

Slating & Tiling

TIPS 84

Mortar bedded hips

The story goes that clay hip tiles were moulded on the upper thighs of ladies working in the factories making tiles. These tiles were tapered such that they lapped over each other. Ladies thighs, hips, can you see the association. The problem with this story is that a valley is the opposite of a hip and valley tiles are also tapered like hip tiles, so why are valley tiles not called hips?

Tapered hip tiles are still available in Europe but here in the UK we have opted for straight hip tiles for use with interlocking tiles and slates, and with plain tiles where the rafter pitches are different.

What is a hip?

A hip is an external junction between two inclined roof slopes that are in the same horizontal plane. The plan angle between the two roof slopes can be any angle from 1 to 179 but is generally 90°, also any angle greater than 135° is difficult to form as the thickness of the roof construction is difficult to close off.

The rafter pitch of the adjacent roof slopes can be any angle but is generally the same as differing rafter pitches which can create complications. At a hip with identical rafter pitches rainwater will run away from the hip on both sides, but if the pitches are not at 90° and the rafter pitches are different then this may not apply and water may run towards the hip on one side, creating a problem.

Provided that the plan angle is 90°, and the rafter pitches are the same, then it is fairly simple to weather the joint using clay or concrete hip tiles, as they will sit square and central over the hip rafter, but with differing rafter pitches the hip tiles will not sit square, and with an angle pattern this will be visually evident, therefore it is best to use angle hip tiles on roofs with equal pitches.

Because the dihedral angle between the two roof slopes is greater than for the two roof slopes meeting at a ridge, hip tiles are shallower. This means that for curved hip tiles the top surface is reduced from a half round to a third round. This also means that the hip tiles are narrower than a ridge tile.

To allow for the hip tiles to lap over the tiles on each adjacent roof slope by 75mm and for the vertical cut of a high profile of a double Roman or pantile profile, the hip tile needs to be approx 220mm wide.

If the rafter pitch is greater than 60° then the third round hip tile will not be able to span the junction correctly, and a half round ridge tile should be used. The exact pitch at which the change takes place will depend upon the

roof tile and hip tile profile.

To prevent the hip tiles sliding off the roof it is essential that a 6mm thick galvanised or stainless steel hip iron is twice screwed into the hip rafter. This can be a problem if there is no hip rafter. If there is a hip batten located up the full length of the hip then the hip iron can be screwed to the hip batten. The mortar bedding should be continuous along all four edges of the hip tile to achieve 50mm of surface contact of both surfaces. It is essential that the mortar is placed under all four edges before the hip tile is placed and levelled into position as if the mortar is buttered under the top edge after it has been placed, the mortar will not adhere to the under surface and a crack will form letting rainwater in under the hip tile.

The cut tiles that form the edge of the roof slope at the hip must each be mechanically fixed as they are edge tiles. If the head of the tile is cut off then additional nail hole fixings will be required, to allow the cut tile to be nailed into a parallel batten, or if interlocking half tiles are available they can be used to make the edge cut tile bigger.

Where the tiles on the roof are all clipped it may be difficult to clip the cut edge tile and therefore it is essential that the hip tiles are all mechanically screw fixed to a hip rafter or batten to hold down the cut tiles especially on the right hand side of the hip.

Above a true hip rafter pitch of 45° (55° rafter pitch) all hip tiles must be mechanically fixed regardless of the use of mortar bedding. This will require the hip rafter to be raised to the top surface of the tile battens and the tile battens fixed to noggins up the side, or a hip batten fixed above the tile battens and strapped down to the hip rafter between the tile battens. If each ridge tile is mechanically screw fixed to the hip batten, or rafter, through the centre of each hip tile then there is no need for a hip iron at the bottom.

Where there is a deep trough profile in a tile, dentil slips should be used to reduce the effective mortar bed to no more than 15mm of wet mortar between the hip tile and the roof tile. If the mortar is greater than 15mm there is the risk of slump in the mortar which will pull away from the underside of the hip tile and leave it vulnerable to water ingress and wind damage. The amount of visible dentil slip is optional.

At the apex of two hips meeting a ridge



Whilst there is plenty of mortar on the underside of this hip tile, none of it adhered to the roof tiles. There was no mortar under the end where the nail hole is. Note the ungalvanised steel nail has rusted away and was not fixed into anything, just bent under to look like it was holding the hip tile down.

the hip tiles should be cut to a tight mitre using a full tile and bedded onto a lead saddle and screw fixed into the hip batten/rafter. The ridge tile should be mitred into the hip mitre but may have to be packed up to meet the hip mitre. The amount of lift will depend upon the pitch of the roof and the plan angle of the hips.

Conclusion

Provided the two roof slopes meet at 90° and the two roof slopes are the same rafter pitch then the construction of the hip using a mortar bedded hip tile over the junction is fairly straightforward. But outside of this condition the construction of the hip becomes more complicated and prone to problems.

Tips

- Wherever possible design and construct the roof with 90° plan angles and equal rafter pitches.
- All cut edge tiles must be mechanically fixed to the roof battens as reliance on mortar to hold the small cuts in place will compromise the security of the hip system.
- In exposed locations and on steep rafter pitches all hip tiles should be mechanically fixed.



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