

# Slating & Tiling

## TIPS 68

### gaps and holes part 2

The first part of this article looked at gaps and holes around a single lap tile. The second part looks at double lap slates and tiles and a few general issues.

#### Slates

Slates, being thin rectangular sheets of stone, fibre cement, or resin slate, are inherently simpler, and yet more sophisticated than tiles, as the gaps between the surfaces are less controlled – especially with stone slates that are rough/irregular, unlike most slates that are smooth/regular.

If constructed correctly, all slates should lay parallel with each other, and gaps between them should be sufficiently small to allow a meniscus of water to build up between faces. The shape of the meniscus will be different on the top surface of the slate than it will be on the underside due to the double-lap arrangement.

Rough slates have less of a problem with water trapped between the slates, while very smooth slates, like fibre cement, will attract the most water. The larger the gaps between the slates, the more air movement there will be between the slates, which helps to dry them out quicker and reduces the risk of frost damage.

The more air that can be sucked between the slates, the more wind uplift load is taken by the underlay, and the less load is taken by the slate itself. Therefore, slates with gaps of two and three millimetres between them will perform better in high winds than those that are tight-fitting.

To prevent insects and bats entering the roof, the gaps should not be more than 4mm. This also applies to side-laps, where the slates are thicker than 4mm – side-lap gaps should not exceed 4mm.

Where the thickness of the slate is 4mm or less, the side-lap gaps can exceed 4mm. But with fibre cement slates fixed with copper disc rivets, the gap should not be less than 2mm, or greater than 9mm, otherwise the copper

disc will either not fit, or can pull through the gap.

Slates in contact with each other will rub due to the thermal movements of the roof. This will cause the surfaces of the slate to abrade, resulting in a grey powder between the slates. While abrasion will occur between all roofing materials, it appears to be more noticeable with slates, as they are flatter.

With stone slates, which are very irregular, it was traditional to back-bed them with lime mortar to prevent wind, birds and insects gaining entry to the roof. In many instances, this has been replaced with an unsightly mortar bedded joint, which prevents the slates from breathing and locks them together, making them more vulnerable to frost damage and breakage.

#### Plain tiles

Traditional double-camber plain tiles can have gaps between them of up to 15mm high and 160mm wide, but, due to the steep pitch of the roof, they do not suffer from water ingress. The camber in the width/length of the tiles prevents water being trapped between the tiles. The gaps allow air to circulate and keep the clay dry. Single camber clay tiles rely upon a dense clay that will not absorb as much water, but unfortunately, because air does not circulate between the tiles as easily as with double-camber tiles, they do tend to deteriorate first on the underside.

With double-camber tiles, the large gaps will allow large insects and small rodents to enter the batten cavity, and it is therefore much more important to have a good underlay to prevent them accessing the rest of the roof than with a single-camber tile. The gaps can be reduced by using cross-cambered tiles, which have a curved top and a straight bottom in their width. This type is generally manufactured in concrete.

#### General

It has been observed that clay



The side-lap gap and the gap created by the twisted tile are sufficient to let a small bird or bat into the roof.

plain tiles and natural slates treated on the underside with spray-applied polyurethane foam may suffer from premature breakage, attributed to the gaps between the tiles being filled with a material that prevents air from circulating around them, so restricting the drying process and increasing the risk of frost damage.

Also, the foam insulation locks together all the elements and restricts the natural thermal movement of the tiles and slates, which can result in the exposed section expanding in strong sunlight and contracting in cold weather, and the foam embedded section responding at a slower rate – causing stress in the material.

If a hole is drilled through the face of a tile or slate, it should be replaced or, if the hole is for a very good reason, it should be protected with a suitable material, such as a neoprene tap washer under a screw head, or a suitable mastic or sealant around the fitting/fixing to prevent any water seeping down the hole.

Wind-driven snow penetrates the smallest of gaps in a roof covering. Because it is almost impossible to stop, it is essential to have a good secondary roof covering of underlay that will collect the snow and drain the melt water away into the eaves gutters.

#### Conclusion

Gaps and holes are a compromise. Spaces between tiles and slates need to be big enough to allow air to circulate to reduce the risk of frost damage, while not being too big to allow large insects and small bird and animals to get into the roof. Meanwhile, the gaps should be as small as possible to keep out the rain and the wind, but be big enough to let water drain out and slow the wind down. Gaps are needed to allow the system to function; sealing up, and locking together, roofing elements will result in cracking and breakage of the slates or tiles.

#### Tips

- Small gaps between slates reduce the effects of capillarity, and help to prevent water reaching the nail holes.
- Double-camber plain tiles can resist frost better than single-camber plain tiles.
- Wind-driven snow will penetrate even the smallest gaps, requiring the underlay to catch the snow and prevent it entering the roof.
- All gaps should be kept to less than 16mm to keep out small birds, and less than 4mm to keep out large insects.

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