

**10.0 PRESSED METAL TILES****10.1 DESIGN**

Metal tiles, shingles and shake panels are press formed to provide a variety of shapes resembling clay tiles and wooden shingles or shakes. They are interlocked or overlapped together laterally and longitudinally and are clipped or fastened to timber or steel battens.

The metal used for the manufacture of metal tiles, shingles and shakes is metallic coated steel, although aluminium or other metals can be used. Pressed metal tiles made from steel invariably have an additional protective coating applied over the metallic coated steel. This may be an organic paint coating applied either by the steel manufacturer before the tiles are formed, or by the tile manufacturer after the tiles are formed. An alternative coating can be provided by applying crushed stone or ceramic granules to the base metallic coated steel and attached by an adhesive coating. In this case a clear acrylic coat is normally applied on top of the stone coating.

These coatings give protection to the metallic coated steel base, as well as providing a decorative finish.

Pressed metal roofing tiles are installed by fixers, trained and appointed by the manufacturers or their representatives, and they are not normally supplied to other installers.

**10.1.1 DURABILITY**

The principles behind detailed requirements for fixings, flashings, corrosion, compatibility and maintenance as described elsewhere in this Code of Practice should also be applied to the design and installation of pressed metal tiles. Exceptions result from the specific differences between tiles and other forms of metal roof cladding and include the height of laps and specific dimensions of metal shingles and shakes prescribed in this section.

**Steel based metal tiles, shakes and shingles must have hot-dipped galvanised fasteners that are compatible with the base metal and provide a service life equivalent to the durability of the panel.**

Panels are fastened to the roof structure by fixing horizontally through the front of the panel and because the fixings are in shear they provide wind uplift resistance suitable for very high wind design loads.

**10.1.2 PITCH**

**Tiles with an upstand of a minimum of 25mm must not be laid on roof structures less than 12°, unless approved in writing by the tile manufacturer, the B.C.A. or the Territorial Authority.**

**Tiles, shakes or shingles with an upstand of less than 25mm must not be laid on roof structures less than 15°.**

N.B. The pitch of the roof is not the same as the pitch of the tiles because this varies with the height of the batten and the height of the upstand. If the minimum pitch cannot be complied with, a method approved in writing or a producer statement should be given before work is commenced.

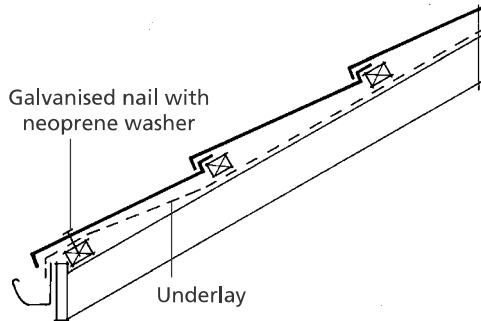
**10.1.3 UNDERLAYS**

**Permeable self-supporting underlay must be installed on all new roofs as specified in section 4.3. of this Code of Practice.**

**The underlay must be installed horizontally with a minimum 75mm overlap.**

The first length of underlay should be positioned so that it lays over the eave batten and the fascia, and into the gutter.

When pressed metal tiles are installed, the underlay is laid horizontally on top of the rafters before the battens are fixed and so there is an air space between the underlay and the tiles, except at the eave.



**Drawing 10.1.3.** 

## 10.1.4 ROOF FRAMING

Roof framing should provide support and fixing for the tile battens that will satisfy the design load wind requirements. Installers should check that the framing has been erected to an accurate and even line before roof fixing is started.

An inspection and any rectification to the framing alignment must be carried out before roof fixing is commenced.

## 10.1.5 TILING BATTENS

Tiling battens must be:

- H1.1 boron treated when used in attic roof construction
- H1.2 treated when used in skillion roof construction
- Douglas fir of moisture content <20%
- KD Pinus Radiata of moisture content <18%
- not less than 50 x 40mm for 900mm rafter spacing
- 50 x 50mm for 1200mm spacing

Copper preservative timbers must not be used with Zinalume coated tiles. Battens required for rafter spacings greater than 1200mm must be specifically designed and be spaced to suit the tile module.

Battens at 370mm centres must be fixed to the rafters or trusses over the underlay using fasteners to comply with Tables 10.1.5.A, B and C.

N.B. Battens at different centres may require different values.

Table 10.1.5.A. for buildings with ceilings and 370mm batten spacing

cpe = -0.9, cpi = 0, cp = 0.9

**Pullout resistance in kN required for battens for buildings with ceilings**

Purlin/ batten size	Max span	Wind Zone 0.61kPa	Wind Zone 0.61kPa	Wind Zone 0.82kPa	Wind Zone 0.82kPa	Wind Zone 1.16kPa	Wind Zone 1.16kPa	Wind Zone 1.50kPa	Wind Zone 1.50kPa
mm x mm	mm	Low 32m/s	Low 32m/s	Medium 37m/s	Medium 37m/s	High 44m/s	High 44m/s	Very High 50m/s	Very High 50m/s
		M	P	M	P	M	P	M	P
50 x 40	900	0.2	0.3	0.3	0.4	0.3	0.5	0.5	0.7
50 x 50	1200	0.2	0.4	0.3	0.5	0.5	0.7	0.6	0.9

M = main body of the roof P = periphery as described in drawing 3.3.2.A.

**Table 10.1.5.A.**

Table 10.1.5.B.  
cpe = -0.9, cpi = 0.2, cp = 1.1

**Pullout resistance in kN required for battens for buildings without ceilings but with a permeable windward wall**

Purlin/ batten size	Max span	Wind Zone 0.61kPa	Wind Zone 0.61kPa	Wind Zone 0.82kPa	Wind Zone 0.82kPa	Wind Zone 1.16kPa	Wind Zone 1.16kPa	Wind Zone 1.50kPa	Wind Zone 1.50kPa
mm x mm	mm	Low 32m/s	Low 32m/s	Medium 37m/s	Medium 37m/s	High 44m/s	High 44m/s	Very High 50m/s	Very High 50m/s
		M	P	M	P	M	P	M	P
50 x 40	900	0.2	0.3	0.3	0.5	0.4	0.6	0.6	0.8
50 x 50	1200	0.3	0.5	0.4	0.6	0.6	0.9	0.7	1.1

M = main body of the roof P = periphery as described in drawing 3.3.2.A.

**Table 10.1.5.B.**

Table 10.1.5.C.  
cpe = -0.9, cpi = 0.8, cp = 1.7

**Pullout resistance in kN required for battens for buildings without ceilings and with a dominant windward opening**

Purlin/ batten size	Max span	Wind Zone 0.61kPa	Wind Zone 0.61kPa	Wind Zone 0.82kPa	Wind Zone 0.82kPa	Wind Zone 1.16kPa	Wind Zone 1.16kPa	Wind Zone 1.50kPa	Wind Zone 1.50kPa
mm x mm	mm	Low 32m/s	Low 32m/s	Medium 37m/s	Medium 37m/s	High 44m/s	High 44m/s	Very High 50m/s	Very High 50m/s
		M	P	M	P	M	P	M	P
50 x 40	900	0.4	0.5	0.5	0.7	0.7	1.0	0.9	1.3
50 x 50	1200	0.5	0.7	0.6	0.9	0.9	1.3	1.1	1.7

M = main body of the roof P = periphery as described in drawing 3.3.2.A.

**Table 10.1.5.C.**

How to achieve these requirements (Data obtained using 45mm batten thickness)

Fastener	Size	No.	kN
Gun nail	90 x 3.15	1	0.4
Ringshank nail (gun/hand)	90 x 3.2	1	0.6
Gun nail	90 x 3.15	2	0.7
Twist Shank Nail	90 x 3.3	1	0.9
Purlin Screw c/s head	10g x 100	1	2.5
Type 17 screw	14g x 100	1	7.3

**Table 10.1.5.D.**

- Battens must have square cut ends and must be butt jointed over the centre line of the rafter.
- Adjacent rows of battens must not be joined on the same rafter and must span at least 3 rafter spacings at the roof edge.
- A batten must be installed immediately behind the fascia as fixing for the eaves tiles
- Eaves tiles must overhang the gutter by a minimum of 30mm.

Eaves tiles are recommended to overhang the gutter by 40mm.

Because an eaves tile batten is installed immediately behind the fascia the position of the next batten up the rafter will be less than that of the tile normal batten spacing.

The position of this batten may vary depending on the pitch of the roof.

The edge of the roof should be taken as 20% of the roof width measured from the fascia, barge, hip or ridge line, and will apply all round the periphery of each roof plane.

The batten layout is marked on the rafters by placing nails at the line of the batten fronts. The roofing underlay is then laid over this, onto the rafters. The battens are then laid from the lowest part of the roof upwards, using the marker nails to locate the front edge of the batten. The marker nails are removed before the tiles are laid.

## 10.2 ROOF DRAINAGE

### 10.2.1 VALLEYS

Valley gutters must be made with the same metal or coating or a compatible material as the roof tiles, and when the roof tile is painted or coated the valleys must also be painted.

Where secret gutters are used or where the flashings are unseen, they must have a durability of 50 years.

The valley up-stand dimension must be a minimum of 20mm and the fasteners must not penetrate the valley.

For valley sizing see *roof drainage section 8.4.5. Valley*.

### 10.2.2 VALLEY INSTALLATION

The valley boards installed between the valley jack rafters to support the valley and tile battens are required to be set with their outer edge a minimum of 90mm 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. The valleys are held in position by clips specially designed to allow for expansion, or by compatible nails and washers placed along side the valley or bent over the top lip of the valley.

**Under no circumstances must the fasteners penetrate the valley surface.**

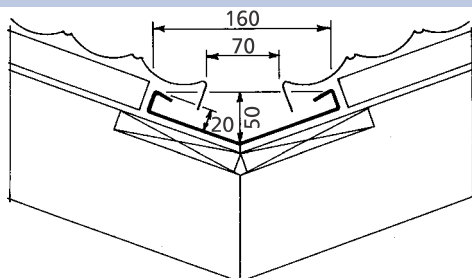
Where joins occur the minimum overlap is to be not less than 200mm.

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.

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

**The gap between tiles on opposing sides of the valley must be a minimum of 70mm.**

Valley boards and boards supporting flashings must be treated H.3 and separation by underlay is required between any metal and the treated timber.



**Drawing 10.2.2 Section through valley** 

### 10.3 FLASHINGS

Standard flashings are supplied for most locations on a roof, and are in two styles, only one of which is used on any one roof. All flashings and roofing accessories are made from the same base metal as the tiles.

- “Long” accessories are 2 metres long, with fixing holes every 500mm, and there are specific accessories for ridges, hips, barges, aprons and walls.
- “Short” accessories are 400mm long trims, and can be used for most flashing applications on a roof.

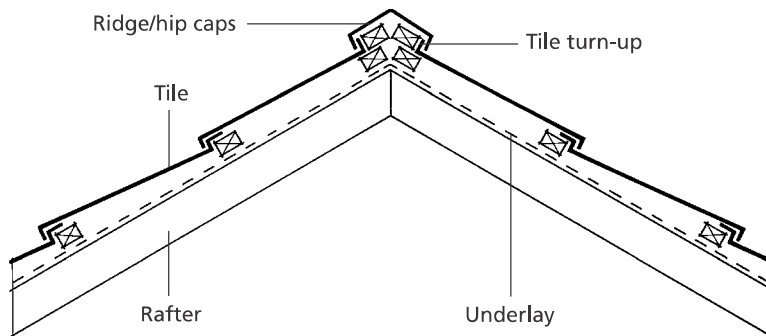
Special flashings are made as required by the manufacturer or the roofer from uncoated steel and subsequently factory coated using the same coating process as used for tiles.

#### 10.3.1 RIDGE

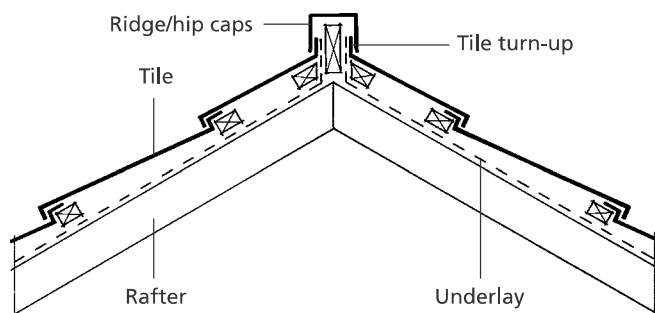
Tiles must be turned up a minimum of 40mm against the battens, hip board or where they butt against a vertical or an inclined surface.

The ridge trim cap or side flashings must cover the tile turn-ups by a minimum of 35mm.

Ridge tiles are bent up and then cut to form a turn-up that fits under the ridge/hip cap or short accessory. To ensure a watertight joint and prevent the ingress of water, a tight fit is required between the tile and the ridge cap.



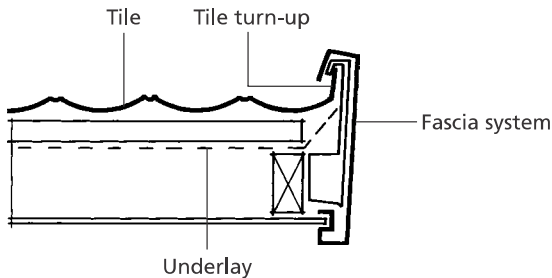
**Drawing 10.3.1.A. Ridge and hip short trim installation** 



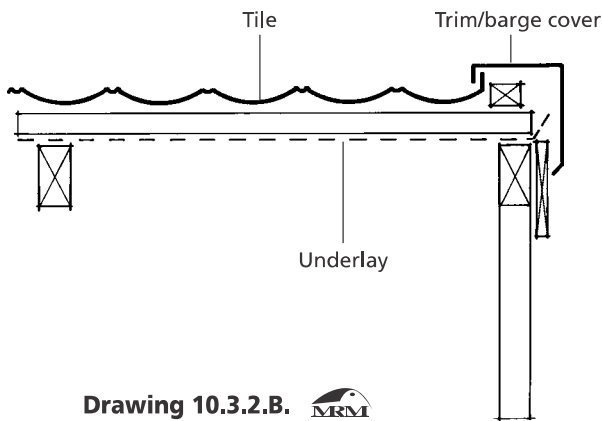
**Drawing 10.3.1.B. Ridge and hip long trim installation** 

## 10.3.2 GABLE ENDS

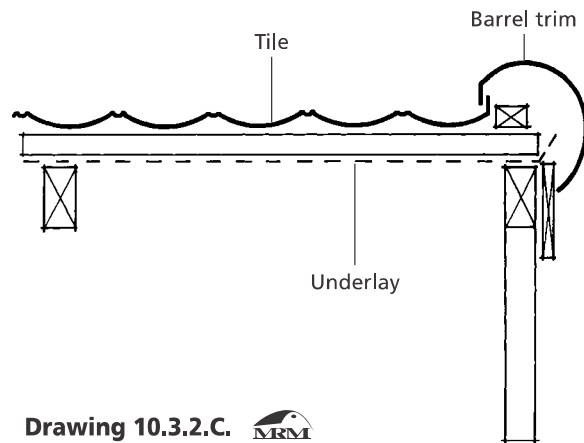
Tile ends are turned up a minimum of 40mm and installed against a batten that will be covered by a barge cover, or under a metal fascia. If a hidden gutter is used tile edges should be turned down into the gutter by a minimum of 20mm.



**Drawing 10.3.2.A** 



**Drawing 10.3.2.B** 



**Drawing 10.3.2.C** 

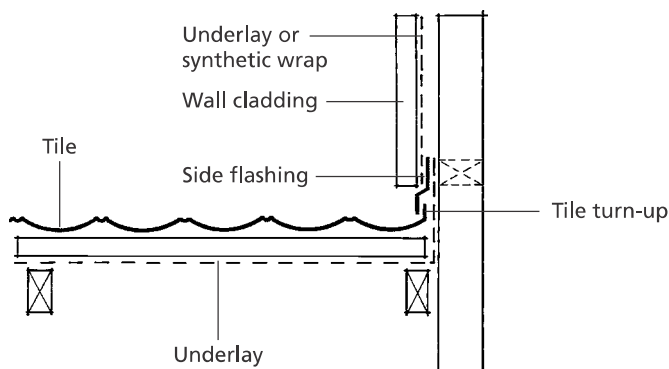
## 10.3.3 HIP

Tiles should be turned up against the battens or hip board by a minimum of 40mm. (see drawing 10.3.1.)

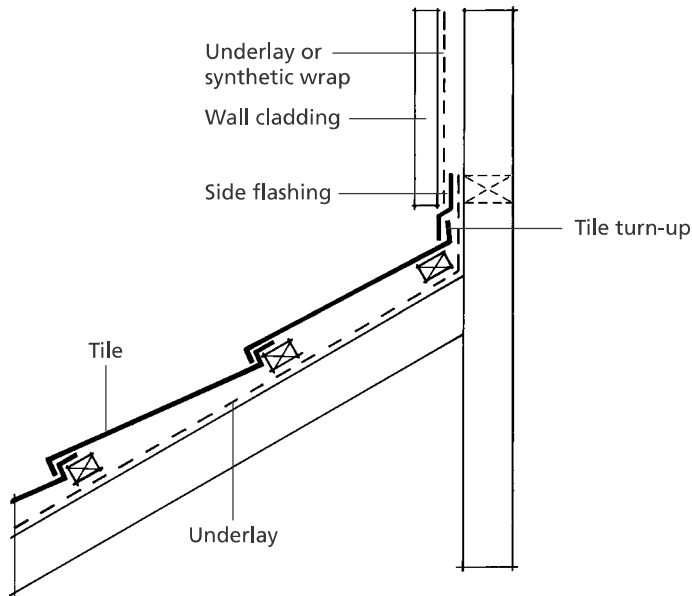
## 10.3.4 VERTICAL WALL

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.

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.



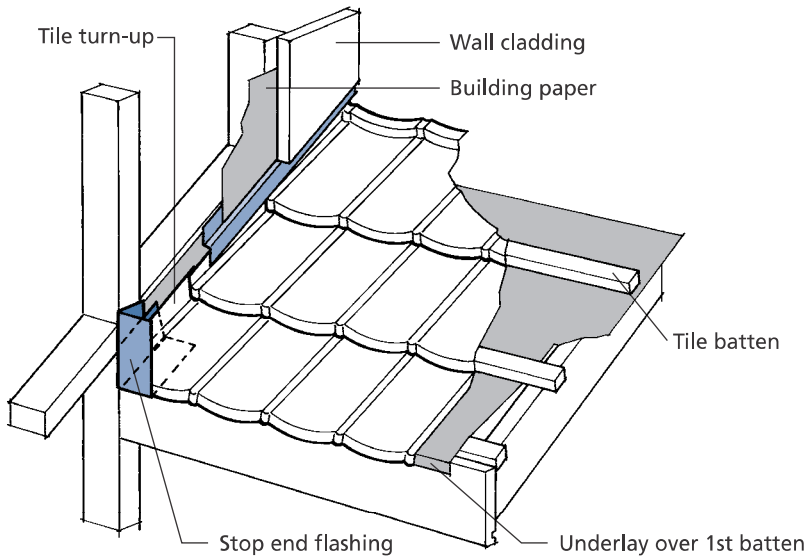
**Drawing 10.3.4.A** 



**Drawing 10.3.4.B.** 

**10.3.5 WALL TO ROOF JUNCTIONS**

Flashings at the ends of roofs where the roof does not end past the wall 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.



**Drawing 10.3.5** 

### 10.3.6 PENETRATIONS

Tiles cut for penetrations through the roof should be provided with up-stands and over-flashed to provide drainage from above without restricting the water flow. The flashing should finish 15mm beyond the tile head lap above the penetration, and should be wide enough to cover the nearest tile rib or up-stand. When the construction is solid masonry or brickwork, and flashings cannot be installed under the wall cladding, a chase should be cut and an over flashing installed in the chase to provide weather protection.

## 10.4 INSTALLATION

### 10.4.1 LAYING

Underlay and tile battens for the section of roof being covered should be completed before laying tiles. The roofing supervisor will establish when the roof should be installed, after all sub-trade work has been completed.

**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.**

If substantial work, such as texturing walls, is to be carried out on a wall above or adjacent to where metal tiles are to be laid, they should be installed after such work has been completed.

Tiles should be inspected and selected, as tiles of different colour match should not be installed on the same plane of a roof. If more than one pallet of tiles is required for one job the colour uniformity should be checked.

**Tiles damaged during installation must be removed and replaced and any deformed tiles or tiles with surface damage must be rejected.**

Tiles should be laid from the ridge down to avoid unnecessary traffic and can be laid broken bond or straight down the roof.

The eave gutter tiles should project over the edge of the fascia to ensure that water discharges directly into the gutter system and tiles should be laid so that they prevent any water penetrating into the roof cavity.

Before tiles are laid, the direction of lay should be determined by:

- Taking into account whether the profile can be laid only one way or both ways;
- Appearance, so that laps face away from the line of sight;
- Allowing for prevailing weather exposure.

Installation of perimeter tiles (excluding eaves tiles) can be completed before the main body of tiles are laid.

### 10.4.2 ROOF TRAFFIC

Metal Tiles are classified as a Type B roof cladding as they cannot be walked on indiscriminately without the risk of damage.

**Persons authorised to walk on a metal tile roof must walk only in the pan of the tile where it is supported by the batten, and wear flat, soft-soled shoes to prevent damage to the tiles and surface coatings.**

**Other trades must be made aware by the contractor or site supervisor of the method of walking on pressed metal tiles without causing damage, and that the cost of repairing damaged tiles is their responsibility.**



### 10.4.3 WORKMANSHIP

Graphite pencils must not be used to mark AZ coated steel products as carbon can cause premature corrosion failure of the coating.

Finishing of tile cuts and bends must leave straight lines up the roof section, to provide a true line for flashings.

When cutting tiles for their installation at ridges, hips, valleys and barges, damage to the surface finish must be avoided by using a guillotine or metal shears. When cutting the tile lengthwise it must be bent before cutting to reduce the amount of distortion that occurs as the profile is flattened during bending.

Tiles turned up and down for ridges, hips, valleys and barges must be bent using a bender designed specifically for this purpose. Tiles must be turned up at ridges, hips and barges by a minimum of 40mm, and down into the valleys to a minimum of 5mm from the valley floor.

### 10.5 SITEWORK

The requirements of *section 14.0. site practice* also apply to the installation of metal tiles, and in addition all gutters, valleys, roof channels and the roof should be left clean and free from debris on completion of the work.

### 10.6 LONGRUN TILES

A longrun tile is a hybrid roof cladding providing the appearance of pressed metal tile with the fixing attributes of long run profiled metal cladding.

The minimum pitch is 8° and underlay and battens are fixed in the same manner as for pressed metal tiles.

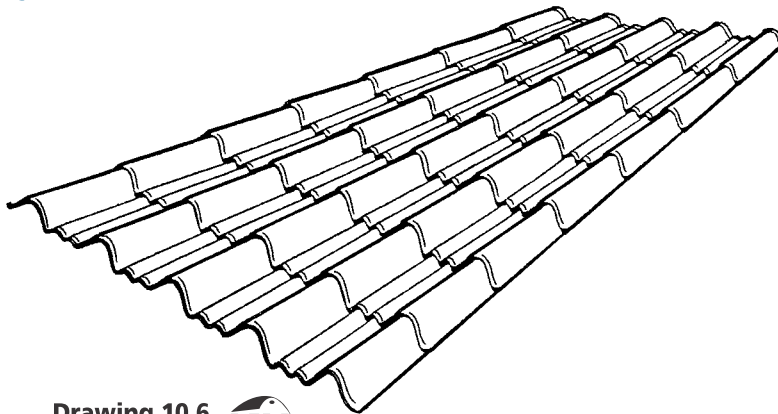
The module or step size of the profile can be adjusted and the pitch of the tile can be varied to suit any batten spacing on an existing roof or to alter the roof appearance.

Maximum sheet length is 7m however transverse laps are possible.

The material is pre-painted metallic coated steel of a yield strength of G250Mpa and is fixed with nails or screws at the front of the tile.

Sheets should be back-laid working from right to left which prevents creep at the gutterline due to the back-step in the underlap of the profile.

Longrun tile can be curved to a 250mm radius.



Drawing 10.6 