

Plain tile – unequal valleys/hips

'Keep it simple' is a good principal for all things in building. But with pitched roofing it should be extended to 'keep pitches equal'; it eliminates so many problems and looks better into the bargain.

With plain tiles it is possible to course around at valleys and hips from one roof slope onto another, making a clean and low maintenance roof covering. But this only works if the rafter pitches are equal on all slopes, or within a few degrees. If outside these para-



- The rafter pitch on the left is 35° and the pitch on the right is 50°. Both were set out at 100mm gauge. Note how many courses there are on the left compared with the right. An open lead valley should have been formed between the two slopes.

eters, purpose made standard bonnet/arris hips or curved/arris valley tiles will not fit. In these circumstances, open lead valleys or ridge/hip tiles should be used to form the junction.

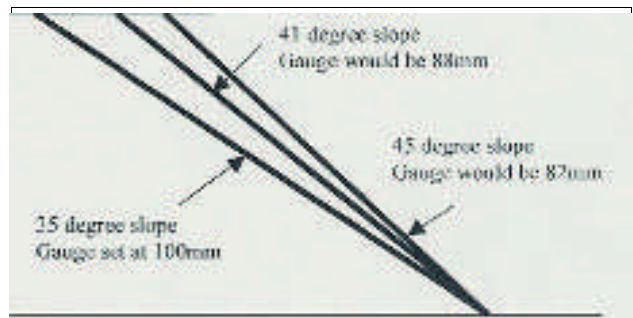
The reason for the need for equal rafter pitches relates to the length of the rafter and the number of tile courses over a given vertical rise between fixed points. Put simply, if two roof slopes start and finish at the same eaves and ridge level, the rafter with the lower pitch will be longest, needing more courses of tiles, resulting in a mismatch at the hip or valley junction. This

can be compensated slightly by setting the lowest rafter pitch to the maximum gauge (100mm), and closing down the gauge on the steeper slopes to give the same number of tile courses.

This sounds simple but there are some conditions that need to be understood:

- 1 The smallest batten gauge must not fall below 88mm gauge. This provides only 12mm of head lap variation. Therefore the difference between the steepest rafter pitch and the shallowest need to be close. The actual number of degrees will depend on the actual angle of the lowest rafter pitch.
- 2 Fixed setting out points on one slope will be transferred onto each roof slope and further affect the batten gauge restriction.
- 3 All standard bonnet/arris hip and curved/arris valley tiles are made to fit equal rafter pitches on a 90° plan angle. They may have some slack in the fit to allow up to 2° of difference between slopes. Beyond that limit the dihedral angle between the two rafter slopes will result in the tiles kicking in or out, leaving gaps for wind and rain to get in and making the roof look untidy.
- 4 An eaves sprocket on one roof slope only, such as with a dormer meeting a main roof slope, will result in the line of the valley changing direction. Hip and valley tiles are only designed to be laid in a straight line and not designed to turn corners.
- 5 Some roof slopes may vary in pitch from one end to the other, or have a hump in the middle. This will require the battens to be laid to a tapered (not fixed) gauge, and must not exceed 100mm or drop below 88mm.
- 6 Some clay tile manufacturers are willing to make special hip and valley tiles to fit unequal rafter pitches. To fit correctly,

Typical batten gauge chart for a plain tile roof



- The batten gauge chart for three different rafter slopes on the same roof of 35°, 41° and 45°. You can see that with the lowest pitch set at 100mm, the steepest pitch is below the 88mm gauge for plain tiles.

not only the rafter pitch but also the batten gauge needs to be known and considered during the design stage. This may not be possible to determine prior to battening out the roof. Special hip and valley tiles are expensive, take time to manufacture and may delay the contract.

7 Where a large roof is being clad with tiles on one slope, whilst the roof has yet to be constructed on another elevation, it may not be possible to determine which is the actual lowest pitched rafter slope before setting out the first roof slope.

Whilst points 3 and 4 could be solved by cutting tiles to a mitered valley/hip with lead soakers, there is a minimum rafter pitch restriction of 45° with mitered valleys and 52.5° with mitered hips provided the plan angle of the junction is 90°. Below these figures a tile and a half will not be wide enough to form the cuts allowing for two head nail fixings.

To determine the scale of the problem and where it will, or will not be possible to adjust the gauge or use standard valley/hip tiles, each part of each roof slope needs to be accurately measured to provide the rafter pitch to within half a degree. From this information a batten gauge chart needs to be drawn up (see diagram) by drawing each rafter pitch out from a common origin. The maximum gauge is then marked out on the lowest rafter pitch. From the gauge position a horizontal line is drawn through each of the other rafter pitches. Measuring up from

the origin, the gauge for each rafter pitch can be determined: - Where the rafter pitches vary more than 2°, purpose made valley and hip tiles may not fit, or special tiles may be needed.

- Where the gauge falls below 88mm, the roof slope will need to be separated using an open valley or ridge hip tile.

- A group of roof slopes may be selected for a further batten gauge chart, such as a hexagonal bay or dormer, separated from the main roof by an open lead valley.

- Over 10 courses the batten gauge should not gain or lose more than 5mm and be adjusted to ensure there is not an accumulative error over the total rafter length. Millimeters are much more accurate than using imperial measurements.

With this information the roof can be set out accurately to ensure the top of all battens on the same course meet precisely on the centre line of each hip and valley, except where open lead valleys or ridge hip tiles are used. Whilst it can be done, it needs a lot of patience, accurate measurement and cutting, and a specifier who understands the limitations of plain tiles and fittings.

It is easier and cheaper to design and construct all the rafter pitches to the same pitch but may not look as interesting to an architect. ■

Compiled by Chris Thomas, The Tiled Roofing Consultancy, 2 Ridlands Grove, Limpsfield Chart, Oxted, Surrey, RH8 0ST, tel 01883 724774, Email:

chris.thomas@thetiledroofingconsultancy.com

To view previous Slating & Tiling Tips, go to www.thetiledroofingconsultancy.com