



Douglas Fir

Pseudotsuga menziesii Franco Syn. - *P. douglasii* Carr. = *P. taxifolia* Britt.

Commercial names:

English:	Douglas fir, British Columbia Pine, Columbian pine.
Spanish:	Pino de Oregón, Abeto Douglas.
French:	Pin d'Orégon, Sapin Douglas, Douglas vert.
Italian:	Abete di Douglas, Douglasia.
German:	Douglasfichte.

Common names:

U.S.A.:	Oregon pine.
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Physical properties:

Density:	510-530-550 Kg/m ³ (North America) 470-510-520 Kg/m ³ (Europe)	
Shrinkage:	Stable/Moderately Unstable	
Shrinkage values:	Total	Unitary
Volumetric:	11-12.5%	(0.35-0.45)
Tangential: 7,5%	(0.24-0.38)	
Radial:	4.8%	(0.15-0.28)
Hardness:	(2.2)	Semi-hard

Mechanical properties (Wood free of defects)

Static bending:	70-100 N/mm ²
Modulus of elasticity:	11,000-13,200 N/mm ²
Compression parallel to grain:	42-68 N/mm ²
Compression perpendicular to grain:	3.1 N/mm ² (ASTM)
Shear:	7.0-10.2 N/mm ²
Toughness:	3.7-6.0 J/cm ²

Structural lumber:

The BS 4978-1988 standard establishes two grades, SS and GS. for mixed wood with *P. menziesii* and *Larix occidentalis* (Douglas fir-larch) that correspond to strength grades C24 and C18 respectively. The NLGA-1987 and NGRDL-1975 standards establish three grades J&P Sel, J&P number 1 and J&P number 2 which correspond respectively to strength grades C24, C16 and C16.

Origin and availability:

This wood is found in North America, and it has been introduced in the United Kingdom, New Zealand and Australia. The forested area, production and export are important.

Wood description:

The color of the sapwood varies from white to creamy white to reddish white, and the heartwood varies considerably from yellow or light reddish yellow in trees with narrow growth rings to orange-red or dark red in trees with wide growth rings. The sapwood is clearly differentiated. The growth rings are noticeably marked by the abrupt change in color from earlywood to latewood. The wood rays are visible in edge-grained (quartersawn) lumber. The grain (fibers) is normally straight, although it can be wavy or spiraled. The texture of the grain varies from medium to coarse (open). The wood has pitch streaks and numerous pitch pockets. Recently cut wood has a characteristic resinous odor distinct from that of the true pines. The knots tend to be "healthy" and of a large diameter. The appearance of the wood and its characteristics vary considerably according to growing conditions and the origin of the wood, (Sometimes the term "yellow fir" is used for wood that has grown more slowly and has narrower rings, and "red fir" is used for wood that has had a faster growth rate and has wider rings.) but all wood is sold commercially under the same name. Wood from European stands has different properties. It is an acid wood and in a damp environment it can corrode metals. This wood can cause skin irritations in some people.

Drying:

There is a slight risk of surface checks and end checks; a risk of resinous exudations from large knots and from pitch pockets, which can form fine brown lines in the longitudinal surfaces; and a risk of discoloration. The recommended drying schedules are number 10 from the CTBA, T11-A4 (4/4) and T10-A3 (8/4) from the FPLM and the K (4/4) schedule from the PRL.

Natural durability and ease of penetration:

The wood is classified as moderately durable or slightly against the decaying action of fungi, and susceptible to cerambycids, anobiids and termites. The heartwood is not penetrable and the sapwood is moderately or slightly penetrable.

Technological properties:

Sawing is not difficult, although resin can slightly blunt the saws. The wood has good properties for rotary-cut veneer and sliced veneer. Steaming is recommended previous to veneer slicing. The wood machines well, although loose knots can cause problems. Working with very sharp tools is recommended. Machining wood of European origin is generally more difficult due to the significant presence of hard knots. The wood glues well, and all types of adhesives can be used, but it is advisable to give special attention to the acidity and the possibility of discoloration of the wood. Nailing and screwing present no problems, although some sources recommend boring holes before nailing. In finishing work pretreatment of the surfaces is recommended. In addition, wood with a high resin content can cause paint and varnish problems.

Applications:

Decorative veneer./ Plywood./ Structural framing./ Interior carpentry./ Exterior carpentry./ Naval construction: ships and boats./ Mine timbers./ Railway ties./ Paper pulp./ Barrel staves. Due to its resistance, this wood is used mainly in construction, either as sawed lumber or as plywood.