

# Building Approval - Roofs

## Roof Design in the Swale Area

### Introduction

The information contained in this leaflet has been simplified to provide easy reference and guidance.

It does not give definitive interpretation of Building Regulations and you are advised to consult with professionals before submitting plans.

All building material and products used should conform to the appropriate British Standards or hold a current Certificate issued by the British Board of Agreement (BBA) or European equivalent.

### Inspection by the local authority

Alterations to existing roofs are controlled under the Building Regulations. You need to tell Swale Council of your intentions by depositing a Building Notice or Full Plans application at least 2 days before commencing the following works:

replacing or re-cladding the existing roof covering material with different material (e.g. tiles in place of slates);  
introducing sarking felt below tiles or slate and/or insulating the roofspace.

This notification will enable you to meet the requirement of the Regulations and give the Council the opportunity to inspect the works in progress.

It is important that the Council is also notified when the works commence, as consideration must be given to the strength and adequacy of the existing roof structure and its ability to withstand additional loadings. This check will also take account of fixings, lateral restraint, holding down straps, ties, and ventilation to the roof voids.

### The main function of a roof

Clearly, there is a need for a roof to:

- be weather resistant;
- prevent excessive heat loss; and
- resist any wind or snow loading.

### Types of roof

The main types of roof are:

- Pitched;
- Flat; and
- mono-pitched.

All these types of roof can be of warm or cold or deck construction.

## Pitched roof

A domestic pitched roof should always be felted before being tiled. This is to resist weather penetration.

When tiling, all manufacturer's details should be consulted. For example specific tiles, may be needed for different pitch roofs, methods for fixing tiles may also vary.

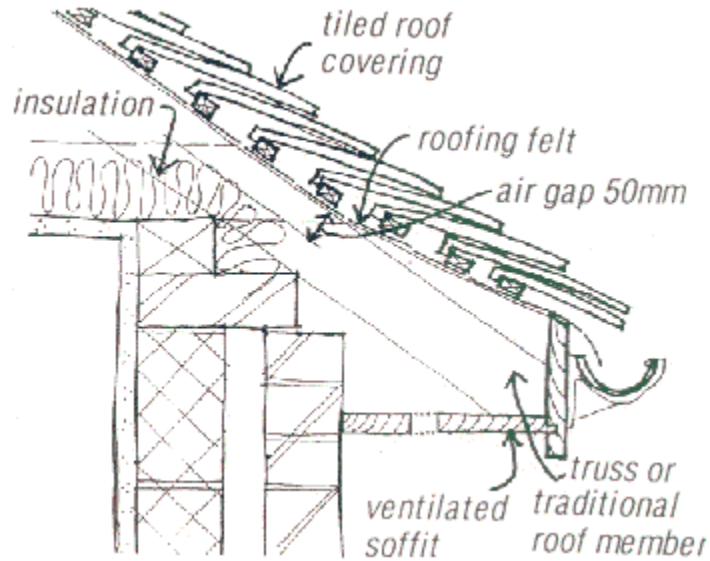


figure 1: typical eaves section

## Battening

Specify for all battens to be treated with appropriate wood preservative, if it is likely, they will become wet during construction.

Battens should be more than 1200mm long (section size 19mm for 400mm centres and 22mm for 600mm centres) and span at least three support points. But joints should be staggered, and splay cut joist should be at 45 degrees.

## Ventilation

Pitched roofs with insulation at ceiling level need to be provided with adequate ventilation openings as shown in figure 1 and 2.

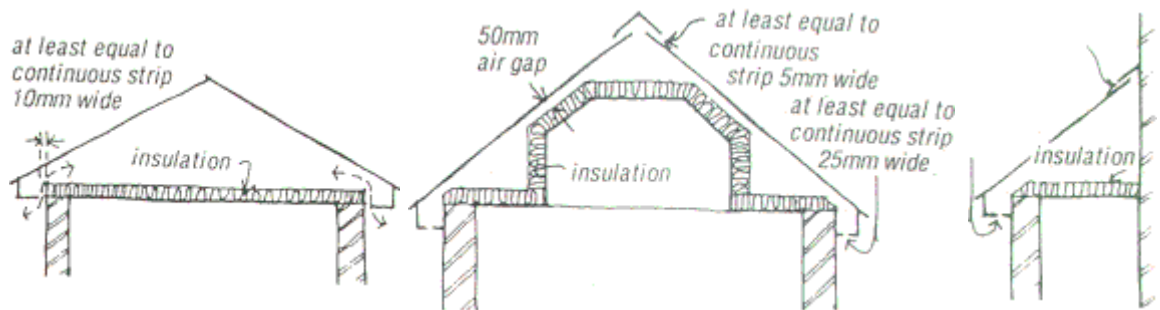


figure 2: ventilation for pitched roofs

### Flat roof

There are two common forms of covering for a typical flat roof:

- warm deck (sandwich); or
- cold deck.

### Warm Deck Roof

The insulation is placed above the roof deck but below the weatherproofing. There should be no insulation below the deck and no ventilation is required (see figure 3).

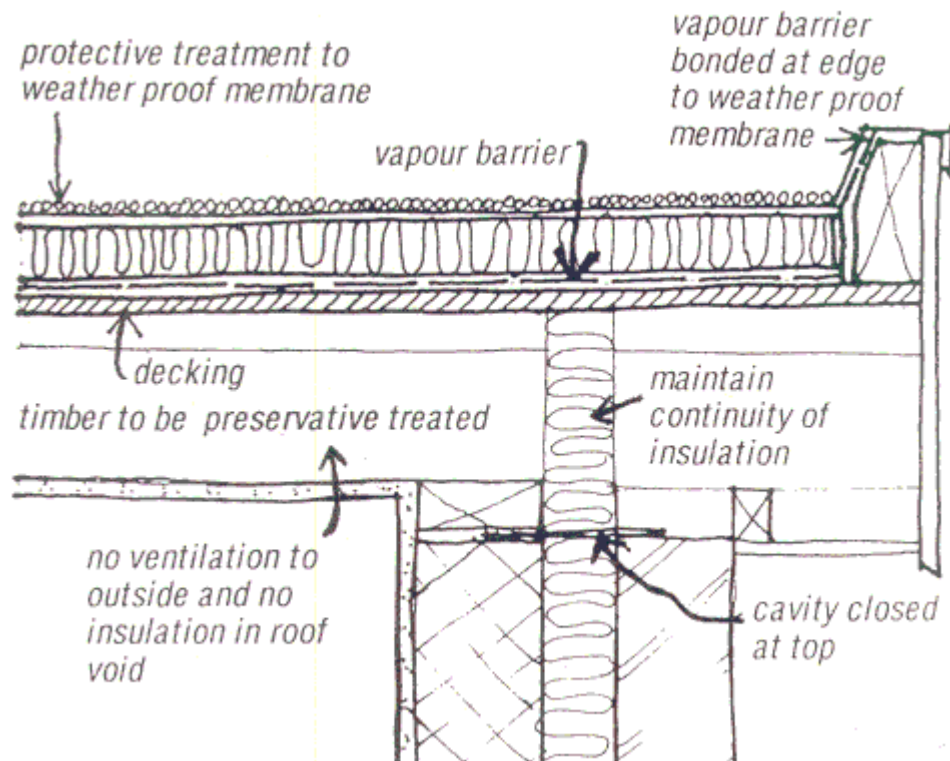


figure 3: warm deck roof construction

Some forms of roof decking may also have insulation bound to them so as to achieve the required maximum thermal value of up to  $0.2w/m^2k$ . When this type of roof is used, the external walls need to be extended up to the underside of the roof insulation to prevent cold bridging.

### Cold Deck Roof

To prevent condensation forming when the insulation is placed at ceiling level, a minimum of 5mm gap is provided for ventilation above insulation. This may involve the

use of 50mm x 50mm counter battens or firrings reducing to 50mm. A vapour barrier should also be placed on the warm side of the insulation, i.e. between the insulation and the ceiling finish.

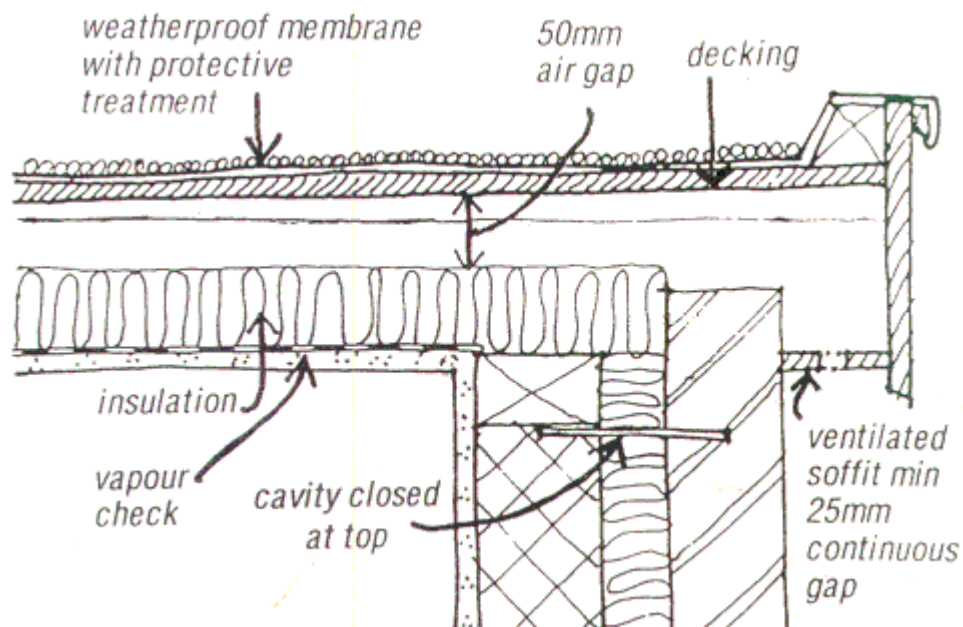


figure 4: cold deck roof construction

The roof should also have ventilation openings of at least equal to a 25mm continuous gap running the full length of the eaves on two opposite sides (see figure 4).

### Roof trusses

Roof trusses are delivered to the site as prefabricated components where they are fixed to the wall plate with suitable metal plates (see figure 3 in leaflet no. 7: walls for examples).

Trussed rafters do not require any ridge board or purlin. If trusses are to be used rather than a traditional form of roof, then calculations must be submitted to Swale Borough Council, building services division prior to truss delivery on site.

Trusses are generally constructed by galvanised steel plate connectors at junctions, which are cut, punched and bent at right angles to the face of the truss. The plates are inserted in factory conditions under heavy pressure on both faces.

Longitudinal ties and chevron diagonal bracing should be fixed above or below ceiling and rafter ties (as in figure 5).

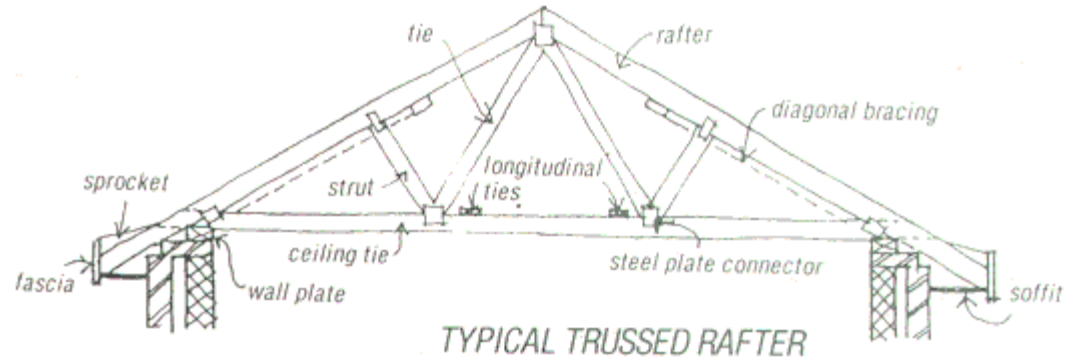


figure 5: typical trussed rafter

### Thermal properties

The insulation in a domestic roofspace should achieve up to  $0.2\text{w/m}^2\text{k}$  (thermal value). This may be relaxed to  $0.35\text{w/m}^2\text{k}$  for a flat roof or in some cases the slopping part or a room in the roof. Your local building surveyor will be able to advise further.

A possible solution to achieve a  $0.2\text{w/m}^2\text{k}$  in the roof space may be 284mm of insulant material with a 0.025 thermal conductivity.

All water storage tanks within the roofspace should be provided with insulation and all pipes should be insulated (see figure 6).

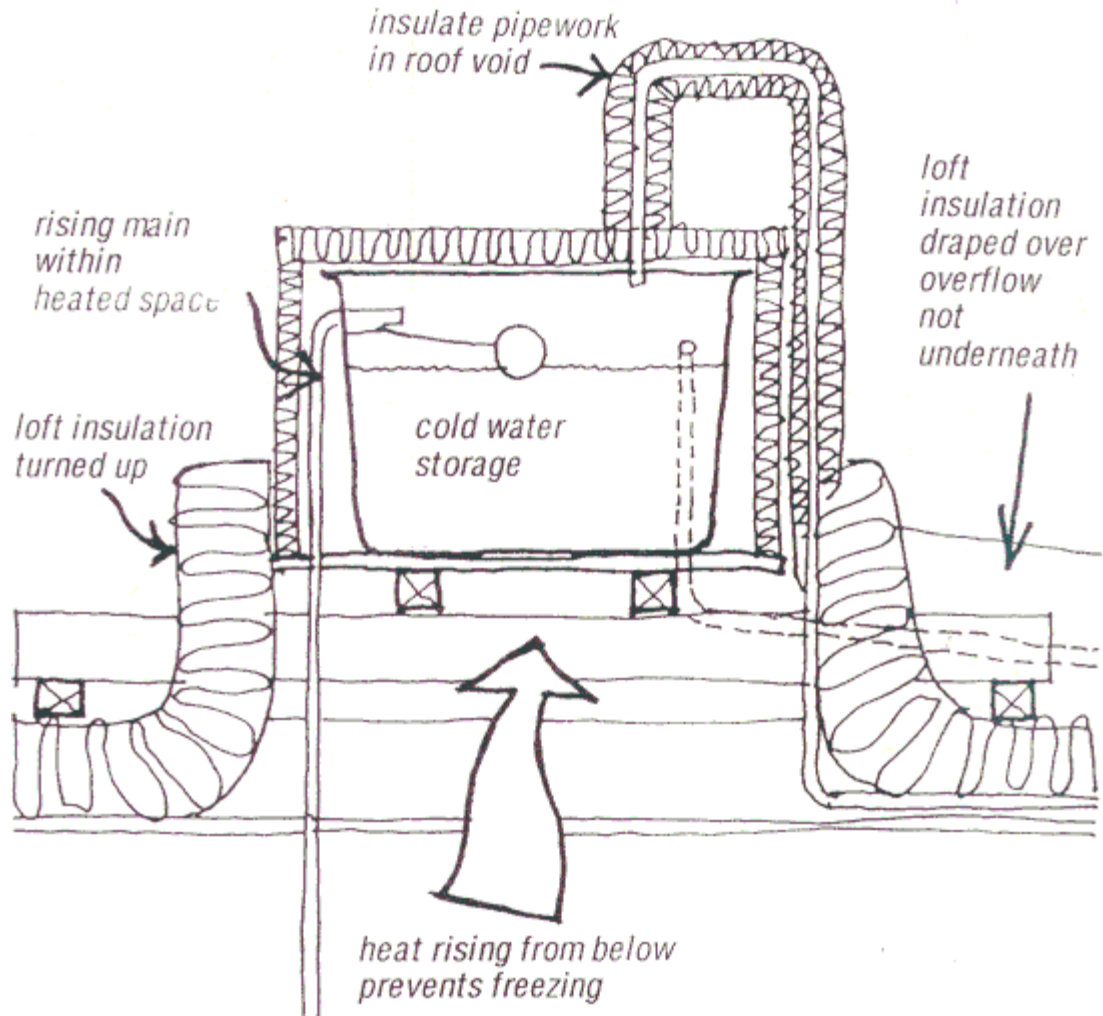


figure 6: domestic roof space insulation

Size of certain timber ceiling and roof members in single family houses. Strength 3 timbers.

**Ceiling joists**

Size of joist (mm) x (mm)	Spacing of joists 400mm (25-50kg/m dead loading) Maximum Clear Span
50 x 95	1.96m
50 x 122	2.53m
50 x 147	3.19m
50 x 195	4.48m

**Binders supporting ceiling joists**

Size of binder (mm) x (mm)	Spacing of Binders 1200mm Maximum Clearance Span of Binder	2400mm

50 x 100	1.27m	1.07m
50 x 125	1.65m	1.37m
50 x 150	2.04m	1.68m
50 x 200	2.81m	2.30m

Common or jack rafters for roofs having a pitch more than 15 degrees but not more than 22.5 degrees.

Size of Rafter (mm) x (mm)	Spacing of Rafters 400mm (0.75kn/m <sup>2</sup> imposed loading) Maximum Clear Span
50 x 100	2.35m
50 x 125	2.98m
50 x 150	3.57m

Purlins for rafters of more than 15 degrees but not more than 22.5 degrees.

#### Spacing for Purlin

Size of Purlin (mm) x (mm)	1500mm	2100mm	2700mm	3000mm
	Maximum Clear Span			
50 x 175	2.08m	1.84m		
50 x 200	2.38m	2.10m	1.85m	
50 x 225	2.67m	2.35m	2.07m	1.96m

Common or jack rafters for roofs having a pitch more than 22.5 but not more than 30 degrees.

Size of Rafter (mm) x (mm)	Spacing of Rafters 400mm Maximum Clear Span of Rafters
50 x 100	2.45m
50 x 125	3.05m
50 x 150	3.65m

Purlins for rafters of more than 22.5 degrees but not more than 30 degrees.

Size of Purlin (mm) x (mm)	1500mm	Spacing of Purlin 2100m	2700m	3000m
		Maximum Clear Span		
50 x 150	1.83m			
50 x 175	2.13m	1.88m		
50 x 200	2.43m	2.15m	1.91m	.81m
50 x 225	2.74m	2.42m	2.14m	2.02m

Common or jack rafters for roofs having a pitch more than 30 degrees but not more than 45 degrees.

Size of Rafters (mm) x (mm)	Spacing of Rafters 400mm Maximum Clear Span of rafters
50 x 100	2.53m
50 x 125	3.15m

50 x 150                      3.76m

Purlins for rafters of more than 30 degrees but not more than 45 degrees.

Size of Purlin (mm) x (mm)	1500mm	Spacing of Purlin		
		2100mm	2700mm	3000mm
		Maximum Clear Span		
50 x 200	2.63m	2.23m	2.01m	1.90m
50 x 225	2.96m	2.50m	2.24m	2.12m
50 x 175	2.66m	2.26m	2.06m	1.99m
50 x 200	3.03m	2.58m	2.36m	2.27m
50 x 225	3.41m	2.90m	2.65m	2.55m

Note: In some cases, bolted connections of structural timbers may be necessary to ensure total stability of the roof construction. For thatched roofing, a specialist design would have to be considered.

### **Reference**

Building Regulations 1991:  
Approved Document A - Structure, (Load and Ground Movement);  
Approved Document F - Ventilation;  
Approved Document L - Conservation of Fuel and Power.

British Standards - 5286/747.  
British Board of Agreement Certificates.  
Building Research Establishment Papers.