

DOUGLAS-FIR

Botanical Name:

Pseudotsuga menziesii (Mirb.) Franco

Douglas-fir is one of the best known wood species in the world. In British Columbia there are two varieties of Douglas-fir, Coastal and Interior. The Coastal variety occurs along the southern mainland Coast and across Vancouver Island, except for the very northern tip. The Interior variety is found throughout southern British Columbia, and as far north as the centre of the province. Douglas-fir is a large tree reaching heights of 85 metres on the Coast, and 42 metres in the Interior. Douglas-fir makes up 8.8% of the provincial growing stock.

Common Uses

Douglas-fir is primarily used for building and construction purposes due to its strength advantages and availability of large dimensions from old-growth trees. It is one of the finest timbers for heavy structural purposes, including laminated arches and roof trusses. Structurally, it is used in the form of lumber, timbers, pilings and plywood.

Douglas-fir is seen as a first class wood for the manufacturing of sashes, doors and windows. The wood is also used to produce a wide variety of products including general millwork, flooring, furniture, cabinets, veneer, vats, ship and boat construction, transmission poles, and marine pilings.



COASTAL DOUGLAS-FIR



INTERIOR DOUGLAS-FIR

What is the difference between Coastal and Interior Douglas-fir?

Coastal Douglas-fir is a much bigger tree than Interior Douglas-fir. The timber from the Coastal trees is generally lighter in colour, and more uniform in texture than that of Interior trees. Both have the same wood properties, however, one main difference is that Interior Douglas-fir is less permeable to preservative treatments.

Douglas-fir lumber is dried according to end-use and customer specifications. Kiln drying inhibits natural staining of the wood, improves its strength and stiffness, enhances its appearance, and increases its resistance to decay and attack by insects.

PHYSICAL PROPERTIES		
DENSITY (kg/m ³)	Green	450
	Air Dry	487
SPECIFIC GRAVITY (12% M.C.)	Standard	0.45
HARDNESS (N)	Side	2990
	End	4020
MOE (Mpa)	Green	11100
	Air Dry	13500
MOR (Mpa)	Green	52.0
	Air Dry	88.6
COMPRESSION PARALLEL (Mpa)	Air Dry	50.1
COMPRESSION PERPENDICULAR (Mpa)	Air Dry	6.01
SHEAR (Mpa)	Air Dry	9.53
CLEAVAGE (N/mm Width)	Air Dry	38.9
SHRINKAGE OD = oven dry air = air dry 12%	Radial (OD)	4.8%
	Tangential (OD)	7.4%
	Volumetric (OD)	11.9%
	Volumetric (air)	7.0%
	Tang / Rad ratio	1.5

VISUAL PROPERTIES	
COLOUR	
Heartwood	Orange red to reddish-brown.
Sapwood	Yellowish-white (light in colour).
Heartwood / Sapwood Contrast	Sapwood is well defined and narrow in old-growth and up to 7 cm wide in second-growth.
Latewood / Earlywood Contrast	Pronounced difference in colour between earlywood and latewood zones.
GRAIN	
Wood is generally straight-grained, although there is sometimes a tendency for wavy or spiral grain to be present.	
FIGURE	
Plainsawn lumber or rotary-cut veneer: Conspicuous growth ring pattern. Quartersawn lumber or quarter-sliced veneer: Distinct, conspicuous latewood stripes.	
KNOTS	
Large knots with large areas of clear material in between.	
OTHER	
Wood is resinous, pitch pockets may be present.	



WORKING PROPERTIES

Douglas-fir has excellent strength properties and is well known for its workability. The wood dries rapidly with small dimensional movement and little tendency to check. It is relatively easy to work, with good machining qualities. It turns, planes and shapes well and can be sanded to a smooth finish. The wood glues moderately easily, has moderate nail and good screw holding ability, and takes a good finish.

PROCESS	PERFORMANCE	COMMENTS
MACHINING		
Planing	Good planing quality	Good surface quality. Typical defects are raised grain and fuzzy grain.
Turning	High surface quality	Very good surface quality.
Sawing	Easy to work with tools	Easy to work with both hand and power tools. Moderate to severe blunting effect. Resin build up on cutters may cause problems.
Boring	Good	Very good boring quality.
Mortising	Excellent	Excellent mortising quality with both chain mortise and hollow chisel mortise.
Shaping	Excellent shaping quality	
Veneering	Excellent	Important plywood species.
Sanding	Good	Very good sanding properties.
FASTENING		
Screwing	Good	Very good holding. Excellent resistance to splitting. Average screw retention: 494 lb.
Lateral Nail Holding	Good	Good holding. Excellent resistance to splitting.
Nail Retention	Good	
Gluing	Good to moderate	Bonds well with a fairly wide range of adhesives under a moderately wide range of bonding conditions.
FINISHING		
Staining	Easy	Old-growth: Smooth finish. Grain becomes wild and pronounced with dark stain. A clear coating works the best. Second-growth: Stainability is average for light colours, poor for dark ones. Good results with light stain or clear finish followed by nitrocellulose alkyd clear sealer and finish. Rotary cut veneers are reported to display such strong natural color that staining is sometimes unnecessary.
Painting	Average to good paint holding ability	Satisfactory to good results.
Lacquering	Excellent results	
Waxing	Good	Very good results are obtained when using light- to medium-coloured waxes, such as Mellow Pine and Chestnut.
DRYING		
Ease of Drying	Easy to moderately easy	A relatively easy wood to dry with little trouble occurring from checking, warping and splitting. Lower grades require more care.
DURABILITY		
Natural Decay Resistance	Moderately durable	Should not be used in applications with prolonged ground contact without treatment.
Treatability	Impermeable to extremely impermeable	Can be improved by incising.



Commercial Availability

Douglas-fir is marketed predominantly as Douglas-fir – Larch in structural grades according to National Lumber Grades Authority (NLGA) rules for dimension lumber. Select Structural, #2 and better and stud grades are the most common grades produced. Specialty in-house grades, and export grades are also available.

Appearance grades are also produced according to NLGA rules. Clears, shop lumber and moulding stock are most common, though there are many potential appearance grades that can be produced.

** Marketed as structural lumber in the D Fir-L (N) (Douglas-fir – Larch) species mix.*



Data for this factsheet has been compiled by Forintek Canada Corp. from internal and external scientific sources. Forintek is a not-for-profit technical research institute serving the Canadian forest sector.