

Slating & Tiling

TI PS 93

Curved valleys

With the latest architectural trend of every new building having at least one curved surface or a curved roofing feature; the integration of semicircular cones into a roof with straight pitches will present a problem, which is usually solved by introducing a valley. But with any curved roof the resulting valley will also be curved. So why is this different to a straight valley?

Geometry

Where a straight plane meets a semicircular plane at any angle that is not an extension (tangent) to the radius, the change of direction is likely to form a valley towards which water will run. The resulting alignment of that valley will inevitably be curved, especially if the pitches of the roof slopes are different.

Even if the pitch is the same, and the two roofs intersect at the eaves at right angles, as the valley rises away from the eaves, the angle at which the two roof slopes meet will change by a few degrees.

Also, the curvature of the valley will result in the true valley pitch becoming shallower, and as it approaches the ridge, or the back of the semi-circle roof section, it could become horizontal. This means that the curved valley will be constantly changing and so will the relationship of the tiles on either side of the valley.

Tiles and slates

The curved roof will be clad with either double lap tiles either plain tiles or unders and overs, or double lap slates, either natural or fibre cement, as there are few interlocking tiles that can be laid on a semi-circular cone. This may mean that the adjacent straight roof slopes will be clad in the same roof covering.

It is possible that the straight roof slope may have an interlocking tile or slate roof covering, and this is more reason why a correctly formed valley between the two roof slopes is needed.

With plain tiles there is only one size, but with slates it would be best to use a large size slate at the eaves and diminish the width of the slates around the curved section finishing with small cuts at the apex.

Regardless of the tiles or slates being used, even if the batten gauge on each slope is maintained, the coursing at the valley will run out as the valley curves up towards the ridge. Therefore it is not possible to form a mitred, tiled, swept or laced valley.

It may be tempting to form a secret, or closed valley, but that is also not recom-

mended, as it will cause problems at a later date when debris has been washed into the valley and it blocks the drainage channel, causing flooding under the tiles or slates.

The best solution is an open valley. This will have to be formed in metal (lead) as it is not possible to obtain a curved GRP valley trough, or to bend one to a curve.

Valley construction

The construction of the lead valley in cross section will be similar to that of a straight valley with the width of the open channel being determined by the rafter pitch, the roof area and the rainfall rate.

On the outer edges there should be a welt and a tilt fillet as normal. But with a curved valley, water will tend to run to the outside of the curve and therefore, to prevent the water washing in under the slates or tiles, either the slates or tiles need to be mortar bedded onto a slate or undercloak strip, or a second tilt fillet should be formed just under the cut edge of the slates on the external radius of the valley. This will form a third line of defence against torrential rain discharging down the valley.

The sections of lead sheet should all be 1.5m long and wide enough to be dressed over the full width of the construction, meaning the lead is likely to be at least 600mm wide before being dressed to a curve. As the valley rises, the true pitch will reduce, requiring more head lap. But also, as the true pitch of the valley reduces, the width of the valley may also need to be increased, especially if there is a large area of roof draining into the curved valley at that point.

Where the valley curves to below 11° true pitch, a conventional lapped sheet construction will not be acceptable and either an alternative material will be needed, or steps and rolls may be needed. Do not consider doing the valley in one long piece with no lap joints, as the lead will tear itself apart.

All of the support boards should be fitted between the rafters as, again, forming a curved support board



The straight section of roof is on the left and the conical roof is on the right. Note how the valley bends to the right. It is a shame that the valley has been incorrectly detailed as a secret valley as it will cause problems in the near future

will be difficult. Every cut tile or slate on both sides of the valley will be different and care should be taken to keep the line as work progresses up the valley.

Conclusion

The important thing to remember is that only an open metal valley is suitable for a curved valley between a curved roof and a straight roof and that the construction may be fairly conventional. Without mortar bedding an additional tilt fillet will be needed.

Like all curved roofs there is a lot of cutting to be undertaken to maintain the curve in both directions, both around the curve and down the sides of the valley.

Tips

- Install the valley boards between the rafters, not above.
- Do not attempt to course around from the curved roof slope onto the straight roof slope at a valley between the two.
- Start and finish the valley at eaves and ridge as normal.

Compiled by Chris Thomas FIoR
The Tiled Roofing Consultancy
2 Ridlands Grove,
Limpsfield Chart, Oxted, Surrey, RH8
0ST
tel: 01883 724 774
email:
chris.thomas@thetiledroofingconsultancy.com

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