

### 3.6 Weathertightness

To combat the effects of driving rain in windy conditions, pitched roofs adopt a layered principle such that all direct paths from the underside to the outer surface are lapped by the adjacent surface. The outer covering for a pitched roof is usually one of two kinds: permeable or impermeable to air. The former category includes components such as tiles or slates which overlap each other to direct rain to the eaves. These are not weathertight, and although measures have been taken in their design to prevent the ingress of rain and wind by providing interlocking mechanisms and overlaps, driving rain may still penetrate tile or slate edges through to the sarking felt. This second layer of defence should have sufficient overlaps between successive sheets to prevent further penetration of water by wind action. By installing plywood sarking behind the felt, additional airtightness may be achieved as well as providing a third barrier for penetrating rain. Plywood sarking has particular benefit in non-ventilated warm roofs, typical of industrial buildings and some loft rooms. In this instance the greatly increased airtightness, which is comparable to that of brickwork for 9.5 mm sheathing-grade plywood, enables simple and efficient construction detailing solutions.

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### 3.7 Thermal efficiency

Energy ratings should be calculated for every roof type governed by the Building Regulations 1991, be it pitched, flat, residential or industrial. There are three methods recommended that demonstrate compliance with Part L of the Building Regulations:

- Elemental
- Target U-value
- Energy Rating

All three methods enable the heat losses through building fabric to be limited within target values expected for compliance. The Government's preferred method, the Standard Assessment Procedure (SAP), is adopted for the Energy Rating method. This method ranks the energy efficiency of a building on a scale of 1–100 (poor–excellent) based on the thermal insulation, heating system and fuel type, ventilation and solar gain and is most likely to be requested by local housing authorities for all new housing stock. Builders, unless directed otherwise, will probably opt for the more simplistic Elemental or Target U-value methods.

With the Elemental method, the design U-value for roofs is relaxed from 0.2 to 0.25 if the building SAP rating is greater than 60. In the example given in Appendix A of a typical roof construction, the plywood sarking could make the difference between this Target U-value being satisfied or not.

# 4 Planning: Building Regulations and other legislation



APA

Mandatory regulations, which must be complied with for all new-build, are stated in the suite of Building Regulations for England and Wales, the Building Standards for Scotland, and the Building Regulations for Northern Ireland. Compliance with these regulations is the responsibility of the building designer, who may be the owner of the building, his appointed architect, a structural engineer appointed by the owner or his architect or, in the case of small buildings, the actual builder. The increasing complexity of roof construction and the codes that govern their design has led many building designers to request the specialist services of a roof designer. In the case of pitched trussed rafter roofs, design or design-and-build, sub-contracts may also be let to a trussed rafter designer. British Standard BS 5268-3 provides information on the responsibilities of these parties.

In ensuring compliance of the roof structure to relevant legislation regarding health and safety of building occupants, documents approved by the Secretary of State should be referred to for practical guidance on meeting the requirements. The relevant Approved Documents are:

England and Wales	Scotland	Northern Ireland
A: Structure	Part C: Structure	C: Site preparation and resistance to moisture
B: Fire safety	Part D: Structural fire precautions	D: Structure
C: C4 – Resistance to weather and ground moisture	Part G: Preparation of sites and resistance to moisture	E: Fire safety
F: Ventilation	Part K: Ventilation of buildings	F: Conservation of fuel and power
L: Conservation of fuel and power	Part J: Conservation of fuel and power	

Apart from ensuring a reasonable standard of health and safety for persons in or around buildings, in accordance with Regulation 7 any new-build 'should be carried out with proper materials in a workmanlike manner'. By following an appropriate technical specification, as defined by the Construction Products Directive (89/106/EEC), plywood manufactured in accordance with US Product Standard PS1-95<sup>[1]</sup> is deemed suitable for use in construction and thereby complies with Regulation 7 if used for its intended purpose. Further guidance may be found in the Approved Document to support Regulation 7: Materials and workmanship.

To ensure safe working practices during construction, the designer should consider relevant safety regulations. These include the Construction (Design and Management) Regulations<sup>[3]</sup> and the Health and Safety Executive's approved code of practice for management of health and safety at work<sup>[4]</sup>.

Other regulations, which may apply but are not covered herein, are The Building Regulations (Northern Ireland) 1973 and The Inner London Building Act. Certain advisory bodies such as the National House Building Council (NHBC), Building Research Establishment Ltd (BRE) and Timber Research and Development Association (TRADA) also produce guidance on roof construction which should be considered.