

Technical Information > Timber Species Database

> Oak, European



Quercus robur, *Quercus petraea*,
Quercus sessiliflora, *Quercus pedunculata*
Also known as: European oak, English oak, French oak, Slovenian oak, Polish oak

Wood type	Hardwood
Introduction	<p>The genus <i>Quercus</i> with more than two hundred separate species produces the true oaks. Most of these are found in the northern hemisphere where, in temperate regions they may form pure stands, or may be dominant species in mixed wood lands, while in warmer countries they tend to occupy the mountain areas. Most of the true oaks are trees but some are shrubs. The trees, on the basis of wood structure, fall into three groups; the red oaks, the white oaks, and the evergreen oaks or live oaks; the red and white oaks are deciduous. Descriptions of the species that occur within Europe are as follows.</p> <p>European oak <i>Quercus petraea</i> Liebl. (<i>Q. sessiliflora</i> Salisb.) and <i>Q. robur</i> L. (<i>Q. pedunculata</i> Ehrh.) known also as English, French, Polish, Slavonian, etc oak, according to origin.</p>
Environmental	Not listed in CITES. Believed available from well-managed sources. Check certification status with suppliers.
Distribution	<i>Q. petraea</i> produces the sessile or durmast oak, while the pedunculate oak is produced by <i>Q. robur</i> : both species occur throughout Europe including the British Isles, and extend into Asia Minor and North Africa.
The Tree	Both species reach a height of 18m to 30m or a little more depending upon growth conditions which also affect the length of the bole. When drawn up in forests at the expense of their branches, this may be 1.5m or so in length, but in open situations, the tree branches much lower down. Diameters are about 1.2m to 2m.
The Timber	There is no essential difference in the appearance of the wood of either

species. The sapwood is 25mm to 50mm wide and lighter in colour than the heartwood which is yellowish-brown. Quarter-sawn surfaces show a distinct silver-grain figure due to the broad rays. The annual rings are clearly marked by alternating zones of early-wood consisting of large pores, and dense late-wood. Conditions of growth accordingly govern the character of the wood to a great extent; for example, in slowly grown wood the proportion of dense late-wood is reduced in each annual growth-ring, thus tending to make the wood soft and light in weight. The growth conditions in the various countries which export oak, vary considerably. Baltic countries, including northern Poland, produce oak which is generally hard and tough, but further south in Poland the growth conditions become more favourable to the production of milder, more uniformly-grown oak, the rich black soil of south-east Poland producing the famous Volhynian oak, the character of this type of wood changing but little in countries in Central Europe such as Czechoslovakia and Hungary, but being generally a little milder in character in Yugoslavia, from whence Slavonian oak is shipped. The weight of oak varies according to type; that from the Baltic area, western Europe, and Great Britain being about 720 kg/m³ and that from Central Europe about 672 kg/m³ on average after drying.

So-called brown oak is the result of fungus attack in the growing tree. The fungus, *Fistulina hepatica*, causes the wood first to assume a yellow colour, then a richer brown or reddish-brown. A yellow-coloured streak sometimes appearing in oak is the result of another fungus, *Polyporus dryadeus*, but since very few tree diseases persist after the tree is felled, dried timber is no different from normal coloured wood, indeed, brown oak is often preferred for its decorative appeal.

Drying

Oak dries very slowly with a marked tendency to split and check, particularly in the early stages of drying, and there is considerable risk of honeycombing if the drying is forced, especially in thick sizes. End and top protection must be provided to freshly sawn stock exposed to sun and drying winds, and sticker thickness should be reduced to about 12mm for stock piled in the open air during early spring and onwards until winter.

Strength

Both the sessile and pedunculate oaks have well known and high strength properties, and those hybrid oaks developed from both types and common throughout Europe, are similar in their strength properties.

* MECHANICAL PROPERTIES

Note: In BS 5268-2: 2002, there is a discrepancy between Tables 7 and 15 regarding characteristic density and Strength classes for use in joint design. The values quoted here should be used, rather than those included in the 14 March 2002 edition of the Code."

Working Qualities



Medium to difficult - The working and machining properties of oak vary with the mild to tough material which either machines easily or with moderate difficulty. These basic properties are concerned with growth conditions, but they may be exaggerated by indifferent drying methods which allow plain-sawn boards to cup, or severe case-hardening to develop, causing excessive wastage in planing and

moulding, cupped stock in resawing, and a greater degree of blunting of cutting edges. These must be kept sharpened, particularly where cross grain is present, and especially in planing highly-figured quarter-sawn surfaces where there may be a liability for the grain to tear out at the juncture of the wide ray-figure thus producing a shelly appearance. In general, oak finishes well from the planer or moulding machine although in some cases a reduction of cutting angle to 20° is preferable. The wood can be stained, polished, waxed, and glued satisfactorily, takes nails and screws well, except near edges, when the wood should be pre-bored, and takes liming and fuming treatments well.

Durability	Durable
Treatability	Extremely difficult Easy (Sapwood)
Moisture Movement	Medium
Abrasions	Very Good
Density (mean, Kg/m³)	720 (Density can vary by 20% or more)
Texture	Medium to coarse
Availability	Variable
Price	Medium to high
Chemical Properties	Iron staining may occur in damp conditions, similarly corrosion of metals.
Use(s)	Heavy structural use, Cladding, Exterior joinery, Interior joinery, Furniture, Flooring
Colour(s)	Yellow brown