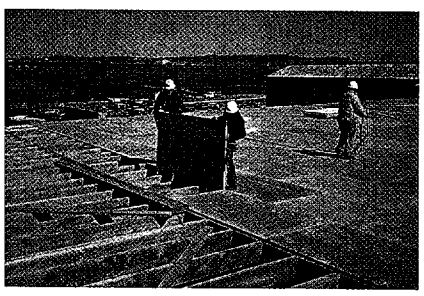
2 Materials



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A wide range of American plywoods is available which gives the wide range of performance and cost attributes required to meet the many applications for which they are used. Performance specifications and design values for using plywood in roofing can be obtained from national and international standards but these must be set within the context of the Building Regulations of England and Wales, the Building Standards for Scotland, and the Building Regulations for Northern Ireland.

This user guide briefly examines the property requirements for plywood used in roofing, what to include in a specification, and a list of relevant American plywoods. Relevant areas are considered in more detail in subsequent sections.

2.1 Performance requirements

The use of structural plywood is controlled through the requirements for bond quality given in European Standard BS EN 314-2. Grade stresses are given in British Standard BS 5268-2 for different lay-ups, timber species and board thicknesses. Roofing is classified as an environment where humidity may be high and it is categorised as Service Class 2 of DD ENV 1995-1-1:1994 (Eurocode 5) and Biological Hazard Class 2 of BS EN 335-3. Only boards meeting the requirements set for performance under humid conditions (BS EN 636-2) or under more extreme conditions (BS EN 636-3) can be used for roofing.

For the majority of cases American plywood complying with BS EN 636-2 will be sufficient: the requirements are given in Table 1.

Supplementary properties can be specified as given in Table 2.

An approximate guide which equates US Product Standard PS1-95[1] veneer grades with those of BS EN 635-3 is given in Table 3.

Table 1 BS EN 636-2 requirements for properties of plywood

Property	Standard and level required
Bonding quality	BS EN 314-2; Class 2
Biodurability	'appropriate for prevailing climatic conditions'. Risk of attack is outlined in Hazard Class 2 of BS EN 335-3. Guidance on factors affecting durability and precautionary measures is in DD ENV 1099 and BS EN 335-3
Mechanical characteristics	Structural data for established products from BS 5268-2 or prEN 12369 (characteristic values) Values can be determined using EN 789 and characteristic values (prEN 12369) and then calculated in accordance with BS EN 1058
Formaldehyde release class	To be designated as Class A, B or C according to BS EN 1084 (Class A having the lowest level). American Exterior and Exposure 1 plywood has the lowest level of Class A

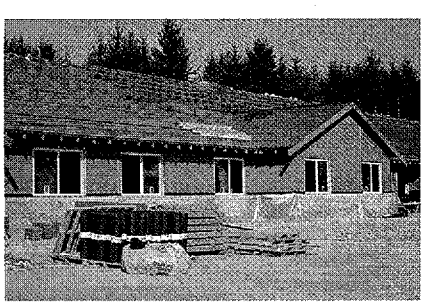
Table 2 Supplementary properties for plywood

Properties		Test method	Reference document
Physical properties	Dimensional changes	BS EN 318	
	Classification by surface appearance		BS EN 635-1, -3
Mechanical properties	Tension properties	BS EN 789	BS 5268-2
	Shear properties	BS EN 789	
	Compression properties	BS EN 789	
	Resistance to screw withdrawal	BS EN 320	
Performance properties	Roofing	prEN 12871-3	prEN 12871-1 prEN 12871-2

Table 3 Equivalent veneer grades of US Product Standard PS1-95 and European Standard BS EN 635-3

PS1-95	BS EN 635-3
N	I
A	I
B	I/II
C plugged	II/III
C	III
D	IV

Requirements for fire behaviour are governed by Approved Document B of the Building Regulations and refer to material performance defined in BS 476. This is covered in a later section of this guide as are aspects relating to the durability of the timber species.



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2.2 Specification

The specification for a structural plywood, based on the performance requirements of BS EN 636-2 or 636-3, should cover the following parameters:

- type
- grade
- nominal panel thickness
- number of plies

2.3 Selection

The important property requirements for a roofing material are strength and stiffness. The environmental conditions where the material will be used must also be accounted for. If the material will be in an atmosphere of high humidity, it must have resistance to moisture and decay. The durability of both the timber and the resin must be considered.

The American plywoods which should be considered for selection are listed in Table 4.

2.4 Quality assurance

Plywood manufactured in accordance with US Product Standard PS1-95 is quality assured. The material is intended for use in load-bearing floors, walls and roofing. The main focus of the quality assurance is the structural uses particularly in timber frame construction. The structural grades of American plywood used in roof construction must undergo rigorous prescriptive inspection or performance tests to qualify for certification in accordance with PS1-95. Once a mill is qualified for panel production to PS1 specification, a