

Extract from Bootle, "WOOD IN AUSTRALIA Types, properties and uses"

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Comparison of Qualitative and Technical Aspects of Douglas Fir and Hoop Pine.

Fir, Douglas *Pseudotsuga menziesii* (Mirb.) Franco Synonym: *Pseudotsuga taxifolia* (Lamb.) Britt. Other common name: **oregon**

1 Probably the most important softwood of North America, growing on the western fringe from Mexico to British Columbia. It is being used as a plantation species in other countries, including New Zealand, but there are only small areas of it in Australian plantations. 2 Heartwood yellow brown to pale reddish brown. Sapwood distinctly paler, varying in width from about 50 mm in mature trees to 75 mm in fast growing plantation stems. Regrowth wood varies considerably in density and strength and it may be necessary to consider the percentage of latewood and the spacing of the growth rings in assessing quality. Growth rings are very prominent because of the considerable difference in density and colour between earlywood and latewood; this also leads to a coarse and uneven texture. Grain generally straight. Resin content can be high, causing occasional bleed-through of paint films: the temperature of kiln drying helps to drive off the volatile fraction and makes the resin less mobile. The presence of the resin gives a distinctive odour to the freshly cut surface. Does not have the spiral grain problems of radiata pine and compression wood is relatively uncommon. The wood near the pith is of good quality, in contrast to that of radiata pine. 3 GD about 650 kg/m³; ADD about 330 kg/m³, for mature wood. 4 Relatively easy to dry but the tangential face is prone to surface checking so a mild schedule is needed when kiln drying. End splitting is also likely if drying is too rapid. Shrinkage about 2.5 per cent radial, 4 per cent tangential. 5 As it is one of the hardest softwoods it is only moderately easy to work. Care is needed in dressing for the softer earlywood may be compressed and later, on recovery, produce a ridged surface. This characteristic makes it unsuitable for turnery. The strong contrast in hardness between earlywood and latewood makes it liable to wear unevenly. Not suitable for steam bending. Not a good base for paint because of the uneven nature of the wood and in external applications early failure, on the latewood of tangential cut material, is sometimes experienced. Inclined to split when nailed near ends of piece. Differential glue absorption can occur. 6 Heartwood classified as Class 4 durability but mature virgin forest material does have reasonable durability for external use as long as it is not in ground contact or in damp situations. It has been used in Australia for many years as a satisfactory window joinery timber when free of sapwood. The heartwood is difficult to impregnate with preservatives and even the sapwood is not readily penetrated, especially in the case of copper-chrome-arsenic salts. 7 SS, SD5. **Some mechanical** properties of material from a variety of sources are **listed on page 419**. 8 Its availability in large sections and long lengths **has made it a highly** favoured import to Australia for many years for applications such as structural framing, joinery, vats, boatbuilding. In North America it is the most important plywood species but is seldom used for that purpose in Australia.

Pine, Hoop *Araucaria cunninghami* Ait. ex D. Don

1 A large softwood native to the rainforests of northern New South Wales and Queensland, and also occurring in the mountain regions of Papua New Guinea. 2 Heartwood pale yellow-brown. Sapwood, to 150 mm wide, almost white. Texture very fine and even. Grain straight. Compression wood often occurs, generally indicated by bands of darker coloured wood. Growth rings inconspicuous. 3 GD about 680 kg/m³ ADD about 530 kg/m³ 4 Easy to dry but care needed to avoid bluestain. **Shrinkage about 2.5 per cent radial**, 3.5 per cent tangential. Plantation thinnings are inclined to twist due to spiral grain; for best results it may be desirable to use a high temperature drying technique under restraint after plasticisation by a pre-steaming treatment. 5 Easy to work. Knots do not machine as easily as those of Pinus species. Unsuitable for steam bending. Glues well. 6 Heartwood not sufficiently durable for external use; variable in resistance to impregnation with preservatives. In tropical and semi-tropical areas the hoop pine borer (*Calymnaderus* spp.) may attack it; complete enclosure by other materials or coating with paint or varnish will give protection. 7 S6, SD5, Some mechanical properties are listed on page 424. 8 Plywood, particleboard, furniture, match splints and boxes (makes the best box), battery separators, joinery, flooring, panelling. 9 Mainly in Queensland.

The Norfolk Island pine, *Araucaria heterophylla* (Salisb.) Franco produces wood of similar appearance though it may not be quite as strong. It is used as a general purpose timber on Norfolk Island. Its strength grouping is provisionally S6, SD6.

Species	Source of test material	Density		Modulus of rupture		Modulus of elasticity		Max. crushing strength		Impact (Izod value)		Hardness (Janka)		
		(kg/M3)		(MPa)		(GPa)		(MPa)		(j)		(kN)		
		Basic	Green	Dry	Green	Dry	Green	Dry	Green	Dry	Green	Dry	Green	Dry
Fir, Douglas	New South Wales	410	730	510	56	90	12	13	26	55			2.1	3.1
Fir, Douglas	Canada			540	52	89	11	13	25	50			2.1	3.0
Fir, Douglas	Canada (coast type)			560	56	97	11	13	27	55			2.3	3.2
Fir, Douglas	Great Britain			500	53	91	8.3	11	25	48			2.4	3.4
Fir, Douglas	New Zealand		750	480	56	98	11	13	28	54			2.5	3.3
Fir, Douglas	USA (coast type)			540	52	84	11	13	27	51			2.2	3.2
Fir, Douglas	USA (mountain type)				50	86	9.3	12	24	47			1.9	2.6
Pine, hoop	Queensland, NSW	450	680	530	48	90	10	13	28	53	9.1	5.6	3.0	3.4