CHÊNE

Family: FAGACEAE (angiosperm)

Scientific name(s): Quercus petraea
Quercus robur

Commercial restriction: no commercial restriction

Note: OAK trees are the dominant broad-leaved species of temperate Europe.

WOOD DESCRIPTION

Color: light brown

Sapwood: clearly demarcated

Texture: medium

Grain: straight

Interlocked grain: absent

Note: Light brown wood to straw colour turning darker with light. The texture is medium but can be fine or coarse according to its origin. The pearly white silver figure is large and well visible.

LOG DESCRIPTION

Diameter: from 40 to 80 cm

Thickness of sapwood: from 1 to 4 cm

Floats: pointless

Log durability: moderate (treatment recommended)

PHYSICAL PROPERTIES

MECHANICAL AND ACOUSTIC PROPERTIES

Physical and mechanical properties are based on mature heartwood specimens. These properties can vary greatly depending on origin and growth conditions.

	Mean	Std dev.
Specific gravity *:	0,74	0,05
Monnin hardness *:	4,2	0,8
Coeff. of volumetric shrinkage:	0,44 %	0,05 %
Total tangential shrinkage (TS):	9,7 %	0,9 %
Total radial shrinkage (RS):	4,5 %	0,5 %
TS/RS ratio:	2,2	
Fiber saturation point:	31 %	

	Mean	Std dev.
Crushing strength *:	58 MPa	7 MPa
Static bending strength *:	105 MPa	15 MPa
Modulus of elasticity *:	13300 MPa	1750 MPa

(*: at 12% moisture content, with 1 MPa = 1 N/mm²)

Stability: moderately stable to poorly stable

Note: Oak trees with a slow growth have a smaller density than oak trees with a rapid growth.
European standard EN 14081-1 "Timber structures - Strength graded structural timber with rectangular cross-section" gives the scope of the requirements found in NF B 52001 and applying to timber structures for visual grading of French timbers.

NATURAL DURABILITY AND TREATABILITY

Fungi and termite resistance refers to end-uses under temperate climate. Except for special comments on sapwood, natural durability is based on mature heartwood. Sapwood must always be considered as non-durable against wood degrading agents.
E.N. = Euro Norm

Funghi (according to E.N. standards): class 2 - durable

Dry wood borers: durable - sapwood demarcated (risk limited to sapwood)

Termites (according to E.N. standards): class M - moderately durable

Treatability (according to E.N. standards): class 4 - not permeable

Use class ensured by natural durability: class 3 - not in ground contact, outside

Species covering the use class 5: No

Note: This species is listed in the European standard NF EN 350-2.
Durability is linked to the presence of water soluble tanins. It decreases with tanins washing in case of harsh exposition.
According to the European standard NF EN 335, performance length might be modified by the intensity of end-use exposition.

REQUIREMENT OF A PRESERVATIVE TREATMENT

Against dry wood borer attacks: does not require any preservative treatment

In case of risk of temporary humidification: does not require any preservative treatment

In case of risk of permanent humidification: requires appropriate preservative treatment

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DRYING

Drying rate: slow

Risk of distortion: high risk

Risk of casehardening: no

Risk of checking: high risk

Risk of collapse: yes

Note: Must be dried slowly and carefully.

Possible drying schedule: 6

M.C. (%)	Temperature (°C) dry-bulb	wet-bulb	Air humidity (%)
Green	42	41	94
50	48	43	74
30	54	46	63
20	60	51	62
15	60	51	62

This schedule is given for information only and is applicable to thickness lower or equal to 38 mm.
It must be used in compliance with the code of practice.
For thickness from 38 to 75 mm, the air relative humidity should be increased by 5 % at each step.
For thickness over 75 mm, a 10 % increase should be considered.

SAWING AND MACHINING

Blunting effect: normal

Sawteeth recommended: stellite-tipped

Cutting tools: tungsten carbide

Peeling: good

Slicing: nood

Note: Steaming is recommended before slicing.

ASSEMBLING

Nailing / screwing: good but pre-boring necessary

Gluing: correct

Note: Gluing must be done with care: wood is dense, slightly acid and rich in tanins.
Nail or screw corrosion if in contact with humidity.

COMMERCIAL GRADING

Appearance grading for sawn timbers: According to European standard EN 975-1 (April 2009)
Possible grading for boules: Q-BA, Q-B1, Q-B2, Q-B3
Possible grading for individual selected boards: Q-SA, Q-S1, Q-S2, Q-S3
Possible grading for strips and square edged timbers (sapwood excluded): Q-FA, Q-F1a, Q-F1b, Q-F2, Q-F3
(for strips and square edged timbers, X or XX suffix indicates the presence and the size of sound sapwood)
Possible grading for baulks: Q-PA, Q-P1, Q-P2

Visual grading for structural applications: Traded timber with CE marking. Possible strength classes: D18, D24 or D30 related to the European standard EN 14081 (May 2006).

FIRE SAFETY

Conventional French grading: Thickness > 14 mm : M.3 (moderately inflammable)
Thickness < 14 mm : M.4 (easily inflammable)

Euroclasses grading: D s2 d0
Default grading for solid wood, according to requirements of European standard EN 14081-1 annex C (April 2009). It concerns structural graded timber in vertical uses with mean density upper 0.35 and thickness upper 22 mm.

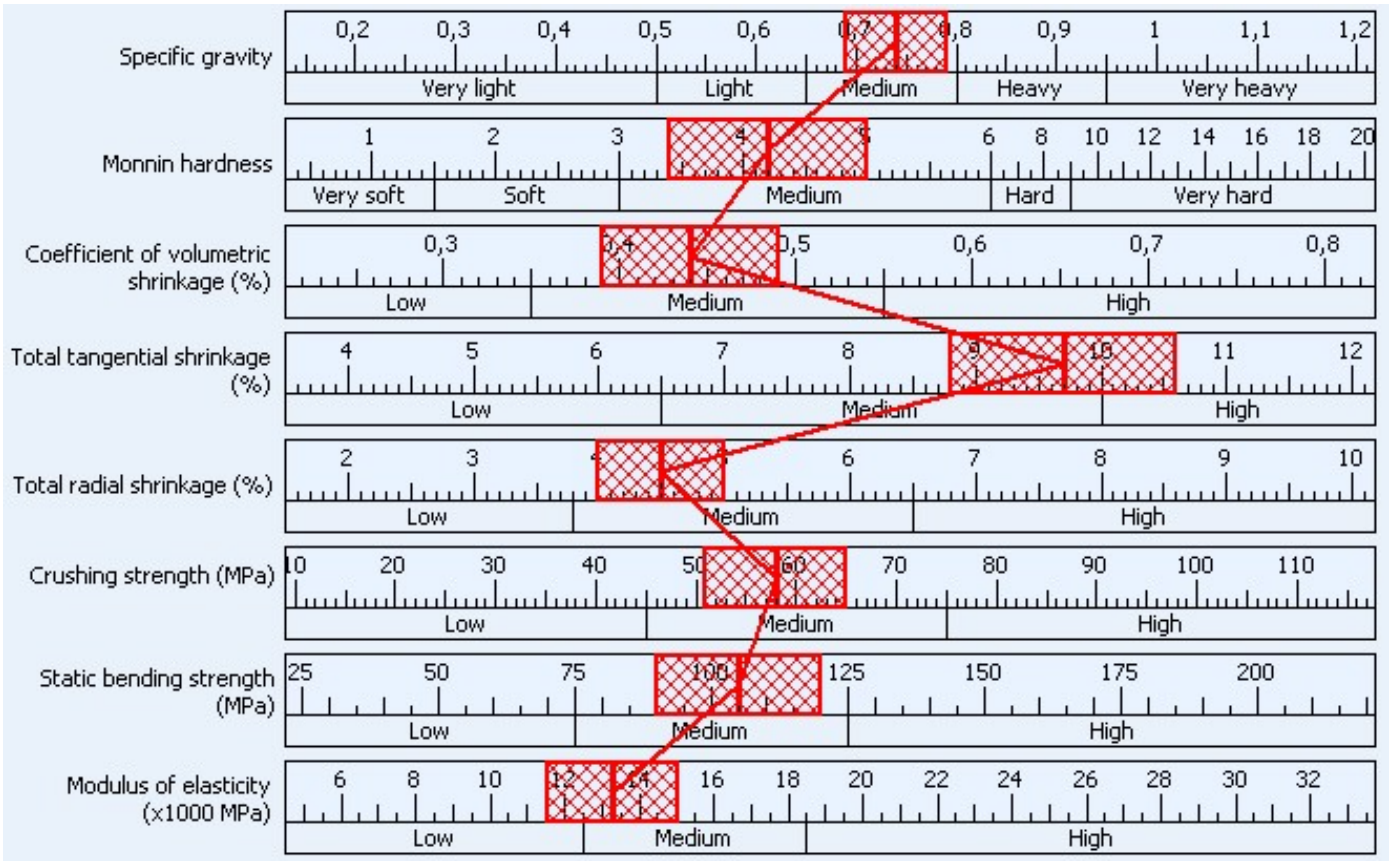
END-USES

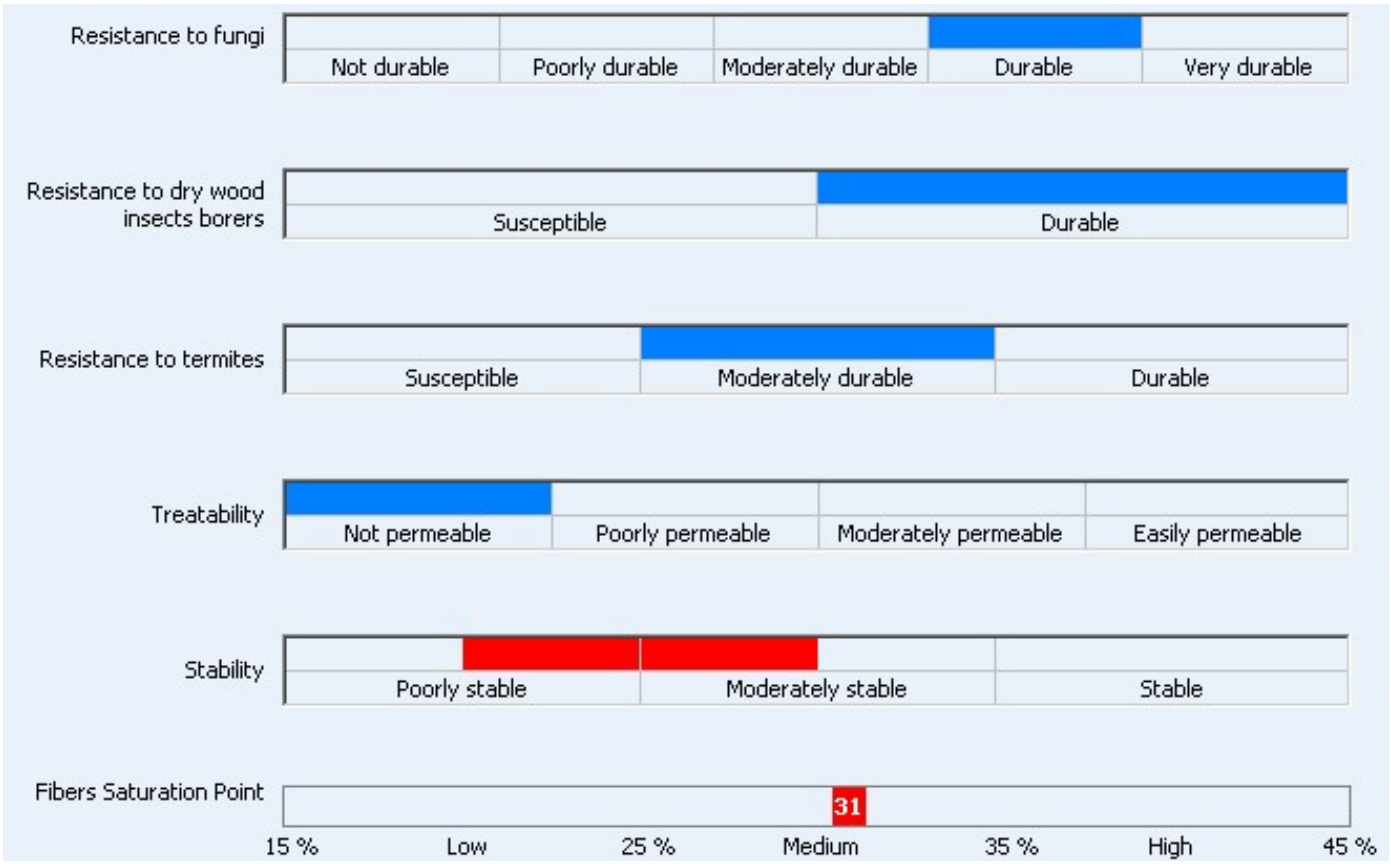
Exterior joinery
Cabinetwork (high class furniture)
Heavy carpentry
Cooperage
Sleepers
Seats
Turned goods
Interior joinery
Flooring
Stairs (inside)
Moulding
Hydraulic works (fresh water)
Sliced veneer
Wood-ware

Note: Tanins create a risk of smudges on woods if not well dried or if machined in a non protected area or if no product is used for protection or finish.

MAIN LOCAL NAMES

Country	Local name	Country	Local name
Germany (temperate timber)	EICHE	Spain (temperate timber)	ROBLE
France (temperate timber)	CHÊNE	France (temperate timber)	CHÊNE BLANC EUROPEEN
Italia (temperate timber)	QUERCIA	United Kingdom (temperate timber)	OAK


Specific gravity
0,2 0,3 0,4 0,5 0,6 0,7 0,8 0,9 1 1,1 1,2
Very light
Light
Medium
Heavy
Very heavy
Monnin hardness
1 2 3 4 5 6 8 10 12 14 16 18 20
Very soft
Soft
Medium
Hard
Very hard
Coefficient of volumetric shrinkage (%)
0,3 0,4 0,5 0,6 0,7 0,8
Low
Medium
High
Total tangential shrinkage (%)
4 5 6 7 8 9 10 11 12
Low
Medium
High
Total radial shrinkage (%)
2 3 4 5 6 7 8 9 10
Low
Medium
High
Crushing strength (MPa)
10 20 30 40 50 60 70 80 90 100 110
Low
Medium
High
Static bending strength (MPa)
25 50 75 100 125 150 175 200
Low
Medium
High
Modulus of elasticity (x1000 MPa)
6 8 10 12 14 16 18 20 22 24 26 28 30 32
Low
Medium
High


Resistance to fungi
Not durable
Poorly durable
Moderately durable
Durable
Very durable
Resistance to dry wood insects borers
Susceptible
Durable
Resistance to termites
Susceptible
Moderately durable
Durable
Treatability
Not permeable
Poorly permeable
Moderately permeable
Easily permeable
Stability
Poorly stable
Moderately stable
Stable
Fibers Saturation Point
31
15 %
Low
25 %
Medium
35 %
High
45 %