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PROPERTIES OF ORDINARY WOOD COMPARED WITH PLYWOOD

Because wood is made up essentially of hollow fibers the longer dimension of which runs lengthwise of the tree, it has widely different properties in the various directions relative to the grain. These differences must be recognized in all wood construction in order to obtain satisfactory service and to make effective use of the material. Significant among the differences is the fact that the tensile strength, compressive strength, bending strength, and stiffness along the grain of the wood are twenty times or more as high parallel to the grain as perpendicular to the grain, and that the shrinking and swelling of wood across the grain with changing moisture conditions is much greater than along the grain; in fact, the change in dimension of normal wood along the grain with change of moisture is so small as to be negligible.*

Plywood consists of thin sheets or layers of wood placed together with the grain of alternate plies at right angles. Hence in building up plywood a step is made in obtaining equality of properties in the two directions, parallel and perpendicular to the edge of a board. The greater the number of plies used for a given panel thickness, the more evenly is the material distributed, and the more nearly equal is the strength of the panel in the two directions.

The following tabulation of approximate values gives a specific example that will better illustrate how

*Data on the strength properties and shrinkage of various native species of wood are presented in U. S. Department of Agriculture Technical Bulletin 479, "*The Strength and Related Properties of Woods Grown in the United States.*" It may be purchased from the Superintendent of Documents, Washington, D. C., for 25 cents.

the redistribution of material in making plywood results in a change in properties:

	ORDINARY WOOD		3-PLY WOOD	
	Grain lengthwise	Grain crosswise	Grain of outer plies lengthwise	Grain of outer plies crosswise
	Percent	Percent	Percent	Percent
Bending Strength	100	8	82	17
Stiffness	100	4	96	9

It will be noted that at the expense of reducing by about 18 percent the bending strength of ordinary wood with the grain lengthwise, the bending strength of 3-ply wood with the grain of outer plies crosswise has been doubled over that of ordinary wood.

It cannot be said, however, that plywood is stronger than ordinary wood, or vice versa, unless the statement is specific as to the grain directions and particular properties referred to.

Plywood does not shrink and swell appreciably in length or width with moisture changes because it has wood with lengthwise grain in both directions. Because it is also more resistant to splitting than ordinary wood, it may be readily nailed near the edges without injury to the panel.