

# SECTION 5 INSTALLATION



THIS MANUAL HAS BEEN PREPARED BY CSR ROOFING TO ASSIST THE BUILDER, THE ARCHITECT AND THE INSTALLER TO SPECIFY, DETAIL, PREPARE AND INSTALL ROOF TILES. WHILE IT IS NOT POSSIBLE TO LIST AND DETAIL EVERY CONDITION THAT MAY BE ENCOUNTERED, CSR ROOFING WILL ASSIST AND ADVISE ON ANY SPECIAL SITUATIONS THAT MAY OCCUR.

# CONTENTS

BATTENS	1
BEDDING AND POINTING	1
SARKING/UNDERLAY	2
LAYING OF TILES	4
SECURING OF TILES	5
SECURING ACCESSORIES	6
CARING FOR YOUR ROOF	11

## LAYING TILES

Tiles should be laid and secured in accordance with AS 2050 and NZS 4206 “Installation of Roof Tiles.”

This section details CSR Roofing’s security installation specifications. These specifications have been developed from regional experience, research and practical application, in context of the following relevant Building Codes and Standards:

- a) AS 2050 “Installation of Roof Tiles”
- b) AS/NZ4200.2 “Installation of materials suitable for use as Pliable Building Membrane”

While regional variations exist, your roof tiling contractors will:

1. Install an appropriate fall protection system to meet Occupational Health and Safety guidelines (subject to regional practice)
2. Install tile battens
3. Install sarking or underlay (as required)
4. Install tiles and accessories using a recommended security method
5. Bed and point ridge and hip joints
6. Install fire-resistant batts over party walls (as required)
7. Fix anti-ponding boards (subject to regional practice)
8. Clean the roof of footmarks and loose debris

# BATTENS

The installation of battens to rafters must comply with the loading requirements of Clause 1.4.1 of AS 2050.

## SECURITY FIXING TO RAFTER

- >> Fixing for tiles to battens and for battens to steel frame should be non-ferrous stainless steel or steel with an appropriate corrosion-resistant coating
- >> Clout nails must comply with AS 2334 and NZS 4206, have a minimum diameter of 2.8mm, and have a minimum penetration of 15mm into the rafter (or 18mm in New Zealand)
- >> Self-drilling screws used to fix battens must comply with AS 3566 and NZS 4206

## JOINTS IN BATTENS

Batten joints should be staggered over the roof so that three consecutive battens (NZ – 2 consecutive battens) are not jointed on the same rafter. All joints in battens must meet in the centre of trusses or rafters, and not be joined over girder trusses. Battens should be nailed.

## HIP AND VALLEY JOINTS

Where battens intersect with hip board and valleys provide firm support.

## STEEL BATTENS

Refer to the steel batten suppliers for the technical fixing specification. Particular consideration should be paid to batten spacings as battens may be installed by trades other than the roof tiler.

# BEDDING AND POINTING

## BEDDING MORTAR MIX

Australian Standard 2050 Installation of roof tiles requires as a minimum..

“Cement mortar for bedding (1:4) 1 cement, 4± 0.4 sand.”

The use of other additives such as “Lime, Fire clay” is permitted at the following ratios:

- >> Lime composition bedding mortar (1:1.6).. ...1 cement, 1± 0.25 lime, 6± 0.6 sand.
- >> Fire clay when used, replaces an equal amount of sand therefore, if 1/2 a measure of fire clay is used the ratio would be (1: 0.5: 3.5) ...1 cement, 0.5± 0.005 fire clay, 3.5± 0.3.5 sand.

**Fire clay is not a replacement for cement.**

The use of plasticizer's and products that aerate mortar is not permitted as these products weaken the mortar.

## POINTING MORTAR

Cement mortar bonding shall not be used as the mechanical fixing method. It can be used however in conjunction with some other form of mechanical fixing.

- >> Pointing mortar when used shall be 3-1 mix, 3 clean sharp sand, 1 cement, with oxides or pigments to suit.
- >> Flexible, premixed pointing is available and in most cases is rated as a mechanical fixing. Check with the manufacturer for confirmation of status.

## BEDDING AND POINTING

The pointing should be neatly trowelled, with an even finish throughout. Collar/cuffs should be pointed (if Flexible pointing is the mechanical fixing then it is mandatory to point collars/cuffs.)

# SARKING/UNDERLAY

## SARKING/UNDERLAY HAS TWO KEY PURPOSES:

- a) the reflective foil finish acts as a radiant heat barrier, reflecting up to 95% of radiant heat
- b) where tiles are broken or become dislodged, Sarking/Underlay acts as a secondary barrier to water entry, particularly at lower roof pitches. As such, Sarking/Underlay is mandatory on roofs with long run rafters or low pitch.

Sarking/Underlay is a reflective, water resistant foil laminate material (or self supporting building paper in NZ) that sits snugly beneath the batten of a tiled roof. Underlay is a pliable building membrane that sits snugly beneath the batten of a tiled roof.

## RECOMMENDATIONS

There are a number of circumstances where the use of Sarking/Underlay is recommended, or mandatory:

- >> Where local regulatory authorities suggest extreme weather conditions are probable i.e. cliff tops, open exposed sites or bushfire prone areas
- >> In bushfire prone areas, to prevent embers entering the roof space
- >> Where design wind velocity exceeds 41m/s (ie. greater than C1 or N3) and 44m/s in NZ.
- >> Immediately underneath and extending to the gutter around solar hot water collectors

- >> Where condensation may be an issue
- >> To minimise the build up of dust in the ceiling cavity
- >> At the change of roof pitch joint from that joint to the eaves gutter
- >> Where rafter length exceeds 4.5m at minimum pitch
- >> Under raked ceiling or exposed rafters

For Australian conditions, CSR Roofing recommends the use of a medium duty polymer based material known as Enviroseal, manufactured by CSR Bradford. CSR Bradford Enviroseal is designed specifically for Australian conditions and exceeds the requirements of AS/NZS 4200.1 Pliable Building Membranes

The advantages of Enviroseal are:

- >> resistance to tearing
- >> acts as a vapour barrier
- >> significantly increased strength over paper-based Sarking/Underlay

- >> significantly increase life of the Sarking/Underlay
- >> one side is treated with anti-glare surfacing reducing reflection
- >> maximum flammability index rating of 5

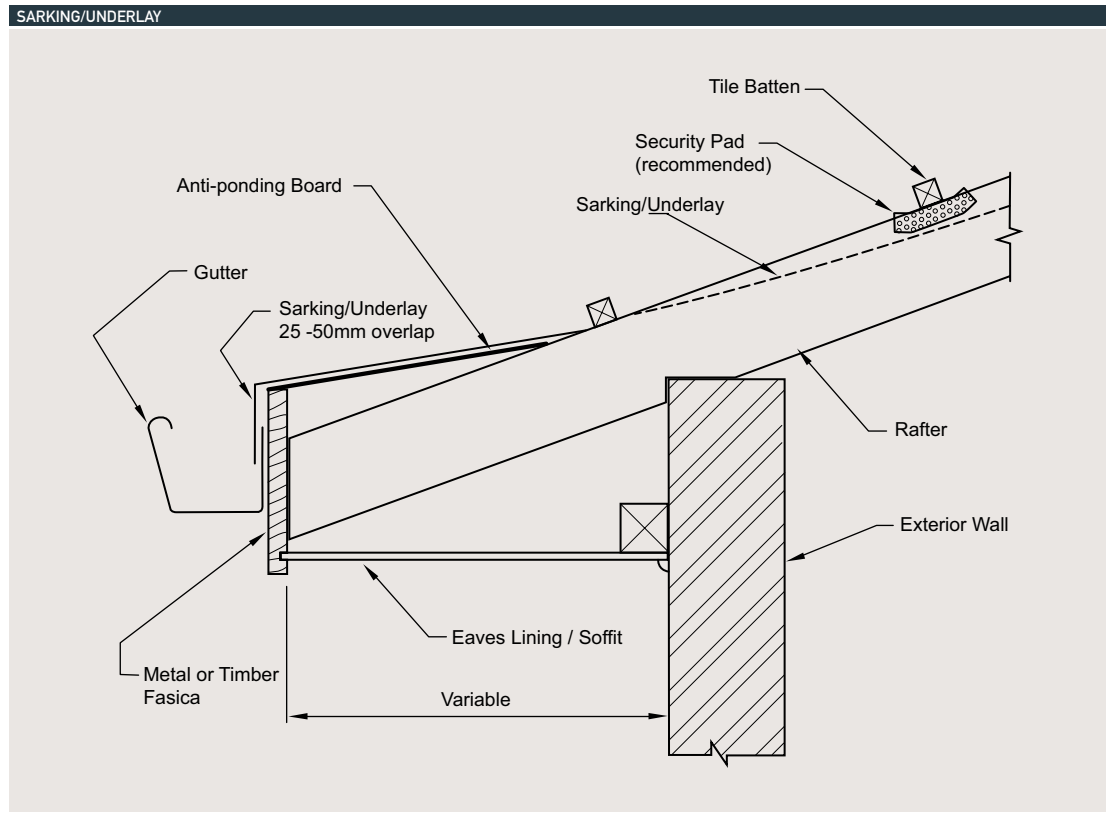
CSR Roofing recommends the use of Sarking/Underlay in all roofs.

## Laying

The reflective side of Sarking/Underlay should be laid face down.

## Over-lapping Sarking/Underlay

Sarking/Underlay should overlap not less than 150mm, ensuring the upper layer rests over the top of the lower layer of Sarking/Underlay. At the end of a roll of Sarking/Underlay, the layers of Sarking/Underlay should overlap by a minimum of one rafter spacing. Sarking/Underlay should sag no more than 40mm between the rafters.



**Obstacles in the Roof**

**Hot Flue:** The Sarking/Underlay should be cut back, allowing a clear space of 50mm

**Penetrations:** The Sarking/Underlay should be turned up and sealed to divert water from any projection in the roof. Where a fascia batten is used in place of a fascia board and there is no gutter, the Sarking/Underlay material should be neatly cut back to the outside edge of the fascia batten.

**Use of Security Pads**

To avoid constant flexing and to increase the life of the Sarking/Underlay material the use of security pads or anti-flap pads is recommended. Security pads should be installed in a staggered pattern under each second row of battens between each pair of rafters.

**Sarking/Underlay at Eaves**

To allow effective run off into gutter, Sarking/Underlay should extend over the fascia board by a minimum of 25mm and a maximum of 50mm.

**Sarking/Underlay Support**

Subject to regional specifications, an approved anti-ponding board is recommended on roofs with a low pitch. (Refer to the prior section on Anti-Ponding Boards.)

Where rafter centres exceed 600mm, the Sarking/Underlay should be adequately reinforced. Where the rafter centres exceed 900mm, supporting the Sarking/Underlay or using an approved heavy grade Sarking/Underlay becomes mandatory. Installation

of Sarking/Underlay support or safety mesh is performed by other trades as referred to in AS 2050 Appendix B.

**Sarking/Underlay at Valleys**

Sarking/Underlay is held in place by fixing a valley batten parallel to the valley gutter. The Sarking/Underlay should overlap the valley by no more than 25mm or be rolled over or cut at the valley batten. If Sarking/Underlay projects too far into valley the roof is likely to leak.

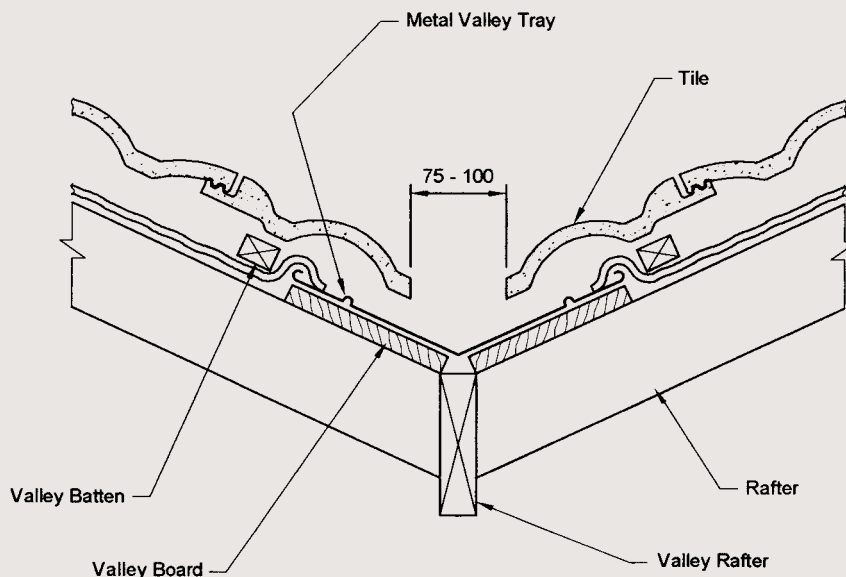
**INSTALLATION**

Sarking/Underlay must be installed to CSR Roofing fixing specifications, in accordance with AS/NZ 4200.2.

Sarking/Underlay is mandatory where wind exceeds 41m/s or N3 as per AS2050



**VALLEY**



# LAYING OF TILES

Tiles should be laid and secured in accordance with AS 2050 and NZS 4206.

## LOADING

The entire roof must be battened and sarked before tiles can be loaded onto the roof.

In buildings with exposed rafters, or a rafter length greater than 6m, tiles should be loaded onto the structure from each side to ensure their weight is evenly distributed.

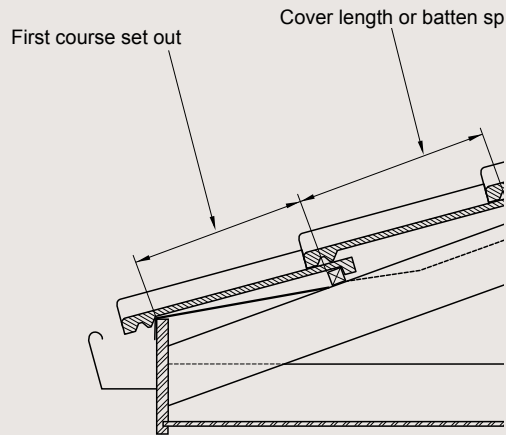
## FIRST COURSE

The first course of tiles should project approximately 50mm over the fascia and into the gutter.

## LAYING

All tile courses should be aligned horizontally, vertically and diagonally, to ensure a straight finish at the roof edge and to achieve the best look for the roof.

TILE SET OUT



STRAIGHT BONDED



CROSS BONDED



# SECURING OF TILES

## TILE CLIPS

CSR Roofing security fixing system includes a variety of clip fittings.

### 1 Standard Tile Clip

The Standard and Heavy Duty clip, available in either galvanised or plastic.

### 2 Eave tile Clips

Eaves clips reduce the possibility of tiles lifting at the eaves in high wind areas.

### 3 Steep and Vertical pitch

All tiles should be mechanically fixed between pitches of 40–70 degrees. “Mechanical fixing” may be achieved through nailing every tile, screwing every tile or clipping every tile. The specific method used varies by region. It is recommended that local advice is sought.

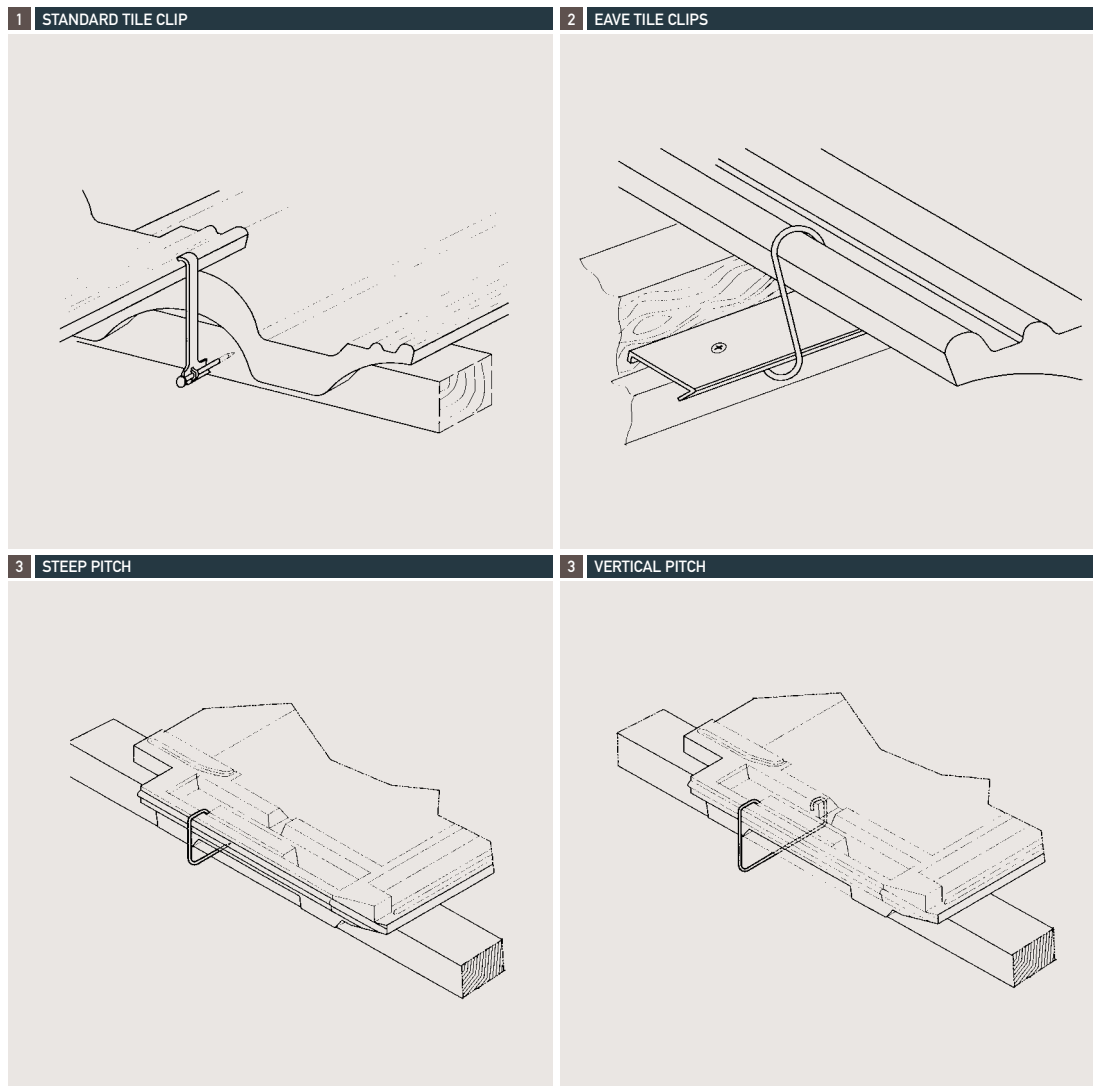
In extreme conditions, clips is the preferred method of mechanical fixing in Australia.

Tiles at pitch greater than 70 degrees must be double mechanical fixed and sarked.

## NAILS

Nails should be non-ferrous or galvanised, of 2.8mm diameter, with length to penetrate the rafter at least 15mm (18mm in New Zealand). The nail requirements relevant to the timber used and wind loadings are specified in AS 2050.2.4. and NZ 4206.

CSR Roofing’s Security Fixing system also offers the use of standard and heavy duty clips, eaves tile clips, screws and adhesives. The additional requirements relating to their application in Sections 1.34, 1.43 and 2.4 of AS 2050.





# SECURING ACCESSORIES

## ACCESSORY TILES

After the main roof tiles have been laid, the installation of accessory tiles can commence. CSR Roofing manufactures various types of accessories, as detailed in the Product Sections of this manual. All junctions of hip and ridges must be made weatherproof. Accessories available for installation are dependent on the profile, the pitch and the position of the join in the roof.

## LAYING

All ridge and hip tiles must be laid in a straight line, allowing for the natural contour of ridge tiles. The over-lapping of ridge tiles should be directed away from the prevailing winds.

## Ridge

The ridge tiles are initially laid onto a bed of mortar and finished with flexible pointing material.

## Hip

A hip begins with a Hip Starter or Shell End, positioned on a bed of mortar at the lower end of the hip.

The roof tiles at the join of a hip must be cut and laid with a maximum of 20mm between the planes.

A Hip Starter must be laid to project into the gutter, in line with the nose of the first course of tiles. Alternatively a ridge tile can be shaped to replace a hip starter.

## SECURITY FIXING

### 1 Ridge and hip

As specified in Table 3 (Minimum Fixing Requirements for Tiles and Accessories/ Fixing Recommendations), at design wind speeds above 41m/s or 44m/s (in NZ), every ridge tile must be mechanically fixed.

Cut tiles should be supported by galvanised nails spiked to the hip board.

### 2 Steep Pitch

Steep Pitch Ridge tiles are used on roofs pitched in excess of 40 degrees.

A galvanised wire or bitumen-impregnated foam may be used to reinforce the bed and pointing of the ridge, hip or gable.

## RIDGE AND HIP FINISHES

Ridge and hip tiles may be laid using different methods to create varying looks for the ridge/hip line. The following are suggested details suitable for hips.

### 3 Standard detail

### 4 Mitred Hip Detail

Consult your local CSR Roofing office for profiles suitable for Mitred hips.

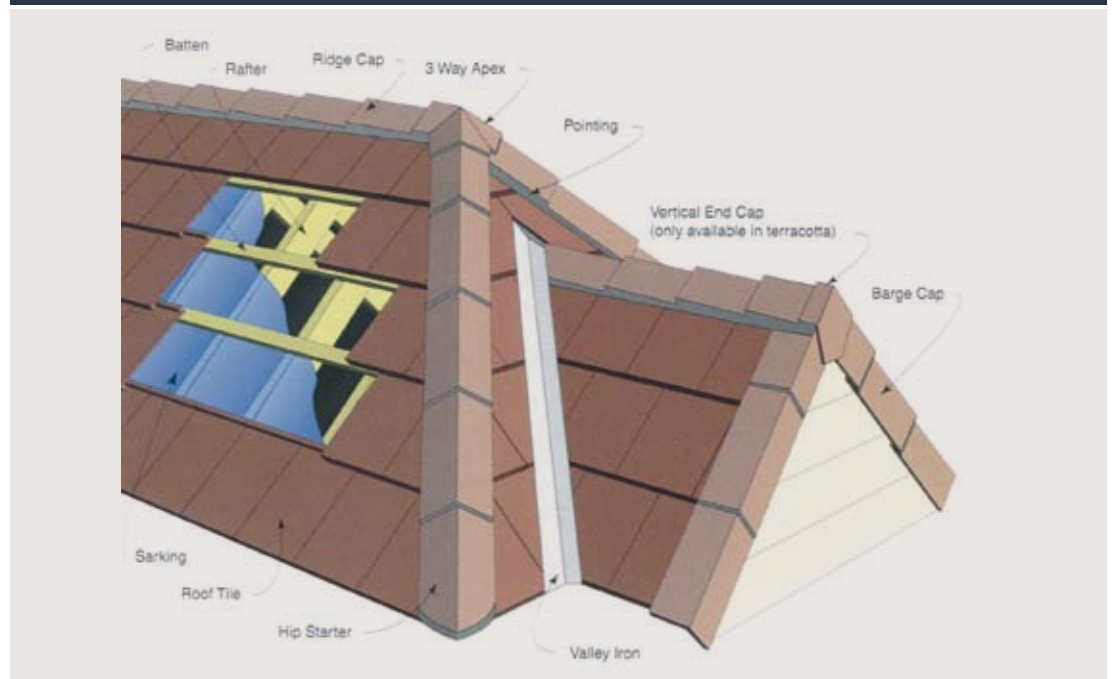
A continuous metal underflashing is installed under the hip tiles.

The underflashing can be in the form of a concealed gutter. All mitred tiles must be machine cut and mitred joints filled with a suitable sealant.

### 5 Butt Joining/A Line

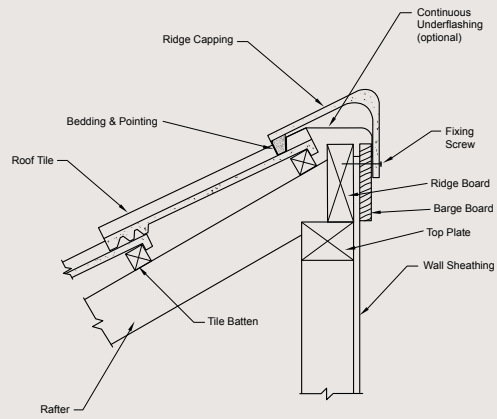
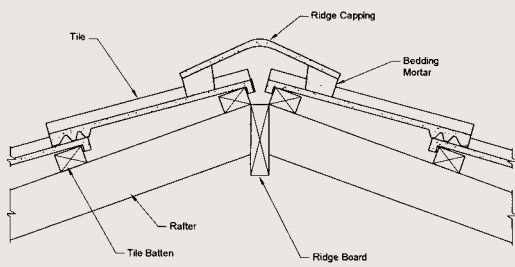
An alternative to conventional, overlapping ridge and hip tiles, butt-joining provides a smooth yet defined roofline. A continuous underflashing is required with this treatment.

## ROOF DETAIL

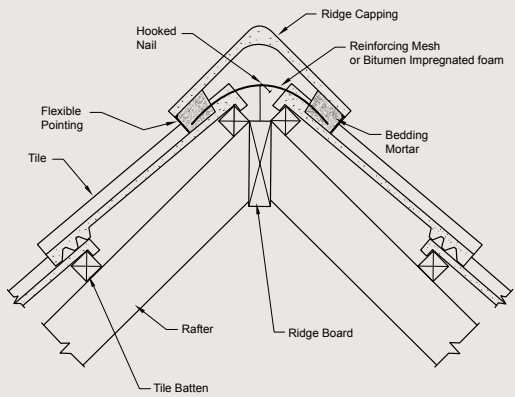




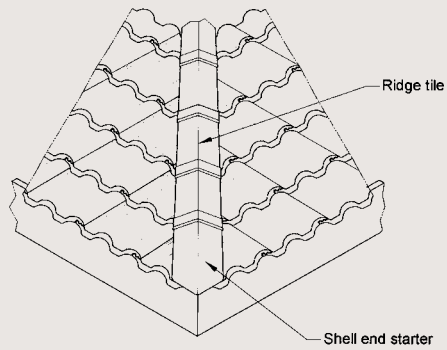
1 RIDGE AND HIP



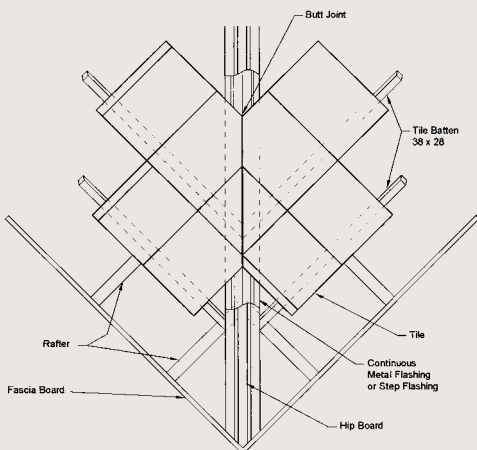
2 STEEP PITCH



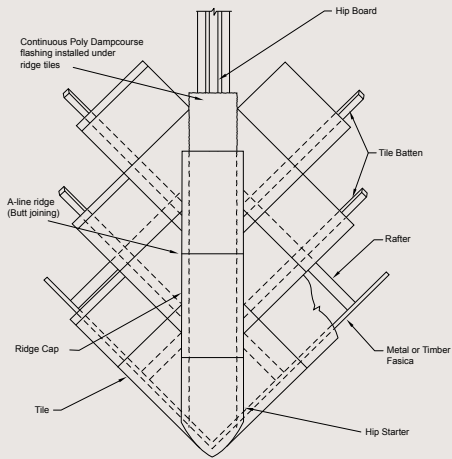
3 STANDARD DETAIL



4 MITRED HIP DETAIL



5 BUTT JOINING/A LINE



## 6 Valley Tile Installation

The valley width is dependent on regional weather conditions.

Under normal conditions, a gap of 75 to 100mm between tiles is acceptable. In high rainfall areas, valley tiles should be sealed with a bitumen impregnated foam. The valley gap may be increased to 100mm.

In high rainfall areas, valley design and downpipe position should be designed to suit the roof as per AS3500.

## 7 Fire Walls/Internal Separating Walls

A fire retardant material should fill the cavity above the fire wall up to the underside of the tiles. In NZ, the fire retardant material and batten is replaced with a fired rated mortar or bedding. Except for 75mm x 50mm roof batten or less, timber or other combustible building element, should not pass through the fire-wall.

## 8 Counter Battening

Whenever a lining material is installed over rafters – commonly referred to as 'Close Boarding' counter battens will need to be installed. This will then ensure sarking/underlay can be laid in accordance with the relevant Australian Standard AS4200.2 and also provide a base for the tile battens to be fixed.

## BUSH FIRE PROTECTION

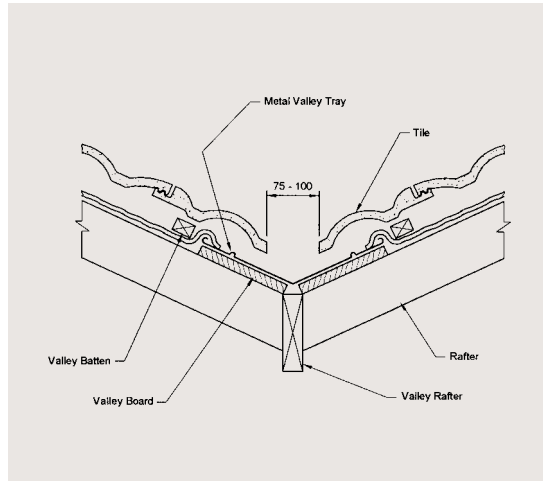
As per AS 3959, additional fixing requirements apply to designated bush fire hazard areas. State authorities, insurers, country fire authorities or related bodies, can identify these high fire hazard areas:

For roofs in these areas,

- » Sarking/Underlay must be used
- » Flexible pointing must be used
- » Every tile must be secured

In Australian locations where high winds are in excess of 41m/s i.e. above N3 or C1, sarking with security pads is recommended irrespective of roof pitch.

## 6 VALLEY TILE INSTALLATION



Where winds exceed 41m/s, sarking is mandatory. In New Zealand, these wind speeds are 41m/s and 44m/s respectively. If further clarification is required, it is advisable to contact your local CSR Roofing office for advice.

## BARGE/GABLE

For gable roofs, it is good practice for roof tiles to finish with equal length of tile at both ends.

A gable end (verge) can be set according to local requirements and exposure conditions, and include:

## 9 Bed and Point Finish

- » Place a fibre cement bedding strip 100mm wide and 5mm thick over the barge board. The bedding strip should project a minimum of 19mm but a maximum of 25mm beyond the face of the barge board. It is recommended that the bedding strip is secured into place with a timber fillet
- » The degree of projection of the bedding strip should be left to the tiler's discretion to ensure finish off with a full tile at all left hand gables (where practical). The underlap of the tile to all left hand gables should be removed.
- » The barge board must be kept flush with the top of the batten. This allows the fibre cement strip to sit level with the top of the batten and barge board.

- » A bedding of cement mortar is placed onto the strip. Tiles with a clean edge are positioned along this bed and pointed with an appropriately coloured flexible pointing. Pointing should be finished with a slight incline toward the outer edge and devoid of trowel marks.

## 10 A+B Barge/Gable Finish

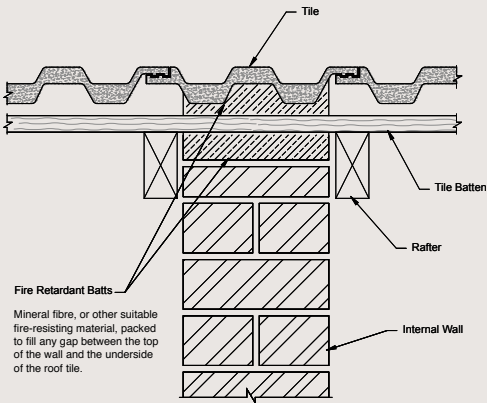
The top of the barge board should be flush with the top of the tilt batten.

Either standard or rounded barge tiles are laid over the gable end (with or without a bedding between the tiles and the barge tile). The lower end of the barge tiles are mechanically fixed (screwed or nailed) according to local specification into the barge board or brickwork.

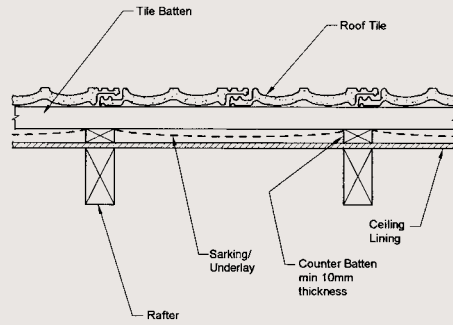
## 11 Concealed/Secret Gutter Finish

The top of the barge must be 75mm above the top of the battens. A suitable metal soaker should be installed as illustrated.

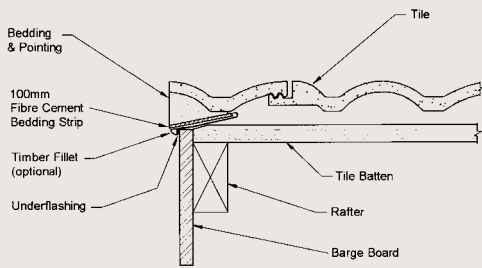
7 FIRE WALLS



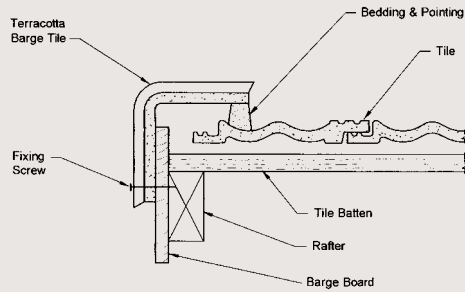
8 COUNTER BATTENING



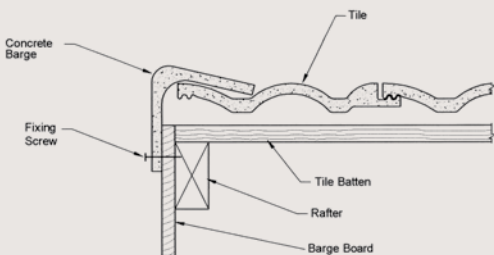
9 BED AND POINT FINISH



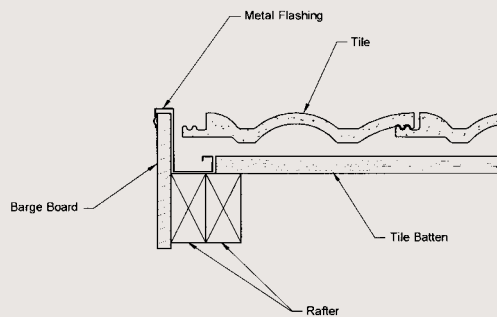
10 A. TERRACOTTA GABLE END



10 B. CONCRETE BARGE



11 CONCEALED/SECRET GUTTER FINISH



## BED AND POINT MATERIALS

### Mortar Mix

The bedding mortar mix should be a sand-cement mix of four parts bricklayer's sand to one part cement. Refer to 2.3 of AS 2050 or NZS 4206.

### Application

The bedding should be trowelled through the whole joint with an even finish. All tiles adjacent to the ridge and hip should be lightly cleaned and brushed free of loose particles.

### Flexible Pointing

Flexible Pointing is a highly pliable yet durable compound which, once cured, forms an incredibly strong bond between the tile and ridge capping. The use of Flexible Pointing yields the following benefits:

- >> Unlike traditional mortar based pointing, it will bend rather than crack with the movement of the house
- >> No need to wait for the roof to settle before pointing can begin, allowing the roof to be completed earlier
- >> Flexible Pointing saves time and money through a reduction in long term roof maintenance
- >> Bond between tile and ridge is so strong that it removes the need for mechanical fasteners
- >> Will flex and move to allow for the removal and replacement of tiles
- >> Available in a range of contemporary colours

As per AS 2050.2, Clause 2.4 above 33m/s, cement mortar should not be used as the sole fixing method.

### Application

Pointing should be coloured to match the roof tiles. Trowel the flexible pointing material to a thickness of 3–5mm, ensuring that the pointing is in full contact with the edge of the capping and has a neat, clean finish. Weepholes may be required to allow drainage. All tiles adjacent to the ridge and hip tiles are to be cleaned and brushed free of loose mortar and pointing particles.

## ROOF COMPLETION

Tilers should take care to remove all debris from the roof and gutters on completion of the job. In particular, care should be taken to remove any steel debris, such as nails, which may cause staining of the tiles or premature corrosion of gutters.

A final detail check of the roof on completion is conducted to ensure that any broken or cracked tiles are replaced ensuring the roof is fully waterproof.

# CARING FOR YOUR ROOF

Your roof is required to remain waterproof for a long time after it is installed. In fact, your roof tiles are structurally guaranteed to perform their function for 50 years\* (Please refer to the guarantee for each product)

Understandably, this guarantee does not cover matters beyond our control, such as:

- >> Damage caused to the roof by other parties, including plumbers,
- >> TV antenna and airconditioning installers etc.
- >> Falling objects
- >> Air pollution
- >> Acts of nature
- >> Tiles being treated with the wrong chemical or coatings
- >> Acts of war or terrorism

To ensure your roof remains watertight, roof traffic should be kept to a minimum. Below are some handy hints to minimise damage to your roof.

- >> Only access your roof when absolutely necessary and observe safety requirements
- >> Wear soft sole, non-slip footwear
- >> Always be aware of weather and conditions, as tiles can be slippery
- >> Extend your ladder at least 1 metre past the gutter and secure
- >> Only step on the lower centre of roof tiles
- >> Secure a walkway of plywood, ladders, planks etc. if heavy traffic is necessary
- >> To remove objects from the roof. Use a long stick or rake where possible
- >> Remove roof tiles by kicking the lower centre of the tile towards the ridge
- >> When performing any maintenance to your roof, it is recommended that you consult a roofing specialist.

Also enclosed are some simple hints should you need to repair your roof. When in doubt about your roof, always consult a roofing specialist.

## SOME FACTS ABOUT TILED ROOFS

Leaks are most often confined to small areas and usually occur as a result of one or more of the following problems:

- >> Cracked or broken cement mortar bedding to the ridge or hip capping  
**Capping should be rebedded or repointed**
- >> Cracked or broken roof tiles  
**Individual roof tiles should be replaced**
- >> Roof tiles displaced  
**Displaced tiles should be put back into their proper position**
- >> Blocked drainage channels under the 'sidelaps' of individual tiles  
**Any build-up of dirt or debris should be removed**
- >> Flashings blocked, damaged or displaced  
**These problems should be corrected**
- >> Blocked gutters (including valley gutters) and downpipes  
**These should be cleaned out**

## CAUTION

If your roof needs checking or if you have a roof leak, it is always best to employ an expert tradesperson to undertake the work for you, as walking around on roofs can be dangerous.

