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E | Sources of timber supply

WORLD WOOD RESOURCE

Total forest area

The forests of the world are 3.4 billion ha. in extent, covering 27% of the land surface. Fifty percent of the world forest area consists of operable forests (i.e. where commercial cuttings have occurred or could occur). The forest area in developed countries amounts to 45% (about 2 billion hectares (ha)) of the total area, out of which 49% (940 million ha) is operable. In developing countries, forests cover 55% (2.2 billion ha) of the land area, of which 46% (about 1 billion ha) is operable. Predominant in developing countries are the tropical forests of Latin America, South-east Asia and Africa, accounting for 1.7 billion ha.

Main types of forest

There are three main types of forest: coniferous; temperate hardwood; and tropical hardwood. Coniferous forests chiefly occur in the cooler latitudes, mainly in the northern hemisphere. The main producing regions are Brazil, Ghana, Ivory Coast, Congo basin, Indonesia and Malaysia. Virtually all tropical timbers imported into Ireland is used for furniture and joinery production."

Temperate hardwoods, as their name implies, occur in the temperate regions of the world. They are characterised by mainly deciduous hardwood trees, which have distinct growing and dormant seasons corresponding to summer and winter. The main producing regions are the eastern states of the USA, the Russian Federation, France and Germany. Typically, temperate hardwoods are produced for joinery and furniture, such as oak, ash, beech and walnut. There can, of course, be mixtures of hardwood and conifer forests in these regions. Tropical hardwoods occur in the wetter areas north and south of the equator. The trees are evergreen and often show continuous growth throughout the year. The main producing regions are Brazil, Ghana, Congo Basin, Ivory Coast, Indonesia and Malaysia. The timbers are used locally in structures, joinery and furniture. Virtually all imported tropical hardwood is used for joinery and furniture production.

Production forests

There are two types: natural forests and plantations. Most of the world's timber is still produced from its traditional source, which is the natural forest.

Natural forests

Most of the temperate region's natural hardwood and coniferous forests are subject to long-term management regimes and are generally protected from over-exploitation by legislation. Control is imposed on the amount of timber which may be felled in any period, thus ensuring the sustainable growth of the forest. Throughout most of Europe these systems have been in operation for centuries, so that there is a long history of managed forests with a strong commitment to their maintenance.

Many tropical hardwood forests have been seriously depleted, mainly due to the encroachment of agriculture, but also because they have been exploited for their highly prized timbers, with little attempt to regulate felling and manage the forest as a renewable resource.

Controls, such as restricting felling to trees above a certain size, are not always effective, with the result that tropical forests are a diminishing resource. Efforts are being made to establish maintenance systems, often incorporating 'enrichment' planting in cut-over forest, which would ensure the continuity of tropical forests as a sustainable resource. These are advanced in Malaysia and some other countries but are only being developed elsewhere.

CITES

To protect vulnerable or endangered species of plants and animals CITES - the Convention on International Trade in Endangered Species of wild fauna and flora lists many species, including a small number of tree species, which are endangered for various reasons, including habitat loss or over-exploitation. Ireland ratified this treaty in 2002. *Afrormosia*, *Pericopsis elata*, and a rosewood species, *Dalbergia nigra*, formerly imported into Ireland, can no longer be traded, as is the case with one species of American mahogany, *Swietenia mahagonia*, from some countries. Species commonly imported into Ireland are not presently affected.

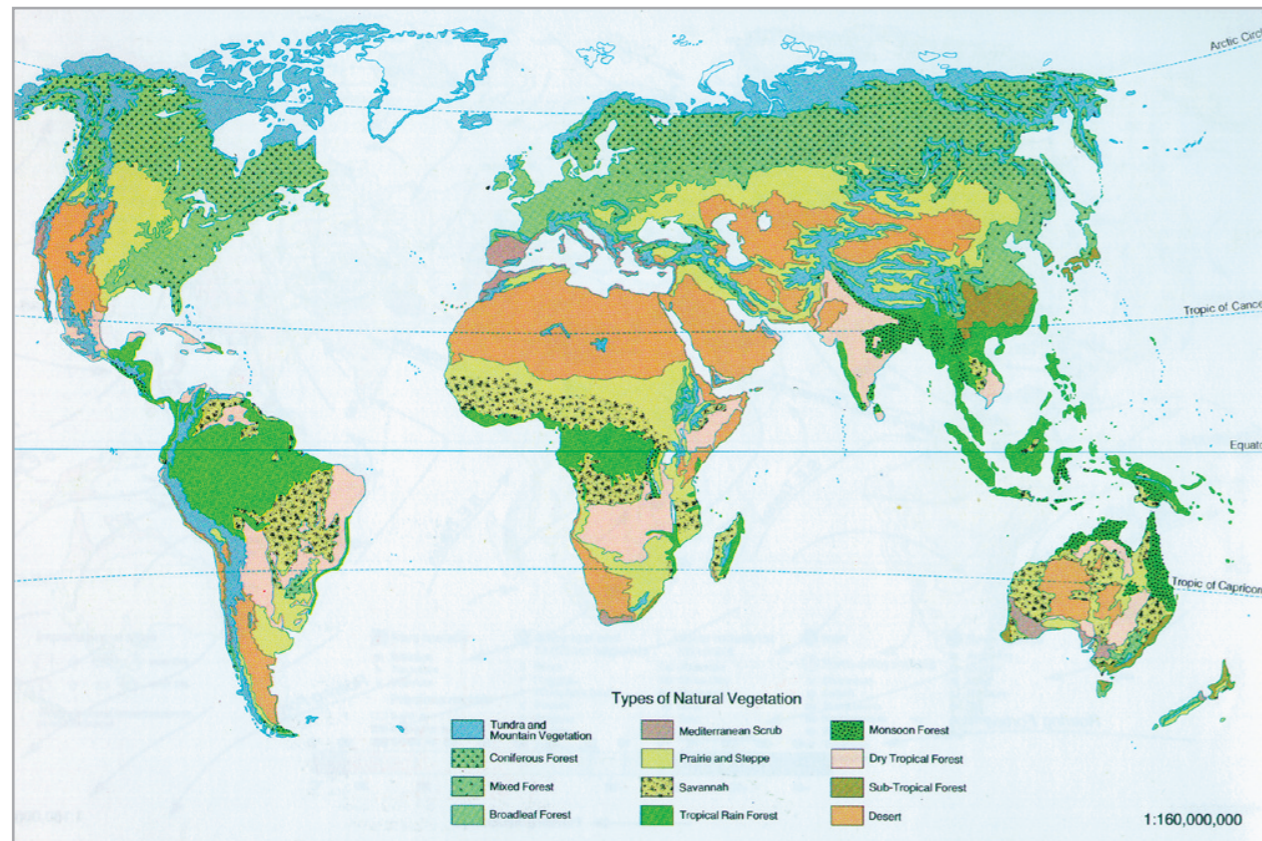
- Operable forests constitute just under 50% of total forest areas.
- Operable forest areas are slightly greater in the developing than the developed regions.
- In the developed world, the Russian Federation and N. America hold the bulk of the resource.
- In the developing world, Latin America holds 50% of the resource - mostly in the Amazon basin.

- The main regions of operable forest in the world are:
- Developed areas: North America, Europe, Russian Federation
- Developing regions: Latin America, Africa, Asia.

- 75% of growing stock is coniferous.
- Coniferous forests are often of a single species or a few species.
- Tropical forests may contain up to 2000 species.
- Sustainable yield from managed forests is far greater than from non-sustainably managed forests

About 3% of all world trade is in forest products compared with an 8% share for oil. The global forest resource has one of the widest range of product possibilities of any raw material source including structural and decorative timbers, furniture components, paper, panel products, chemical products for fabric, paint and solvent manufacture, rubber, food and pharmaceuticals. More than half of the global wood harvest is fuelwood.

Timber is a renewable resource. As such, its future can be assured in perpetuity. The proper management and maintenance of forests would ensure that virtually all the tree species that provide the diversity of timbers that we use could be available to timber users for as long as there is a need for them. Therefore, it is of immense strategic importance that the renewability of the timber resource be maintained, worldwide.



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Plantation forests

Plantation forestry is more recent, and has been introduced to promote afforestation or reforestation of denuded areas. Ireland exemplifies the latter; having been reduced to less than 1% of forest cover at the turn of the century, it currently stands at 11%, due to the establishment of plantations. Plantation forestry, whereby young trees are planted rather than waiting for natural seedings to replace felled timber, produces more uniform growth, and is more amenable to control.

Plantations are prevalent in Ireland, Britain, Chile, New Zealand and South Africa. In other countries they occur in conjunction with a programme of managed natural forests, such as in France and Germany, where there are moves to increase the forest reserve. Where forests have reached maturity, and are felled, the current practice is generally to plant the replacement crop rather than depend on natural regeneration which tends to be slower to establish. In parts of the USA plantations are replacing natural forests as a means of accelerating the rate of reproduction of trees and assisting mechanised harvesting systems. Plantations in the tropics are mostly at an experimental level, although there are producing plantations of introduced rapid-growing species of both softwoods and hardwoods, with Indonesia, India and Brazil accounting for 80% of tropical plantations.

Some hardwood species, such as teak and eucalyptus, have been widely planted in tropical and sub-tropical countries, and are contributing to the world timber supply. Hevea (rubberwood), originally planted for latex production, is now widely used in furniture manufacture, replacing species such as mahogany.¹

However the management of plantation forests is changing. Where possible natural regeneration of continuous cover forest techniques are incorporated in silvicultural systems. In addition to traditional timber production forests are now valued for wood energy and non-wood services such as recreation and carbon sequestration.

Plantations will play a more important role in the 21st century, particularly in the tropics, as their value will be appreciated as a conservation measure to protect the dwindling natural forest resources. There is a growing awareness of the positive role the world's forests make in relation to climate change. Irish forests which are mainly plantation forests can contribute about 20% of the reductions in national greenhouse gas emissions that Ireland needs, to fulfil its obligations, to meet Kyoto targets.

FOREST PRODUCTS

About 3% of all world trade is in forest products compared with an 8% share for oil. The global forest resource has one of the widest range of product possibilities of any raw material source - structural and decorative timbers, furniture components, paper, panel products, chemical products for fabric, paint and solvent manufacture, rubber, food and pharmaceuticals. More than half of the global wood harvest is fuelwood.

Industrial wood production is roughly 70% coniferous and 30% non-coniferous. Global use of industrial wood is split between the major product groups as follows:

- sawnwood 55%
- panel products 12%
- paper 33%

The following table lists the timbers commonly available in Ireland. Among Irish grown timbers, Sitka spruce is the most readily available.

	Imported	Irish grown
Softwoods	European whitewood European redwood Oregon pine Western red cedar Southern yellow pine Larch	Sitka spruce Norway spruce Douglas fir Scots pine Lodgepole pine Larch species
Hardwoods	American oak (red & white) American ash European beech American cherry Maple (hard & soft) Tulipwood American walnut Lauan/meranti Obeche African mahogany Iroko Utile Sapele	Oak Ash Beech Sycamore

- The volume of coniferous sawnwood traded internationally is about 5 times greater than the volume of non-coniferous timber.
- International trade in coniferous sawnwood is dominated by Canada which accounts for about half the annual trade flows.
- The main destinations for the Canadian shipments are U.S.A, Europe and Japan.
- Canadian exports to regions other than the U.S.A, are very sensitive to movements in the U.S.A market, due to Canada's heavy reliance on the U.S.A market.
- Scandinavia (Sweden, Finland, Norway) export principally to W. Europe.
- The Russian Federation is a major exporter to W. Europe.
- China is now a major importer of hardwoods.

ENVIRONMENTAL AND ECOLOGICAL USES

Value of the forest resource

Timber is a renewable resource. As such, its future can be assured in perpetuity. The proper management and maintenance of forests the world over would ensure that virtually all the tree species that provide the diversity of timbers that we use could be available to timber users for as long as there is a need for them. Therefore, it is of immense strategic importance that the renewability of the timber resource be maintained, worldwide.

Sustainable forestry

In Europe exploitation has been curtailed over the centuries, to the point where virtually all the forests are under comprehensive sustained management, their future generally protected by law. On the North American continent such control was introduced much later. The urgent problem areas are in the tropical forests of the developing nations, where the rate of forest depletion is considerable. Inappropriate development policies and an inability to address social and economic problems outside the forest sector have frequently hindered the advancement of effective forest management programmes.

There are increasing efforts being made to address the problems and help to control the depletion of the forests, by felling and export control, improved forest management and plantation development. International organisations are striving to introduce methods of conservation, and attempts are being made to introduce eco-labelling of timber whereby timber should carry a certificate to prove that it comes from a sustainably managed forest.

- Support sustainably managed forests.
- Buy from such forest sources.
- Do not buy endangered or diminishing timber species.

Many countries now operate forest certification which is a system that verifies that forests and woodlands are managed according to principles of sustainable forest management (SFM). It proves that these woods have been independently inspected and evaluated according to strict environmental, social and economic principles and criteria as agreed by recognised accredited bodies. Certification extends beyond the forest and chain of custody certification is awarded to timber processors and manufacturers or others in the wood chain who have received certification from an accredited organisation. Businesses with chain of custody certification can stamp their products with the logo of accredited certifying body which in Europe is usually FSC or PEFC or SFI in America.

How to support sustainable forestry

In the interests of protecting the future availability of tropical timber, specifiers and users of timber should express their concern that the wood must come from a properly managed forest where good practice ensures a supply of timber in perpetuity.

- Urge that forests be managed according to principles of SFM.
- Ensure that timber purchased comes from sustainably managed forests.

IRISH TIMBER

Irish forests have increased from 1% of land cover to 10% since the beginning of the 20th century. A number of State initiatives were set up from 1904 to address forest decline. These included the purchase of Avondale Estate and the establishment of a commission in 1908 which advocated that the State should carry out afforestation. For most of the 20th century the State was involved directly in forestry. It was then accepted that State forests were not to encroach on agricultural land and as a result forests were established on sub-marginal land, most often at higher exposed elevations and on peatlands. This imposed great limitations on what species could be used. Broadleaves would not grow on most of the acquired lands, and softwoods became the mainstay of Irish forestry.

Sitka spruce proved to be the species best suited to the available forest sites, with lodgepole pine planted on the poorest sites. Other species included Scots pine, Norway spruce, European and Japanese larch, Douglas fir and a range of exotic species. The planting of broadleaved species amounted to only 5% of annual planting. Up to the end of the Second World War afforestation was slow, but it accelerated from 1950 on and many excellent forests were established.

Since the 1980s there has been a dramatic change in forestry, both in ownership, species mix and type of land planted. Due to EU and State incentives, there has been considerable growth in private, mainly farmer planting, while State afforestation has practically ceased. The State forests have been transferred to Coillte the State Forestry Board, which in addition to managing its forests has acquired two major panel board mills. The forest estate amounts to about 760,000 ha and some 52% is owned by Coillte.

There is a growing awareness of the need to diversify forest species composition and broadleaf afforestation principally ash and oak has increased from 5% to 37% of annual planting. However, conifers will continue to be the mainstay of Irish commercial forestry.

Currently 4.0 million cubic metres of logs are produced annually north and south. Sitka spruce is the most abundant softwood timber on the market. Much of the mature wood is sold as structural and carcassing timber while small logs are used for panel board manufacture. Norway spruce (the same species that is known as European whitewood, or white deal) and Douglas fir are the next two most popular structural and building timbers. The former is popular for flooring, while Douglas fir makes good structural members but home grown timber is in limited supply. Lodgepole pine has been traditionally planted on the poorest sites and has been considered as a pioneer species, to be replaced by species such as spruce in the second rotation, but if grown on better sites can produce joinery quality timber. Broadleaved trees, or hardwoods, are available, but must be sought out. There are as yet very few mature quality broadleaved forests in Ireland of commercial size and therefore the market in Irish grown hardwood timbers is small. However, it is possible to obtain Irish hardwoods, particularly oak, ash and beech. With the current increase in broadleaf planting, the prospects for a useful future market in Irish hardwoods is promising.

E 2 Properties of available timbers

NOTES:

The woods described below are those most commonly available on the Irish market. A wide range of other species, both homegrown and imported, may be available from time to time, or regularly in small amounts, or on order. Accompanying the photographs are brief descriptions of the timbers and their uses. The technical properties are summarily described, in tabular form, following the illustrations.

In relation to the properties of timber, the following points should be noted:

1. Because there are distinct winter and summer seasons in the temperate regions of the world, all timbers from those regions have visible annual growth rings, being very distinctive features in many species.
2. In general terms, there is a good positive correlation between wood density and strength, so the denser the wood the stronger, and harder, it will be.
3. The normal convention in measuring wood shrinkage is to calculate the percentage reduction in dimension along radial and tangential surfaces which occurs when wood dries from completely wet or 'green' to 12% moisture content.
4. Wood moisture content (MC) is calculated on the basis of its oven-dry weight; being a porous material many woods can exceed 100% MC when completely saturated.
5. Moisture movement refers to the change of dimension of wood in service due to changes in atmospheric humidity, the wood expanding with the absorption of moisture from the air in highly humid conditions.
6. Durability of wood refers to the durability of the heartwood; the sapwood of all timbers is perishable. Durability rating refers to the length of survival of timber intact when in ground contact as a stake.
7. The resistance to impregnation with preservatives (treatability) normally refers to heartwood, as the sapwood is generally permeable; spruce and some other species have fairly resistant sapwood.
8. Working properties are generalised, and the different aspects of workability may vary.
9. The availability of timber is a general expression and may vary from time to time depending on market circumstances.

2.1 Softwoods

DOUGLAS FIR (OREGON PINE) (*Pseudotsuga menziesii*)

Source

Western USA and Canada; old growth forests can produce large-dimensioned clear stock. Also grown in Ireland. The home-grown timber is always known as Douglas fir, and comes in smaller sizes.

Wood

Sapwood: whitish to pale yellow, or reddish white; slow-grown material has a narrower band of sapwood than fast-grown stock. Heartwood: variable, generally a pale reddish brown, but can range from yellowish to deep red; growth rings distinct; grain straight, even or uneven; texture uniform in slow grown stock, often uneven in faster-grown material; moderately durable.

Uses

One of the few conifers from which clear timber or baulks of large dimension in long lengths can still be obtained. Uses include: heavy construction; flooring; interior trim; window joinery; veneer; plywood; poles; piles; paper pulp, cladding.





LARCH, EUROPEAN (*Larix decidua*)

Source
Grown throughout Europe, including Ireland; not as abundant as spruce.

Wood
Sapwood: narrow, pale yellow; heartwood: pale reddish-brown to brick red, sharply differentiated from sapwood; clearly defined growth rings; contains hard knots; straight grained; resinous; moderately durable.

Uses
Boat building; flooring; transmission poles; fencing; piling; cladding; exterior construction and joinery.

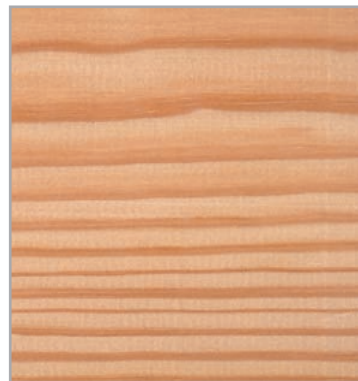


PINE, LODGEPOLE (*Pinus contorta*)

Source
Lodgepole pine available in Ireland is Irish grown; it is native to western America from Alaska to Mexico.

Wood
Pale yellow, sometimes with brownish tinge, with little differentiation between sap and heartwood; can have large knots; grain is straight; texture is fine and fairly even; growth rings distinct with darker latewood; resin canals show as faint streaks on side grain; non-durable.

Uses
Construction; joinery; pallet wood; panel products; pulp; fencing



PINE, SOUTHERN YELLOW (*Pinus palustris, P. elliottii, P. echinata, P. taeda*)

Source
Eastern United States; timber from a range of closely related pines, normally plantation grown. Timber from old-growth trees is normally referred to as "pitch pine", and is more durable than timber from plantations.

Wood
Sapwood: whitish to yellowish of variable width; heartwood: light yellow to reddish brown; grain straight and uneven; highly figured due to contrast between early and latewood in the growth rings; clear to knotty; medium texture; non-durable. Available material usually has a high sapwood content.

Uses
Beams; heavy construction; bridges; mine timbers; piling; poles; plywood and particle board; joinery; pallets



REDWOOD, EUROPEAN (SCOTS PINE or Red Deal) (*Pinus sylvestris*)

Source
Central and northern Europe, especially Scandinavia and Russia. Also grown in Ireland, where the wood is known as Scots pine.

Wood
Sapwood: straw coloured; heartwood: pale reddish brown. In Irish grown Scots pine, the sapwood is usually 50-100 mm wide, whereas in imported European redwood it is generally considerably less, especially in timber from northern regions. Annual rings clearly marked; non-durable.

Uses
Construction; better grades and slower grown for joinery, windows, furniture and turnery; railway sleepers; transmission poles; piles and pitprops; wood pulp.

SITKA SPRUCE (*Picea sitchensis*)

Source
Native to British Columbia and the northwest United States; grown extensively in Ireland, it is the most popular conifer here. Timber on the Irish market is home grown from sustainably managed forests, and is a substitute for European white-wood.

Wood
Sapwood: creamy white to light yellow and merges gradually into the heartwood, which is light pinkish yellow to pale brown with some irregular darker pink streaks; straight even grain; even, medium texture; somewhat lustrous. Irish timber is fast grown, light in weight and coarse in texture; non-durable.

Uses
Construction; formwork; packaging; pulp/paper products; poles; fence rails.



WHITEWOOD, EUROPEAN (NORWAY SPRUCE or White Deal) (*Picea abies*)

Source
North and central Europe, especially available from Scandinavia and the Russian Federation; also grown in Ireland.

Wood
Almost white to pale yellowish brown, with no discernible difference between sap and heartwood; straight grained; fine textured; growth rings visible, but less prominent than in European redwood; slight natural lustre; non-durable.

Uses
Construction; joinery and carpentry; plywood; particle board and pulpwood; veneers; packaging.



WESTERN HEMLOCK (*Tsuga heterophylla*)

Source
Native to Alaska, British Columbia, and the northwest United States but also grown to some extent in Ireland.

Wood
A non-resinous, whitish or pale yellow wood with little distinction between heartwood and sapwood. Straight even grain, stable. Heavy sections can be difficult to dry uniformly. Non-durable, and resistant to preservative treatment.

Uses
Construction; internal joinery; pallets.



WESTERN RED CEDAR (*Thuja plicata*)

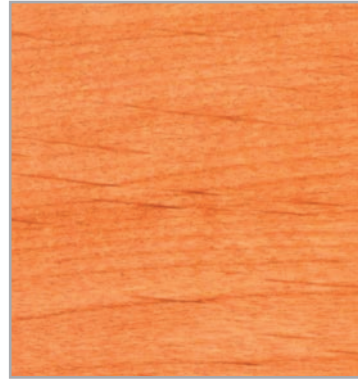
Source
British Columbia, and to some extent Washington, Oregon and southern Alaska.

Wood
Sapwood: whitish; heartwood: dark chocolate brown. May be variegated; ages to reddish brown; on weathering assumes a silver grey colour; straight even grain; texture medium; cedar-like odour; very durable; wood acidic and corrodes most metals when damp (except stainless steel, silicon bronze or copper).

Uses
External trim and cladding; posts and poles; shakes and shingles; boat building; packaging and decking.



2.2 Hardwoods



AMERICAN ALDER (*Alnus rubra*)

Source

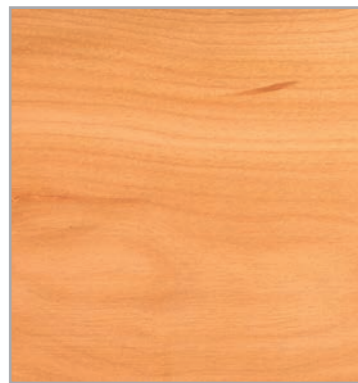
Northwest America. Also commonly known as red alder. European alder (*Alnus glutinosa*) is grown in Ireland and is available in small quantities.

Wood

When freshly cut, alder is pale in colour but darkens in the light to a light red-brown colour, resembling cherry. There is little differentiation between heartwood and sapwood. It is straight-grained with an even texture and of relatively low density. It takes a good finish and can readily be stained and polished. Non-durable.

Uses

Furniture, especially kitchen cabinets, internal joinery, mouldings.



AMERICAN CHERRY (*Prunus serotina*)

Source

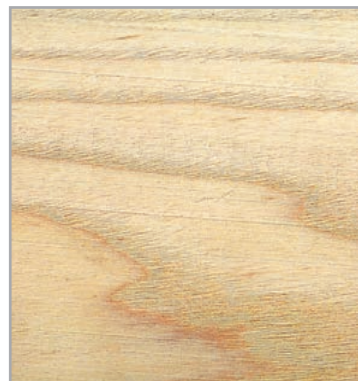
Eastern United States. Cherry is also available from Europe.

Wood

Growth rings evident but not well marked. Heartwood is a pale pinkish brown when first cut, darkening on exposure even to a mahogany-like colour, with the sapwood noticeably lighter; generally straight grained; moderately durable. Supplies of sawn wood may contain a proportion of sapwood, giving a marked colour contrast.

Uses

High-class joinery, cabinet making and furniture; panelling and veneers.



EUROPEAN ASH (*Fraxinus excelsior*)

Source

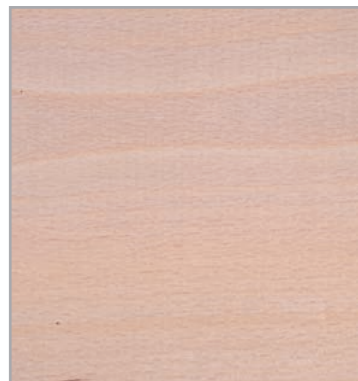
Throughout Europe, including Ireland. Ash is also available from America.

Wood

White to light brown, usually no distinction between sap and heartwood; growth rings distinct with band of obvious pores which give attractive figure on flat sawn surfaces; may have irregular dark brown to black heartwood which is sound and can give an attractive feature. Attractive joinery timber. Typically straight grained, it is tough and flexible; perishable.

Uses

Furniture and chairs; sports goods, agricultural implements and tool handles; gymnasium equipment; flooring; plywood and decorative veneer (panelling).



EUROPEAN BEECH (*Fagus sylvatica*)

Source

Mid to southern Europe, including Ireland, although we are near the northern limit of its range. Beech is also available from America.

Wood

No clear distinction between sap- and heartwood; pale reddish brown (deep reddish brown after steaming); growth rings evident, ray tissue showing as small spindle-shaped marks on flat sawn surfaces to dark irregular flecks on quarter sawn; no distinct figure; perishable. High movement.

Uses

Furniture (solid and laminated) and interior joinery, construction and flooring; domestic woodware, tool handles and turnery; plywood.

BIRCH (*Betula spp.*)

Source

Birch is available from North America, Europe and in very small volumes in Ireland.

Wood

Birch is normally pale or light brown, frequently with darker streaks or flecks. The wood is hard, of high density and with good wearing properties. Non-durable.

Uses

Widely used in Europe for the manufacture of plywood, both throughout and as a facing veneer. Also used as flooring, furniture and for turned items.



IROKO (*Milicia excelsa*)

Source

Tropical Africa 10° north and south of the equator, from Sierra Leone in the west to Tanzania in the east.

Wood

Freshly sawn heartwood is a distinct yellow, quickly changing to golden-brown on exposure to light. Sapwood narrow, pale and clearly defined. Grain interlocked and texture rather coarse but even; very durable.

Uses

Interior and exterior joinery; window frames and sills, stair treads, fire-proof doors; laboratory benches; piling, dock and harbour work.



MAPLE, ROCK (OR HARD) (*Acer saccharum*)

Source

Canada and the USA.

Wood

A close grained, fine and even-textured, pale-coloured temperate hardwood; annual growth rings are evident but not strongly marked. Sapwood: white with a reddish tinge; heartwood: pale or light tan, occasionally darker. Grain is generally straight, but can be curly or wavy; non-durable.

Uses

Flooring, furniture, cabinet making, trim, panelling, dowels, interior construction.



OAK, AMERICAN RED (*Quercus rubra*, *Q. falcata*)

Source

USA; in pure stands which regenerate easily.

Wood

Fast growing fairly tough timber; sapwood: white; heartwood: pink to light reddish brown; grain straight and open; flat sawn timber shows flared grain and quarter sawn shows silver grain, but, because the rays of red oak are short the silver grain is not so pronounced as in white or European oak, and is more 'flakey'. Less durable than European or American White oak.

Uses

Furniture (one of the most popular in the USA), boats - frames and fittings, construction, dowels, flooring, joinery, musical instruments.



**OAK, AMERICAN WHITE (*Quercus alba*) and others****Source**

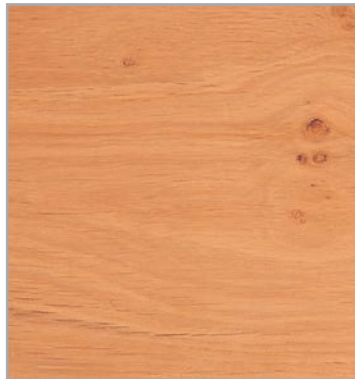
Widespread, mainly in east to mid USA; the classic white oak (*Q. alba*) ranges from Maine to Texas; supplies are available from sustainably managed forests.

Wood

Sapwood: whitish to light brown, variable width; heartwood: ranges from light tan to pale yellow brown to dark brown; may have pinkish tinge - the colour is more variable than European oak. Straight open grain; flat sawn boards have flared appearance due to prominent pores; quarter sawn boards show silver grain. Texture - medium to coarse; durable.

Uses

Furniture and cabinet making; joinery; flooring; panelling; construction; exterior trim and cladding; sleepers, shingles and shakes. Boatbuilding.

**OAK, EUROPEAN (*Quercus petraea*, *Q. robur*)****Source**

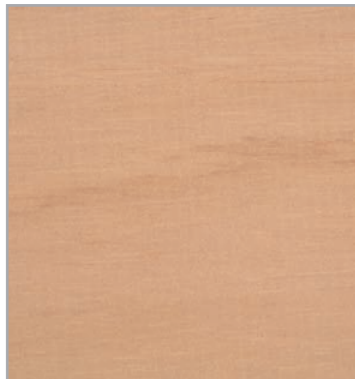
Grown throughout central and western Europe, and in Ireland. Can get clear boles up to 15m long. Much of the timber is produced in sustainably managed forests.

Wood

There is no difference between the wood of the two European species of oak. Sapwood is pale cream, 25 - 50mm wide; heartwood ranges from yellowish brown, light tan to deep brown. Growth rings are obvious due to alternating bands of large pored early wood and dense late wood, and produce a flare pattern on flat sawn surfaces. Distinct silver grain on quarter sawn surfaces. Fast-grown oak is tough and hard, slow grown is mild and easy to work; grain is normally straight, but may be irregular. The weight varies - northern and western European oak averages 720 kg/m³ and that from central Europe is about 672 kg/m³ after drying; durable.

Uses

Furniture and cabinet making; joinery and panelling; flooring; construction; veneers; exterior trim and cladding; boat building; fencing and railway sleepers.

**OBECHE (*Triplochiton scleroxylon*)****Source**

Tropical west Africa (mostly in Nigeria, Ghana, Ivory Coast and Cameroon), in transition zones between evergreen and semi-deciduous forests; some from sustainably managed forests; resource does not appear to be threatened.

Wood

Creamy white to pale yellow brown in colour with little or no distinction between sapwood and heartwood. Sapwood may be up to 150mm wide. Grain is interlocked, producing a faint striped appearance on quarter sawn surfaces, otherwise little decorative figure. Texture is coarse to moderately fine and even. A light-weight timber, brittle-heart is common in large logs; non-durable.

Uses

Light furnishings and cabinet making; display cases and materials; mouldings; veneer and coffins.

SAPELE (*Entandrophragma cylindricum*)**Source**

An African tree, it extends from Ivory Coast to Cameroon and eastward through Zaire to Uganda. Some of the production forests are sustainably managed.

Wood

Sapwood: grey-pink or cream; heartwood: red-brown or purple-brown. Grain: moderately interlocked or wavy. Quarter sawn stock shows a regular stripe; wavy grain produces fiddle back and roe figure. Texture is moderately fine. The wood is lustrous with a cedar-like scent.

Uses

Joinery, furniture, boat building, panelling, veneer and plywood

**TULIPWOOD (*Liriodendron tulipifera*)****Source**

USA; from certified sustainably managed sources. Also known as Yellow poplar, though not a true poplar.

Wood

Sapwood: white or creamy coloured - usually variegated or striped; heartwood: pale olive green to yellow or brown, may be streaked with steel-blue to black - turns greenish on exposure; grain is straight, though it may show a blister figure; texture is fine and even; non-durable.

Uses

Joinery (including doors, interior trim); cabinet making, furniture and panelling; veneers, plywood and pulpwood.

**UTILE (*Entadrophragma utile*)****Source**

West and central Africa, especially Ivory Coast; some material available from sustainably managed forests.

Wood

Sapwood: light brown; heartwood: pink-brown to deep red-brown or purple-brown; grain broadly interlocked to give a ribbon figure or wide irregular stripe on quarter sawn surfaces; texture medium; a lustrous wood; durable.

Uses

Furniture, joinery, panelling, turnery, internal construction, veneer and plywood.

**WALNUT, AMERICAN BLACK (*Juglans nigra*)****Source**

East to midwest USA; not very abundant; some supplies from sustainably managed forests. Walnut (*Juglans regia*) is also available from Europe.

Wood




Sapwood: whitish to yellowish brown; heartwood: varies from light greyish brown to deep chocolate brown to almost black purplish brown; 'warm and inviting' appearance; grain is slightly open and usually straight, but may be wavy or irregular; famous for its wavy, curly or mottled figures - from burls, crotches and stumpwood; texture is coarse and uniform; moderately durable.

Uses

Cabinet making, fine furniture, specialty items, gunstocks, panelling, wainscotting, high-class veneers and flooring.



















Table E 2.1 Summary table of softwood timbers available on the Irish market.

TIMBER	COLOUR	TEXTURE	DENSITY (kg/m ³)	MOISTURE MOVEMENT	DURABILITY (of heartwood)	PERMEABILITY	WOOD SAMPLES	WORKING PROPERTIES	NAIL/SCREW HOLDING	GLUING	STAINING/ PAINTING	AVAILABILITY
Douglas fir (Ireland & US import)	reddish brown	fine to medium	530	small	moderately	resistant durable		good	good avoid splitting	satisfactory	satisfactory	Reasonable - large sizes hard to get
Larch (Irish, European or Siberian)	light reddish brown	fine	590	small	moderately	resistant durable		good	good avoid splitting	satisfactory	satisfactory	Reasonable - Irish source
Pine, lodgepole (Irish)	pale yellowish	fine	460	medium	non-durable	resistant		good	good	very good	good	Irish timber available -
Pine, Scots (Irish)*	pinkish brown	medium	510	medium	non-durable	moderate		medium	good	good - resin	satisfactory may impede	Irish stock not so plentiful
Redwood European+ (European imported)	pinkish brown	medium	540	medium	non-durable	moderate		medium	good	good - resin	satisfactory may impede	Readily available
Spruce Norway* (Irish)	whitish	fine to medium	420	small	non-durable	resistant		good	good	good	good	Reasonable
Spruce, sitka (Irish)	pinkish white	medium to coarse	410	small	non-durable	resistant		good	good	very good	satisfactory	Readily available
Western red cedar (Irish & imported)	reddish brown	medium	390	very small	very durable	resistant		good	fairly good	very good corrodes ferrous metal	good	Reasonable but Irish stock not regularly available
Whitewood, European (imported)	whitish to pale yellow brown	fine to medium	470	medium	non-durable	resistant		good	good	good	good	Readily available

*Scots pine and European redwood are the same species (Pinus sylvestris), the former being the name given to home grown timber, the latter the preferred name for imported. Also known as Red deal in Ireland.

*Norway spruce and European whitewood are the same species (Picea abies) the former being the name given to home grown timber, the latter the preferred name for imported. Also known as White deal in Ireland.

Table E 2.2 Summary table of hardwood timbers commercially available on the Irish market.

TIMBER	COLOUR	TEXTURE	DENSITY (kg/m ³)	MOISTURE MOVEMENT	DURABILITY (of heartwood)	PERMEABILITY	WOOD SAMPLES	WORKING PROPERTIES	NAIL/SCREW HOLDINGS	GLUING	STAINING/ PAINTING	AVAILABILITY
Alder American	light red-brown	even	500	small	non-durable	permeable		good	good	good	good	Reasonable
Ash American	greyish brown to light brown	medium	670	medium	non-durable	moderately resistant		medium	good	good	good	Readily available
Ash European	white to light brown	medium/coarse	710	medium	perishable	moderately resistant		good	good	good	good	Reasonable, some Irish stock available
Beech European	whitish to pale brown	fine	720	large	perishable	permeable		good	good	good	good	Imported from European continent - Readily Available
Birch	whitish to pale brown	fine	600	medium/large	non-durable	permeable		good	good	good	very good	Limited stocks
Cherry American (black cherry)	light to dark reddish-brown	fine	580	medium	moderately durable	moderately resistant		good	good	good	very good	Readily available
Iroko	yellow brown	medium	660	small	very durable	extremely resistant		medium/difficult interlocked grain may tear	good, requires pre-boring	satisfactory	good, may need filling	Readily available
Maple, hard	creamy white	fine	740	medium	non-durable	resistant		medium	good	good	very good	Readily available, often as flooring
Oak, American red	yellowish-brown with red tinge, variable	medium/coarse	740	medium	non-durable	moderately resistant		good	pre-boring recommended	good	very good	Readily available
Oak, American white	pale yellow -brown to brown	medium to coarse	770	medium	durable	extremely resistant		good	good, corrodes ferrous metals	variable	very good	Readily available, not as abundant as red oak
Oak, European	yellowish brown	medium to coarse	700	medium	durable	extremely resistant		medium/difficult	good, corrodes ferrous metals	good	very good	Reasonable, some Irish stock available
Obeche	white to pale yellow	medium	390	small	non-durable	resistant		very easy to work	good	good	very good, may need light filling	Reasonable to good
Sapele	red-brown	medium	630	medium	moderately durable	resistant		good, may tear in moulding	good	good	good	Reasonable to good
Tulipwood	pale olive to brown	fine	450	small	non-durable	resistant		easy to work	nailing - good screwing - poor	good	very good	Readily available
Utile	dark reddish brown	medium	660	medium	durable	extremely resistant		medium	good	good	very good	Reasonable
Walnut, black	light to rich dark brown	medium	660	small/medium	moderately durable	permeable		medium to good	good	good	very good	Reasonable

E3 Glossary and Abbreviations

GLOSSARY

Adult wood: (see mature wood)

Afforestation: Tree planting in bare land or land with previous crop other than trees.

Ambrosia Beetle (Pinhole borer). Insects which attack the sapwood of many species while the wood is still undried or “green”. The attack ceases when the wood is dried and cannot recur. Of no structural significance but may be disfiguring on exposed surfaces.

Annual ring (annual growth ring): The layer of wood growth added each growing season to the diameter of the tree. In temperate regions, with distinct growing seasons, annual rings of most species are distinct, some very much so due to difference in cells formed early and late in the growing season. Many tropical timbers have no growth rings.

Anti-stain treatment: Fungicide solution applied to timber at some sawmills, to minimise staining during transit and storage.

Bark pocket: An opening between annual growth rings that contains bark – appearing as dark streaks on quarter sawn and rounded areas on flat sawn stock.

Beam: A structural member used horizontally acting alone and not in a load sharing system. Purlins and lintels are specific forms of beams.

Bearing: The contact area of a structural element (e.g. beam, joist, rafter etc.) at its point of support

Birdseye: Dimpling of the tangential surface of some hardwoods, notably hard maple, which forms small circular features which are decorative.

Bleeding: Diffusion of resin, such as from a knot, through paint or varnish resulting in discolouration.

Blue stain: Blue-grey discoloration caused by mould-type fungi in moist timber (above 20%); also known as sapstain.

Bow: A curve along the face of a plank normally due to growth stresses or poor stacking.

Box Beam: A built-up beam with wooden flanges and wooden panel webs (e.g. OSB or ply) on either side of the flanges.

Boxed heart board: A board in which the pith (see below) is enclosed; more liable to twist and fissure than other boards.

Brace, lateral: A continuous member connected to a truss chord to maintain the vertical position of the truss and assembly of trusses and/or to prevent buckling of compression members.

Broadleaved trees: A grouping of trees (botanically known as angiosperms), wide leaves (e.g. oak, ash, mahogany), often deciduous, which provide hardwood timber.

Camber: An upward vertical displacement built into a member to offset deflection.

Cambium: The layer of cells between the phloem and xylem (bark and wood) in a tree where growth occurs.

Cantilever: The part of a truss or structural member that extends beyond its support.

Case-hardening: Where the outer part of the wood has been dried too rapidly before the centre, and has become set in a stretched condition which causes stress between the outer and inner parts of the wood. The wood is likely to distort if further sawn or machined.

Cell: The minute structures of which wood is composed, including fibres, vessels and other elements.

Cellulose: The carbohydrate that is the principal constituent of wood. It has large, long-chain molecules which, when bonded together, provide a very strong framework to the wood cells.

Certification: A system that verifies that forests and woodlands are managed according to principles of sustainable forest management (SFM). It proves that these woods have been independently inspected and evaluated according to strict environmental, social and economic principles and criteria as agreed by FSC, PEFC or other recognised accredited body (see certification scheme).



Killykean Holiday Homes, Lough Oughter, Co. Cavan. This was a research and development project designed to discover the potential of seven different species of Irish grown timber. Outside, the vertical Douglas fir cladding, joinery and beams are stained red while the interior timbers were left in their natural colours.

Certification scheme: A market-oriented scheme used to certify that forests are managed on a sustainable basis.

Chain of custody certification: Awarded to timber processors and manufacturers or others in the wood chain who have received certification from an accredited organisation such as FSC and PEFC. It proves that their businesses have been independently inspected and evaluated according to strict environmental, social and economic principles and criteria as agreed recognised accredited body and also that their raw material has been sourced from certified forests. Businesses with chain of custody certification can stamp their products with a logo of an accredited certifying body which in Europe is usually the Forest Stewardship Council (FSC) or the Programme for the Endorsement of Forest Certification (PEFC).

Charring rate: The rate at which timber is carbonised or lost to fire under standard conditions expressed as mm/minute

Check: A separation of the fibres along the grain, forming a crack that does not extend through the timber.

Clear span: Horizontal distance between inner edges of supports.

Compression failure: Localised buckling of wood fibres, due to compression along the grain, caused by direct compression or bending; in planed timber may appear as fine wrinkles across the surface.

Compression wood: Dense, short-fibred wood occurring on leeward side of wind-stressed conifer trees; usually darker in colour; causes unequal shrinkage, distortion and reduced strength.

Concealed surface: As defined by BS 1186, a surface in joinery or trim which, after installation, will be concealed, not only by decoration.

Conifer trees: A grouping of trees (botanically known as gymnosperms) with needle or scale-like leaves (e.g. pine, spruce), most of which are evergreen, which provide softwood timber.

Cross-cut: A cut across the grain, to cut timber to length.

Cup: Curvature across the face of a plank.

Dead knot: A knot surrounded by bark, liable to loosen or fall out in service.

Dead load: A permanent load resulting from the weight of the building materials or installed equipment.

Decay: The decomposition of wood resulting from the action of wood-rotting fungi in damp/wet conditions; resulting in a loss of strength and weight, generally with a change in texture and colour.

Density: The mass of wood substance per unit volume; expressed as kilograms per cubic metre, at a specified moisture content, generally 12%; there is a strong positive correlation between density and strength.

Dry Rot: Decay of timber in service caused by the fungus *Serpula lacrymans*. Contrary to the common name, can only grow in moist wood.

Durability: The level of resistance to decay or insect attack of heartwood. The durability of timbers is given in years of life in moist conditions before deterioration, described as:

Very durable = > 25 yrs
 Durable = 15 - 25 yrs
 Moderately durable = 10 - 15 yrs
 Slightly durable = 5 - 10 yrs
 Not durable = < 5 yrs

Earlywood: Also known as springwood; the portion of the annual ring formed at the beginning of the growing season; generally of lower density and weaker than the latewood.(q.v.)

Edge: The narrower surface of a rectangular piece of timber.

Edge distance: The distance from the edge of the timber to the centre of the nearest fastening.

End distance: The distance measured at right angles from the end of the timber along its length to the centre of the nearest fastener.

Equilibrium moisture content: (EMC). The moisture content at which wood neither loses nor gains moisture when exposed to air at a constant relative humidity and temperature.

Face: The wide surface of a rectangular piece of timber; or any of the surfaces of a square piece of timber.

Fibre saturation point (FSP): The moisture content (MC) of wood at which all free water is lost from cell cavities, and only water bound within the cell walls remains; generally between 25 and 30% moisture content; shrinkage occurs only as wood MC drops below FSP.

Figure: The pattern produced, on the surface of wood, by growth rings, rays and variations in grain structure.

Fingerjoint: An end joint made by cutting wedges or fingers into the ends of boards, meshing them together and bonding with adhesive.

Fissure: A generic term to include checks, splits and shakes.

Fire Resistance: Relates to three criteria, stability, integrity and insulation. Stability relates to the ability of the construction to stay in place and carry load. Integrity relates to the passage of fire and smoke while insulation relates to the temperature on the unexposed (in terms of fire) side of the construction. Fire resistance usually relates to fire testing to the relevant parts of BS 476 or the relevant parts of I.S. EN 1363 to 1366 and I.S. EN 1634. However, the fire resistance of a construction can be assessed for example by estimating from fire tests carried out on similar constructions or from the use of standards such as BS 5268 Part 4. Fire resistance is usually expressed in minutes or hours.

Fire-resistance rating: The performance time, usually noted in minutes, that a material or structure achieves when exposed to a specified fire test.

Fire retardant: A chemical preparation which reduces flammability or retards the spread of flame over a surface.

Flat-sawn timber: Timber sawn so that the growth rings are at an angle less than 45° to the face.

Glulam: Structural wood products made by bonding together laminae of planed timber. May be straight or curved, and long spans can readily be produced.

Grading: The process whereby sawn timber is sorted into categories on the basis of appearance or strength.

Grain: Primarily, the direction of the main fibres of the wood; when qualified, may refer to their size, arrangement and/or appearance (see close, open, coarse grained).

Greenhouse gas emissions: Greenhouse gases include carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O), which are released or emitted into the atmosphere as a by-product of natural and industrial processes. These emissions are regulated by the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC).

Green timber: Freshly felled or undried timber with its moisture content above fibre saturation point (qv).

Hardness: The capacity of the wood to resist indentation, usually classified by the "Janka" or "Brinell" hardness scales.

Hardwood: Timber of broad-leaved trees; the term relates to the botanical grouping of the trees and not to the hardness of the wood (some hardwoods, e.g. balsa, are softer than most softwoods).

Heartwood: Wood of the inner growth rings, extending from the pith to the sapwood; no longer participating in the life processes of the tree. The starches are depleted and often replaced with resins and other substances which may make the wood darker and more decay resistant.

Heel: Point on a truss where the top and bottom chords intersect.

Helsinki Process: The Ministerial Conference on the Protection of Forests in Europe is usually known as the Helsinki or Pan-European Process. It is one of a number of international fora that have developed criteria and indicators to assist in assessing success in implementing Sustainable Forest Management.

Honeycomb: Internal splitting in a plank as a result of drying stresses.

Intumescent: A fire protective coating which when heated swells and provides protection to the material underneath.

Joist: One of a series of parallel beams used to support floor or ceiling loads, which are themselves supported by bearing walls or other beams.

Juvenile wood: The cylindrical core of wood produced next to the pith during the first 10-20 years of the tree's life. Usually weaker and less stable than mature or adult wood.

Kiln-drying: The drying of sawn wood under controlled conditions of temperature, humidity and air flow in a kiln or chamber to achieve the desired final moisture content. The term "kiln-drying" does not imply any particular moisture content and the moisture content required should be stated by the specifier.

Knot: The portion of a branch that has been surrounded by wood in the subsequent growth of the stem. The shape of the knot on the surface of a plank will depend on the angle at which it is cut.

Knot area ratio (KAR): In a plank, the proportion of the cross-section at any point occupied by knots; used to assess the visual strength grade of timber.

Latewood: Also known as summerwood; the portion of the annual ring formed in the later part of the growing season; generally of higher density and stronger than the earlywood (q.v.).

Lignin: The second most abundant constituent of wood; a cementing substance that bonds adjoining cells and the cellulose framework.

Lintel: A load bearing beam over an opening such as a door or window.

Live load: Loading of a temporary nature such as wind, snow and construction loads; a similar term to imposed load.

Machine strength graded timber: Timber that has been mechanically evaluated for stiffness or other parameters from which its bending strength is automatically calculated resulting in the timber being assigned to a strength class formerly referred to as "stress-rated".

Make good: A term usually applied to repairing wood by means of a plug, insert or filler. In construction terms it is the same as reinstatement.

Mature wood: Also known as adult wood, is produced after the juvenile stage (in the case of Sitka spruce after 14 to 18 years). Mature wood has better strength qualities and is desirable for products that need strength and stability.

Medium density fibreboard (MDF): Reconstituted panel board of medium density manufactured mainly from spruce and pine fibres which are bonded together with synthetic resins.

Moisture content (MC): The weight of water in a piece of wood expressed as a percentage of the weight of the wood when oven-dry.

Movement: The change in width and thickness (movement along the length is negligible that accompanies normal fluctuations in relative humidity after wood is put in service; usually rated over a relative humidity (q.v.) change of 60 to 90% as follows:

- small = < 3%
- medium = 3 - 4.5%
- large = > 4.5%

Nominal size: A term whose definition may vary; normally refers to the size by which timber is known and sold, which is often different from the actual size of the timber; or to the size to which tolerances apply, but the tolerances may exceed those of EN336.

Oriented strand board (OSB): Reconstituted wood panelboard manufactured from pulpwood logs by bonding peeled wood strands which are arranged in layers at right angles to one another to provide strength.

Oven dry weight: The weight obtained by drying wood in an oven at 105°C ±3°C until no further loss in weight occurs.

Panel boards: Wood products manufactured from wood chips and residues. Includes fibreboard, plywood, medium density fibreboard (MDF) and oriented strandboard (OSB).

Permeability: The capability of the wood to absorb preservative; often varies between sap and heartwood. The classification refers to heartwood only, as sapwood is generally permeable, and may vary with the preservative used and type of treatment.

Phloem: Bark tissue comprising various types of cells which transport dissolved organic and inorganic materials in vascular plants (see also xylem).

Pith: The core of a tree stem, consisting of dark-coloured very soft tissue; it can show on the surface of planks, taken from the centre of the tree, as a dark line of easily indented tissue.

Pitch pocket: An opening between growth rings which contains, or has contained, resin.

Pores: Openings of vessels on the surface of cut timber, occurring only in hardwoods, seen as minute holes on end grain or grooves on side grain.

Quarter-sawn timber (edge grain): Timber sawn so that the growth rings are at an angle greater than 45° to the face.

Rays: Bands of soft tissue vertically aligned and radiating from the centre of the tree; insignificant in softwoods and variable in hardwoods – if broad can produce distinctive figure - e.g. silver grain in oak.

Relative humidity (RH): The ratio of the amount of water vapour present in air to the amount which the air would hold if saturated at the same temperature.

Sapwood: Wood of the outer growth rings, extending from the heartwood to the bark; contains living cells, with carbohydrate food reserves, and conducts the sap up the tree; generally considerably wetter than heartwood when freshly felled, and is perishable.

Sawlogs: Logs larger than pulpwood or logs suitable for sawing. Broadly divided into large sawlog and small sawlog categories.

Large sawlog: Logs with a top diameter of 20cm or greater. Used mainly in construction including roof members and joists.

Small sawlogs: Logs with a top diameter between 14cm and 20cm. Suitable for pallets, crates, fencing and light construction.

Seasoning or drying: The process of removing moisture from green wood to improve its serviceability. Seasoning often refers to drying in the atmosphere; kiln drying to accelerated drying under controlled conditions in a drying chamber or kiln.

Shake: A separation of the fibres along the grain, if between the annual rings is known as ring shake.

Softwood: Timber of conifer trees; the term relates to the botanical grouping of the trees and not to the hardness of the wood (some softwoods, e.g. yew, are harder than many hardwoods).

Spiral grain: Growth of fibres in a spiral direction around the trunk of the tree; may cause twisting of timber during drying.

Spring: A curve along the edge of a plank; normally due to growth stresses, e.g. compression wood (q.v.).

Strength grading: The process where timber is visually or mechanically assessed and assigned a grade or strength class. Strength grading is based on known characteristics of the timber species.

Stress: The applied force per unit area; the primary stresses are bending, tensile, compression and shear.

Structural timber: Timber which carries load. Only timber which has been properly strength graded should be used structurally.

Sustainable forest management (SFM): The stewardship and use of forests and forest land in a way and at a rate that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national and global levels and does not cause damage to other ecosystems (Helsinki Process).

Alternative definition: SFM is the process of managing permanent forest land to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment (International Tropical Timber Organisation).

Sustained yield: The regular continuous supply of the desired produce to the full capacity of the forest without depletion.

Tension wood: Comparable to compression wood (q.v.) in conifers, it occurs in broad-leaved trees, on the upper side of leaning trees. Shorter gelatinous fibres cause unequal shrinkage, distortion and reduced strength.

Texture: The appearance of the timber produced by variations in the size of vessels and other cells, from fine (narrow vessels and rays) to coarse (wide vessels and rays).

Twist: Warping in which one corner of a plank twists out of the plane of the other three; associated with split and boxed-heart planks due to shrinkage of spiral-grained wood.

Visually strength-graded timber: Timber graded for strength based on visual assessment of limiting features (see KAR above).

Wane: The original rounded surface of a tree remaining (with or without bark) on timber after conversion.

Water repellent: A liquid that penetrates the wood and retards changes in moisture content while still allowing the wood to breathe; often incorporates a preservative, when it is known as a water-repellent preservative.

Wet Rot: A collective term for fungi causing decay of timber in service (other than Dry Rot [qv])

Workability: The degree of ease and smoothness with which wood can be sawn, planed and otherwise worked.

Xylem: Wood tissue consisting of various types of cells, which transport water and dissolved substances to the leaves.

E 4 Standards and Codes

The following standards are referred to in *Woodspec* or are useful reference sources. As standards are continually revised and updated care should be taken to use the most recent revision.

CEN STANDARDS

CEN is the body responsible for the production of European Standards. These standards are initially produced as drafts and given designations such as prEN or ENV. ENVs tend to be voluntary and can be considered to be advanced drafts. Once a draft CEN standard has been voted on and approved by CEN members, the standard becomes a full standard with the formal designation EN (European Norm). After a period of time (usually 6 months) the national standards body of a CEN member state should adopt the standard and withdraw or amend any conflicting national standards. Once an EN is adopted by a member state the standard is given the national standard designation as well; in the case of Ireland the EN becomes I.S. EN and in the case of the UK BS EN. The content of the standards cannot be changed and the requirements laid out in the standards are therefore the same for all member states. However, member states are entitled to add National Annexes; these can only be informative and cannot alter the meaning or technical content of the standard.

Effectively design standards have a series of supporting standards; the supporting standards tend to deal with items such as products, various processes and workmanship. For example product standards I.S. EN 300 deals with OSB (Orientated Strand Board) and EN 14250 deals with the manufacture of roof trusses. EN14081 (all 4 parts) deals with timber strength grading and prEN 14372 when complete will deal with the manufacture of timber frame panels. The continuing introduction of EN standards creates difficulties for a timber specifier mainly because of the sheer volume of standards being issued and withdrawn but also a number of the older EN standards have been revised and re-issued (as have some Irish and British Standards to reflect the content of the EN standards). In addition some EN standards refer to draft standards which the normal user would not have access to (never mind the validity of using a standard that is a draft and which may contain incorrect information).

I.S. 444 and BS 5268 (Parts 2, 4 and 6) are the main design standards used in Ireland and are based on the permissible stress approach. Eurocode 5 (EC5) has the formal designation EN 1995-1-1 and 1995-1-2; these standards are limit state standards; 1995-1-1 is the approximate equivalent of BS 5268-2 and 1995-1-2 is the approximate equivalent of BS 5268-4. BS 5268 has been updated and is updated on a regular basis to reflect changes and the publication of EN standards (a similar process is has been completed for IS 193, the Irish standard on roof trusses). Generally those using BS 5268 (IS 444 is based on BS 5268) and EC5 are advised not to mix the two standards. However, both standards do refer to a number of the same EN standards (e.g. EN 636 for plywood specification). The two design standards refer to different loading standards and generally it would be wrong for example to design a beam to one standard and to design a supporting column to the other standard. Another example would be to design the size of a connection to one standard and to use the spacing requirements of the other standard.

One final issue relating to the EN standards, in Ireland a number of British Standards are used and this means that with the issue of an EN, Ireland can for the first time have its own standard – even if Ireland voted against the particular standard (standards are approved by CEN members using a weighted voting system). With the introduction of EC5 it could be argued that BS 5268 should no longer be used as it is not an Irish Standard. At present CEN member states are allowed to have existing national design standards running in parallel with the EN standards but the national standards are meant to be withdrawn by 2010. A pragmatic view would be that standards like BS 5268 are effectively Irish national standards as they have been used as such for quite a number of years. Certainly designers are familiar with BS 5268 and very few designers are familiar with EC5. In addition once EC5 become widely used, flaws in the document will become apparent and changes will be made. There are already proposals to amend parts of EC5 even though it has been only issued as an EN in late 2004.

The information in this Specification Guide has been updated but given the rather chaotic state of standards at present, there are bound to be incorrect or out dated references. Some standards have been revised and/or have been superseded during the course of working on this guide. EN 14081 (for timber grading) was introduced in 2006 but NSAI is working on the consequences of its introduction and its affect on I.S. 127 and its timber certification schemes. NSAI carries out its work through consultative committees and the consultation process can take some time. Rather than change every reference within the main body of this document, these standard references have been corrected in the standards summary in Section E4. The specifier should always check a standard reference (this applies not just to timber but to all materials) to see if a new standard has been issued or if the standard has been revised.

The design references in this guide refer mainly to the relevant Irish or British Standard (IS 444 and BS 5268); some of the advice on timber specification is applicable in principle to EC5 but changes would have to be made to some of the values and references.

It is important to monitor the situation with standards and to use and specify standards with care.

IRISH AND BRITISH STANDARDS AND BUILDING REGULATIONS

Some Irish Standards relating to joinery are obsolescent. Users of these standards should satisfy themselves that they are appropriate for the intended end use. The Irish Standards used in Ireland tend to be very similar to those used in the UK. There are some product standards e.g. I.S. 193 (Trusses) which are almost identical to their British counterpart. There are a few design standards such as I.S. 325 (Masonry) which arose because of differences in materials but apart from design values for the material are again substantially identical to their British counterpart. Much of the advice given in this publication is applicable to use in the UK; obviously references to Irish Standards should be replaced by a reference to a British or European Standard.

The Building Regulations in Ireland are very similar to those in the UK. In Ireland the Technical Guidance Documents are the equivalent to the UK Approved Documents. There are significant differences between the Irish Technical Guidance Documents and the UK Approved Documents; mainly in the area of Fire Safety. In addition control of the timber industry in areas such as roof truss manufacture, timber frame manufacture and timber grading is probably tighter in Ireland than the UK. NSAI operate Approval Schemes in these areas and are involved in other areas of the timber industry.

The good practice guides given in this document are applicable to Ireland and the UK and are usually independent of standards and the Building Regulations.

IRISH STANDARDS AND CODES

Standard Number	Title
IS 16	Knotting
IS 105	Wire and cut nails for building purposes
IS 63 Pts 1 & 2	Wood windows
IS 96	Moisture content of timber for building
IS 126	Galvanised fencing wire
IS 127	Structural timber - visual strength grading
IS 130	Chain link fencing
IS 158	Closed string wood stairs
IS 193	Timber trussed rafters for roofs (superseded by EN 1995-1-1)
IS 196: Pts.1-6	Wood doors
IS 435 Pts. 1, 2 & 3	Timber post and rail roadside fencing
IS 436	Farm fencing
IS 437	Horse and stud fencing- timber post and rail
IS 440	Timber frame dwellings.
IS 444	The use of structural timber in buildings
IS 513, 514,515, 518	Methods of testing windows.
IS 575	

BRITISH STANDARDS AND CODES

Standard Number	Title	
BS 144:	1997	Specification for coal tar creosote for wood preservation.
BS 459:	1988	Specification for matchboarded wooden door leaves for external use.
BS 585-1:	1989	Wood stairs. Specification for stairs with closed risers for domestic use, including straight and winder flights and quarter or half landings.
BS 585-2:	1985	Wood stairs. Specification for performance requirements for domestic stairs constructed of wood-based materials.
BS 644:	2009	Timber windows. Fully finished factory assembled windows of various types. Specification.
BS 1088-1:	2003	Marine plywood. Requirements.
BS 1088-2:	2003	Marine plywood. Determination of bonding quality using the knife test.
BS 1186-2:	1988	Timber for and workmanship in joinery. Specification for workmanship.
BS 1186-3:	1990	Timber for and workmanship in joinery. Specification for wood trim and its fixing.
BS 1187:	1959	Specification for wood blocks for floors.
BS 1202-1:	1974	Specification for nails. Steel nails.
BS 1202-2:	1974	Specification for nails. Copper nails.
BS 1202-3:	1974	Specification for nails. Aluminium nails.
BS 1210:	1963	Specification for wood screws.
BS 1297:	1987	Specification for tongued and grooved softwood flooring.
BS 1892-1:	1986	Gymnasium equipment. Specification of general requirements.
BS 2482:	2009	Specification for timber scaffold boards.
BS 4050-1:	1977	Specification for mosaic parquet panels. General characteristics.
BS 4050-2:	1966	Specification for mosaic parquet panels. Classification and quality requirements.
BS 4072:	1999	Copper/chromium/arsenic preparations for wood preservation.
BS 4261:	1999	Wood preservation. Vocabulary.
BS 4512:	1969	Methods of test for clear plywood.
BS 4756:	1998	Specification for ready mixed aluminium priming paints for woodwork.
BS 4787-1:	1980	Internal and external wood doorsets, door leaves and frames. Specification for dimensional requirements.
BS 4978:	2007	Visual strength grading of softwood. Specification.
BS 5268-2		Structural use of timber. Code of practice for for permissible stress design, materials and workmanship.
BS 5268-3:	2006	Structural use of timber. Code of practice for trussed rafter roofs.
BS 5268-4.1:	1978	Structural use of timber. Fire resistance of timber structures. Recommendations for calculating fire resistance of timber members.
BS 5268-4.2:	1990	Structural use of timber. Fire resistance of timber structures. Recommendations for calculating fire resistance of timber stud walls and joisted floor constructions.
BS 5268-6.1:	1996	Structural use of timber. Code of practice for timber frame walls. Dwellings not exceeding four storeys.
BS 5268-6.2:	2001	Structural use of timber. Code of practice for timber frame walls. Buildings other than dwellings not exceeding four storeys.
BS 5395-1:	2010	Stairs. Code of practice for the design of stairs with straight flights and winders
BS 5395-2:	1984	Stairs, ladders and walkways. Code of practice for the design of helical and spiral stairs.
BS 5395-4:	2011	Code of practice for the design of stairs for limited access
BS 5534:	2003	Code of practice for slating and tiling (including shingles).
BS 5588-0:	1996	Fire precautions in the design construction and use of building. Guide to fire safety codes of practice for particular premises/applications.
BS 5588-1:	1990	Fire precautions in the design construction and use of building. Code of practice for residential buildings.
BS 5756:	1997	Visual strength grading of hardwood. Specification.
BS 6100-8:	2007	Building and civil engineering. Vocabulary. Work with timber and wood-based panels
BS 6150:	2006	Painting of buildings. Code of practice.
BS 6229:	1982	Code of practice for flat roofs with continuously supported coverings.

BRITISH STANDARDS AND CODES

Standard Number	Title
BS 6375-1: 2009	Performance of windows and doors. Classification for weathertightness and guidance on selection and specification.
BS 6375-2: 2009	Performance of windows and doors. Classification for operation and strength characteristics and guidance on selection and specification.
BS 6375-3: 2009	Performance of windows and doors. Classification for additional performance characteristics and guidance on selection and specification.
BS 6446: 1997	Specification for manufacture of glued structural components of timber and wood based panels.
BS 7359: 1991	Nomenclature of commercial timbers including sources of supply.
BS 7543: 1992	Guide to durability of buildings and building elements, products and components.
BS 7543: 2003	Guide to the durability of buildings and building elements, products and components.
BS 7664: 2000	Specification for undercoat and finishing paints.
BS 7719: 1994	Specification for water-borne emulsion paints for interior use.
BS 7913: 1998	Guide to the principles of the conservation of historic buildings.
BS 7956: 2000	Specification for primers for woodwork.
BS 8000-5: 1990	Workmanship on building sites. Code of practice for carpentry, joinery and general fixings.
BS 8000-7: 1990	Workmanship on building sites. Code of practice for glazing.
BS 8103-1: 1995	Structural design of low-rise buildings. Code of practice for stability, site investigation, foundations and ground floor slabs for housing.
BS 8103-3: 2009	Structural design of low-rise buildings. Code of practice for timber floors and roofs for housing.
BS 8201: 2011	Code of practice for installation of flooring of wood and wood-based panels
BS 8212: 1995	Code of practice for dry lining and partitioning using gypsum plasterboard.
BS 8214: 2008	Code of practice for fire door assemblies.
BS 8233: 1999	Sound insulation and noise reduction for buildings. Code of practice.
BS 8300: 2009	Design of buildings and their approaches to meet the needs of disabled people. Code of Practice.
BS 8417: 2011	Preservation of wood. Code of practice
BS 8529: 2010	Composite doorsets. Domestic external doorsets. Specification
BS 9250: 2007	Code of practice for design of the airtightness of ceilings in pitched roofs.
BS 9999: 2008	Code of practice for fire safety in the design, management and use of buildings

EUROPEAN STANDARDS AND CODES

Standard Number	Title
EN 300: 2006	Oriented strand board (OSB). Definitions, classification and specifications.
EN 309: 2005	Wood particleboards. Definition and classification.
EN 312: 2010	Particleboards. Specifications
EN 313-1: 1996	Plywood. Classification.
EN 313-2: 2000	Plywood. Terminology.
EN 315: 2000	Plywood. Tolerances for dimensions.
EN 316: 2009	Wood fibre boards. Definition, classification and symbols
EN 317: 1993	Particleboards and fibreboards. Determination of swelling in thickness after immersion in water.
EN 335-1: 2006	Durability of wood and wood-based products. Definitions of use classes. General.
EN 335-2: 2006	Durability of wood and wood-based products. Definition of use classes. Application to solid wood.
EN 335-3: 1996	Definition of hazard classes of biological attack. Application to wood-based panels.
EN 335-3: 1996	Definition of hazard classes of biological attack. Application to wood-based panels.
EN 336: 2003	Structural timber. Sizes, permitted deviations.
EN 338: 2009	Structural timber. Strength classes
EN 350-1: 1994	Durability of wood and wood based products. Natural durability of solid wood. Guide to the principles of testing and classification of the natural durability of wood.
EN 350-2: 1994	Durability of wood and wood based products. Natural durability of solid wood. Guide to natural durability and the treatability of selected wood species of importance in Europe.
EN 351-1: 2007	Durability of wood and wood-based products. Preservative-treated solid wood. Classification of preservative penetration and retention.
EN 351-2: 2007	Durability of wood and wood-based products. Preservative-treated solid wood. Guidance on sampling for the analysis of preservative treated wood.
EN 385: 2001	Finger jointed structural timber. Performance requirements and minimum production requirements.
EN 386: 2001	Glued laminated timber. Performance requirements and minimum production requirements.
EN 387: 2001	Glued laminated timber. Large finger joints. Performance requirements and minimum production requirements.
EN 390: 1995	Glued laminated timber. Sizes. Permissible deviations.
EN 391: 2002	Glued laminated timber. Delamination of glue lines.
EN 460: 1994	Durability of wood and wood-based products. Natural durability of solid wood. Guide to the durability requirements for wood to be used in hazard classes.
EN 599-1: 2009	Durability of wood and wood-based products. Efficacy of preventive wood preservatives as determined by biological tests. Specification according to use class.
EN 599-2: 1997	Durability of wood and wood-based products. Performance of preventive wood preservatives as determined by biological tests. Classification and labelling.
EN 622-1: 2003	Fibreboards. Specifications. General requirements.
EN 622-2: 2006	Fibreboards. Specifications. Requirements for hardboards.
EN 622-3: 2004	Fibreboards. Specifications. Requirements for medium boards.
EN 622-4: 1997	Fibreboards. Specifications. Requirements for softboards.
EN 622-5: 2006	Fibreboards. Specifications. Requirements for dry process boards (MDF).
EN 633: 1994	Cement-bonded particleboards. Definition and classification.
EN 634-1: 1995	Cement-bonded particleboards. Specification. General requirements.
EN 634-2: 2007	Cement-bonded particleboards. Specification. Requirements for OPC bonded particle boards for use in dry, humid and external conditions.
EN 635-1: 1995	Plywood. Classification by surface appearance. General.
EN 635-2: 1995	Plywood. Classification by surface appearance Hardwood.
EN 635-3: 1995	Plywood. Classification by surface appearance. Softwood.
EN 636: 2003	Plywood. Specifications.

EUROPEAN STANDARDS AND CODES

Standard Number	Title
EN 844-1: 1995	Round and sawn timber. Terminology. General terms common to round timber and sawn timber.
EN 844-10: 1998	Round and sawn timber. Terminology. Terms relating to stain and fungal attack.
EN 844-11: 1998	Round and sawn timber. Terminology. Terms relating to degrade by insects.
EN 844-12: 2001	Round and sawn timber. Terminology. Additional terms and general index.
EN 844-2: 1997	General terms relating to round timber.
EN 844-3: 1995	Round and sawn timber. Terminology. General terms relating to sawn timber.
EN 844-4: 1997	Terms relating to moisture content.
EN 844-5: 1997	Terms relating to dimensions of round timber.
EN 844-6: 1997	Terms relating to dimensions of sawn timber.
EN 844-7: 1997	Terms relating to anatomical structure of timber.
EN 844-8: 1997	Terms relating to features of round timber.
EN 844-9: 1997	Terms relating to features of sawn timber.
EN 845-1: 2003	Specifications for ancillary components for masonry. Ties, straps, hangers and brackets.
EN 912: 2011	Timber fasteners. Specifications for connectors for timbers
EN 927-1: 1997	Paints and varnishes. Coating materials and coating systems for exterior wood. Classification and selection
EN 942: 2007	Timber in joinery. General requirements.
EN 975-1: 1996	Sawn timber. Appearance grading of hardwoods. Oak and beech.
EN 975-1: 2009	Sawn timber. Appearance grading of hardwoods. Oak and beech
EN 975-2: 2004	Sawn timber. Appearance grading of hardwoods. Poplars.
EN 1001-1: 2005	Durability of wood and wood-based products. Terminology. List of equivalent terms.
EN 1001-2: 2005	Durability of wood and wood-based products. Terminology. Vocabulary.
EN 1072: 1995	Plywood. Description of bending properties for structural plywood.
EN 1084: 1995	Plywood. Formaldehyde release classes determined by the gas analysis method.
EN 1176-1: 2008	Playground equipment and surfacing. General safety requirements and test methods.
EN 1192: 2000	Doors. Mechanical strength. Requirements and classification.
EN 1195: 1998	Timber structures. Test methods. Performance of structural floor decking.
EN 1313-1: 2010	Round and sawn timber. Permitted deviations and preferred sizes. Softwood sawn timber.
EN 1313-2: 1999	Round and sawn timber. Permitted deviations and preferred sizes. Hardwood sawn timber.
EN 1315: 2010	Dimensional classification of round timber
EN 1316-1: 1997	Hardwood round timber. Qualitative classification. Oak and beech.
EN 1316-2: 1997	Hardwood round timber. Qualitative classification. Poplar.
EN 1316-3: 1998	Hardwood round timber. Qualitative classification. Ash and maples and sycamore.
EN 1611-1: 2000	Sawn timber. Appearance grading of softwoods. European spruces, firs, pines and Douglas fir.
EN 1910: 2000	Wood and parquet flooring and wood panelling and cladding. Determination of dimensional stability.
EN 1912: 2004	Structural timber. Strength classes. Assignment of visual grades and species.
EN 1927-1: 2008	Qualitative classification of softwood round timber. Spruces and firs.
EN 1927-2: 2008	Qualitative classification of softwood round timber. Pines.
EN 1927-3: 2008	Qualitative classification of softwood round timber. Larches and Douglas fir.
EN 1990: 2002	Eurocode. Basis of structural design.
EN 1991-1-1: 2002	Eurocode 1. Actions on structures. General actions. Densities, self-weight, imposed loads for buildings.
EN 1991-1-2: 2002	Eurocode 1. Actions on structures. General actions. Actions on structures exposed to fire.
EN 1991-1-3: 2003	Eurocode 1. Actions on structures. General actions. Snow loads.
EN 1991-1-4: 2005	Eurocode 1: Actions on structures - General actions - Wind actions.
EN 1991-1-5: 2003	Eurocode 1. Actions on structures. General actions. Thermal actions.
EN 1991-1-6: 2005	Eurocode 1. Actions during execution.

EUROPEAN STANDARDS AND CODES

Standard Number	Title
EN 1991-1-7: 2006	Eurocode 1:Actions on structures. General actions. Accidental actions.
EN 1995-1-1: 2004	Eurocode 5. Design of timber structures. Common rules and rules for building.
EN 1995-1-2: 2004	Eurocode 5. Design of timber structures. General. Structural fire design.
EN 1995-2: 2004	Eurocode 5. Design of timber structures. Bridges.
EN 10230-1: 2000	Steel wire nails. Loose nails for general applications.
EN 12152: 2002	Curtain walling. Air permeability. Performance requirements and classification.
EN 12207: 2000	Windows and doors. Air permeability. Classification.
EN 12208: 2000	Windows and doors. Watertightness. Classification.
EN 12210: 2000	Windows and doors. Resistance to wind load. Classification.
EN 12217: 2003	Doors. Operating forces. Requirements and classification.
EN 12219: 2000	Doors. Climatic influences. Requirements and classification.
EN 12369-1: 2001	Wood-based panels. Characteristic values for structural design. OSB, particleboards and fibreboards.
EN 12369-2: 2011	Wood-based panels. Characteristic values for structural design. Plywood.
EN 12369-3: 2008	Wood-based panels. Characteristic values for structural design. Solid-wood panels.
EN 12400: 2002	Windows and pedestrian doors. Mechanical durability. Requirements and classification.
EN 12466: 1998	Resilient floor coverings. Vocabulary.
EN 12490: 2010	Durability of wood and wood-based products. Preservative-treated solid wood. Determination of the penetration and retention of creosote in treated wood.
EN 12524: 2000	Building materials and products. Hygrothermal properties. Tabulated design values.
EN 12775: 2001	Solid wood panels. Classification and terminology.
EN 12825: 2001	Raised access floors.
EN 12871: 2010	Wood-based panels. Performance specifications and requirements for load bearing boards for use in floors, walls and roofs.
EN 13017-1: 2001	Solid wood panels. Classification by surface appearance. Softwood.
EN 13017-2: 2001	Solid wood panels. Classification by surface appearance. Hardwood.
EN 13168: 2001	Thermal insulation products for buildings. Factory made wood wool (WW) products. Specification.
EN 13183-1: 2002	Moisture content of a piece of sawn timber. Determination by oven dry method.
EN 13183-2: 2002	Moisture content of a piece of sawn timber. Estimation by electrical resistance method.
EN 13183-3: 2005	Moisture content of a piece of sawn timber. Estimation by capacitance method.
EN 13213: 2001	Hollow floors.
EN 13226: 2009	Wood flooring. Solid parquet elements with grooves and/or tongues
EN 13227: 2002	Wood flooring. Solid lamparquet products.
EN 13228: 2011	Wood flooring. Solid wood overlay flooring elements including blocks with an interlocking system.
EN 13271: 2002	Timber fasteners. Characteristic load-carrying capacities and slip-moduli for connector joints.
EN 13307-1: 2006	Timber blanks and semi-finished profiles for non-structural uses. Requirements.
EN 13329: 2006	Laminate floor coverings. Specifications, requirements and test methods.
EN 13353:2008+A1:2011	Solid wood panels (SWP). Requirements
EN 13354: 2008	Solid wood panels (SWP). Bonding quality. Test method
EN 13377: 2002	Prefabricated timber formwork beams. Requirements, classification and assessment.
EN 13442: 2002	Wood and parquet flooring and wood panelling and cladding.
EN 13488: 2002	Wood flooring. Mosaic parquet elements.
EN 13489: 2002	Wood flooring. Multi-layer parquet elements.
EN 13556: 2003	Round and sawn timber. Nomenclature of timbers used in Europe.
EN 13629: 2002	Wood flooring. Solid pre-assembled hardwood board.
EN 13629: 2012	Wood flooring. Solid individual and preassembled hardwood boards
EN 1363-1: 1999	Fire resistance tests. General requirements.

EUROPEAN STANDARDS AND CODES

Standard Number	Title
EN 13647: 2011	Wood and parquet flooring and wood panelling and cladding. Determination of geometrical characteristics.
EN 13696: 2008	Wood flooring. Test methods to determine elasticity and resistance to wear and impact resistance.
EN 13756: 2002	Wood flooring. Terminology.
EN 13810-1: 2002	Wood-based panels. Floating floors. Performance specifications and requirements.
EN 13810-1: 2002	Wood-based panels. Floating floors. Performance specifications and requirements.
EN 13986: 2004	Wood-based panels for use in construction. Characteristics, evaluation of conformity and marking.
EN 13990: 2004	Wood flooring. Solid softwood floor boards.
EN 14076: 2004	Timber stairs. Terminology.
EN 14080: 2005	Timber structures. Glued laminated timber. Requirements.
EN 14080: 2005	Timber structures. Glued laminated timber. Requirements.
EN 14081-1: 2005	Timber structures. Strength graded structural timber with rectangular cross section. General requirements.
EN 14081-2: 2010	Timber structures. Strength graded structural timber with rectangular cross section. Machine grading. Additional requirements for initial type testing.
EN 14081-3: 2005	Timber structures. Strength graded structural timber with rectangular cross section. Machine grading. Additional requirements for factory production control.
EN 14081-3: 2012	Timber structures. Strength graded structural timber with rectangular cross section. Machine grading; additional requirements for factory production control.
EN 14081-4: 2009	Timber structures. Strength graded structural timber with rectangular cross section. Machine grading. Grading machine settings for machine controlled systems.
EN 14128: 2003	Durability of wood and wood-based products. Performance criteria for curative wood preservatives as determined by biological tests.
EN 14220: 2006	Timber and wood-based materials in external windows, external door leaves and external doorframes. Requirements and specifications.
EN 14221: 2006	Timber and wood-based materials in internal windows, internal door leaves and internal doorframes. Requirements and specifications.
EN 14250: 2004	Timber structures. Product requirements for prefabricated structural members assembled with punched metal plate fasteners.
EN 14250: 2010	Timber structures. Product requirements for prefabricated structural members assembled with punched metal plate fasteners.
EN 14279:2004+A1:2009	Laminated veneer lumber (LVL). Definitions, classification and requirements.
EN 14298: 2004	Sawn timber. Assessment of drying quality.
EN 14322: 2004	Wood-based panels. Melamine faced boards for interior uses. Definition, requirements and classification.
EN 14342: 2005	Wood flooring. Characteristics, evaluation of conformity and marking.
EN 14351-1: 2006	Windows and doors. Product standard, performance characteristics. Windows and external pedestrian door sets without resistance to fire and/or smoke leakage characteristics.
EN 14354: 2004	Wood-based panels. Wood veneer floor covering.
EN 14374: 2004	Timber structures. Structural laminated veneer lumber. Requirements.
EN 1438: 1998	Symbols for timber and wood-based products.
EN 14519: 2005	Solid softwood panelling and cladding. Softwood machined profiles with tongue and groove.
EN 14545: 2008	Timber structures. Connectors. Requirements
EN 14592: 2008	Timber structures. Dowel-type fasteners. Requirements
EN 14600: 2005	Doorsets and openable windows with fire resisting and/or smoke control characteristics. Requirements and classification.
EN 14755: 2005	Extruded particleboards. Specifications.

EUROPEAN STANDARDS AND CODES

Standard Number	Title
EN 14761:2006+A1:2008	Wood flooring. Solid wood parquet. Vertical finger, wide finger and module brick.
EN 14762: 2006	Wood flooring. Sampling procedures for evaluation of conformity.
EN 14915: 2006	Solid wood panelling and cladding. Characteristics, evaluation of conformity and marking.
EN 14975: 2006	Loft ladders. Requirements, marking and testing.
EN 15060: 2006	Paints and varnishes. Guide for the classification and selection of coating systems for wood based materials in furniture for interior use.
EN 15146: 2006	Solid softwood panelling and cladding. Machined profiles without tongue and groove.
EN 15197: 2007	Wood-based panels. Flaxboards. Specifications.
EN 15228: 2009	Structural timber. Structural timber preservative treated against biological attack
EN 15269-1: 2010	Extended application of test results for fire resistance and/or smoke control for door, shutter and openable window assemblies, including their elements of building hardware. General requirements.
EN 1529: 2000	Door leaves. Height, width, thickness and squareness. Tolerance classes.
EN 1530: 2000	Door leaves. General and local flatness. Tolerance classes.
EN 1533: 2010	Wood flooring. Determination of bending strength under static load. Test methods
EN 1534: 2010	Wood flooring. Determination of resistance to indentation. Test method
EN 15644: 2008	Traditionally designed prefabricated stairs made of solid wood. Specifications and requirements.
EN 15736: 2009	Timber structures. Test methods. Withdrawal capacity of punched metal plate fasteners in handling and erection of prefabricated trusses.
EN 15737: 2009	Timber structures. Test methods. Torsional resistance of driving in screws
EN 26891: 1991	Timber structures. Joints made with mechanical fasteners. General principles for the determination of strength and deformation characteristics.

EN/ISO CODES

Standard Number	Title
EN ISO 4618: 2006	Paints and varnishes. Terms and definitions.
ISO 8992: 2005	Fasteners. General requirements for bolts, screws, studs and nuts.
ISO 12578: 2008	Timber structures. Glued laminated timber. Component performance and production requirements.
ISO 13823: 2008	General principles on the design of structures for durability.
ISO 16893-2: 2010	Wood-based panels. Particleboard. Requirements
ISO 16894: 2009	Wood-based panels. Oriented strand board (OSB). Definitions, classification and specifications.
ISO 21581: 2010	Timber structures. Static and cyclic lateral load test methods for shear walls
ISO 22390: 2010	Timber structures. Laminated veneer lumber. Structural properties
ISO 27567: 2009	Laminated veneer timber. Measurement of dimensions and shape. Method of test Structural Timber Composites including Glulam .

E 5 Literature

3.1 BUILDING REGULATIONS AND APPROVED DOCUMENTS:

Amendments and revisions are issued from time to time. Care should be taken to refer to the latest version.

- Building Regulations, 1997. Statutory Instrument No. 497 of 1997. 35 pp.
The Stationery Office, Dublin.
- Building Regulations, 2005. Technical Guidance Document A - Structure. 31 pp.
Department of the Environment, Dublin.
- Building Regulations, 2006. Technical Guidance Document B - Fire Safety. 159 pp.
Department of the Environment, Dublin.
- Building Regulations, 2004. Technical Guidance Document C - Site Preparation and Resistance to Moisture. 18 pp.
Department of the Environment, Dublin.
- Building Regulations, 2000. Technical Guidance Document D - Materials and Workmanship. 8 pp.
Department of the Environment, Dublin.
- Building Regulations, 2005. Technical Guidance Document E - Sound. 21 pp.
Department of the Environment, Dublin.
- Building Regulations, 1997. Technical Guidance Document F - Ventilation. 13 pp.
Department of the Environment, Dublin.
- Building Regulations, 2011. Technical Guidance Document G - Hygiene. 8 pp.
Department of the Environment, Dublin.
- Building Regulations, 2010. Technical Guidance Document H - Drainage and Waste Water Disposal. 22 pp.
Department of the Environment, Dublin.
- Building Regulations, 2005. Technical Guidance Document J - Heat Producing Appliances. 21 pp.
Department of the Environment, Dublin.
- Building Regulations, 2005. Technical Guidance Document K - Stairways, Ladders, Ramps and Guards. 31 pp.
Department of the Environment, Dublin.
- Building Regulations, 2008. Technical Guidance Document L - Conservation of Fuel and Energy. 55 pp.
Department of the Environment, Dublin.
- Building Regulations, 2010. Technical Guidance Document M - Access for People with Disabilities. 26 pp.
Department of the Environment, Dublin.

3.2 OTHER PUBLICATIONS

- Forest Products and Wood Science; an Introduction. By John G. Haygreen and Jim L. Bowyer. 1982. 495 pp.
The Iowa State University Press.
- Guide to Irish Hardwoods. By Gordon Knaggs & Stella Xenopoulou. 2004. COFORD
- House Building Manual. HomeBond. 2004 (4th Edition) 465 pp. National House Building Guarantee Company Ltd.,
Dublin.
- Science and Technology of Wood - Structure, Properties, Utilization. By George Tsoumis. Van Nostrand Reinhold.
- Timber. Structure, Properties, Conversion and Use. By H.E. Desch and J.M. Dinwoodie. 1996 (7th Edition).
McMillan Press Ltd.

E 6 Useful web addresses

These addresses are given for information only. Please note that *Woodspec* has no control over the contents of these sites and that some information on these sites may not relate to Irish conditions.

Conservation

Convention on International trade in Endangered Species (CITES).....	www.cites.org
Forest Stewardship Council.....	www.fsc.org
Just Forests.....	www.justforests.org
Programme for the Endorsement of Forest Certification Schemes (PEFC)	www.pefc.org
Sustainable Forestry Initiative SFI.(US)	www.sfiprogram.org
Wood for Good.....	www.woodforgood.com

Timber and board suppliers and associations

Coillte.....	www.coillte.ie
American Hardwood Export Association.	www.ahec-europe.org
American Plywood Association (now APA- the Engineered Wood Association).....	www.apawood.org
American softwoods	www.americansoftwoods.com
Finsa (Chipboard)	www.finsa.es
Ghana Timber Marketing Board	www.ghanatimber.org
Malaysian Timber Council	www.mtc.com.my
Masonite	www.masonite-europe.com
Nordic Timber Council.	www.nordictimber.org
SmartPly (OSB)	www.smartply.com

Standards

British Standards Institute	www.bsigroup.com
European Standards	www.cen.be also http://esearch.cen.be
National Standards Authority of Ireland.....	www.nsai.ie

Organisations

Building Research Establishment	www.bre.co.uk
COFORD.....	www.coford.ie
Department of the Environment (building regulations)	www.environ.ie
Forest Service.....	www.agriculture.gov.ie
Homebond.....	www.homebond.ie
Irish Agreement Board	www.irishagreementboard.com
Irish Georgian Society.....	www.igs.ie
Irish Timber Frame Manufacturers Association	www.itfma.ie
Irish Timber Growers Association	www.itga.ie
Irish Timber Trade Association.	www.itta.ie
International Tropical Timber Organisation	www.itto.org.jp
National Standards Authority of Ireland.	www.nsai.ie
NOFMA The Wood Flooring Manufacturers Association (US)	www.nofma.org
Sustainable Energy Ireland	www.sei.ie
Timber Decking Association	www.tda.org.uk
Timber Research & Development Association (TRADA)	www.trada.co.uk
Wood Marketing Federation.....	www.wood.ie