Construction Notes - No 1 Eaves

In a series of articles on interlocking concrete roof tiles, experts from the **Concrete Tile Manufacturers Association** have pooled their knowledge. This Construction Note discusses eaves.

The Eaves
The eaves is the lowest part of any roof covering, where the rain water flowing off a roof flows into the gutter. An eaves is normally horizontal. Raking eaves should be avoided as they can present the designer with a problem of detailing a satisfactory gutter system and can give an untidy appearance, particularly with deep profiled tiles.

Boxed Soffit
The traditional way of forming an eaves is with a fascia board and soffit, fixed to the ends of the rafters and called a boxed soffit. The use of a fire-resistant soffit prevents bird from nesting between the rafters, makes the finishing of the outer skin of the wall simpler, and protects the timber roof structure from fire that may spread out through an upper storey window. The horizontal depth of a soffit can be as much as 2 metres, but is normally about 200mm.

Open Rafters
If there is not soffit board then the eaves is called an 'open rafter' and can give a country cottage style effect to the building. With open rafters the installation of roof space ventilation becomes more difficult. The timbers will need staining or painting and the top course of any vertical tiling or brickwork is more difficult to finish between the rafters.

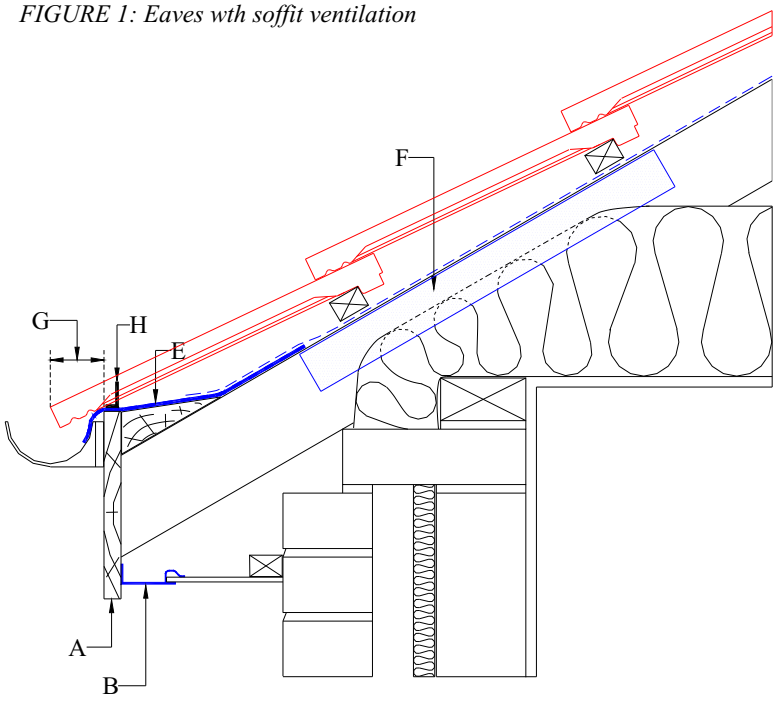
Fascia Board
The fascia board **(A)** is a very important semi-structural component of the roof and is traditionally 20mm thick, planed softwood. The bottom of the fascia board should not clash with the head of the windows, which could prevent the window casement from opening. The top of the fascia board should be at a height to support the eaves course of tiles at the same pitch as the rest of the roof. If the fascia is too high the eaves tiles will tilt up, or 'sprocket', if too low then they will dip. Neither is advisable. For every design of tile, every degree of rafter pitch, with or without over fascia ventilation, the height of the fascia board above the rafter, or counterbatten, will be different.

Some manufacturers provide tables of fascia board heights for their products. But where a thicker fascia board is proposed, or another manufacturer's fascia grill is used, the fascia board height can be determined by battening and laying the first three courses of tiles. Then a 1 metre long straight edge is laid down three courses of tiles, resting on the leading edge of each tile course and a short length of fascia with the over-fascia vent grill fixed to it. The fascia board should be slid up the face of the rafter foot, lifting the eaves tile until the straight edge touches the leading edge of each course at the same time. By marking the top of the rafter on the back of the fascia board the correct height for that section of fascia can be set out and fixed. In most cases the fascia board is fixed by the carpenter prior to the roof tiler arriving on site, very often resulting in the height being wrong. Packing up the fascia board with a thin lath may be possible if the tiles only require nailing. If a clip needs to be nailed into the fascia, the nail holding the eaves clip needs to penetrate the timber fascia board by at least 25mm.

Cellular Plastics Fascia Boards
Nailing eaves clips into the top of a cellular plastics fascia board is not a good idea as the foam core will not grip the nail as well as softwood. Improved nails (annular ring shank or drive nails) or screws will give an improved resistance to withdrawal but is not likely to achieve the value as for timber. If you intend to fix into the foam core the withdrawal resistance of nails or screws will need to be clarified.

Roof Space Ventilation
To comply with BS 5250 and Building Regulation Approved Document F2 the roof space will need to be ventilated to reduce the risk of condensation forming. These documents recommend that air is drawn into the roof at the lowest point. It is for this reason that it is logical to install the low level ventilation grills at the eaves. The two most common positions are in the soffit directly behind the fascia board **(B)** and on top of the fascia board **(C)** under the eaves course of tiles. Whichever is chosen they need to keep out large insects and wind-driven rain but allow an interrupted air path. The installation

FIGURE 1: Eaves wth soffit ventilation



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of a soffit vent could allow fire ingress into the roof void whereas an over-fascia vent is more protected.The over-fascia vent grill will vary in design and height depending upon whether it provides a 10mm or 25mm opening, and also from manufacturer to manufacturer. Some systems have a built-in interrupter or duct tray that forms a skirt into the gutter, and have a vertical grill. With these the underlay finishes on top of the grill, whereas others have a bottom entry grill to allow the underlay to extend into the gutter. With the latter the gutter needs to be spaced away from the fascia to allow air past the back of the gutter and into the grill.

Insulation Interrupter/Duct Tray

To ensure that the insulation in the roof does not interrupt the flow of air from the eaves vent into the main body of the roof, an 'interrupter' or 'duct' tray is used **(F)**. This is often a proprietary section of corrugated plastics. The depth of the tray will depend upon the air flow of the eaves vent 10 or 25mm. Insulation quilt thicknesses of 200mm plus are not uncommon to comply with the most recent Building Regulations, but with trussed rafter depths of less than 100mm there is potentially a cold bridge at the wall plate position. The length of the interrupter/duct tray up the rafter will need to increase as the rafter pitch drops and the insulation thickness increases. In some instances this will require interrupter/duct trays extending over 1 metre up the rafter. If a series of narrow width interrupters are proposed, ensure that they can be joined together to make the length required. If the interrupter/duct tray is longer than required it would be better to put the excess at the top, rather than at the bottom, to accommodate any future increase in the thickness of the insulation.

Tilting Fillet

From the top of the fascia or ventilation grill unit there needs to be a tilting fillet **(D)** to support the underlay, to prevent it sagging behind the grill, blocking off the air flow and water ponding in the sag. With some systems the built-in interrupter will also act as an underlay support. When a soffit grill is used a solid triangular timber board running the length of the fascia can be used.

Underlay

If the underlay is to be draped into the gutter it is not advisable to use BS 747 type 1F bituminous felt as it will rot away if exposed to the weather. A 1 metre wide strip of BS 747 type 5U felt **(E),** lapped with the rest of the underlay, is a better solution. If you intend to use a plastic or other underlay it is advisable to seek advice from the manufacturer.

Gutter overhang

The lowest, or first, course of tiles should be positioned to have the leading edge finish approximately in line with the centre of the gutter **(G)**. If the width of the gutter is more than 100mm, the overhang of the tiles can be extended up to no more than 75mm. This overhang will determine the position of the first batten.

Profiled tile fillers

To prevent birds, rodents and large insects from getting into the batten cavity and nesting, it is essential that the corrugations of profiled tiles are filled in with a profile filler unit **(H)**. Often, a continuous eaves comb is nailed to the top of the fascia board which will keep birds out, but may not keep out large insects.
Some filler units are combined with the eaves clip. It is rare for flat or low profile tiles to need a profile filler unit. The use of mortar to filler the profile is not common practice for concrete tiles, but where used it should have holes of at least 10mm diameter to allow condensation or water from wind-driven snow on the underlay to escape.

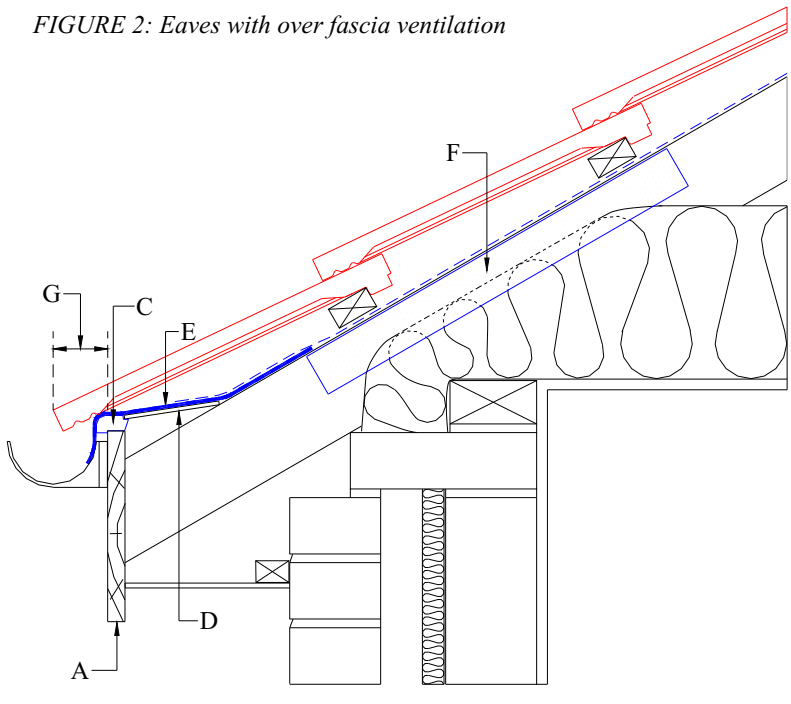
Tile fixings - minimum

BS 5534: 2003 requires all perimeter tiles to be mechanically fixed. For interlocking tiles this could be head nailing or clipping. Additional fixings should be determined by doing a wind uplift calculation for the roof, which can be provided by the manufacturer of the tiles.

Summary

- The eaves is the lowest part of the roof and deals with all the rainwater flowing into the gutter. Make sure it is weather tight.
- Because the eaves is the first part of the roof to be tiled, it is not the easiest part of the roof to effect a repair. Get it right first time!
- Do not forget, the eaves is easily accessible from a ladder or scaffold and so is scrutinised more than other parts of the roof. All the more reason for it to be constructed correctly.

FIGURE 2: Eaves with over fascia ventilation



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