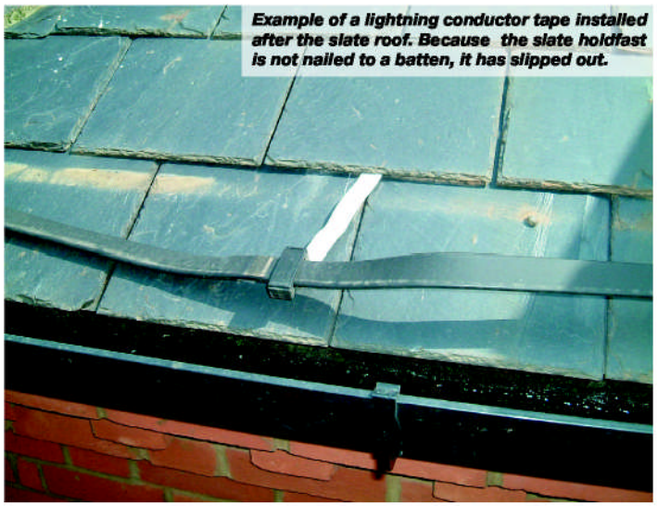
Slating & Tiling

TIPS 53

lightning conductors



Example of a lightning conductor tape installed after the slate roof. Because the slate holdfast is not nailed to a batten, it has slipped out.

Global warming, we are told, could make lightning a more common climatic condition that we should be prepared for. While not every roof needs a lightning protection system, those that do need to resist lightning, deluge rainfall and high winds. To achieve this, it is essential that the lightning protection system is integrated with the roof covering.

Compliance

All lightning protection systems should comply with BS6651 and be designed, installed and tested by specialist lightning protection engineers. Often this is either done after the roof has been completed, or in two phases: after the felt and battens, and on completion of the roof.

Problems can occur at a later date if there is no coordination between the roof installation and the lightning protection system. Even where there is good coordination between the trades, there are fixing problems that need to be solved. When re-roofing is undertaken around an existing lightning protection system, it should be checked on completion of the works by a qualified lightning protection engineer.

Systems

There are three main systems:

- Air terminals rise above the ridge and protect an area around it; some of which have ionising devices that positively attract lightning streams to them. Each air terminal is then connected to the earth by the shortest route.
- Tapes are conductors that are exposed above the roof covering, located along all ridge, eaves, verge and hip lines; all connected as a grid to one or more earth cables.
- Strike pads have tapes distributed below the tiles/slates, and only the strike pads are seen above the roof covering.

Air terminal

Air terminals are copper rods 0.5m to 2.0m long, often with a multiple-pointed end that extends up into the air. The plate at the base of the rod takes the full force of the wind on the rod.

The recommended fixing method for the air terminal bracket is to fix it to the apex of the ridge tiles using 38mm-long wood screws and wall plugs. This recommendation may result in the ridge tile and air terminal being blown over. It is better if the air terminal bracket is screw-fixed directly to the roof structure, and the 15mm copper rod is passed up through the joint between two ridge tiles. Or with a dry ridge, up through a hole in the centre of a ridge tile and sealed with mastic to prevent water tracking down the rod. If the bracket is fixed directly to the roof structure, then the conductor tape is to be distributed below the roof covering.

Tape system

The tapes are soft copper or aluminium strips, some of which are coated, and vary in size from 20mm x 3mm to 50mm x 6mm in section. They are held onto the roof with plastic DC clips that are either glued onto the outer face of a tile or slate with a round pad, or fixed using a slate holdfast, which is a DC clip on the end of a 500mm-long aluminium strip. The fixing of the DC clip is critical as it has been known for hurricane force winds to lift the tape at a vulnerable point, like a corner, and cause it to flail around doing further damage to the roof and the building.

The adhesive pads are effective on smooth surfaces, such as resin slates, FC slates, some profiles of smooth faced concrete, and clay tiles; but they are not suitable for granular-faced tiles, tiles with no large flat surface, or natural slates, as the adhesive can pull off the outer flake of slate.

Slate holdfasts are popular in most situations as they will work with almost any type of slate or tile. With natural/FC slate and interlocking slate – like Cambrian – the fixings should be installed when the tiles or slates are laid. The correct procedure is to nail the aluminium tape to a batten; either through the gap between the tiles, or using the head nail fixing of an interlocking tile. The DC clip should hang just below the leading edge of the upper tile so as not to obstruct it, yet allow space for the tape to be inserted in the clip. If the DC clip is too far below the leading edge of the tile above, the wind can lift and bend the aluminium strip. Too often the holdfast straps are pushed up between the slates or, at best, bent over the head of a tile to stop it sliding out. This places the full wind uplift load from the conductor tape onto the tile above the holdfast strap and, if not nailed or clipped adequately, may pull the tile off with the conductor tape.

Strike pads

Each strike pad, like an air terminal, will protect an area around the pad, so they are located at regular intervals along the ridge, eaves, verge and hip of the roof. The tapes are distributed below the roof covering and short tapes 'T' off through the roof covering to a plate – often a square tape clamp.

At a mortar-bedded hip, or ridge, the tape is often fed through the mortar joint, but elsewhere the tape needs to pass either through the head-lap of the tiles or through a vent tile. Either way, unless a groove is cut in the tile, or a slot is cut through the ventilation grill in the vent tile, the tape will kick up the tile above.

This can be a problem at low rafter pitches, when it can affect the ability of the roof covering to keep out wind-driven rain and large insects.

General

While most inclined valleys will not require protection, tapes will often either be laid down the valley as an easy route from the ridge to the eaves, or will cross the valley to get between one eaves and another. Where this occurs, the flow of water down the valley can be disturbed and water can track along the conductor tape instead of going into the gutter.

It is essential to connect all metal valley, metal roof windows and metal ridges to the lightning conductor tape, but an aluminium conductor tape should not come into contact with a lead sheet valley as the electrolysis will eat away the aluminium tape.

It is common for aluminium gutter systems to be used as the lightning protection at the eaves. In this situation, cable bridges between each section of guttering are required.

Tips

- Slate holdfast lightning protection tape fixings should be nailed or screwed to a batten.
- Air terminals should be screwed directly to the roof structure.
- The tape serving a strike pad should not be kicked up a tile or slate as it will affect its performance.
- Aluminium conductor tapes should not come into direct contact with lead sheet valleys or flashings.

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

lchris.thomas@thetiledroofingconsultancy.com

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