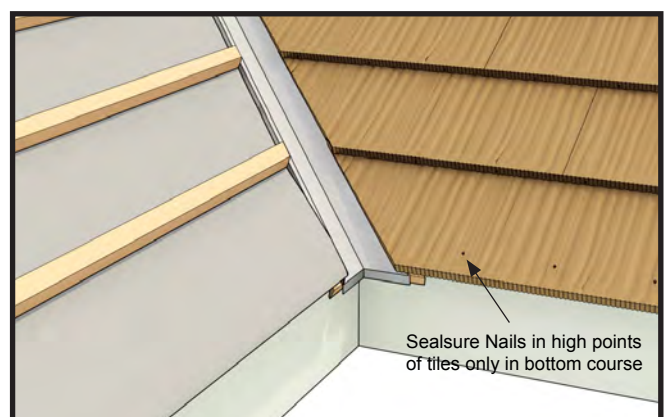
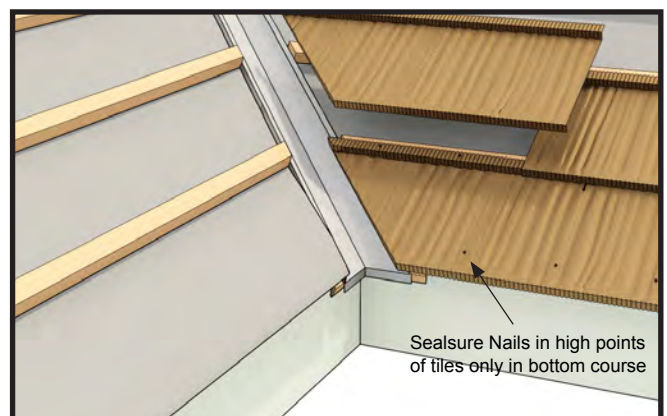
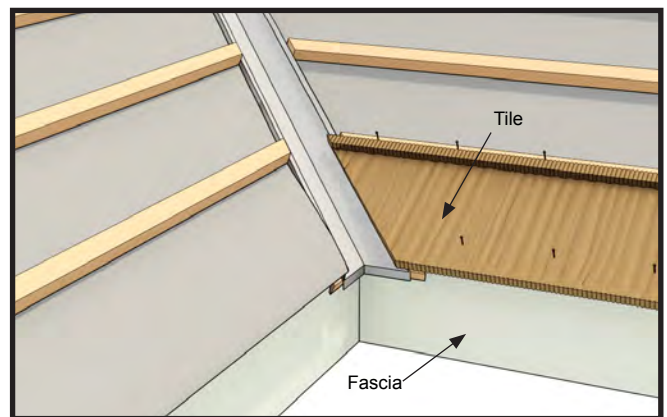
Measure the distance from the last corrugation of the installed tile to the desired finished tile line in the valley (approximately 40mm to each side of the valley centre line). This measurement is done at the top and bottom of the installed tile. This is the **BEND** line. To this measurement, add the depth of the valley from the **FINISHED TILE** line minus 10mm which is the amount the tile will drop into the valley. This is the **CUTTING** line and will result in a tapered downturn.

The tile edge should be bent down to a minimum of 5mm from the valley floor.

Cut with the guillotine and bend down the tile at the bend line.

Install in the normal manner, endeavouring to place one nail as close to the valley as possible to the end of the batten adjacent to the valley tray.

DO NOT nail in the valley itself.

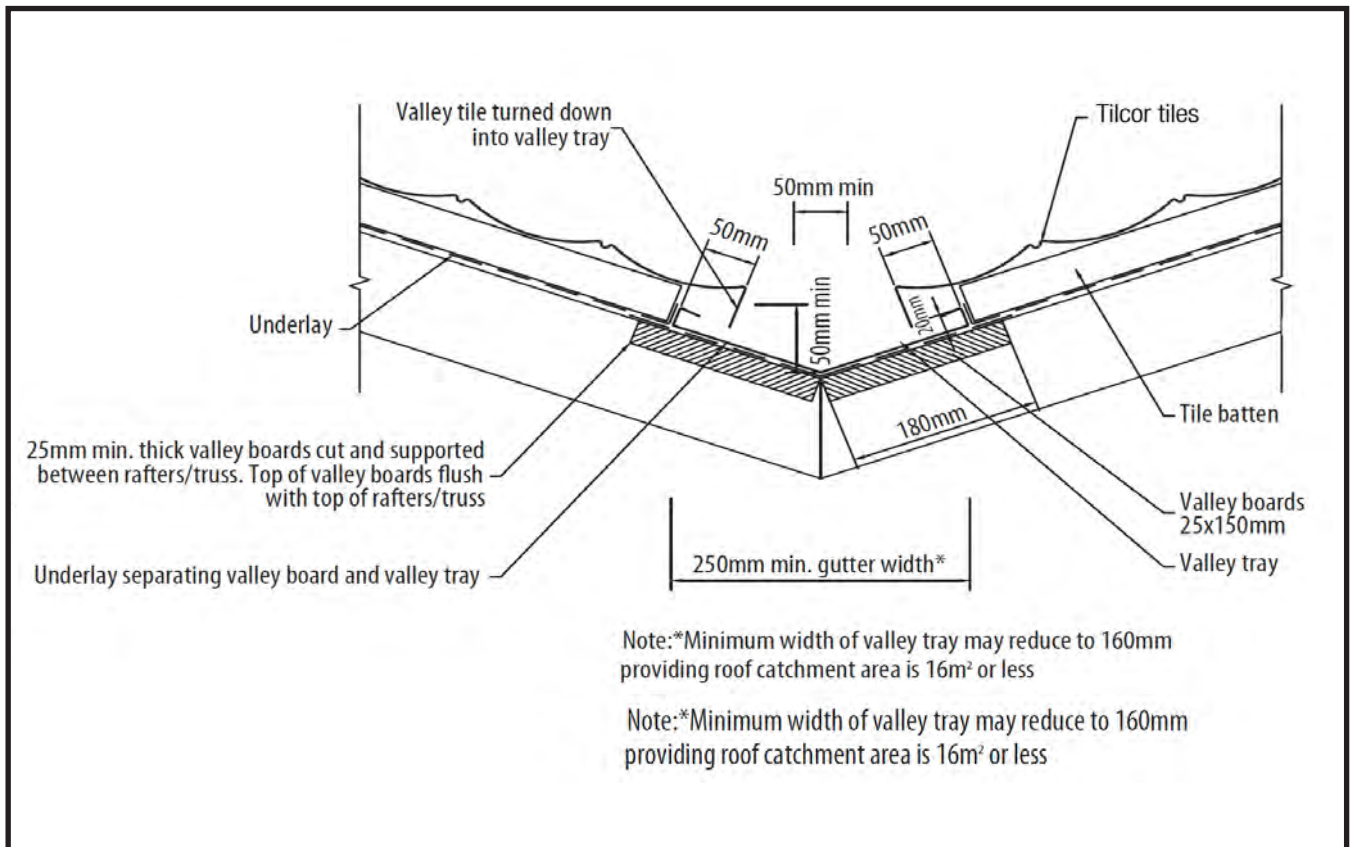


Valley Installation Continued

7.

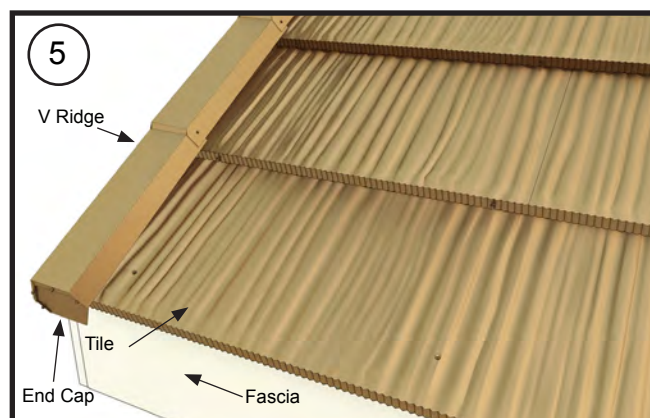
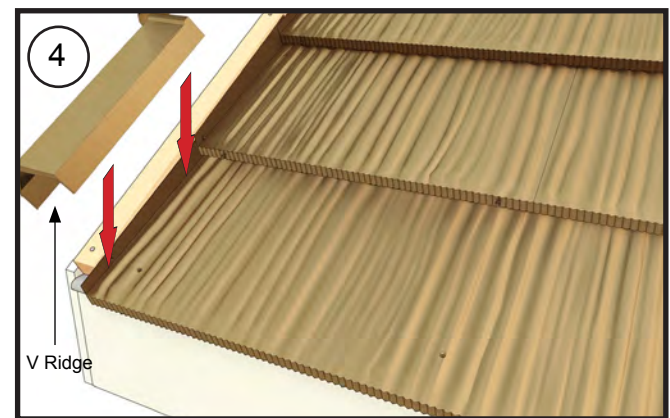
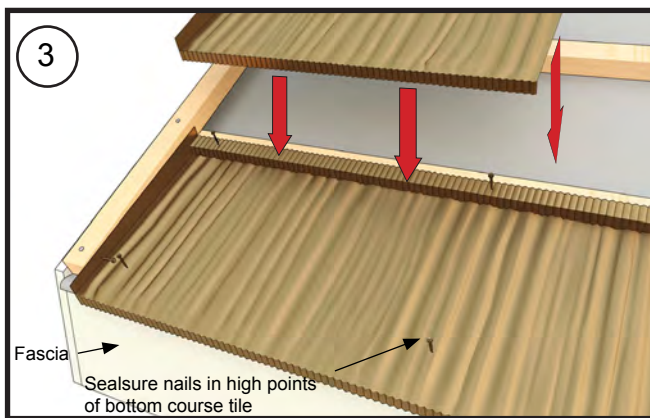
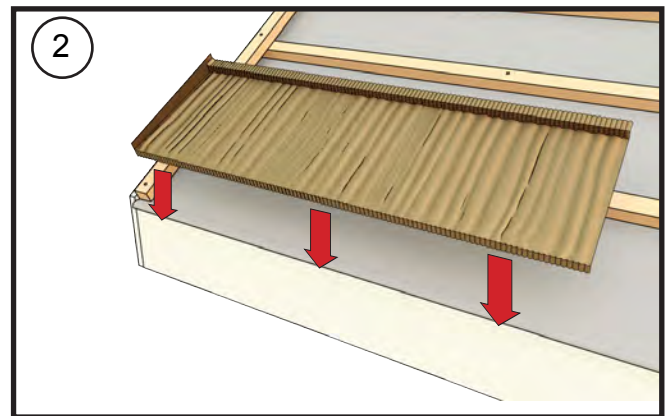
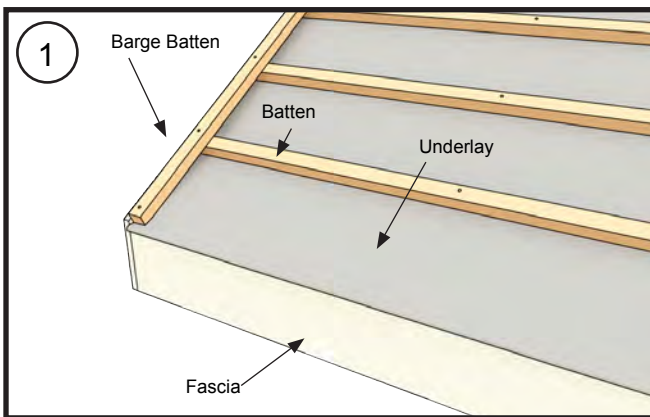
The gap between tiles on opposing sides of the valley must be a minimum of 50mm.

Valley boards must be treated H3.2 and must be separated with underlay between any tile or flashing and the treated timber.



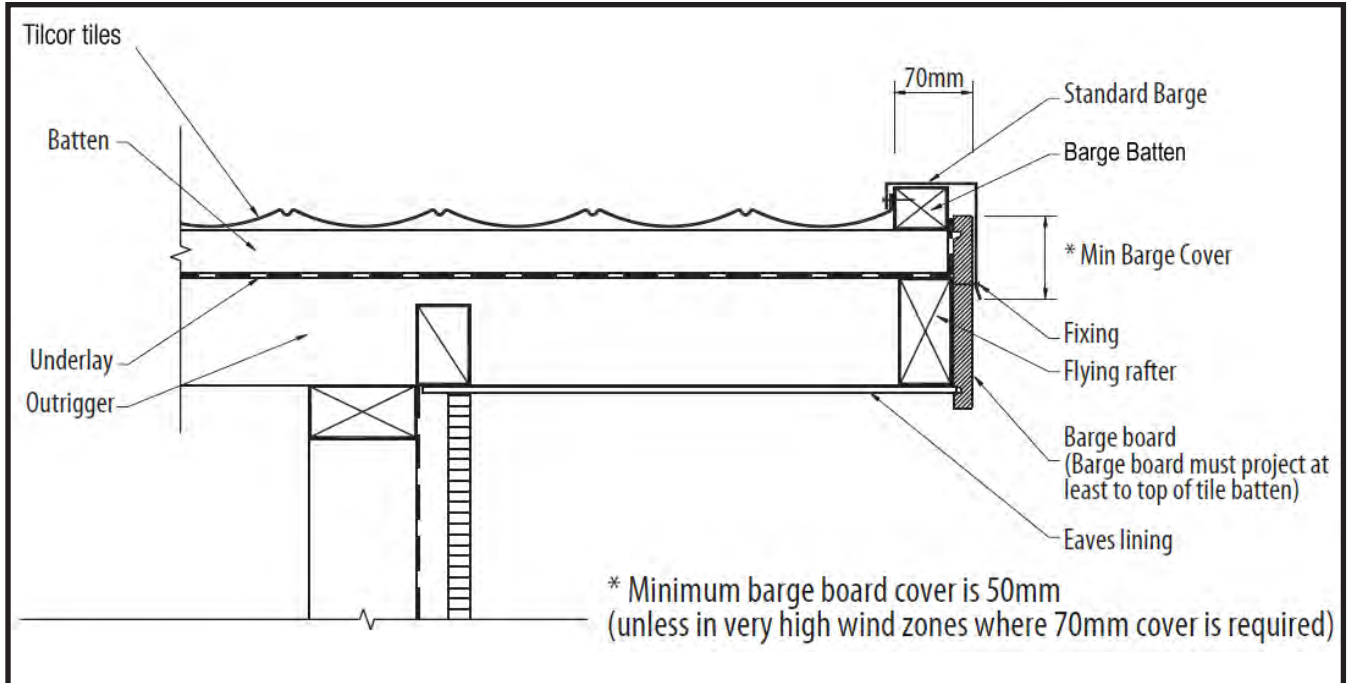
Gable Installation (Tudor, Shake and Royal)

Tile ends are turned up a minimum of 40mm and installed against the barge batten that is covered by a Standard Barge, Barrel Trim or V Ridge (as shown). Alternatives include under a metal fascia system where there is no barge batten or a hidden gutter. Where a hidden gutter is used, tile edges should be turned down into the gutter by a minimum of 20mm.

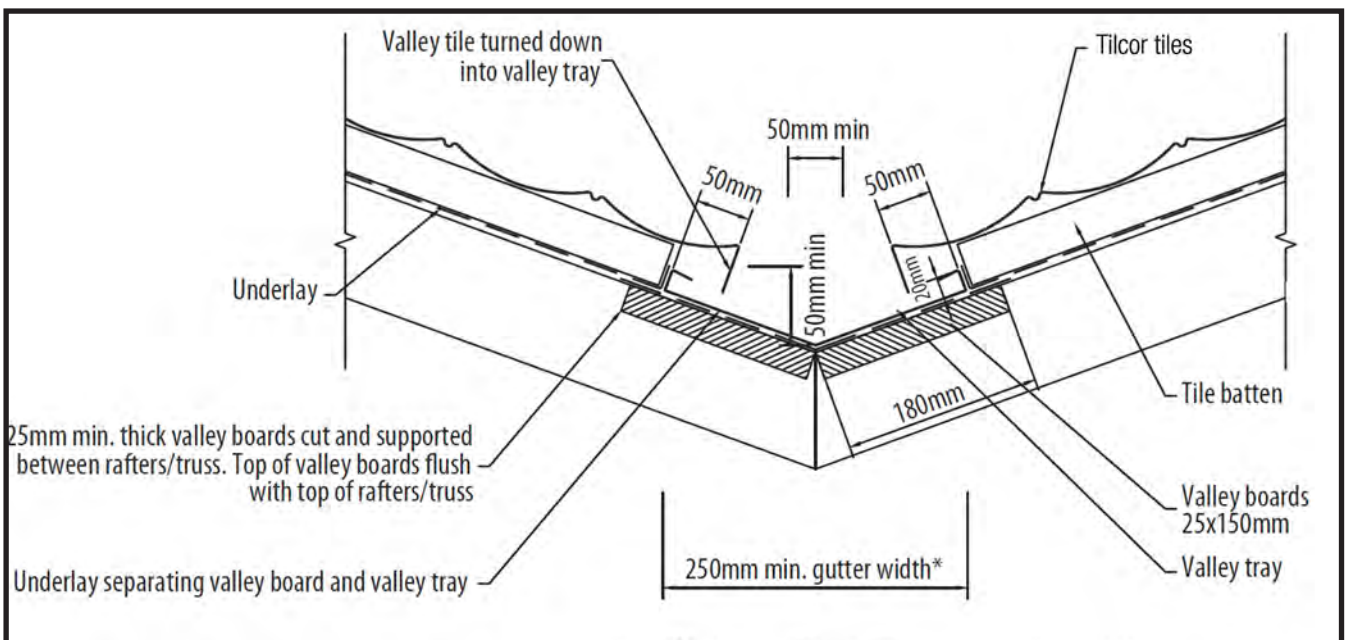


Gable Installation Continued

Standard barge Timber Fascia

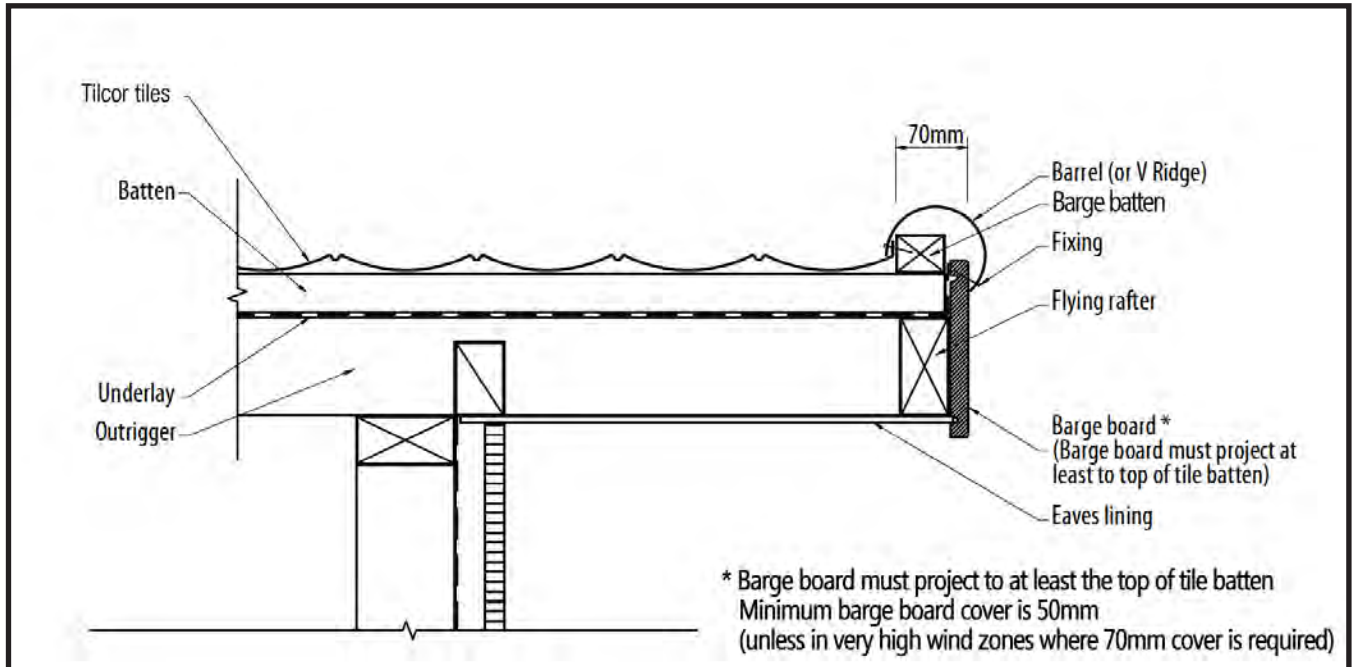


Barrel Trim (shown) or V Ridge Timber Fascia

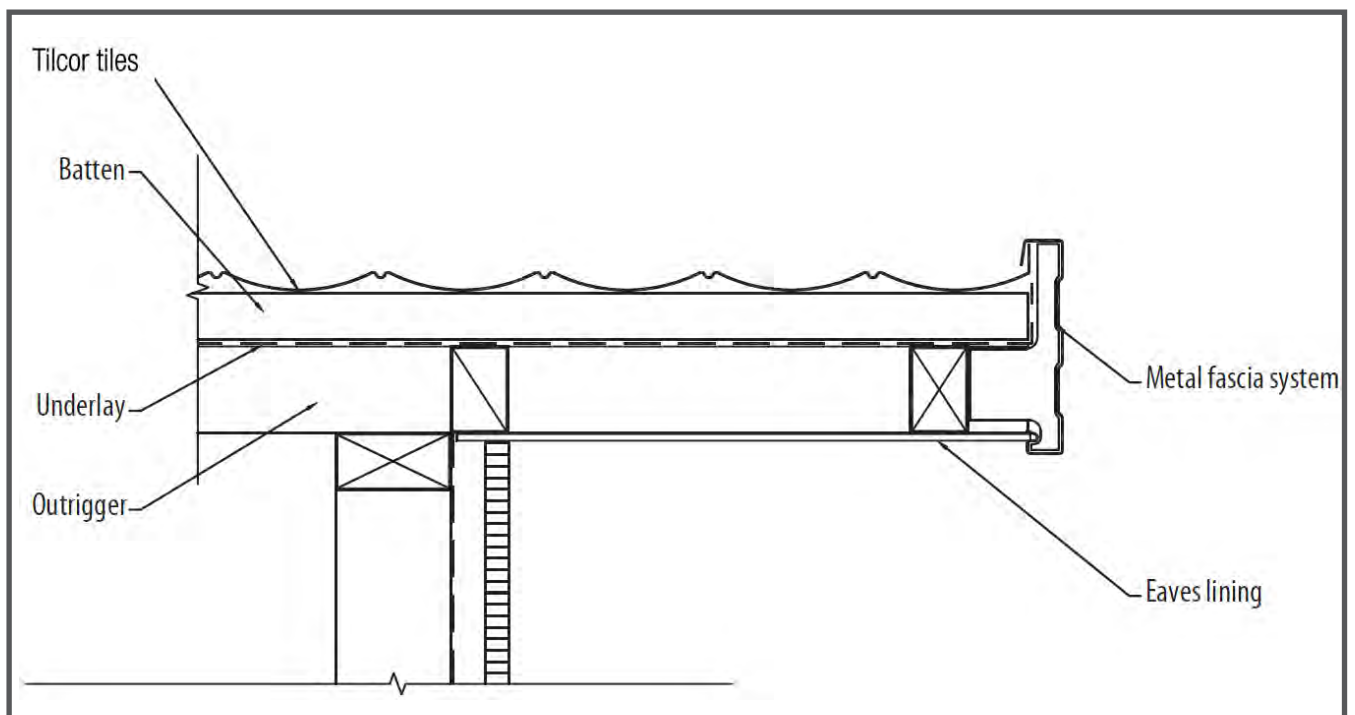


Gable Installation Continued

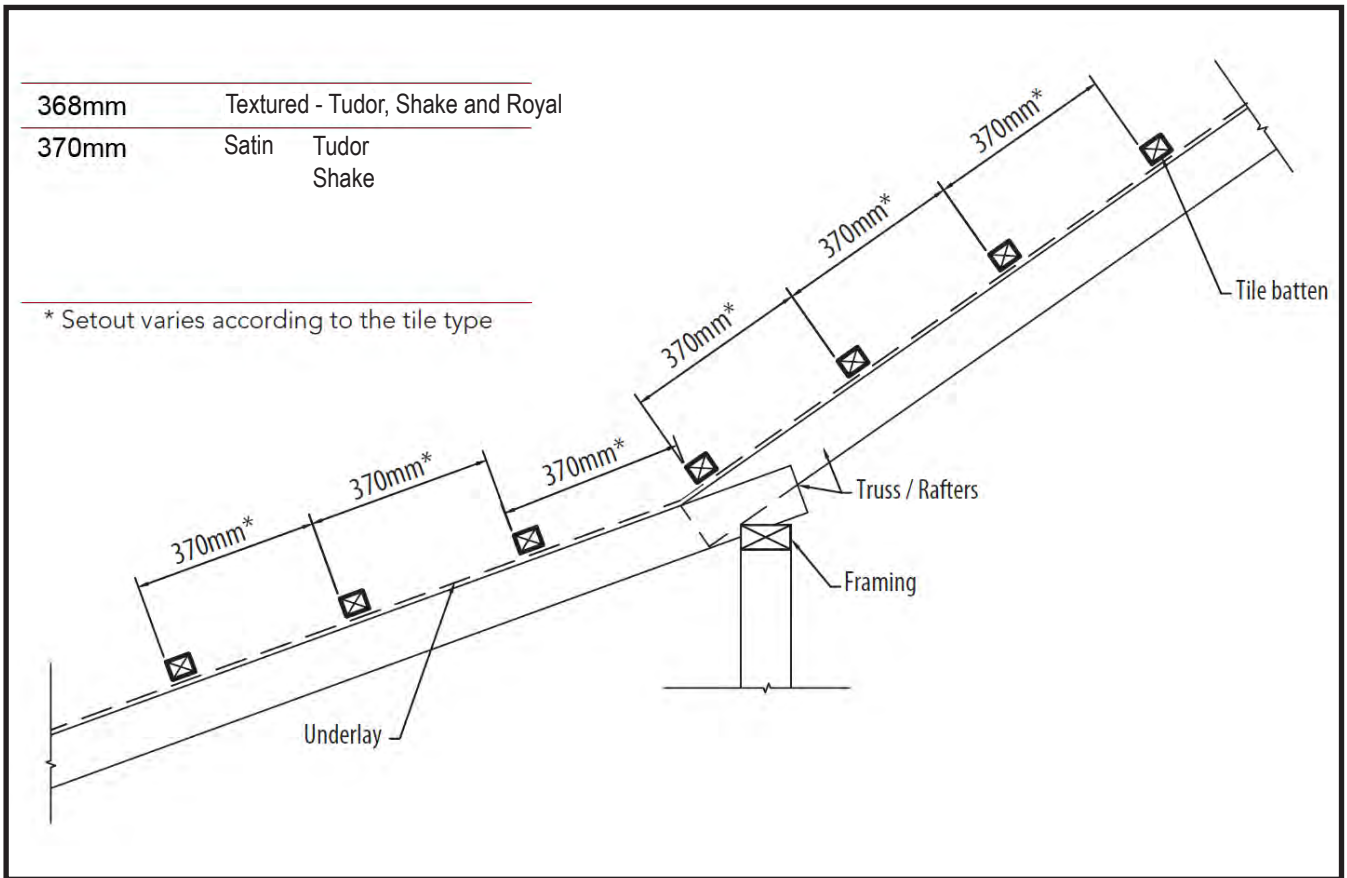
Barrel Trim (shown) or V Ridge or Standard Barge to Metal Fascia



Turn Up - Metal Fascia

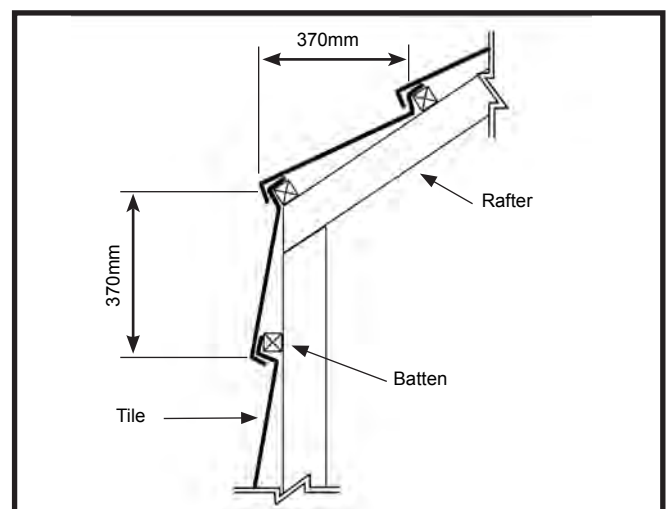


Mansard Roof Including a Change of Roof Pitch



Batten set out follows pitch change

As illustrated, where the roof line changes pitch, a batten is placed at this point. In situations where you have a pitch change and a specific number of full tiles cannot be laid down, it is suitable to bend a full tile lengthwise to compensate.

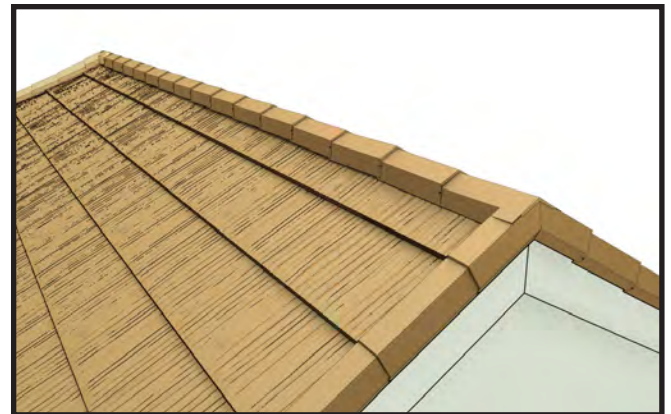
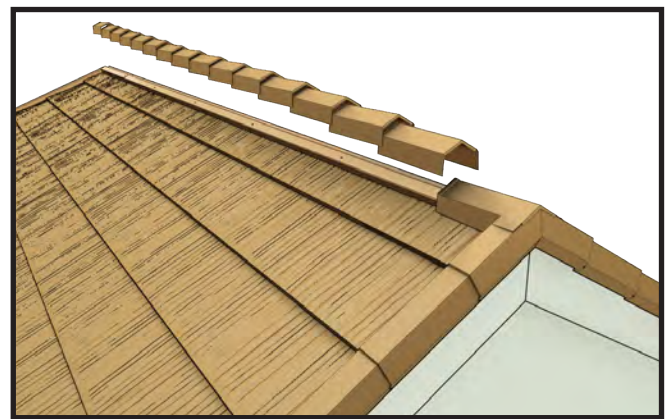
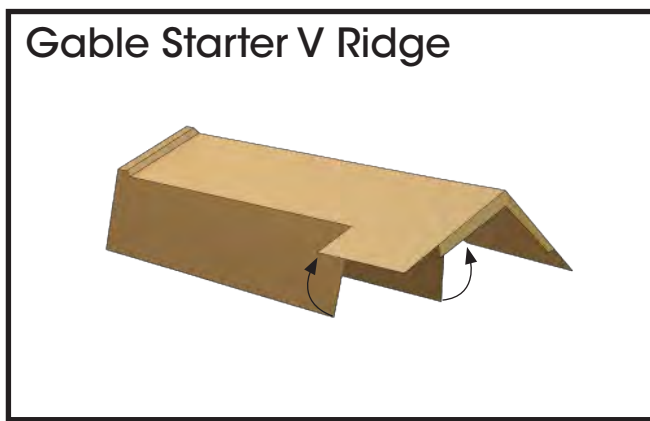


Ridge Installation

It is recommended to fit the V Ridge or Barrel Trim up all hips and gables before moving to the ridge. The starting and finishing trim on the ridge must be lapped over the hip or gable trim with silicon applied under the lap to create a waterproof seal. To ensure a watertight joint and prevent the ingress of water, a tight fit is required between the tile and the ridge cap.

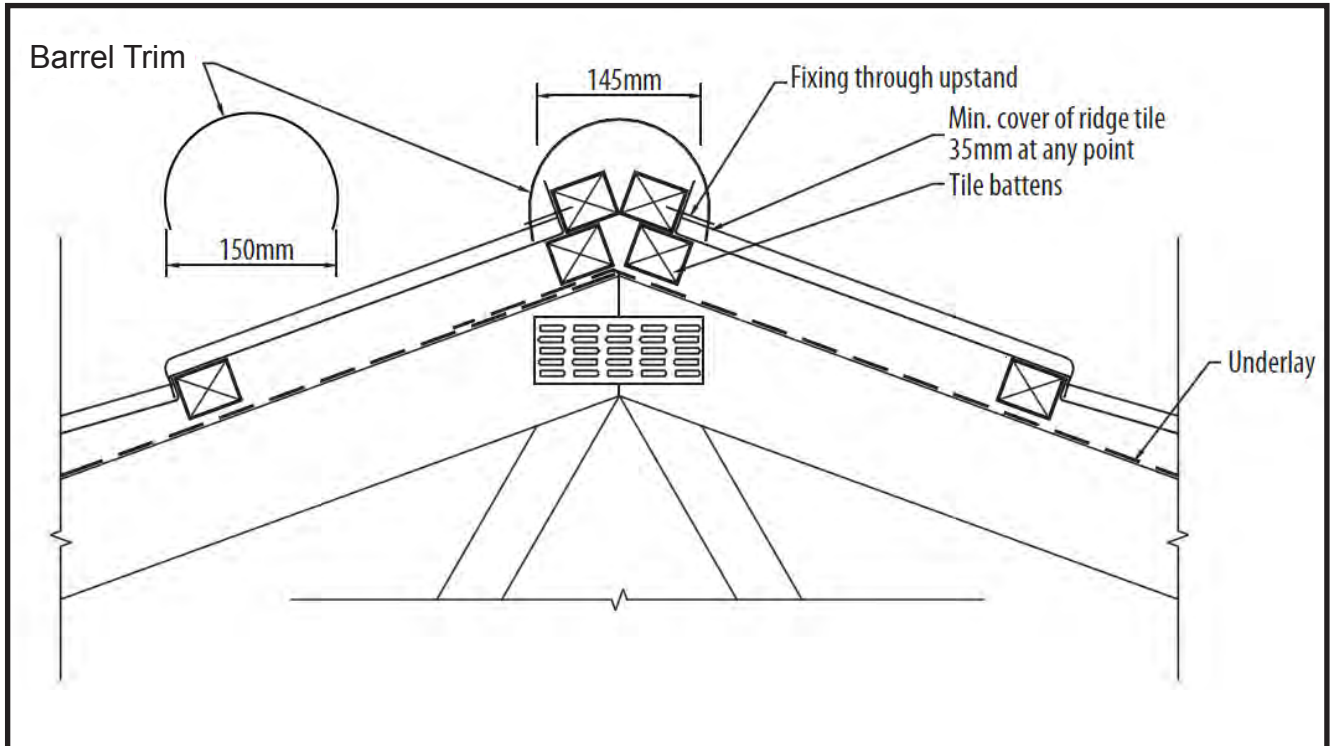
Note: Tiles must be turned up a minimum of 40mm against the batten, hip board or where they butt against a vertical or an inclined surface.

The ridge trim can be fixed through the side of the trim using fasteners. It is also recommended that the silicon spots be covered for aesthetic reasons using the Touch-Up Kit.

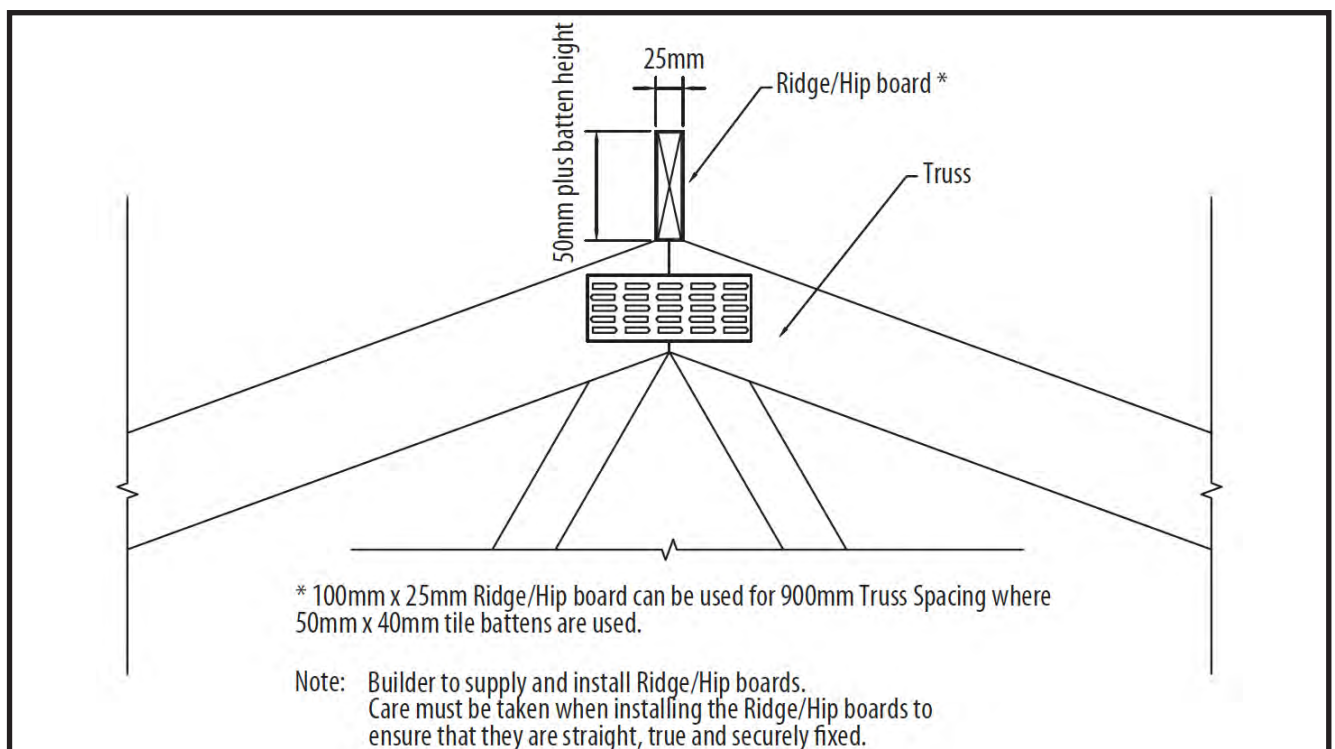


Ridge Installation Continued

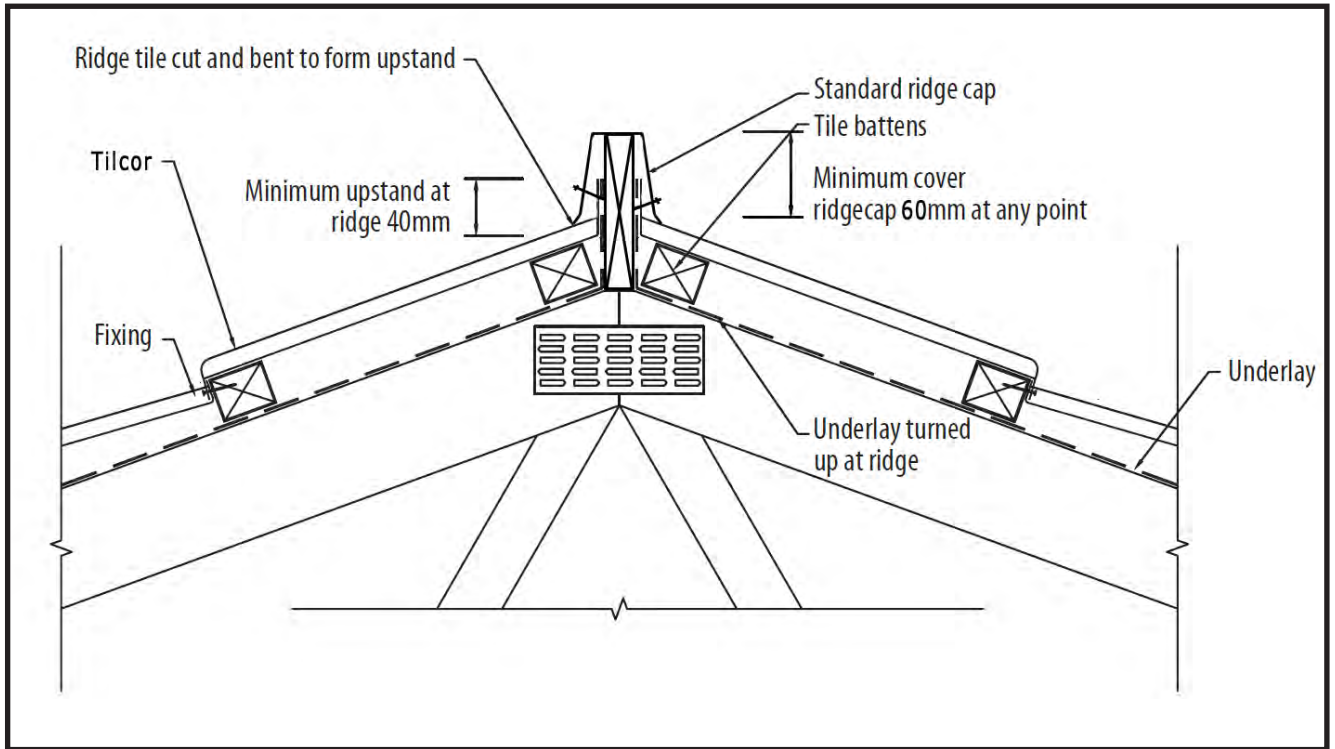
Barrel Trim (shown) or V Ridge



Standard Ridge

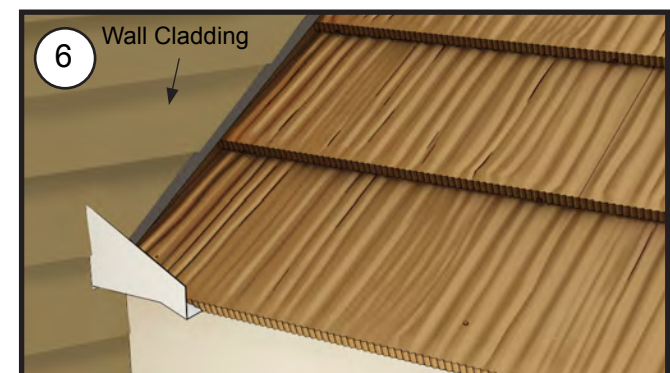
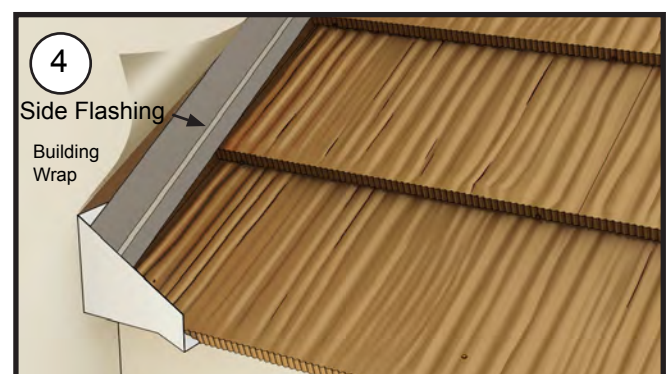
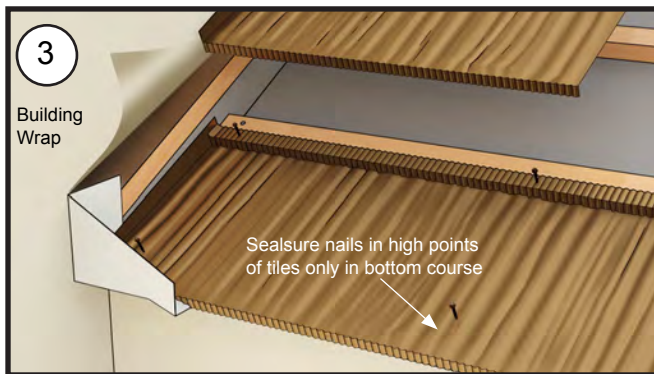
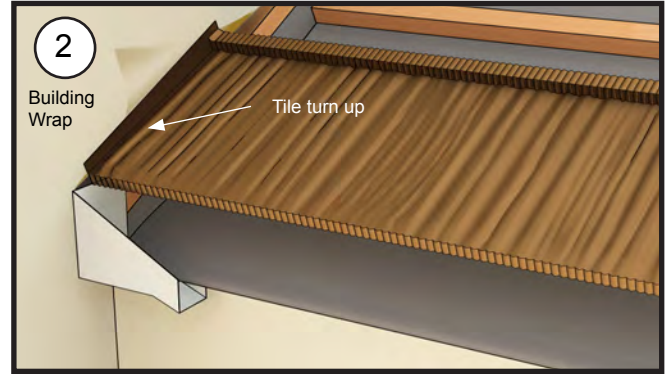
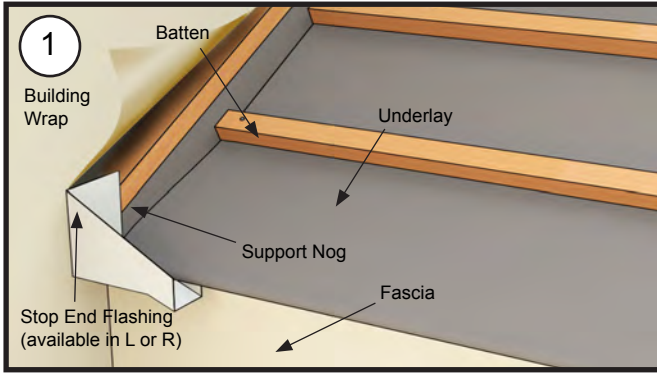


Ridge Installation Continued

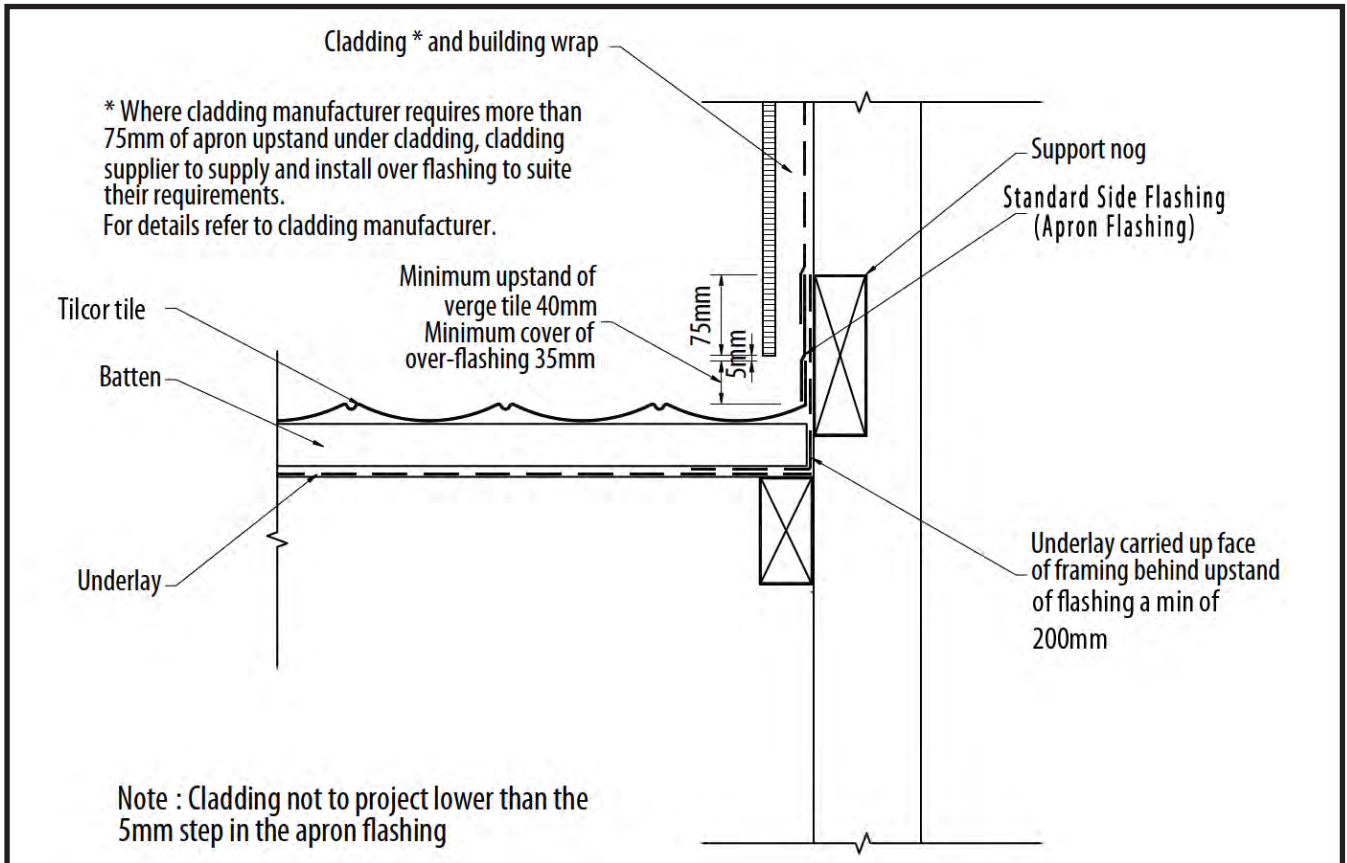


Sidewall Installation

Flashings at the ends of roofs, where the wall continues past the roof, require a stopend flashing that ensures water is directed into the gutter. Sufficient material should be left standing out from the wall so that cladding installers can ensure a weather secure finish.



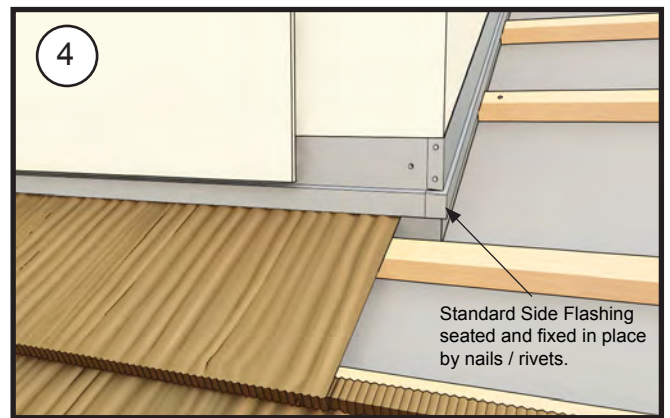
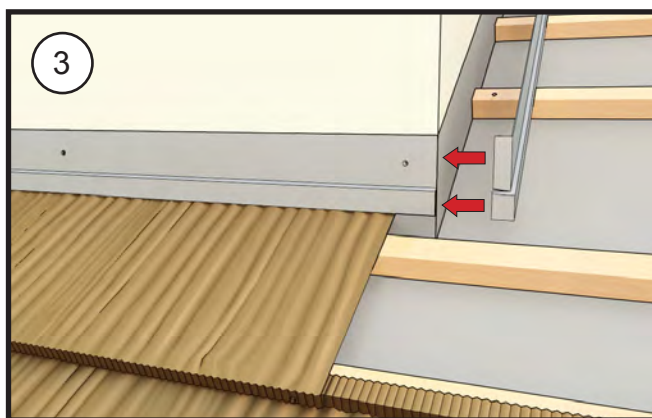
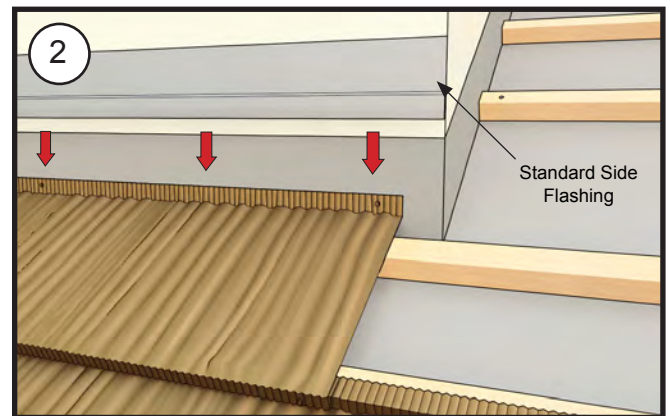
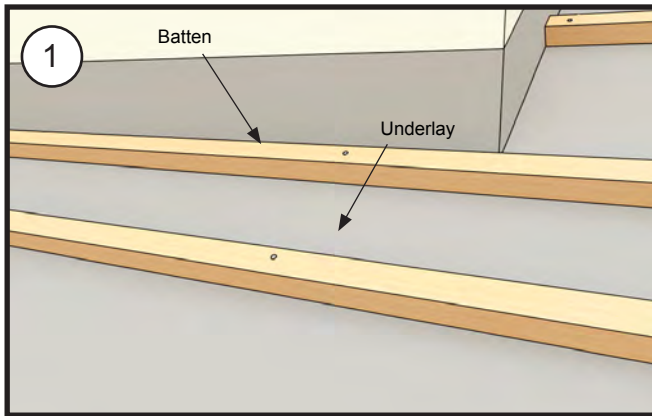
Sidewall Installation Continued



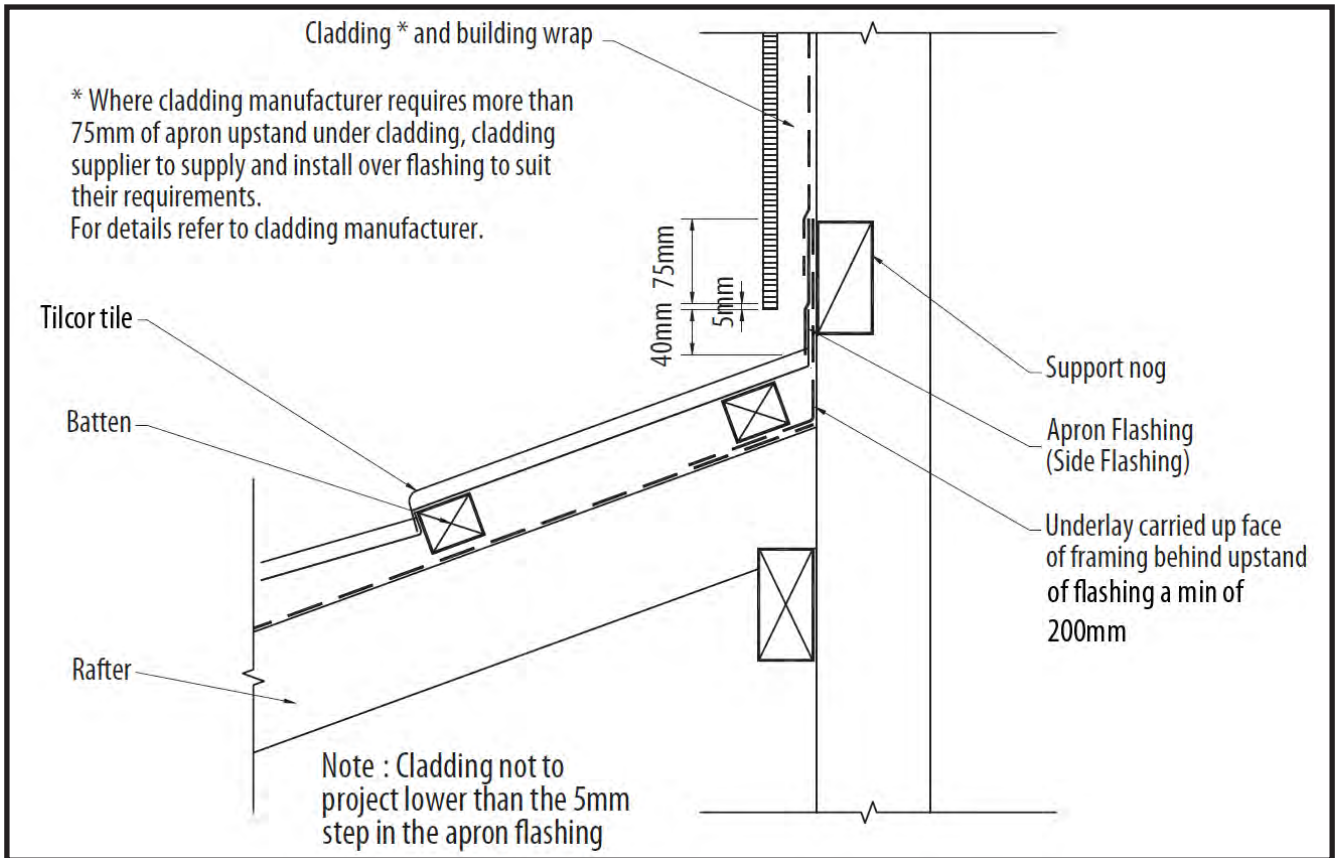
Headwall Installation

The wall cladding flashings must be positioned before the tiles and must be designed so that the turned up tile can be inserted behind the flashing.

Note: All preparatory work of under-flashing, fixing of eaves, gutters and valley gutters must be completed and all tiling battens must be in place before laying tiles.



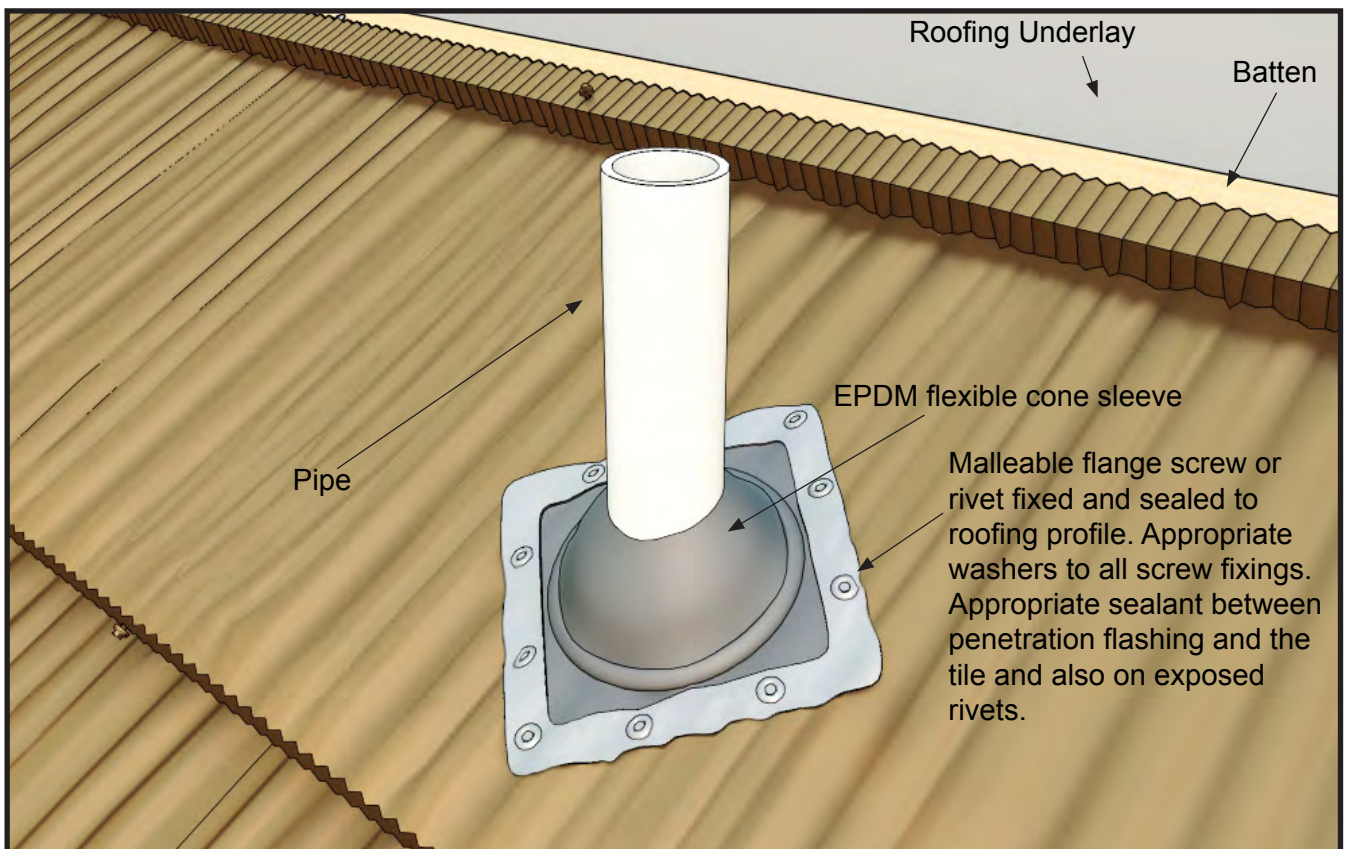
Headwall Installation Continued



Penetration Installation

Roof penetrations shall be flashed as follows:

- a) Pipe penetrations up to 60mm shall be flashed using an EPDM boot flashing as shown in below figure.





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