Harmony
NO OTHER TILE CAN MATCH IT

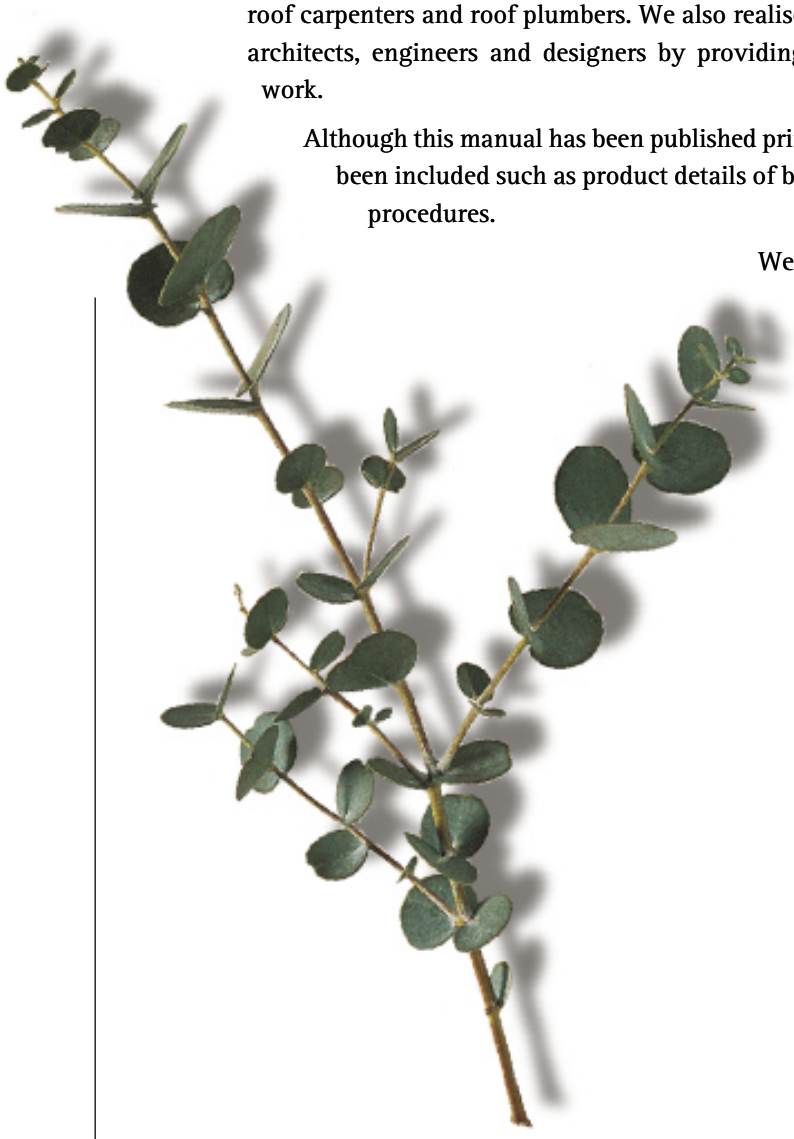
FOREWORD

Harmony Roof Tiles has great pleasure in presenting this Technical Manual to the industry and take this opportunity to explain a little more about its background.

For a number of years, our company has been aware of the need to provide our clients with more detailed information about fixing concrete roof tiles, that is to include information for bricklayers, roof carpenters and roof plumbers. We also realised the need to improve the assistance given to architects, engineers and designers by providing more detailed information for their design work.

Although this manual has been published primarily for these reasons, other information has been included such as product details of both tiles and accessories, standards and fixing procedures.

We believe that this Technical Manual will go a long way in answering all of your questions concerning performance and fixing of Harmony Roof Tiles.



Harmony
NO OTHER TILE CAN MATCH IT

CONTENTS

1 PRODUCTS AND ACCESSORIES

1.1 Alpine

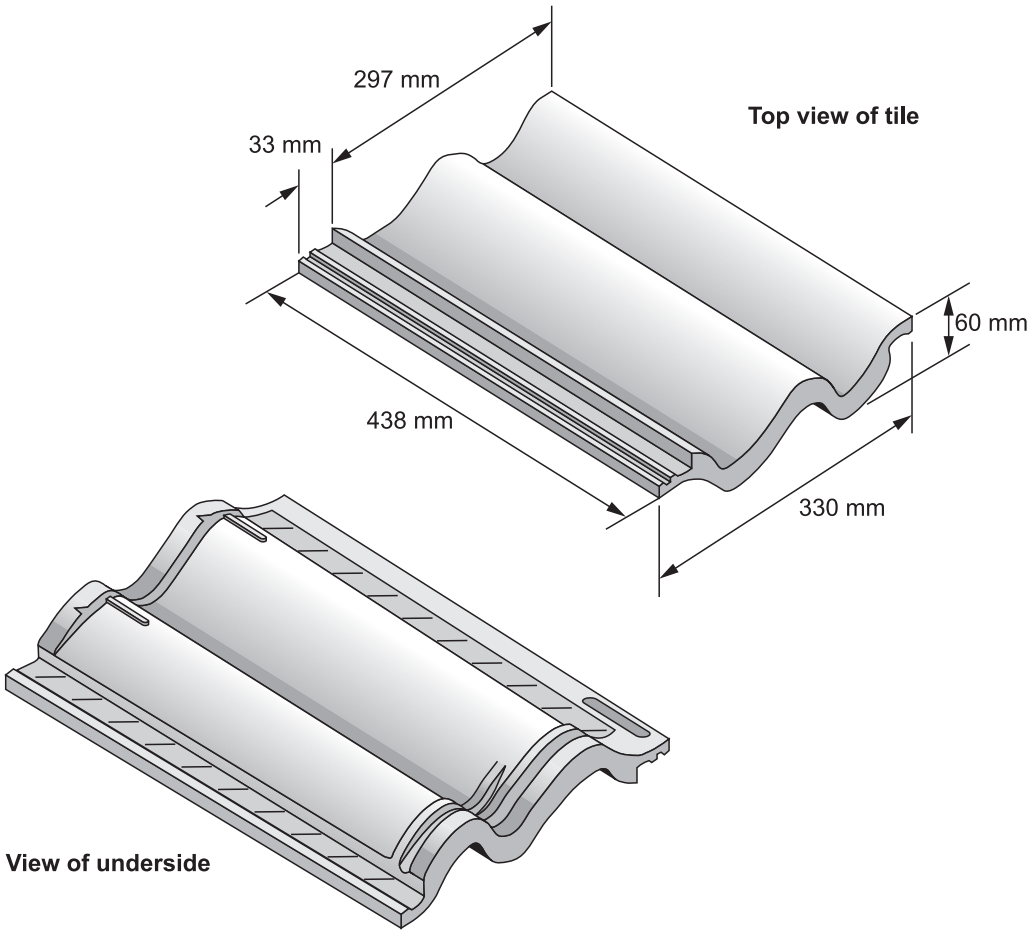
Construction: Extruded concrete interlocking roofing tile with fused or integral colour and clear sealer coat.

Manufactured to exceed the minimum requirements of AS2049–1992

Application: Roof and wall covering in pitch range of 12½°–90°

Weight: 4.8 kg (average)

Tiles per m²: (Nominal 76 mm head lap) 9.5



1 PRODUCTS AND ACCESSORIES

1.2 Villa

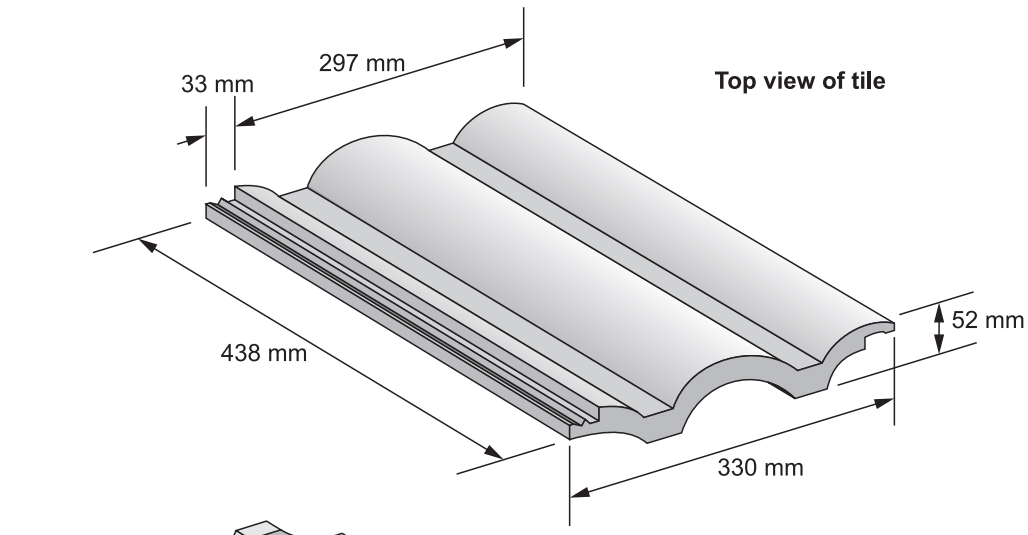
Construction: Extruded concrete interlocking roofing tile with fused or integral colour and clear sealer coat.

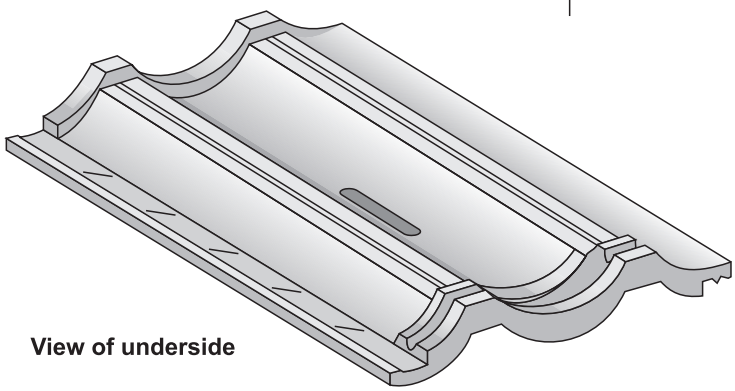
Manufactured to exceed the minimum requirements of AS2049–1992

Application: Roof and wall covering in pitch range of 12½°–90°

Weight: 4.8 kg (average)

Tiles per m²: (Nominal 76 mm head lap) 9.5



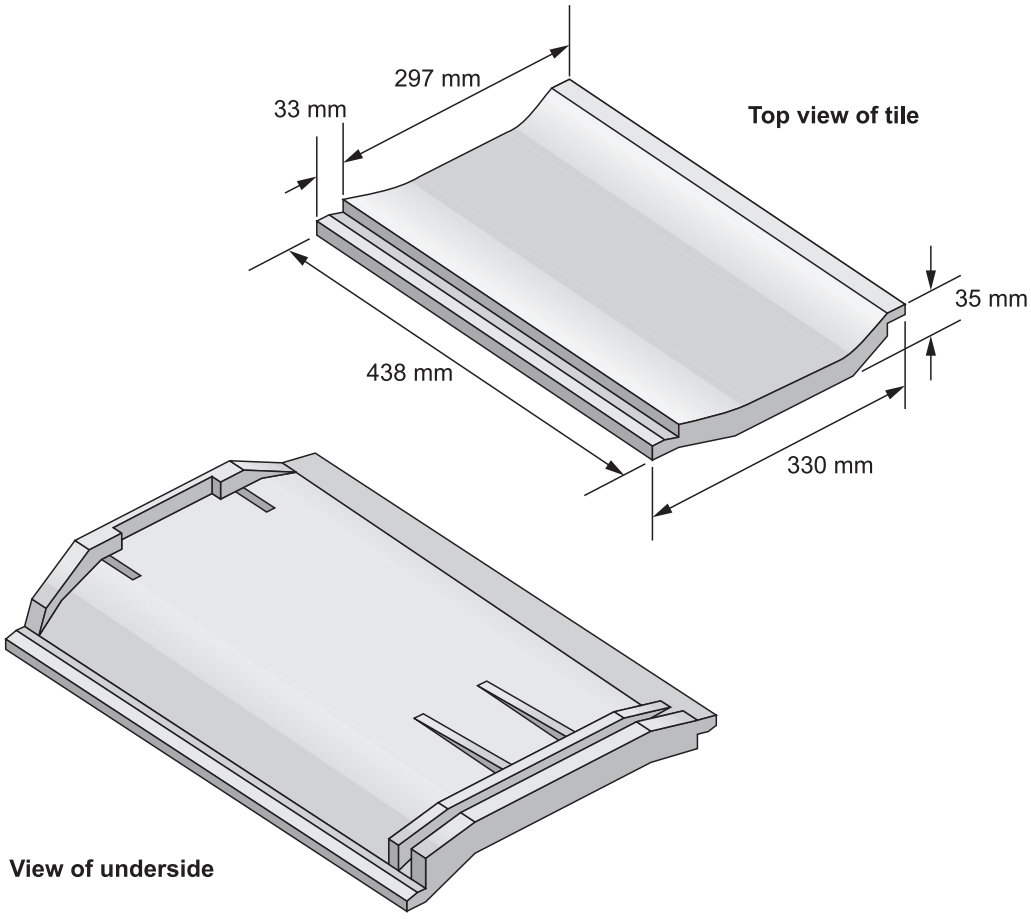


View of underside

1 PRODUCTS AND ACCESSORIES

1.3 Shingle

Construction:	Extruded concrete interlocking roofing tile with fused or integral colour and clear sealer coat.
	Manufactured to exceed the minimum requirements of AS2049–1992
Application:	Roof and wall covering in pitch range of 15°–90°
Weight:	4.8 kg (average)
Tiles per m^2:	(Nominal 86 mm head lap) 10



1 PRODUCTS AND ACCESSORIES

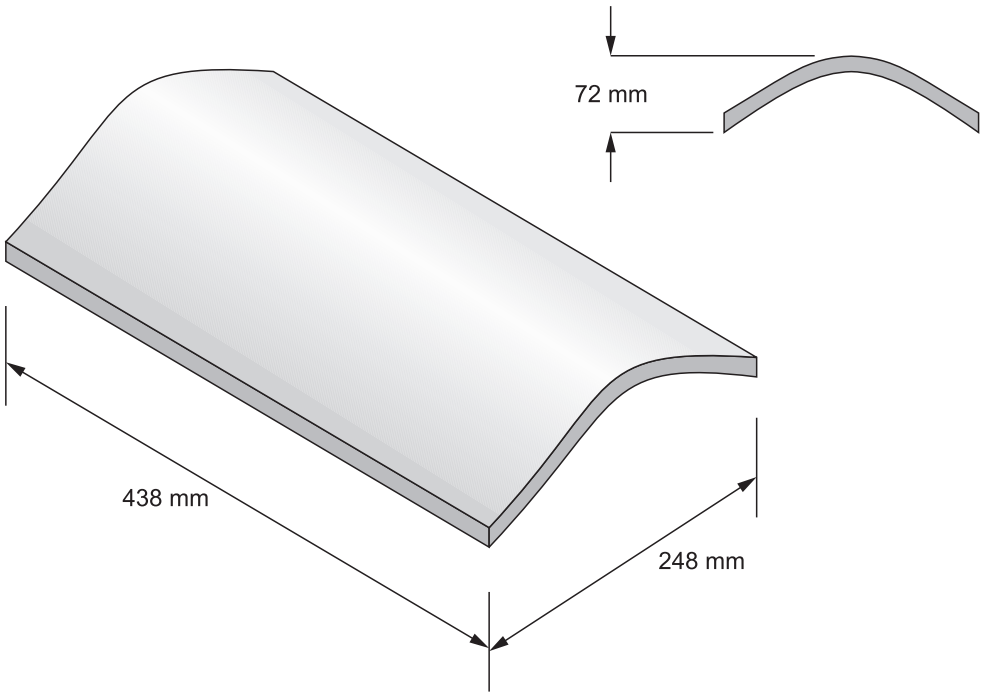
1.4 Ridge Cap

Construction: Extruded concrete with fused or integral colour and clear sealer coat. Manufactured to exceed the minimum requirements of AS 2049–1992.

Application: Capping Ridges and Hips

Weight: 4.6 kg (average)

Tiles per lineal metre: 2.5



1 PRODUCTS AND ACCESSORIES

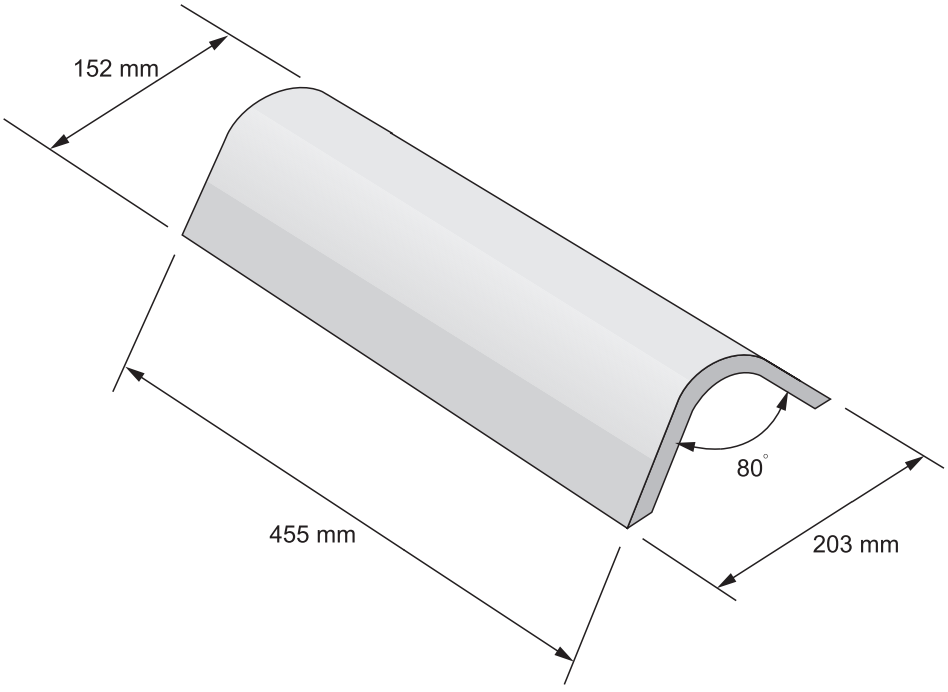
1.5 Rake Ridge

Construction: Hand made moulded concrete with fused or integral colour and clear sealer coat.

Application: Gables, Verges and Skillions

Weight: 4.0 kg (average)

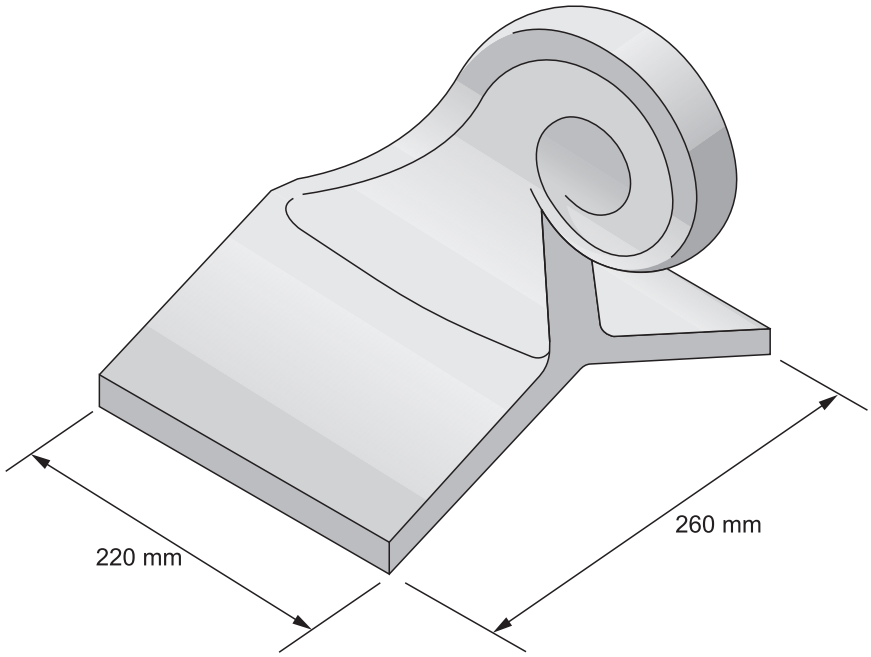
Tiles per lineal metre: 2.5



1 PRODUCTS AND ACCESSORIES

1.6 Finials (Scroll Type)

Application: For Gable ends or Dutch Gables



2. AUSTRALIAN STANDARDS

2.1 AS2049 - 1992 Manufacturing

2. AUSTRALIAN STANDARDS

2.2 AS2050 - 1995 Installation

3. ROOF PITCHES AND REQUIREMENTS

3.1 Roof Pitch Alpine and Villa

Roof Pitch	Construction Requirements
12.5°	Minimum pitch.
Pitch ≥12.5° - 15°	Sarking required.
Pitch >15° - <18°	Recommend sarking.
Pitch ≥18° - <27°	Standard fixing.
Pitch ≥27° - <36°	Standard fixing. Perimeter scaffolding or guard rail to be supplied by builder.
Pitch ≥36°	50 x 38 mm minimum batten required. Mechanical fixing every tile.. Perimeter scaffolding or guard rail to be supplied by builder.

NOTE	Regardless of pitch, all roofs in areas of design wind velocity >47 metres per second should be sarked.

3. ROOF PITCHES AND REQUIREMENTS

3.2 Roof Pitch Shingle

Roof Pitch	Construction Requirements
15°	Minimum pitch.
Pitch ≥15° - <19°48'	Sarking required.
Pitch ≥19°48' - <27°	Recommend sarking.
Pitch ≥27° - 36°	Recommend sarking. Standard fixing. Perimeter scaffolding or guard rail to be supplied by builder.
Pitch ≥36°	50 x 38 mm minimum batten required. Mechanical fixing every tile. Perimeter scaffolding or guard rail to be supplied by builder.

NOTE	Regardless of pitch, all roofs in areas of design wind velocity >47 metres per second should be sarked.

4. CONSIDERATIONS FOR HIGH WIND AREAS

4.1 Fixing Requirements

Australian Standard AS2050–1995 specifies particular fixing requirements in respect to high wind areas.

To ensure these requirements are met, the owner, builder or designer must notify Harmony Roof Tiles of the correct category as listed below:

Harmony Category Rating	Design Wind Velocity m/s	Tile Fixing		Ridge Fixing		Barge Fixing
		Edge of Roof	Field of Roof	Tiles	Hip Fixing	
Category 1	Up to but not including 33	Mechanically fix each full tile in 2nd course and then either every 2nd tile in every course, or every tile in every 2nd course.		Mechanically fix the end four ridge tiles	Nil	Mechanically fix each barge tile
Category 2	From 33 up to but not including 41	Mechanically fix each full tile in 2nd course	Mechanically fix each 2nd full tile	Mechanically fix every ridge tile	Mechanically fix the end four hip ridge tiles	Mechanically fix each barge tile
Category 3	From 41 up to and including 60	Mechanically fix every full tile	Mechanically fix every full tile	Mechanically fix every ridge tile	Mechanically fix every hip ridge tile	Mechanically fix each barge tile

NOTE

Harmony Roof Tiles may see fit to make extra recommendations if we consider that the location or roof construction requires such.

4. CONSIDERATIONS FOR HIGH WIND AREAS

4.2 Definitions of Fixing Methods

Mechanical fixing of roof tiles:	a) nails or tile clips
Mechanical fixing of ridge capping:	a) ridge clips b) hip clips c) polymer based pointing mortar - complying to Australian Standards AS 2050–1995

5. GENERAL ROOF PREPARATION

5.1 Scaffolding and General Guard Rail Requirements

Edge Protection - Identified Minimum Industry Standards.

ROOF STRUCTURE	MINIMUM REQUIREMENT
1. All roofs with eaves height at or above 3m from ground level	Guard rail system and/or perimeter scaffold no lower than 900mm from the fascia
2. All roofs pitched at 27.5° less than 32°	Guard rail system and/or perimeter scaffold no lower than 900mm from the fasica.
3. All roots pitched at or above 32°	Perimeter scaffold at fascia height. Some elevations may require additional working platform within the roof structure subject to length and pitch of rafters as determined by a site safety assessment.
4. All two storey roofs below 27.5°	Guard rail system and/or perimeter scaffold no lower than 900mm from the fascia
5. All two storey roofs at or above 27.5°	Perimeter scaffold at fascia height. Some elevations may require additional working platform within the roof structure subject to length and pitch of rafters as determined by a site safety assessment.
6. All roofs exceeding two storey	Perimeter scaffold at fascia height. Some elevations may require additional working platform within the roof structure subject to length and pitch of rafters as determined by a site safety assessment.
7. Any potential slippery product at or above 15° (e.g., fibro cement, fibreglass, metal roof products)	Guard rail system and/or perimeter scaffold no lower than 900mm from the fascia. Roofs below 15° may require a site safety assessment.
8. All "Internal Voids" with free fall of 3 m or more from roof elevation	Internally erected working platform to reduced free fall to less than 2 m. Note: Definition of an "Internal Void" is a roof elevation that has a cathedral or raked ceiling.

A person who erects or dismantles a guard rail system or perimeter scaffold, must ensure that the erection or dismantling, as the case may be, is done in accordance with Regulations 3.67 and AS1576 parts 1 to 5.

When scaffolding exceeds, or is likely to exceed, a height of 4m it must be erected, alltered or dismantled by a certified scaffolder.

** Reproduced with permission from the Code of Safe Work Practice for the Roof Tiling Industry - WA*

5. GENERAL ROOF PREPARATION

5.2 Preparatory Trades

The relevant trades must have performed the following preparatory work before any tiles can be laid.

Brickwork

- All relevant brickworks complete.

Carpenter

- Ridge and hip boards fixed flush with rafters.
- Fascia (or tilt batten) fitted.
- Barge board fitted.
- Verge strip fitted (if required for bedding).
- Gable sheeting and flashing fitted for dutch gables.
- Anti-ponding boards fitted (if required).
- Lining boards and counter-battens fitted (for exposed rafters).

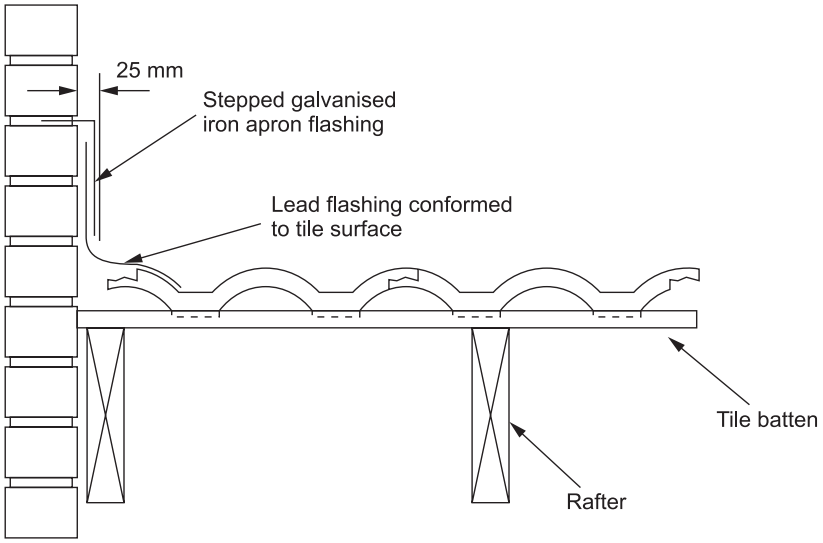
Plumber

- Valley irons and gutters fitted.
- Secret gutters and flashings fitted (if required).

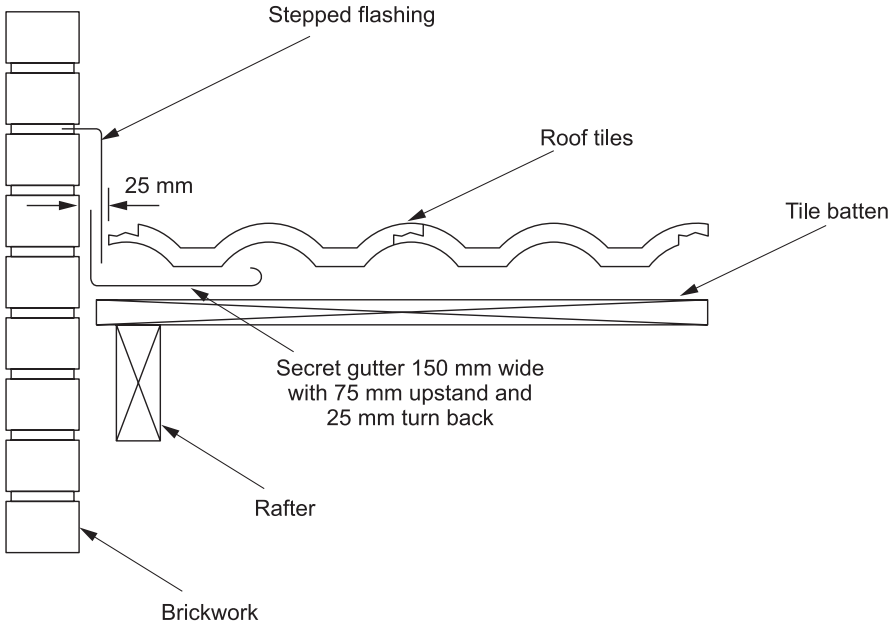
5. GENERAL ROOF PREPARATION

5.3 Flashing

a) Side abutment flashing



b)Secret flashing



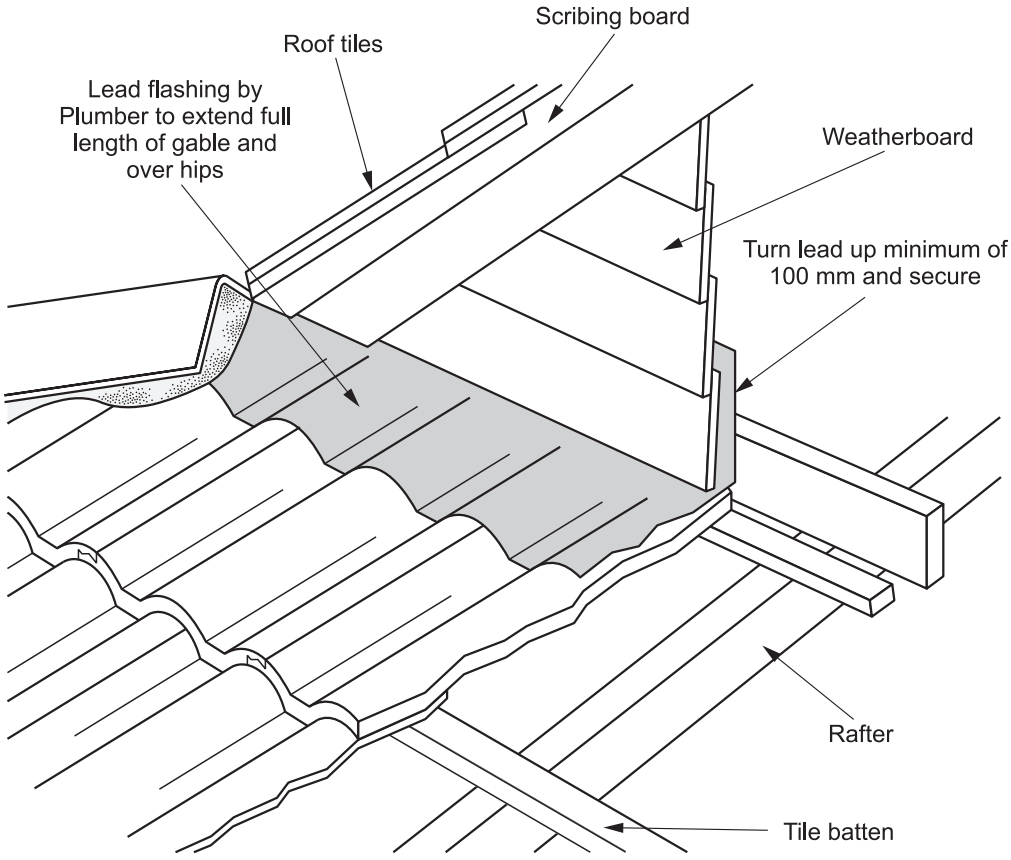
5. GENERAL ROOF PREPARATION

5.3 Flashing

c) Dutch Gable Flashing

Dutch gable over flashing should extend the entire width of the gable. It should finish over the top of the hip rafters.

a) Side view.

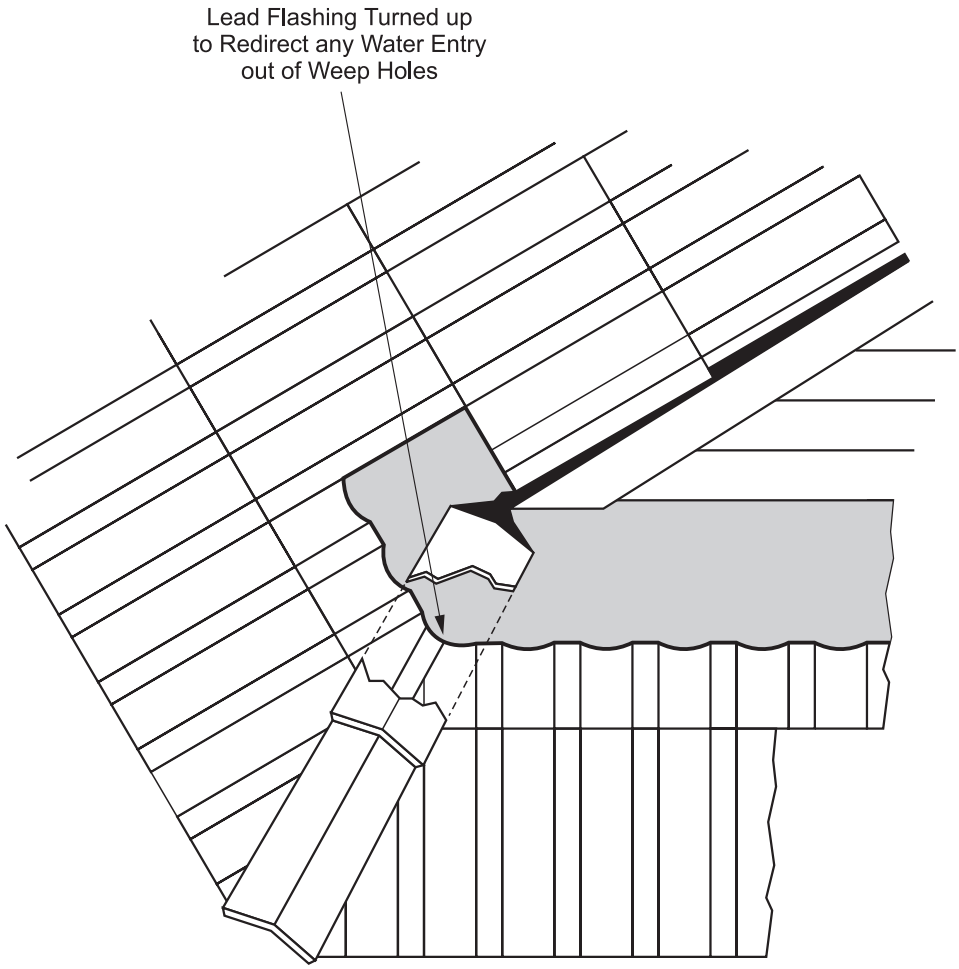


5. GENERAL ROOF PREPARATION

5.3 Flashing

c) Dutch Gable Flashing

b) Top view.

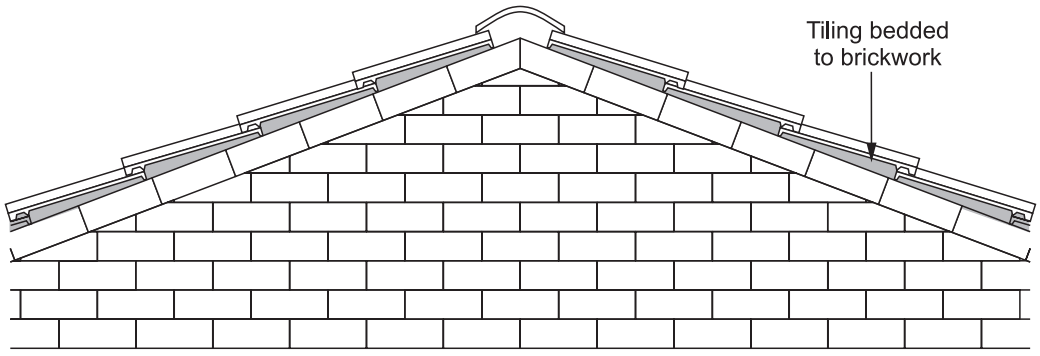


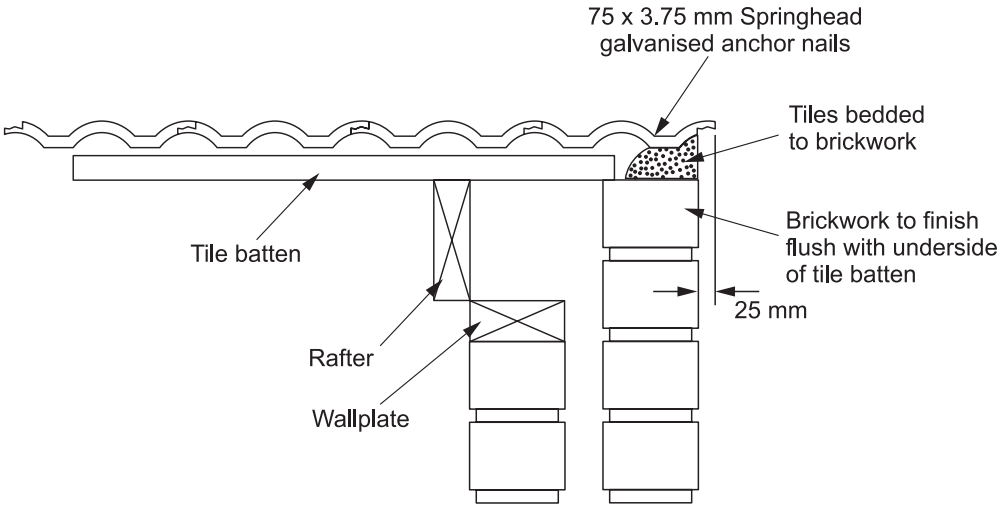
5. GENERAL ROOF PREPARATION

5.4 Bedded Verge

Brickwork on the gable ends should finish flush to the under side of the tile batten and should be cut to a straight level line over the full length of the gable. When tiles are to be bedded on top of the brickwork, a header course of bricks on top of the cut course gives a neater, professional finish.

In an exposed beam construction, where ceilings are fixed on top of the rafters, an allowance should be made for the extra height.

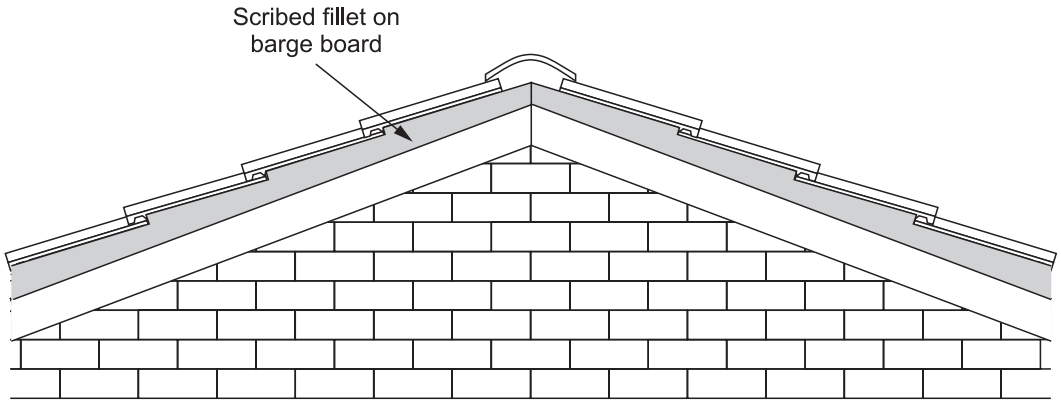


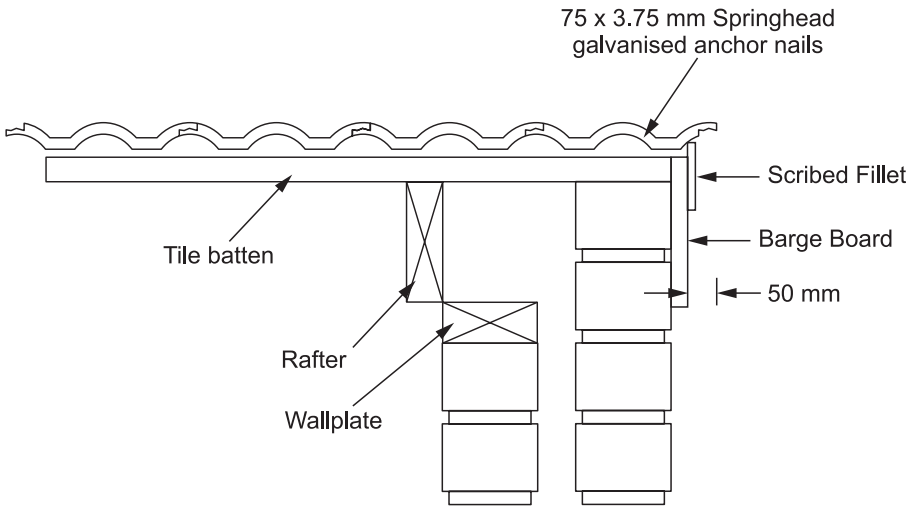


5. GENERAL ROOF PREPARATION

5.5 Barge Board and Scribed Fillet

The barge board should be fixed so that it is level with the top of the tile battens. This will hold the tile level and allow secure fixing of the verge tiles and will also allow the secure fixing of a scribed filet where one is to be used. Barge boards are fitted before the tiles and scribed fillets are fitted after the tiles.

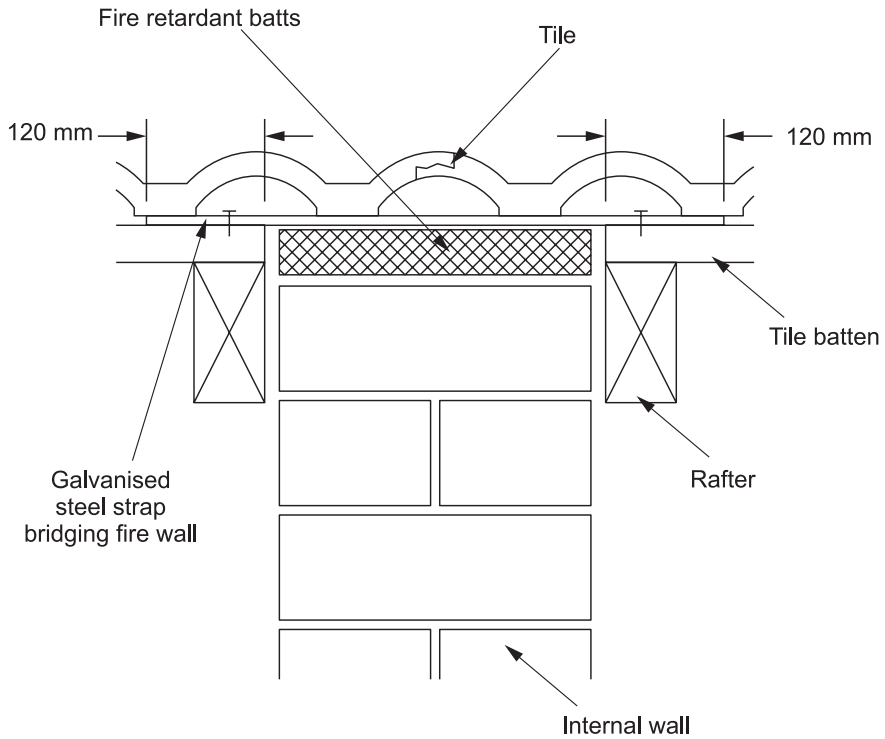




5. GENERAL ROOF PREPARATION

5.6 Fire Wall

There should be a 75 mm gap between the top of the finished brickwork and the top of the rafter. This will provide a space for the insertion of a non-combustible fire blanket without affecting the line of the roof. The tile battens should not cross over the fire wall but should be cut flush with the edge of the brickwork. The galvanised steel strap should overlap the fire wall by a minimum of 120 mm.



5. GENERAL ROOF PREPARATION

5.7 Rafter Spacings

Harmony Roof Tiles use timber battens which comply with Australian Standards AS1684–1992 and AS2082–1979.

Rafter/Truss Spacings	Minimum Batten
up to 600 mm	38 x 25 mm
600 - 900 mm	50 x 38 mm
900 x 1200 mm	50 x 50 mm

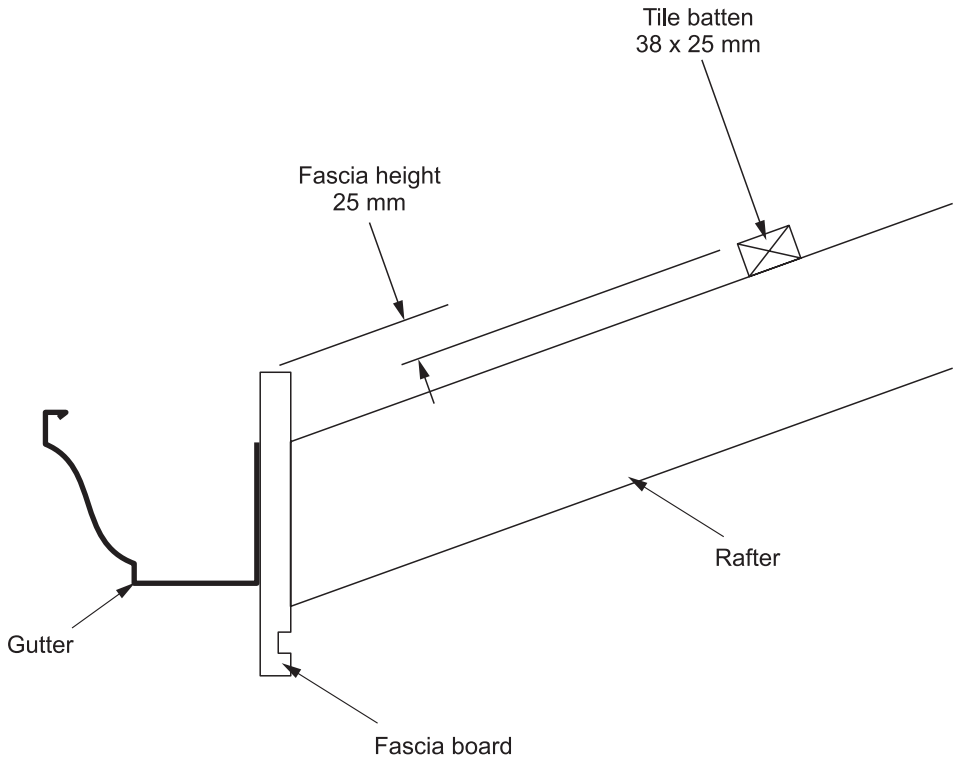
NOTE

For spacings up to 600mm, 50 x 25mm battens can be used if specified.

5. GENERAL ROOF PREPARATION

5.8 Height of Tilt Board

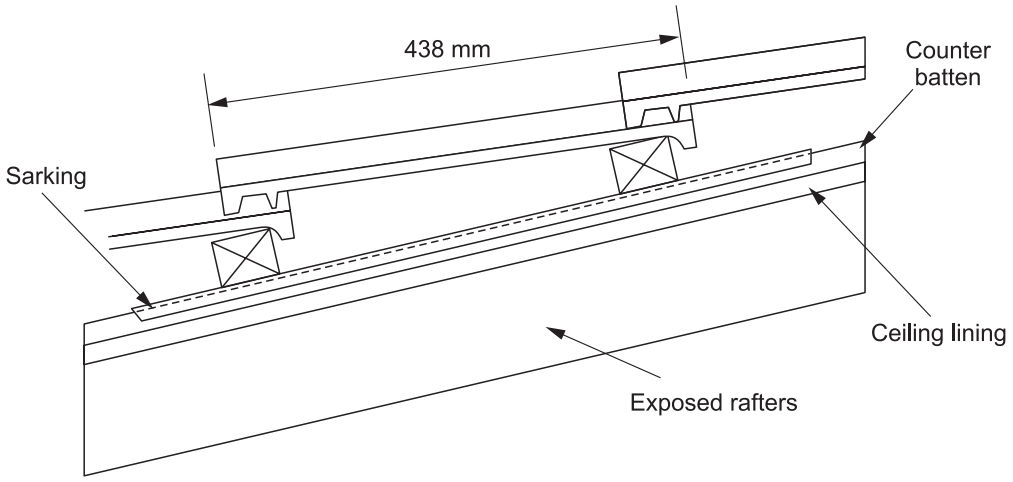
The fascia board or tilt batten and the gutter should be fixed by the builder before tiling commences. The thickness of the tile battens govern the height of the tilt batten or fascia. As shown in the illustration below, the 'upstand' should equal the thickness of the tile batten plus 25 mm.

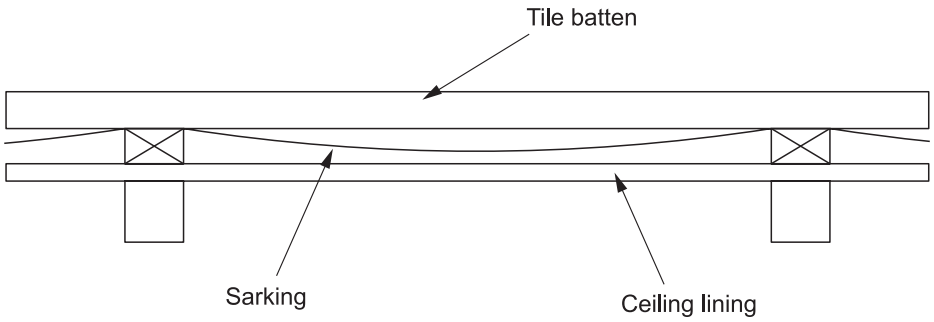


5. GENERAL ROOF PREPARATION

5.9 Exposed Rafters and Counter Battens

In this type of ceiling construction, where the ceiling is fixed on top of exposed roof rafters, there are some requirements that need to be completed before tiling can begin. Counter battens must be positioned accurately over the rafter centre lines on top of the lining board and the sarking membrane attached to these battens. The counter battens should be thick enough, (around 50 mm x 13 mm), to allow the sarking to dish correctly in accordance with AS/NZS 4200.2-1994.





5. GENERAL ROOF PREPARATION

5.10 Valley Boards and Flashings

Valley Gutter

There are accepted practices covering the construction of valley gutters. The width of the material used to constuct a standard valley tray should not be less than 400 mm and joins must be overlapped by not less than 100 mm in the direction of the flow.

Care should be taken to ensure that the valley gutter is not bent or flattened out on internal angles at the eaves gutter.

Recess Valley Gutter

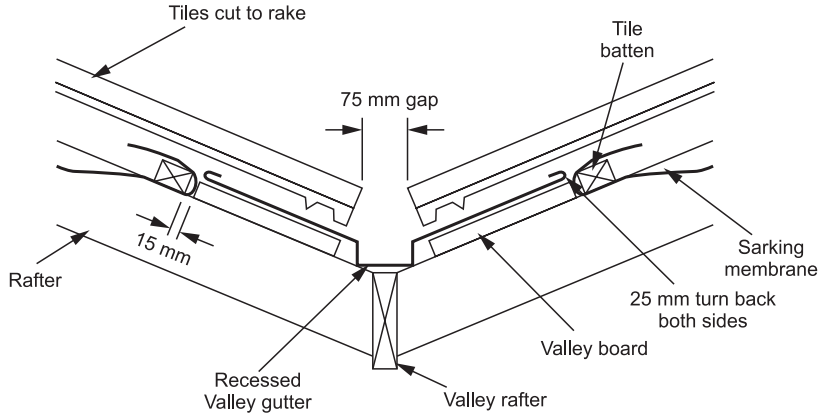
A recess valley gutter usually forms a recess between the two sides of the valley tray into the valley rafter.

They should be used when;

a) A valley exceeds 8.0 m in length thus coping with excess water volume.

b) A dog leg occurs in roof design. This will help guide the flow of water around the bend and prevent overspill.

c) Two different pitched roofs meet. To stop overflow, the wider side forming the recess valley should be between 300 mm and 450 mm and placed on the lesser pitched roof side.



Valley Boards

The valley board should be 5mm thinner than the tile battens. This will prevent damage to the turned edge of the valley flashing.

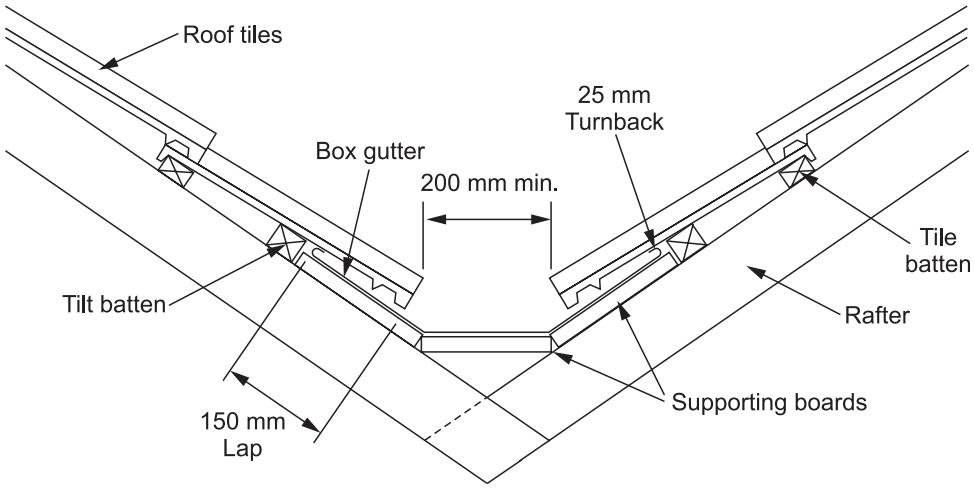
Valley boards should be checked into the back of the tilt or fascia to ensure an even line at the internal angles and support the valley flashing where it enters the eaves gutter.

5. GENERAL ROOF PREPARATION

5.11 Box Gutter

When box gutters form part of the roof framing, sufficient fall towards the outlet should be built into the framing.

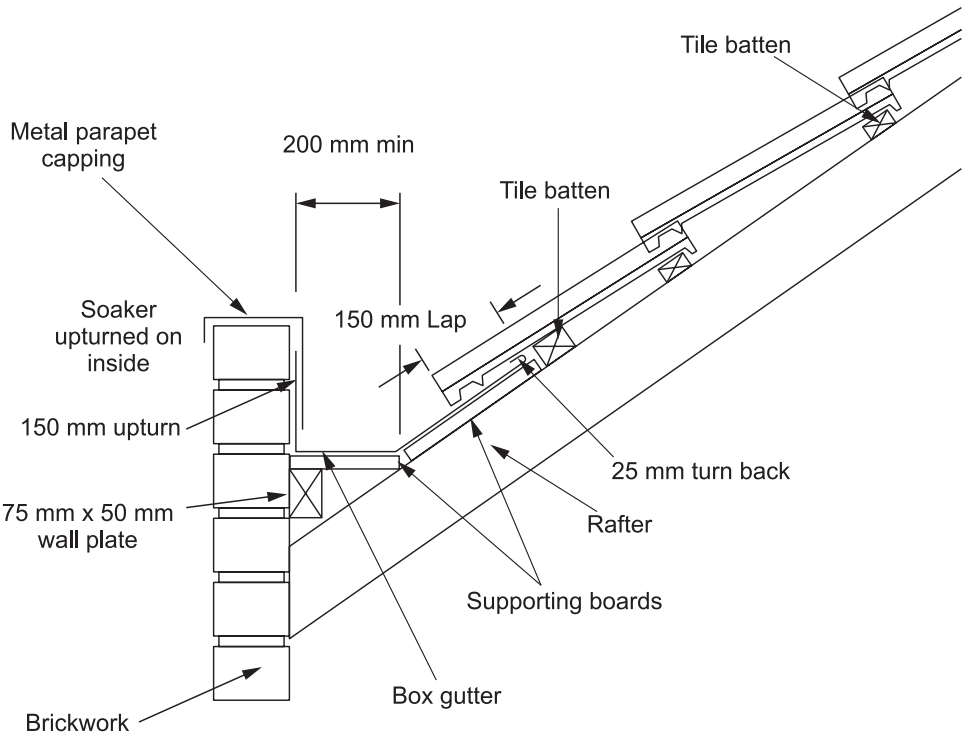
a) Between two slopes.



5. GENERAL ROOF PREPARATION

5.11 Box Gutters

b) To parapet wall.



5. GENERAL ROOF PREPARATION

5.12 Discharge of Water from Upper Roof

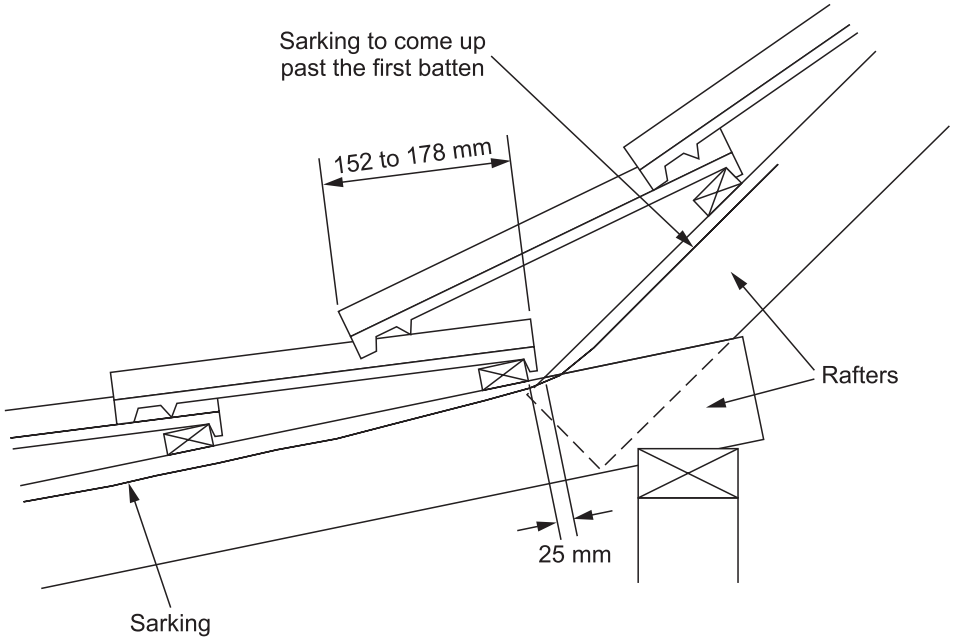
The discharge of water from upper roofs, through downpipes directly onto tiled roofs, should be avoided. However, in cases where water is discharged onto a tiled roof, the following requirements are necessary:

- A spreader must be used at the base of the downpipe. The spreader must be sealed at both ends to prevent water discharge into the side lap of the tile.
- Under the spreader an outer flashing (usually lead) should be installed and dressed into the profile of the roof tile.
- The roof area below the spreader should be sarked for a minimum width of 1800 mm either side from the point of discharge and extended down to the eaves gutter or valley.

5. GENERAL ROOF PREPARATION

5.13 Change of Pitch

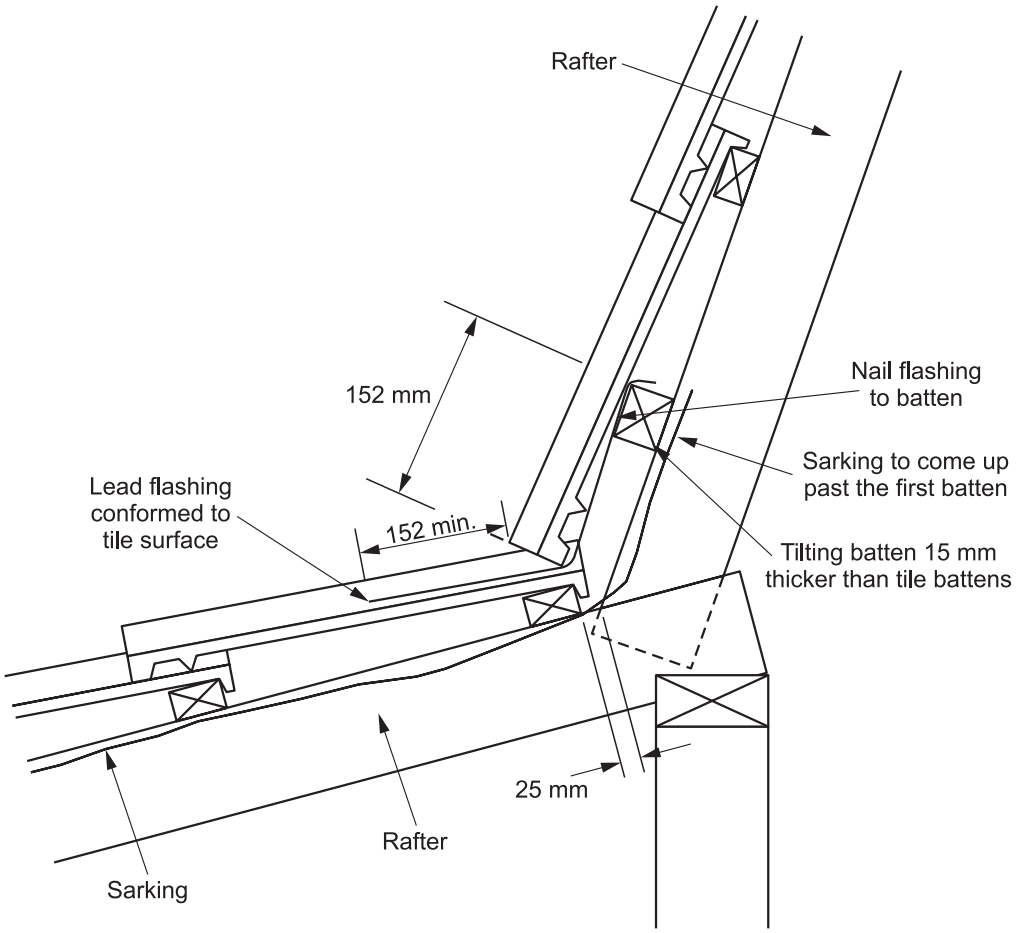
a) Less than 45°



5. GENERAL ROOF PREPARATION

5.13 Change of Pitch

b) More than 45°



6. SARKING

6.1 Benefits

The recommended material for use as sarking is a Reflective Foil Laminate which provides weather-proofing as well as insulation. It has a high reflection and low emission factors for low temperature (thermal) radiation found within buildings.

The Reflective Foil Laminate is a flexible sheet material which is supplied as a roll. It is installed over the rafters, under the tile battens and has many benefits to offer when used under the roof covering. Sarking reflective foil insulation material should be a double sided, anti-glare type with a maximum flammability index of 5 in accordance with AS/NZS 4200.1-1994 .

Using reflective foil laminate as a sarking material is recommended because of its excellent insulating and weatherproofing properties. Sarking reduces approximately 90% of radiant heat in the summer and between 30% to 40% heat loss in the winter. It has excellent water proofing qualities and when installed properly prevents damage occurring to ceiling materials and interior fixtures and fittings.

Sarking eliminates dust intrusion and reduces sound penetration. It also helps prevent fire, from an outside source, igniting inside the roof space. Its use is highly recommended in buidings which are located in high risk bush fire areas.

When wind gusts occur, sarking reduces the impact of uplift forces on the roof tiles.

6. SARKING

6.2 General Uses

You should fix Sarking under the following circumatances:

- Where local or building regulations dictate the use of sarking.
- Where local conditions include a high risk of wind driven rain.
- Where the roof design means water is discharged from an upper storey.
- Where the roof design includes exposed rafters with top lining.
- Where the roof pitch is 15° or less (Alpine and Villa profile).
- Where the roof pitch is 19° 47′ or less (Shingle profile).
- Areas of design wind velocity greater than 47 metres/second.

6. SARKING

6.3 General Requirements and Fixing

As we have read at the beginning of this section on sarking, the membrane is installed under the roof covering and its main pupose is to collect and dispose of any water which may penetrate the roof covering. The Australian Standard AS/NZS 4200.2-1994, which is the standard for “Pliable Building Membranes and Underlays”, contains detailed information about how the sarking membrane should be fixed.

Great care should be taken to ensure that the sarking membrane is fixed correctly otherwise its effectiveness is limited. Likewise, similar care should be taken not to damage the membrane during fixing.

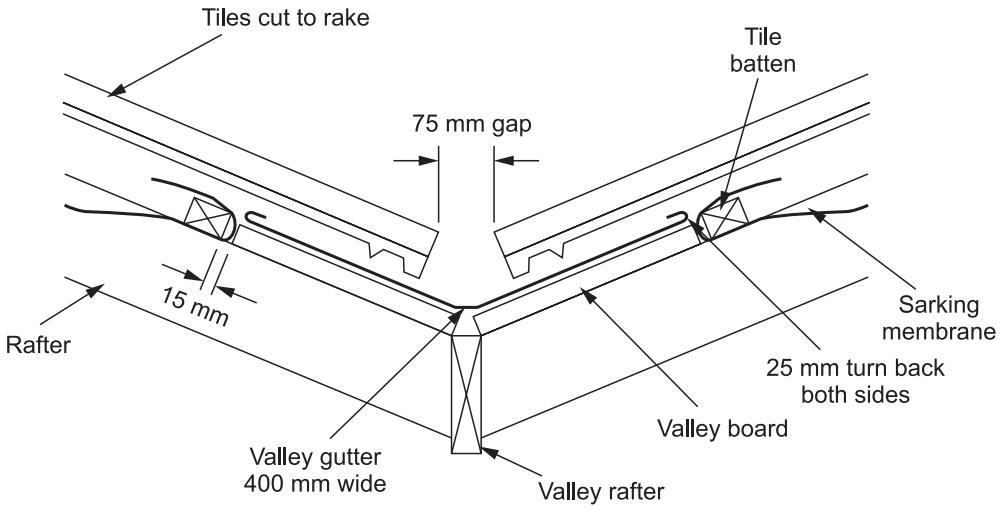
Sarking is laid across the roof rafters with each run overlapping the previous run below it by a minimum of 50 mm. Allow a ‘one rafter space’ overlap where a vertical joint of the membrane is required. To ensure adequate drainage, the sarking should be layed between adjacent rafters and fixed under the tile battens. It should sag no more than the depth of the supporting batten (counter batten) and in no case is the sag to exceed 40 mm.

Extend the membrane by about 50 mm over the facia and secure firmly to the top edge of the facia. Make sure that the membrane is extended over the facia enough to ensure effective water run-off. When fixing the sarking at the ridge line, carry the membrane over the ridge board.

6. SARKING

6.3a Valleys

When working on a sarked roof, it is important to note that the sarking material must not be laid into the valley gutter. A tile batten (valley batten) should be fixed along each side of the valley board around 15 mm away from the board. The sarking membrane should then be turned over around the batten.

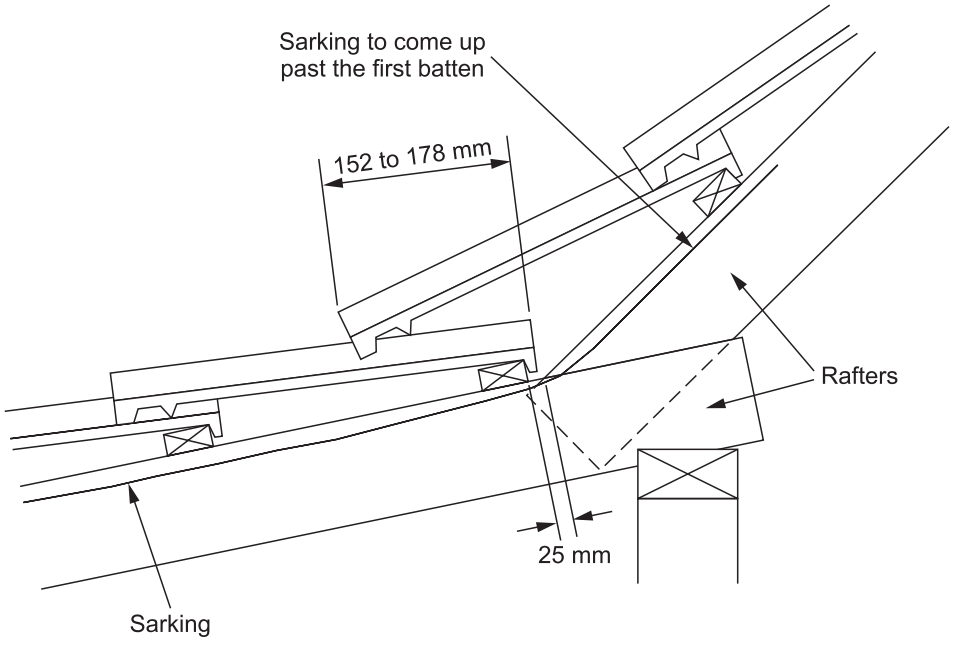


6. SARKING

6.3b Change of Pitch

When there is a change of pitch between two roofs, sarking should be fixed to the lower roof if it has a pitch of less than the minimum requirements (see sections 3.1 and 3.2). Under these circumstances the sarking under the lower roof must extend at least 350 mm into the higher pitched main roof. The sarking should be fixed to the lowest batten of the upper roof section and continue over the whole of the lower section.

Where sarking is also to be fixed on the upper part of the roof, the overlap to the lower roof section should be at least 150 mm.



6. SARKING

6.3c Sarking Support

a) Mesh

The Australian Standard AS/NZS 4200.1-1994 recommends that the "sarking membrane should be supported by wire mesh or be otherwise adequately reinforced" on a roof construction where the distance from one rafter centre to the next is between 600 mm and 900 mm. If the distance between rafter centres exceeds 900 mm, this recommendation becomes a requirement of the Standard.

6. SARKING

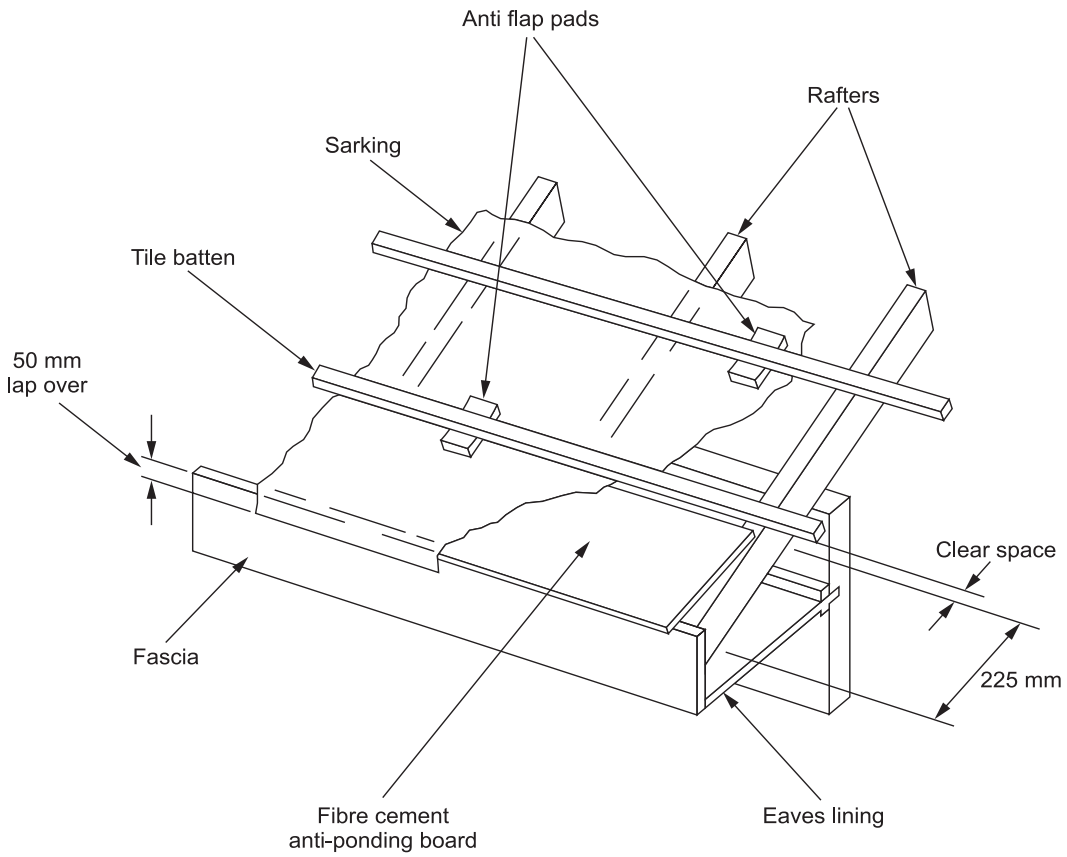
6.3c Sarking Support

b) Anti-ponding Board

On a roof construction with a pitch below 19° 48′, the use of anti-ponding boards is recommended. The boards are installed to support sarking and ensure that any water collected by the sarking is correctly discharged into the eaves gutters.

The builder will be required to install this anti-ponding protection which usually consists of fibre cement sheeting or similar materials.

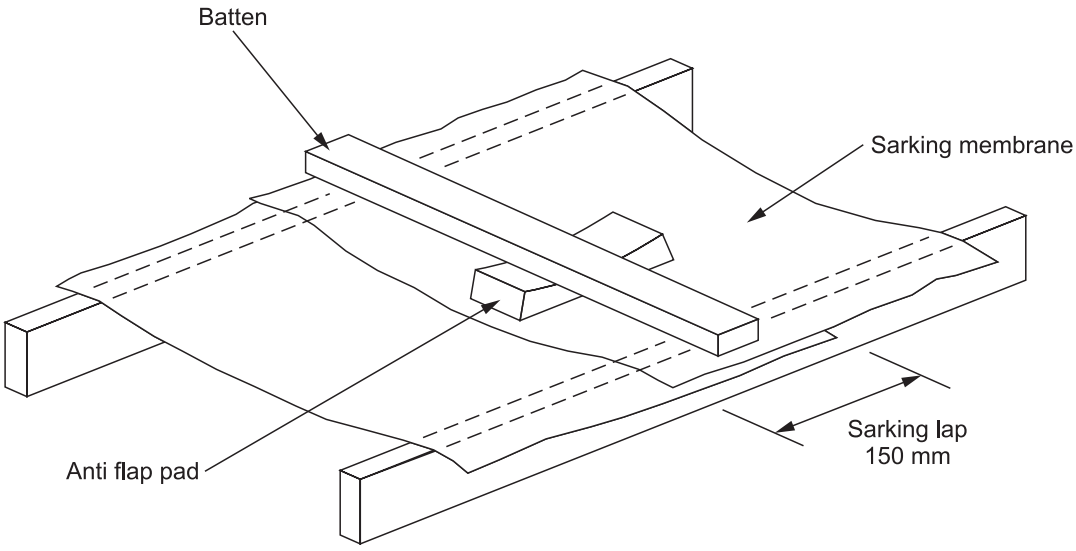
The anti-ponding board should be 225 mm in width and must leave a clear space to the first tile batten.



6. SARKING

6.3d Anti-flap Pads

During times of high wind, sarking can move (flap about) causing increased noise levels. If a roof is likely to be subjected to high winds then consideration should be given to the use of security pads. These pads are made of a light foam rubber material and are fitted when the sarking is fixed in place. The pads are placed under the tile battens between each rafter, at every sarking lap joint. In all applications where sarking is installed, Harmony Roof Tiles includes the use of anti-flap pads.



7. FIXING TILES AND ACCESSORIES

7.1 Introduction

Introduction

The Australian Standard AS2050–1995 covers the laying and securing of roof tiles.

Precautions

The Australian Standard AS2050–1995, Appendix A and Appendix B states that the correctness and safety of the building is the responsibility of the builder.

Loading

Battening and sarking of the entire roof must be completed before tiles are loaded. In buildings where the rafters are internally exposed, or the length of the truss top chord or rafter exceeds 6 metres, tiles should be loaded onto the structure from each side to ensure that their weight is evenly distributed.

First Course

The first course of tiles should be positioned to provide an adequate projection (around 50mm) over the fascia and into the gutter.

Mechanical Fixing

Because of variation in work practice between States, this document uses the term 'mechanically fix' to describe the activity of nailing and clipping tiles (refer to Section 4.2).

Fixing Materials

Nails should be non-ferrous or galvanised with a minimum diameter of 2.8mm. They should be of sufficient length to penetrate the batten by at least 15mm.

Steep Pitch Fixing

For pitches 36° and over, all tiles shall be mechanically fixed.

Minimum Fixing Requirements

Refer to section 3.1 and 3.2 for information about the minimum fixing requirements for tiles and accessories

7. FIXING TILES AND ACCESSORIES

7.2 Setting Out for Alpine and Villa Profiles

To obtain a uniform appearance of the completed tile courses, correct spacing of the tile battens is essential. To obtain this uniformity follow the procedure detailed below.

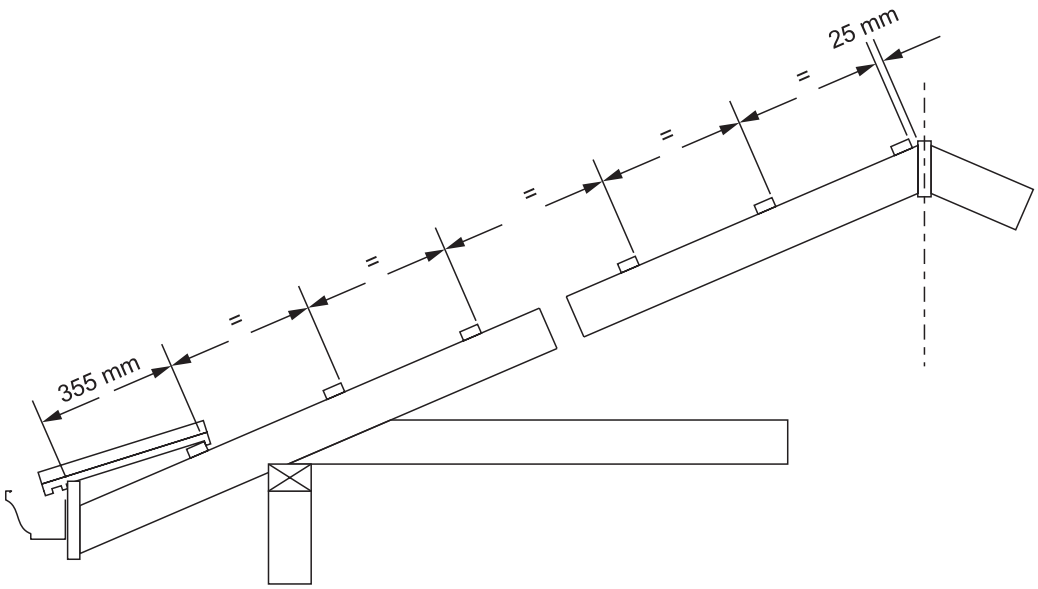
1 Measure the distance from the front edge of the fascia or tilting batten to 25 mm from face of ridgeboard.

2 In the spacing table (see section 7.2a) , find the dimension nearest to this measurement and then note the dimension at the head of the particular column in the table. This is the required uniform course spacing. Bear in mind that 362 mm is the maximum permissible course spacing.

3 Mark off both ends of the roof at a point 355 mm from front edge of fascia board or tilt batten. Mark off from this point up the remainder of the rafter using the uniform course spacing obtained from the table or adjusted slightly if necessary so as to obtain equal increments finishing 25 mm from face of ridgeboard.

4 Snap a chalk line across the top of the roof framing.

5 Locate lower edge of battens on chalk lines and nail to roof framing.



Harmony
NO OTHER TILE CAN MATCH IT

7. FIXING TILES AND ACCESSORIES

7.2a Spacing Table–Alpine/Villa (Based on a 76 mm Headlap)

	Spacing of Courses										
	330	333	336	340	343	346	349	352	356	359	362
1	355	355	355	355	355	355	355	355	355	355	355
2	685	688	691	695	698	701	704	708	711	714	717
3	1015	1021	1028	1034	1041	1047	1053	1060	1066	1073	1079
4	1345	1355	1364	1374	1383	1393	1403	1413	1422	1431	1441
5	1675	1688	1701	1713	1726	1739	1752	1765	1777	1790	1803
6	2005	2021	2037	2053	2069	2085	2101	2118	2133	2149	2165
7	2335	2354	2373	2393	2412	2431	2450	2470	2489	2508	2527
8	2665	2687	2710	2732	2755	2777	2799	2822	2844	2867	2889
9	2995	3021	3046	3072	3097	3123	3149	3175	3200	3225	3251
10	3325	3354	3383	3411	3440	3469	3498	3527	3555	3584	3613
11	3655	3687	3719	3751	3783	3815	3847	3880	3911	3943	3975
12	3985	4020	4055	4091	4126	4161	4196	4232	4267	4302	4337
13	4315	4353	4392	4430	4469	4507	4545	4585	4622	4661	4699
14	4645	4687	4728	4770	4811	4853	4895	4937	4978	5019	5061
15	4975	5020	5065	5109	5154	5199	5244	5289	5333	5378	5423
16	5305	5353	5401	5449	5497	5545	5593	5642	5689	5737	5785
17	5635	5686	5737	5789	5840	5891	5942	5994	6045	6096	6147
18	5965	6019	6074	6128	6183	6237	6291	6347	6400	6455	6509
19	6295	6353	6410	6468	6525	6583	6641	6699	6756	6813	6871
20	6625	6686	6747	6807	6868	6929	6990	7052	7111	7172	7233
21	6955	7019	7083	7147	7211	7275	7339	7404	7467	7531	7595
22	7285	7352	7419	7487	7554	7621	7688	7756	7823	7890	7957
23	7615	7685	7756	7826	7897	7967	8037	8108	8178	8249	8319
24	7945	8019	8092	8166	8239	8313	8387	8460	8534	8607	8681
25	8275	8352	8429	8505	8582	8659	8736	8812	8889	8966	9043

7. FIXING TILES AND ACCESSORIES

7.3 Setting Out for Shingle Profile

To obtain a uniform appearance of the completed tile courses, correct spacing of the tile battens is essential. To obtain this uniformity follow the procedure detailed below.

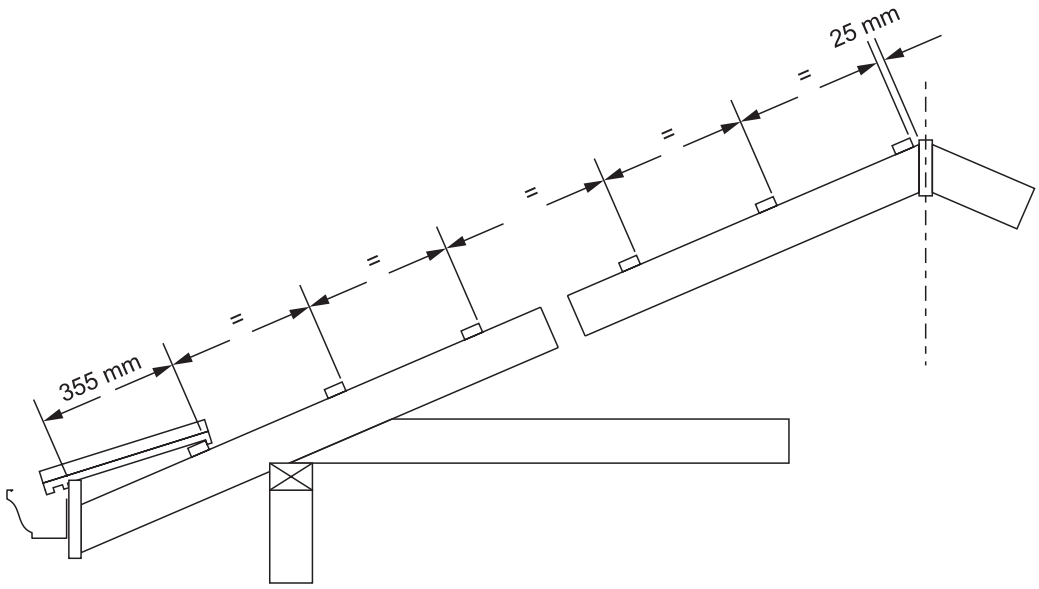
1 Measure the distance from the front edge of the fascia or tilting batten to 25 mm from face of ridgeboard.

2 In the spacing table (see section 7.3a) , find the dimension nearest to this measurement and then note the dimension at the head of the particular column in the table. This is the required uniform course spacing. Bear in mind that 352 mm is the maximum permissible course spacing.

3 Mark off both ends of the roof at a point 355 mm from front edge of fascia board or tilt batten. Mark off from this point up the remainder of the rafter using the uniform course spacing obtained from the table or adjusted slightly if necessary so as to obtain equal increments finishing 25 mm from face of ridgeboard.

4 Snap a chalk line across the top of the roof framing.

5 Locate lower edge of battens on chalk lines and nail to roof framing.



7. FIXING TILES AND ACCESSORIES

7.3a Spacing Table–Shingle (Based on a 86 mm Headlap)

	Spacing of Courses							
	330	333	336	340	343	346	349	352
1	355	355	355	355	355	355	355	355
2	685	688	691	695	698	701	704	708
3	1015	1021	1028	1034	1041	1047	1053	1060
4	1345	1355	1364	1374	1383	1393	1403	1413
5	1675	1688	1701	1713	1726	1739	1752	1765
6	2005	2021	2037	2053	2069	2085	2101	2118
7	2335	2354	2373	2393	2412	2431	2450	2470
8	2665	2687	2710	2732	2755	2777	2799	2822
9	2995	3021	3046	3072	3097	3123	3149	3175
10	3325	3354	3383	3411	3440	3469	3498	3527
11	3655	3687	3719	3751	3783	3815	3847	3880
12	3985	4020	4055	4091	4126	4161	4196	4232
13	4315	4353	4392	4430	4469	4507	4545	4585
14	4645	4687	4728	4770	4811	4853	4895	4937
15	4975	5020	5065	5109	5154	5199	5244	5289
16	5305	5353	5401	5449	5497	5545	5593	5642
17	5635	5686	5737	5789	5840	5891	5942	5994
18	5965	6019	6074	6128	6183	6237	6291	6347
19	6295	6353	6410	6468	6525	6583	6641	6699
20	6625	6686	6747	6807	6868	6929	6990	7052
21	6955	7019	7083	7147	7211	7275	7339	7404
22	7285	7352	7419	7487	7554	7621	7688	7756
23	7615	7685	7756	7826	7897	7967	8037	8108
24	7945	8019	8092	8166	8239	8313	8387	8460
25	8275	8352	8429	8505	8582	8659	8736	8812

7. FIXING TILES AND ACCESSORIES

7.4 Fixing Battens

Rafter/Truss Spacings	Minimum Batten
up to 600 mm	38 x 25 mm
600 - 900 mm	50 x 38 mm
900 x 1200 mm	50 x 50 mm

The battens should be laid out over the setting out nails and cut to size. All joints should be square and cut to the centre of the rafter or truss. Joins should be staggered throughout the roof with no two joins occurring on the same rafter or truss in adjacent courses.

All tile battens should be nailed to each rafter or truss with at least one nail of sufficient length to penetrate the rafter or truss by the thickness of the tile batten being used, eg 50mm x 25mm batten require 25mm penetration.

If a cut course has occurred in the setting out, the tile batten should be angled to support the tile on the same plane as the rest of the roof.

7. FIXING TILES AND ACCESSORIES

7.5 Loading Roof

The pitch of the roof has to be considered when loading the roof.

Roof Pitch Less Than 30°

The roofing tiles should be carried onto the roof in “lifts” of six to eight tiles. Each lift should be deposited on the tile batten, with the nose of the bottom tile hooked over the tile batten, and the back of the tile sitting on the batten below. Each tile in the lift should have the nose of the tile hooked over the one below.

The lifts should be spaced approximately 900mm apart over the entire roof, with an extra lift at the hip or gable to allow for cutting and wastage.

On trusses or roofs designed with a camber to take up the load, it may be a requirement that the roof be loaded equally on both sides to spread the weight evenly.

Roof Pitch Between 30° and 40°

The loading of these steep pitched roofs requires special attention. Safety must be of foremost importance to prevent the tiles slipping and falling from the roof.

The following method will provide for satisfactory placement of lifts before the spreading operation.

The method for loading roofs below 30° is used with exception that one batten is left free and the lifts are placed 450mm apart. It is then possible to slit the lift into two. The top half of the lift is hooked over the nose of the tile over the free batten and the back of the tile rested on the split lift below.

Roof Pitch More Than 40°

On very steep pitched roofs loading of the roof should not exceed the amount of tiles that can be laid and fixed in that days work.

All loose material should be removed from the roof for safety reasons.

7. FIXING TILES AND ACCESSORIES

7.6 Laying and Fixing Tiles

Tiles should be laid in accordance with AS 2050–1995. All courses of tiles should be aligned horizontally, vertically and diagonally in order to ensure that the roof presents a regular and even appearance. The tiles can be laid in either straight or broken bond. Where possible, the tiles should be fitted close together, (but not hard together) and should be parallel to one another. However, all tiles may be 'slack jointed' to compensate for the roof being out of square and to ensure gable ends finish with either full or cut half tiles.

The maximum slack joint gap should be 15mm.

Tiles are always laid from right to left, commencing at the eaves course.

7. FIXING TILES AND ACCESSORIES

7.6 Laying and Fixing Tiles

Setting-out

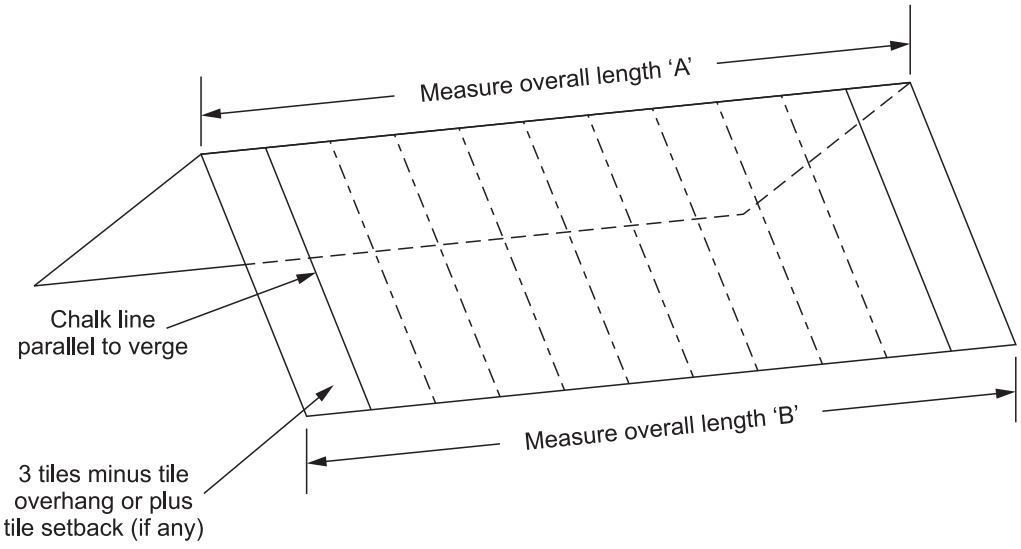
It is important to –

a) Obtain straight lines at sidelaps

b) Avoid narrow cut tiles at verges

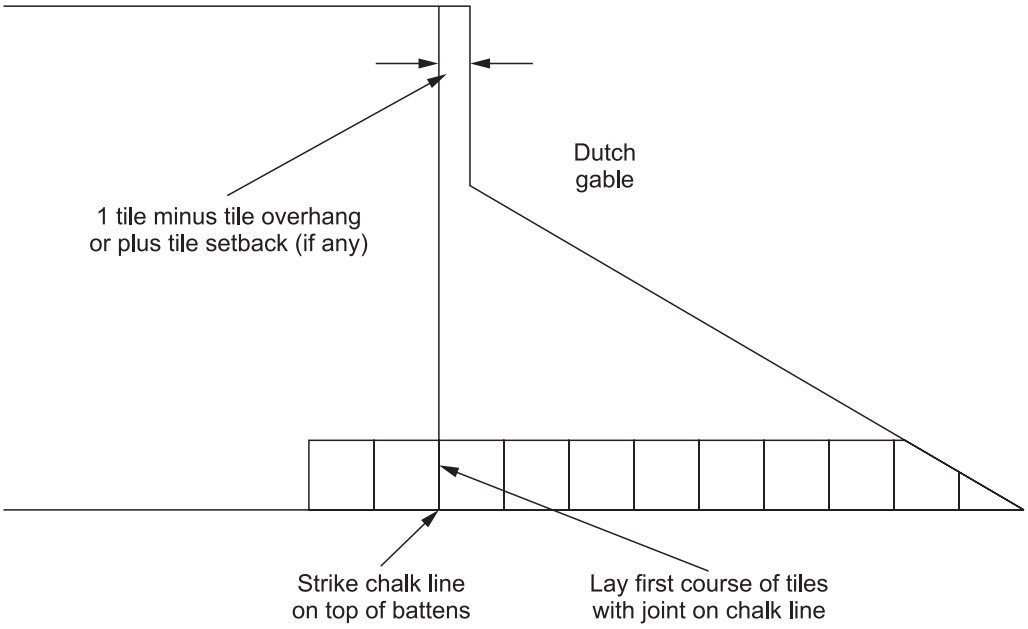
c) Ensure that tiles at verges are parallel to the verge

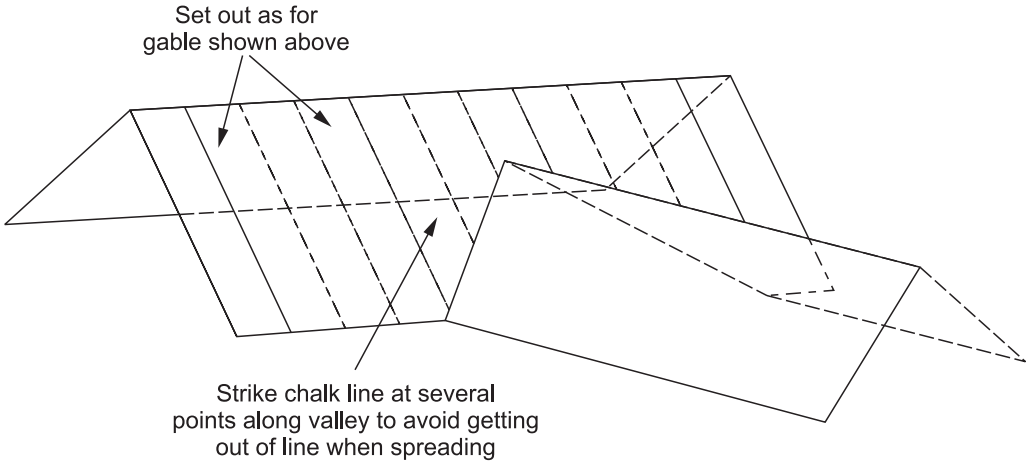
Mark ridge and eaves at equal intervals of three tiles plus where necessary an allowance for adjusting each tile joint to compensate for a difference between 'A' and 'B' and to finish with a half or full tile at each verge. Join marks with chalk line as shown.



7. FIXING TILES AND ACCESSORIES

7.6 Laying and Fixing Tiles





7. FIXING TILES AND ACCESSORIES

7.7 Hip and Valleys

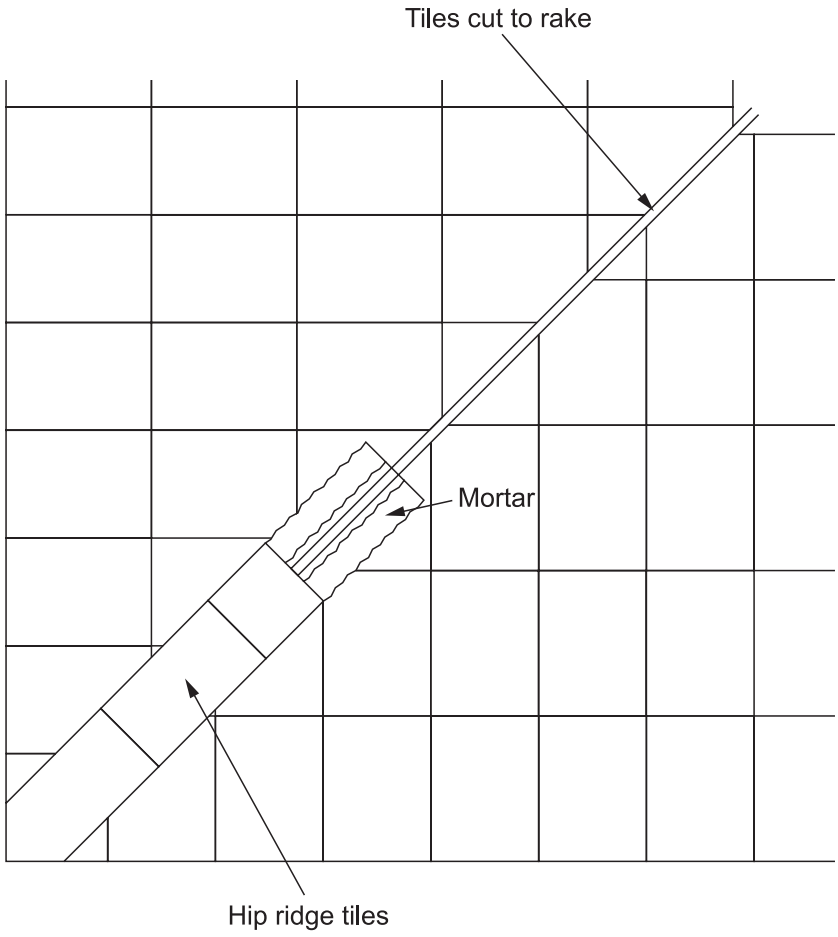
Tile cutting is carried out by using pincers or a tile cutter designed to suit the tile material.

All tiles should be cut cleanly and to suit the angle of the roof.

Hip tiles should be cut to the centre of the hip rafter, there should be no more than a 13 mm gap between the starting and finishing sides of the hip.

To hold the cut tiles on the hip level with the full tile it is necessary to drive a nail of sufficient length into the hip rafter, then bend the nail under the cut tile to hold the cut tile level with the full tile.

Valley tiles should be cut no wider that 75 mm between the two planes of the roof. The tiles should overhang the valley gutter by no less than 100 mm.



7. FIXING TILES AND ACCESSORIES

7.8 Bedding and Pointing

Preparation

Before the bedding and final touches are completed on the roof it is important that the roof be checked and all the necessary preliminary work completed.

All debris should be removed and tiles broken during fixing replaced.

Bedding and pointing of the accessories is carried out in two operations.

Stage One

Tiles and accessories that required bedding are fixed with a mortar mix of one part masonry cement or similar to four parts clean sand (brickies sand is the most suitable).

Stage Two

Bedding that requires pointing or areas that require pointing only are normally finished with a mortar mix of one part portland cement to three parts clean sand, with oxide or similar colouring agent introduced into the mix to suit the colour of the tile.

If required and/or specified, an approved polymer based pointing mortar can be used. This product is usually available pre-mixed and colour matched to any roof tile.

Bedding and pointing operations should not be carried out in extreme conditions. During periods of high temperatures the accessories should be thoroughly wetted before use.

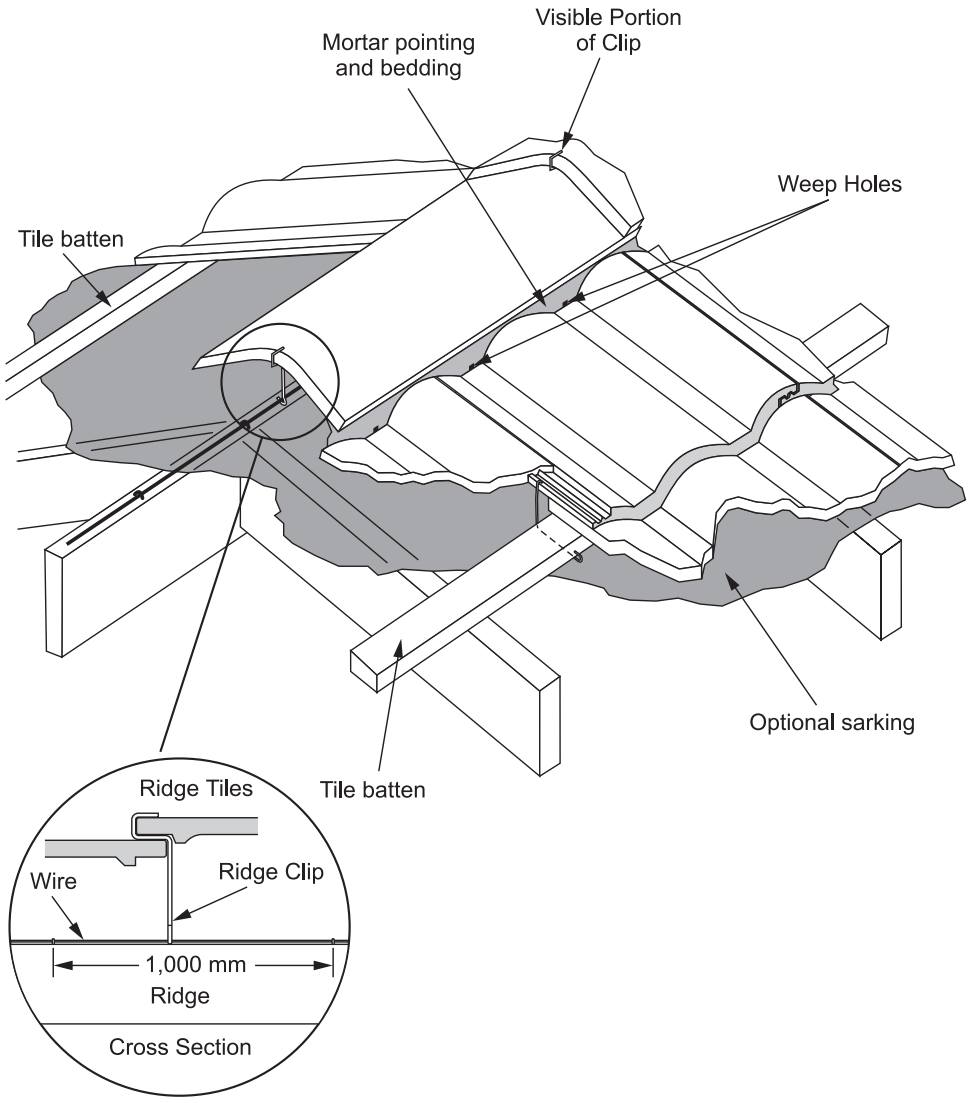
Under no circumstances should any type of additive be added to the mixes.

7. FIXING TILES AND ACCESSORIES

7.9 Ridge and Tile Clipping

a) Ridge Clip

The ridge clip is designed to secure each ridge piece to both ridge and hip boards. The top of the ridge clip is fitted on the middle edge of the ridge piece and the bottom part is hooked on to a wire that is secured along the length of the ridge or hip board at one metre intervals. The wire should be firmly taut at each secured point.



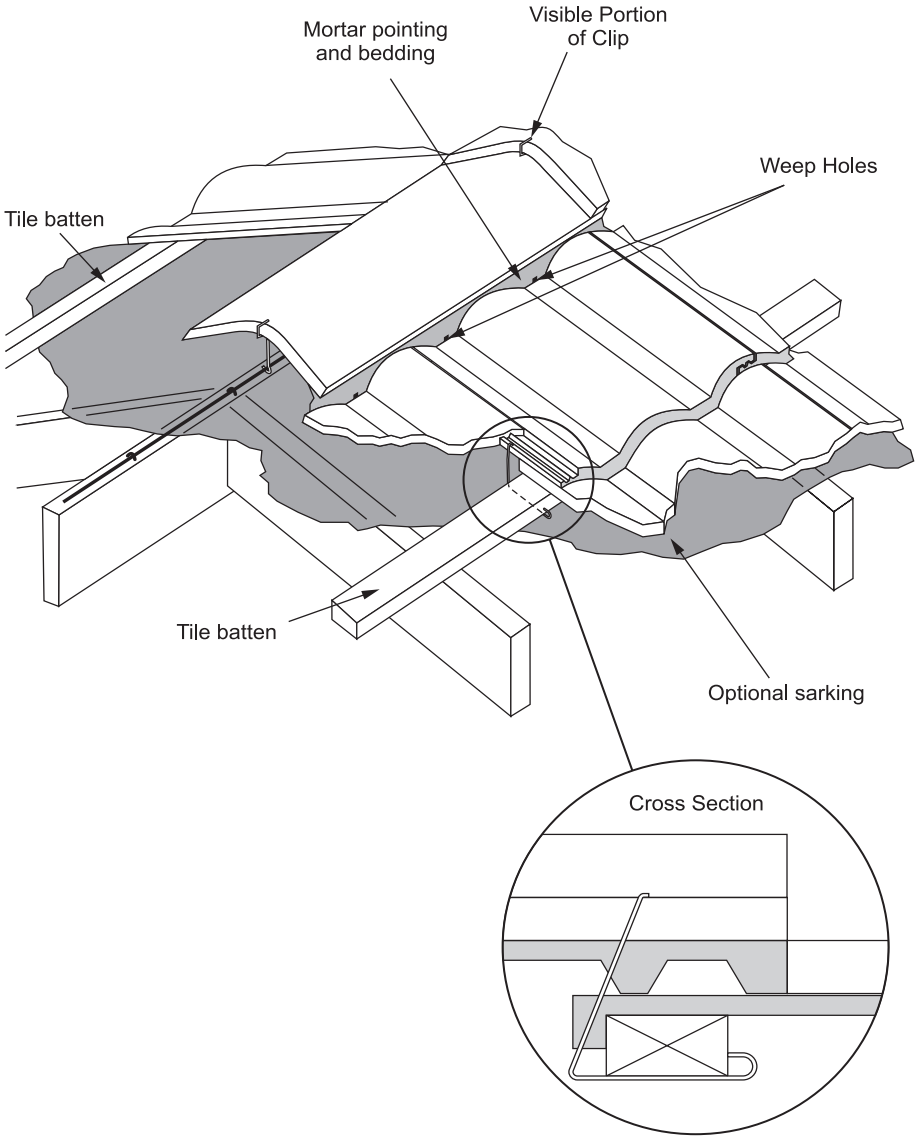
7. FIXING TILES AND ACCESSORIES

7.9 Ridge and Tile Clipping

b) Tile Clip

The tile clip allows for simple hand installation and the roof tile is tied from the nose end direct to the roofing batten. The side lap clip provides the tile roof with the added safeguard of resisting all upward pressure resulting from high winds and will allow for any timber shrinkage.

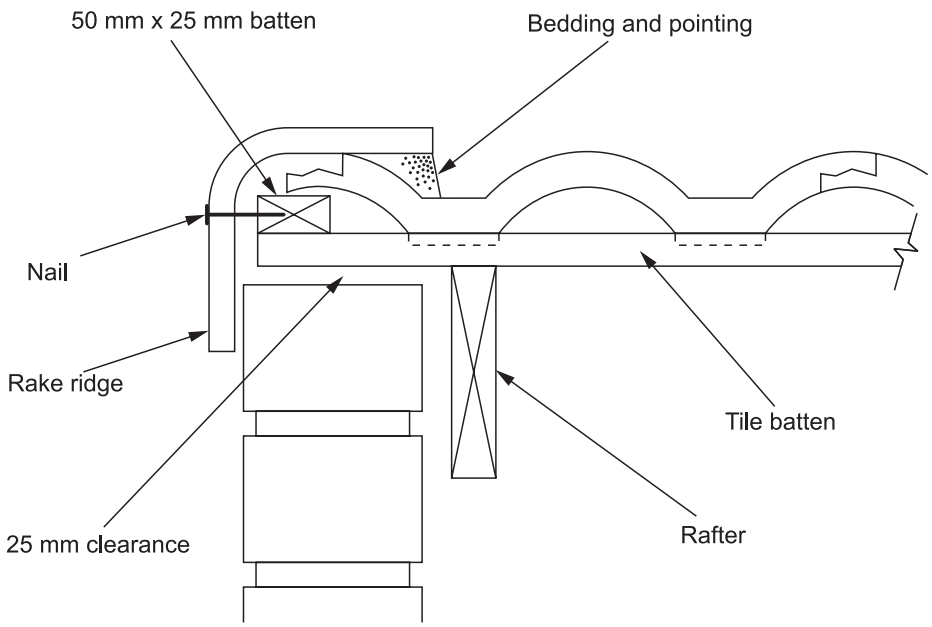
Both ridge and tile clips conform to AS 2050-1995.



7. FIXING TILES AND ACCESSORIES

7.10 Rake Ridge

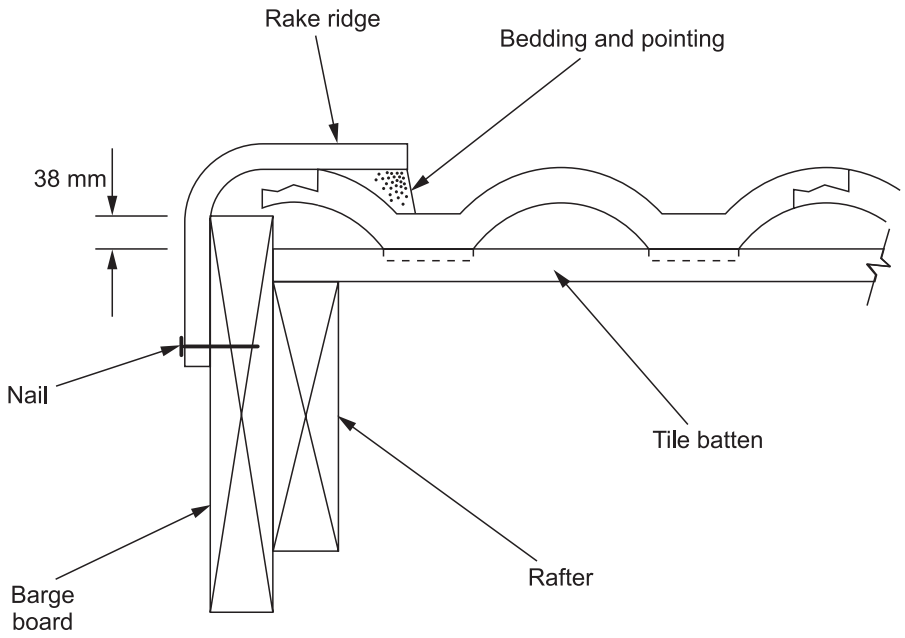
a) Finish to Brick Gables



7. FIXING TILES AND ACCESSORIES

7.10 Rake Ridge

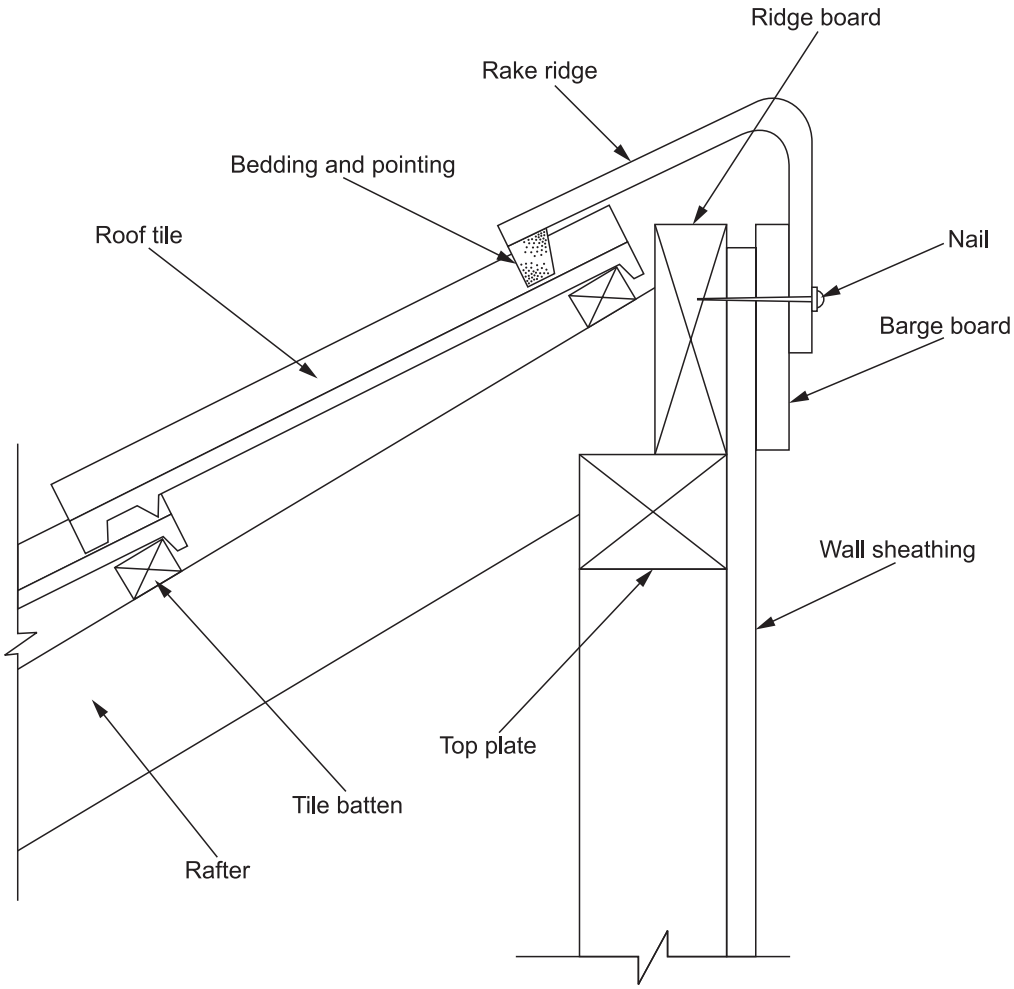
b) Finish to Barge Board



7. FIXING TILES AND ACCESSORIES

7.10 Rake Ridge

c) Finish to Sawtooth Roof



Harmony
NO OTHER TILE CAN MATCH IT

GLOSSARY OF TERMS

Abutment

The junction of a roof with a structure which rises above it.

Accessory

A concrete or terracotta product used to finish a roof; includes ridge, barge tiles and finials

Anti-Ponding Board

A sarking support which bridges the top of the fascia board (or tilting batten) and the rafters. They are used to prevent water building up (ponding) behind the fascia.

Apex

The intersection of all ascending hips where they meet either a ridge or another ascending hip.

Barge Board

A dressed timber (can be metal) member fixed along the pitched edges of a gable which is used to cover the ends of the roof members.

Batten

A small section of timber or steel which provides a means of supporting, positioning or fixing tiles. The following are examples of batten types:

Tile batten – a batten parallel to the eaves line and at right angles to the rafters. Sometimes called nailing strip or furring strip. Tiles are fixed to it.

Counter batten – a batten fixed on top of the rafters to allow sarking to sag where ceiling lining (with exposed beams) is used.

Tilting batten (bellcast) – a batten fixed to the eaves end of a pitched roof to maintain the roof slope at the eaves course. The fascia board is usually used for this purpose.

Bedding

The fixing of tiles, ridging or hip capping upon a bed or mortar. This is also the term used for the mix of builder's sand and mortar used to fix tiles .

Note: edges are finished off by 'pointing'.

Bond

The system of aligning tiles on the roof in relationship to each other. With straight bond the sides of tiles form straight lines from bottom to top course. With staggered, broken or cross bond, tiles in each alternate course overlap, by half, the tiles above and below them.

Dormer

A vertical window formed in a slopping roof.

GLOSSARY OF TERMS

Eaves

The lower parts of a roof which project beyond the face of the external walls.

Eaves Overhand

The inclined distance (line of rafter) from the external load-bearing wall to the fascia.

Eaves Width

The horizontal dimension between the inside of the fascia board and the outside of the external wall.

Edge of Roof

The area of a roof bounded by the eaves, ridge and barge, extending towards the centre of the roof for a distance equal to 0.1 multiplied by the minimum plan dimension of the building, measured from eaves to eaves or barge to barge.

Fascia Board

A member, usually of timber, fixed to the rafter ends.

Fixing Materials

Components used to fix and weatherproof a roof, eg nails, clips, mortar.

Flashing

A strip of flexible waterproof material (usually ductile) used to exclude water from the junction between a roof covering and another part of the structure, vis:

Apron flashing – a flashing with the lower edge lapped over the head of each tile.

Cover flashing a flashing which overlaps the sides of tiles. Often overlaps other components such as soakers.

Raked flashing – a flashing which covers an inclined intersection. The top edge is secured into a chase cut parallel to the top surface of the roof.

Stepped flashing – a flashing used to cover an inclined intersection, secured into the horizontal joints.

Gable

The vertical face of the roof end.

Gable End Cover Tile (Barge Tile)

A tile fitting covering the gable end.

Gauge

The measured distance between tile batten centres.

GLOSSARY OF TERMS

Gutter

Any form of roof water channel, viz:

Back gutter – a cutter at the back of a chimney or other penetration in a pitched roof.

Box gutter – a gutter with parallel sides, usually between two opposing roof slopes.

Concealed gutter (secret gutter) – a gutter formed at a valley or against an abutment and concealed by the tiles and flashing.

Eaves gutter – a gutter fixed at the eaves.

Valley gutter – a gutter at the internal junction of two roof slopes.

Hip

The external angle formed by the meeting line of two pitched roof surfaces.

Hip Capping

A tile fitting covering the hip.

Hipped End

A roof surface bounded by the hips at the sides and the eaves at the base.

Lap

Head or end lap = the portion of a tile covered by the tile above it.

Side Lap – The portion of a tile which interlocks with the tile beside it.

Mansard

A roof with two pitches on one side of the ridge. The steeper pitch commences at the eaves and meets a lesser pitch which terminates at the ridge line.

Pitch

The angle of inclination of the roof surface to the horizontal or the ratio of the height to the span of a roof (eg 15° or 1:3.75).

Pointing

The application of coloured mortar over bedding for decorative purposes. Also the term for the mix.

Profile

The end elevation or cross section of the tile to indicate shape and design of the tile.

GLOSSARY OF TERMS

Rafters

Rafters in a roof frame are usually timber members which support the roofing material, viz:

Common rafter – the main support rafter of the slope between eaves, wallplate and ridge.

Cripple rafter – the rafter connecting a hip and valley.

Hip rafter – a rafter following the line of the external intersection of two roof surfaces.

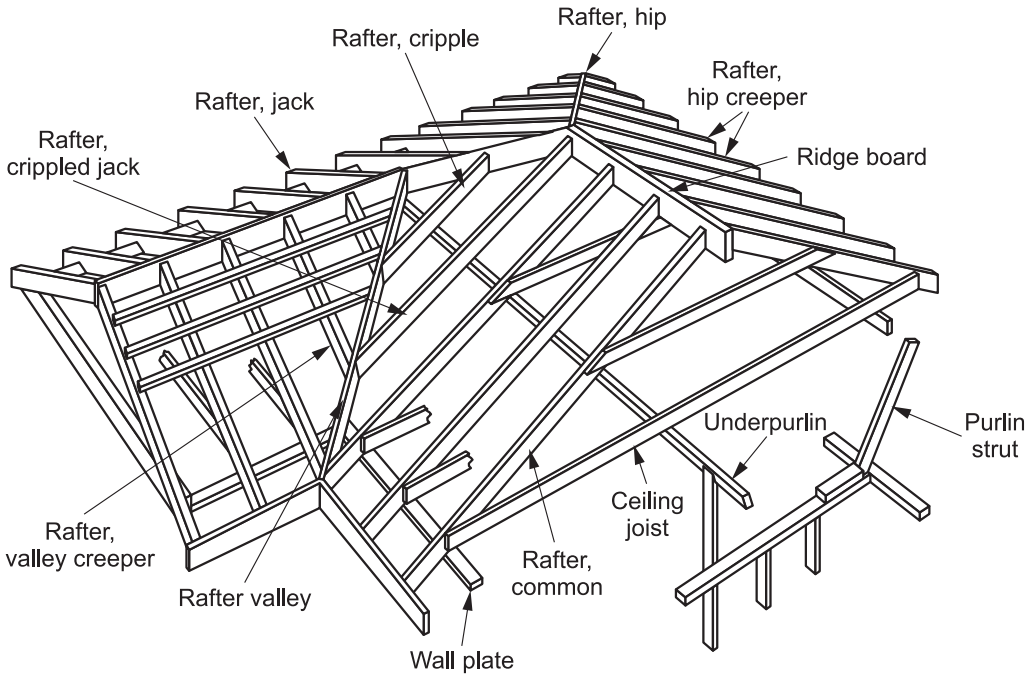
Hip creeper rafter – a rafter connecting a wall plate and hip.

Jack rafter – a rafter that fits against the end of a ridge at the intersection of two hips.

Principal rafter – an upper member in a truss having the same inclination as the common rafters.

Valley rafter – a rafter following the line of the internal intersection of two roof surfaces.

Valley creeper rafter – a rafter connecting ridge and valley.



Ridge

The uppermost meeting line of two pitched surfaces.

Ridge Clip

Specially formed metal fastening used to secure ridge capping to hip and ridge boards.

Ridge Capping

A tile fitting covering the ridge line.

Sarking

A waterproof membrane laid over the rafters and under the tile battens. The membrane is usually made from double faced aluminium foil.

Sawtooth Roof

A roof structure which is vertical on one side of the ridge line and pitched on the other.

Sheathing

A close boarding or other material nailed to the framework of wall or roof. Sometimes referred to as sheeting.

Skillion

Roof with a single slope from eaves to ridge. Also a smaller lower pitched roof extending from the main roof.

Soaker

Waterproof, flexible material (usually ductile) placed under the junction of mitred tiling or at junction of hips and ridge or abutments to prevent the penetration of water.

Soffit Lining

Usually cement fibre board fixed to the rafters or soffit bearers, forming projecting eaves.

Starter

The first hip cap at the lowest point of the hip line.

Steel Battens

Steel battens shall be designed in accordance with AS 1538. They shall be manufactured of galvanised steel, of at least commercial grade, with a corrosion-resistant coating of a minimum of 300 g/m^2 of zinc.

Tile Clip

Specially formed metal fastening used to secure tiles to tile battens.

Valley

The internal angle formed by the meeting line of two pitched roof surfaces. A metal tray is fixed in this area to direct water to the gutter.

Verge

The free edge of a roof surface, e.g., at a gable or dormer edge.

Weatherproof

When the performance of the roofing system or component is equal to or better than that of the datum specimen if subjected to the Dynamic Weather Resistance Test, which is detailed in Appendix C AS 2050–1995.

Weather Resistance

When tested in accordance with the test set out in Appendix C. AS 2050–1995, the completed roof shall be sufficiently free from defect or distortion to be weatherproof.

Weephole

A small hole inserted in the ridge bedding and pointing mortar at the water channel of the tile for drainage purposes.