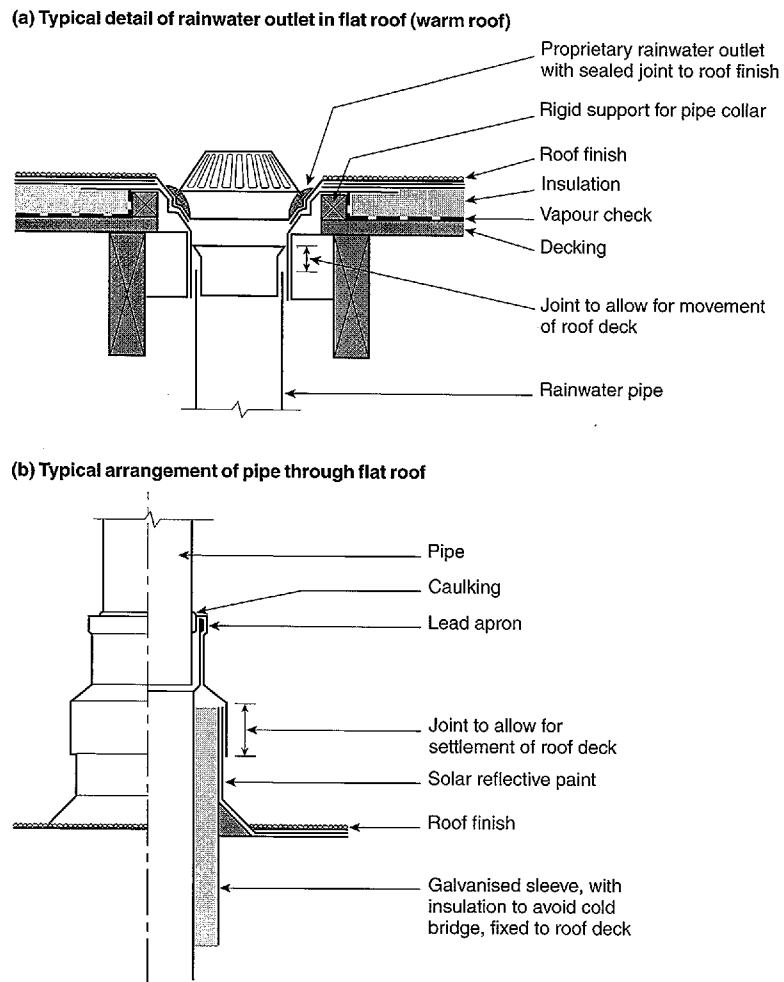


bracing members to be omitted, although web chevron bracing and some longitudinal bracing will still be required by the designer, as shown in Figure 3. Gable ends require special detailing of the roof construction. Figure 4 shows the provision of a gable ladder for fixing soffits on the external underside and inter-nogging to support roofing battens where the distance from the last truss to the end of the roof exceeds the truss spacing. Additional detailing is also required around openings in the roof for chimneys, air vents or roof lights.

The type of detail required in the construction of flat roofs is mainly focused on two points: the smooth transition of membranes over discontinuities, and continuity of the weatherproof membrane at parapets to ensure a weathertight system. Figure 5 shows wooden chamfers to ease the transition of the weatherproof membrane from a horizontal to a vertical plane and the level of detail required at parapet walls. Cold bridging should be avoided by insulating the roof from both parapet walls and all external walls, as well as insulating around any services or drains that penetrate the roof surface. Details for services and drains are shown in Figure 6.



**Figure 6** Details of penetrations through a flat roof  
(Drawings reproduced courtesy of Timber Research and Development Association)

# 6 Durability

---

## 6.1 Introduction

Wood and wood-based panel products can be attacked by both fungi (rot) and insects. Wood-destroying fungi can cause deterioration of susceptible timbers and wood-based products if the wood remains at moisture contents of 20% or more for significant periods. Most timbers, and especially wood-based products, used in buildings are below these moisture contents when installed. Good design and care in construction can prevent or minimise the occurrence of these moisture conditions and thus reduce subsequent opportunities for attack by wood-destroying organisms. In particular, good ventilation systems can reduce high moisture contents. Insects, while more tolerant of low moisture contents, can be discouraged by the glues used in modern plywood construction and by the high temperatures achieved in insulated roof spaces. However, where the risk of attack is seen as unacceptable, the specifier should take steps to reduce or remove the risk. This can be achieved by incorporating wood preservatives into the panel product.

The risk of attack and, therefore, the need to use plywood of enhanced durability can be determined by its intended service environment. Service environments are defined in European Standards as hazard classes of biological attack. BS EN 335-3 relates these hazard classes to the use of various panel products, including plywood. For roofing timbers, only hazard classes 1 and 2 need be considered. These describe a service environment which is above the ground and covered (ie indoors); for hazard class 1 the environment remains dry while for hazard class 2 there is a risk of wetting from high humidity or condensation.

---

## 6.2 Exposure classes

Eurocode 5, which covers the use of plywood in roof construction, states that 'only in exceptional cases would covered structures be considered to belong to service class three', the most onerous of the three classes. This logically places plywood for use in both flat and pitched roof construction in service class two, for materials whose average moisture content will not exceed 20% at a temperature of 20 °C and relative humidity not exceeding 85% for a few weeks per year. The accompanying National Application Document for the UK goes further in clearly stating that timber used in cold roof construction may be termed a service class two material. Furthermore, for warm roof construction where the plywood decking is within a heated environment and protected from damp conditions, the plywood and other roofing members may be upgraded to service class one.

Plywoods manufactured in accordance with US Product Standard PS1-95<sup>[1]</sup> are suitable for both service classes one and two as stated in BS 5268-2; a European Standard has not yet been produced for the grade stresses and