technology transfer *fact sheet*

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Abies concolor
Family: Pinaceae

White Fir

The genus Abies (True Firs) is composed of about 40 species native to North America [9], Central America [7], Africa [2], Europe [1] and Eurasia [25]. There are two varieties of white fir, the typical white fir (Abies concolor var. concolor) and California white fir (Abies concolor var. lowiana [Gord.] Lemm). Abies is the classical Latin name of silver fir (Abies alba Mill.) of Europe. The word concolor means of uniform color, referring to the needles, which are pale blue green on both surfaces.

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Distribution

White fir is native to the mountains from central Colorado west to southeast Idaho and southwest Oregon, south to southern California and east to southern Arizona and southern New Mexico. It also grows in northwest Mexico.

The Tree

White fir trees reach heights of 180 feet, with diameters of 6 feet on the west coast (California & Oregon), while in Arizona and New Mexico it reaches heights of 134 feet, with a diameter of 4 feet . A record specimen from the Sierra Nevada was measured at 192 feet tall, with a diameter of almost 9 feet.

The Wood

General

Both sapwood and heartwood is nearly white to a reddish brown. It has a medium to coarse texture and no characteristic odor or taste. It normally is straight grained, easy to work and stays in place when properly dried. It is moderate to moderately low in strength, stiffness, ability to resist shock and in nail withdrawal resistance. It is easily dried, but is susceptible to wetwood bacterial attack, which requires special handling during drying. It paints and glues well.

Mechanical Properties (2-inch standard)

	Specific gravity	MOE $x10^6$ lbf/in^2	MOR lbf/in^2	Compression Parallel lbf/in^2	Compression Perpendicular lbf/in^2	WML[a] in-lbf/in^3	Hardness lbf	Shear lbf/in^2
Green	0.37	1.16x106	5.90 x 103	2.90 x 103	.28 x 103	5.6	340	.76 x 103
Dry	0.40	1.5 x 106	9.8 x 103	5.8 x 103	.53 x 103	7.2	480	1.1 x 103

[a]WML = Work to maximum load.
Reference (59).

Drying and Shrinkage

Type of shrinkage	Percentage of shrinkage (green to final moisture content) 0% MC	6% MC	20% MC
Tangential	7.0	5.7	2.4
Radial	3.3	2.6	1.1
Volumetric	9.8	7.8	3.3

References: 0% MC (98), 6% and 20% MC (90).

Kiln Drying Schedules[a]

Condition	4/4, 5/4, 6/4	8/4	10/4	12/4	16/4
	Stock				
Standard	T10-C4	T8-D3	–	–	–
1-in. squares	T10-C6	–	–	–	–
Whiter 1-in.squares	T5-C6	–	–	–	–
2-in. squares	T8-C4	–	–	–	–
Whiter 2-in. squares	T5-C4	–	–	–	–

[a]References (6, 86).

Working Properties: White fir is easy to work and stays in place when properly dried. It paints and glues well and is moderate to moderately low in nail holding ability.

Durability: Rated as slightly resistant or nonresistant to heartwood decay (11).

Preservation: t is considered difficult to penetrate with preservatives (6).

Uses: The tree is a favorite Christmas tree. The wood is used for solid construction (framing, sheathing, subflooring, concrete forms, decking, planking, beams, posts, siding and paneling), plywood, pulp, millwork, prefabricated buildings, structural members, crating, shook, furniture parts, mobile homes, fruit and vegetable containers.

Toxicity: May cause dermatitis or eczema (2,7&12).

Additional Reading and References Cited (in parentheses)

1. Boone, R. S.; Kozlik, C. J.; Bois, P. J., and Wengert, E. M. Dry kiln schedules for commercial woods - temperate and tropical. Madison, WI: USDA Forest Service, FPL-GTR-57; 1988.

2. Hausen, B. M. Woods injurious to human health. A manual. New York, NY: Walter de Gruyter; 1981.

3. Hyam, R. and Pankhurst, R. Plant and their names. A concise dictionary. Oxford, UK: Oxford University Press; 1995.

4. Laacke, R. J. Abies concolor (Gord. & Glend.) Lindl. ex Hildebr. Subalpine Fir. in: Burns, R. M. and Honkala, B. H., tech. coords. Silvics of North America. Volume 1, Conifers. Washington, DC: USDA Forest Service; 1990; pp. 36-46.

5. Little, jr. E. L. Checklist of United States trees (native and naturalized). Washington, DC: USGPO, USDA Forest Service, Ag. Handbook No. 541; 1979.

6. Markstrom, D. C. and McElderry, S. E. White Fir, An American Wood. Washington, DC, USA: USDA Forest Service, FS-237; 1984.

7. Mitchell, J. and Rook, A. Botanical dermatology: plants and plant products injurious to the skin. Vancouver, BC: Greenglass Ltd.; 1979.

8. Record, S. J. and Hess R. W. Timbers of the new world. New Haven, CT: Yale University Press; 1943.

9. Simpson, W. T. Dry kiln operator's manual. Madison, WI: USDA Forest Service, FPL Ag. Handbook No. 188; 1991.

10. Summitt, R. and Sliker, A. CRC handbook of materials science. Vol. 4. Boca Raton, FL: CRC Press, Inc.; 1980.

11. USDA. Wood handbook: wood as an engineering material. Madison, WI: USDA Forest Service, FPL Ag. Handbook No. 72; 1974.

12. Woods, B. and Calnan, C. D. Toxic woods. British Journal of Dermatology. 1976; 95(13):1-97.