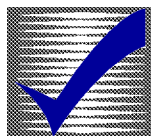




HOW-TO BOOKLET #3125

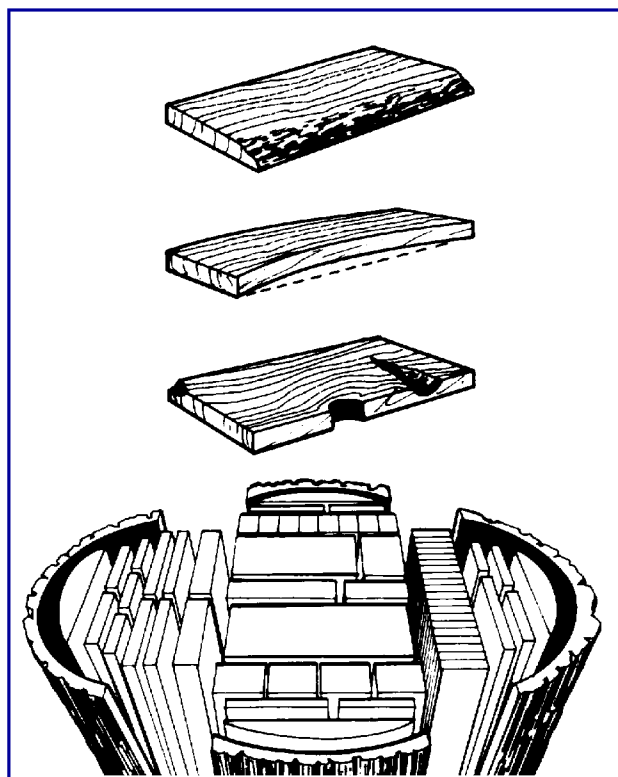
SELECTION & USE OF: WOOD AND PLYWOOD



TOOL & MATERIAL CHECKLIST

- Softwood
- Plywood
- Particleboard
- Hardwood
- Veneer
- Hardboard

Read This Entire How-To Booklet For Specific Tools and Materials Not Noted in The Basics Listed Above.



A good basic knowledge of the characteristics and types of woods is invaluable in any form of carpentry and woodworking. Lumber should be selected to serve the particular purpose for which it is to be used. Buying lumber of insufficient strength and quality for your job can be wasteful and even dangerous; buying a better grade than is needed is extravagant.

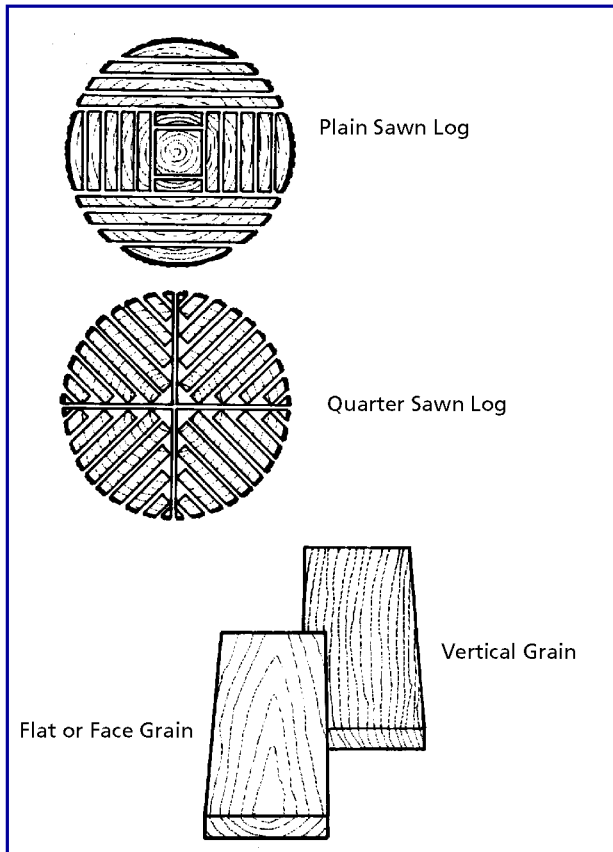
Lumber is graded according to quality and strength. While this grading is of great help to the purchaser, the many species of wood and the several grades of quality complicate the task of buying lumber. In addition to knowing and appreciating the physical properties and limitations of lumber, prospective home remodelers find that an understanding of lumber merchandising terms is helpful. Many persons describe their needs in words which, to a dealer, mean quality in excess of the grade actually needed. For instance, if a home remodeler who needs a set of shelves in the basement simply states that he wants a “good looking board”, the dealer may give him a top-grade board. Actually, one of the lower grades could serve just as well at less cost.

CLASSIFICATION OF LUMBER

Wood is classified as softwood or hardwood for convenience only. These terms do not describe the relative softness or hardness of wood, but rather the two principal sources of the wood.

Softwoods. Timber cut from trees with needle-sharp leaves (most evergreens). Members of the softwood family include pine, fir, hemlock, spruce, redwood, and cedar. Most softwood is used in construction applications.

Hardwoods. Lumber cut from trees with typically broad leaves. This family of trees include oak, walnut, cherry, maple, ash, and beech. Hardwood lumber is used primarily for paneling, flooring, and the construction of furniture.



It is important to remember that these two categories are used to classify types of trees; they do not necessarily refer to the strength of a particular tree's wood. Some hardwoods - poplar is a good example - are relatively soft, while softwoods such as southern yellow pine and Douglas fir are extremely hard.

Most lumberyards and home centers carry very little hardwood lumber - with the exception of oak flooring—because it is expensive and, being used mostly for furniture making and woodworking, is not in great demand. Softwoods, on the other hand, are a staple of home construction and do-it-yourself projects.

The quality of lumber milled from conifers varies from species to species. Redwood and cedar resist decay and insects; yellow pine offers superior structural strength; and pine in general takes paint better than fir. But lumber also has different characteristics depending on how it is cut from the log. Some lumbers are even pressure treated to further enhance their value (See How-To Booklet #3082).

PLAIN AND QUARTER SAWING

Plain sawing is the most common of the two major sawing methods because it wastes the least amount of wood. In the simplest form of plain sawing, boards are cut continuously from a log without turning the log. As a result the boards all have what is called a “flat” or “face” grain. Such boards have large, interesting grain patterns, but they are prone to warping and other defects. More sophisticated forms of sawing can produce a full range of lumber—flat-grain boards, vertical-grain lumber, timbers and beams, and dimensional lumber—all cut with a minimum of waste.

In quarter sawing, for example, the log is cut into quarters and then sawn into boards and timbers. Quarter sawing produces more waste wood because cuts are made through the tree at right angles to the annual growth rings. It produces lumber that is stronger and its face grain less likely to warp. Of course, this also makes quarter-sawn lumber more expensive than most other types of lumber cuts.

A log that is plain sawn at a mill produces these four broad types of lumber:

- ▶ **Boards.** Nominally 1 inch thick and from 2 to 12 inches wide, boards are normally used for siding, flooring, shelving, or furniture. They are graded for appearance rather than for strength.
- ▶ **Dimensional Lumber.** This is structural wood for use in construction, From 2 to 4 inches thick and 2 or more inches wide, dimensional lumber is graded for strength, not appearance.

- ▶ **Timbers and Beams.** Cut from the center of the log in sections at least 5 inches square, timbers and beams are most often graded for strength. Those graded for appearance are meant for open beam or other exposed construction.

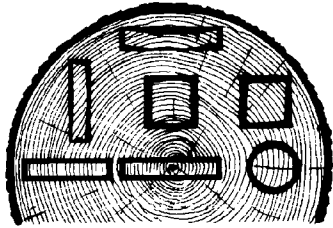
- ▶ **Select and Finish.** This type of lumber is free or nearly free of blemishes and knots, and is used where appearance is a major concern.

When a tree is first cut down, it contains a high percentage of water. This percentage will drop dramatically as the tree dries out. But the water content is still high when a log is cut into rough lumber at the sawmill. Before lumber can be “surfaced” or “dressed”, it must be either stacked in sheds to air dry or placed in large ovens to be kiln-dried. Kiln drying allows the wood to dry more thoroughly under more strictly controlled conditions. This produces a better lumber but at increased cost.

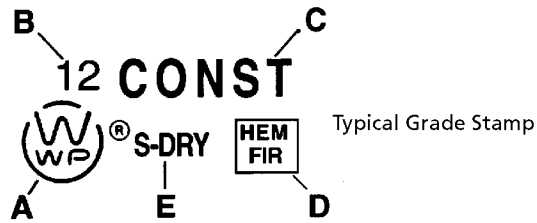
Generally, lumber is first dried at the mill before being shipped to the lumberyard or home center. Occasionally, however, green lumber is dried at the yard. It is important to remember that as lumber dries, it shrinks and, unless it is properly stacked, can twist, bow, crook, or cup. These imperfections can greatly reduce or limit a board's usefulness. The way the lumber is sawn affects shrinkage—flat-grain lumber shrinks approximately twice as much as vertical grain boards and is much more susceptible to any drying defects.

GRADE STAMPS

The function of lumber grade is to provide identification so the user can purchase wood for the use intended. The official grading agency mark on a piece of lumber assures its assigned grade. Grading practices of an agencies' member mills is supervised to assure uniformity. Shown here is a typical grade stamp of Western Wood Products Association, the largest lumber producers group in the country. The other major softwood association is the Southern



Black areas around cuts above indicate where shrinkage occurs.



First Products Association.

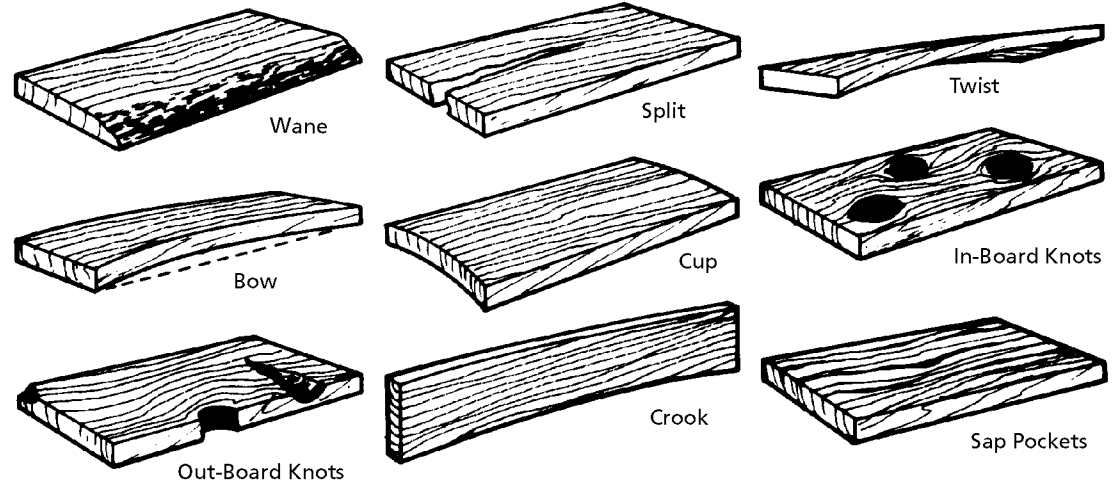
- A Mark of the Western Wood Products Association.
- B Each mill is assigned a permanent number for grade stamp purposes.
- C An example of an official grade name abbreviation. The official grade name, as defined by the association, gives positive identification to graded lumber. (See Dimension Lumber Chart).
- D This mark identifies wood species.
- E This symbol denotes moisture content of the lumber when manufactured. S-Dry indicates seasoned lumber. S-Green indicates unseasoned "green" lumber. S-Dry lumber is normally recommended for most do-it-yourself projects.

As you can see, the official grade mark stamp on a piece of lumber tells you everything you need to know about the lumber except the price.

BUYING LUMBER

Lumber is priced and sold by the board-foot unit - this is a piece that is nominally 1 inch thick by 12

Lumber Imperfections



inches wide by 1 foot long. Moldings and some special types of lumber are sometimes sold by the lineal foot. To determine the board-foot volume of a piece of lumber, use the following equation:

Nominal thickness (in.) x Nominal width (in.) x Length (ft.) divided by 12. Therefore, a 2 x 4 that is 12 feet long will contain 8 board-feet:

$$(2 \times 4 \times 12) / 12 = 8$$

Sawmills cut softwood lumber in lengths ranging from 4 to 24 feet in multiples of one foot. Standard lengths of hardwood lumber range from 4 to 16 feet in multiples of one foot.

The thickness and width of softwood lumber will depend on whether the pieces are rough-sawn or planed smooth, green or dry. Dimensions of milled lumber are almost always scant because the wood must be seasoned and dressed (planed) after it is cut from the log.

For example, a green, rough-sawn board 1-inch thick will be 3/4-inch thick if dry and dressed, it will be 25/32 inch thick if green (above 19% moisture content) and dressed. If the lumber is

grade-marked, the stamp will indicate if the piece was green or dry when it was dressed to size. Nominal and actual sizes of some commonly used boards and dimension lumber are shown in the following table:

Nominal Size Inch	ACTUAL SIZE	
	Dry (seasoned)	Green (unseasoned)
Boards		
1x4	3/4 by 3 1/2	25/32 by 3 9/16
1x6	3/4 by 5 1/2	25/32 by 5 3/8
1x8	3/4 by 7 1/4	25/32 by 7 1/2
1x10	3/4 by 9 1/4	25/32 by 11 1/2
1/12	3/4 by 11 1/4	25/32 by 11 1/2
Dimension Lumber		
2x4	1 1/2 by 3 1/2	1 9/16 by 3 9/16
2x6	1 1/2 by 5 1/2	1 9/16 by 5 5/8
2x8	1 1/2 by 7 1/4	1 9/16 by 7 1/2
2x10	1 1/2 by 9 1/4	1 9/16 by 11 1/2
2x12	1 1/2 by 11 1/4	1 9/16 by 11 1/2

To order lumber, first determine the requirements of your job. Then write down the thickness, width, and length of each piece needed, and the number of pieces of each size. No. 1 Common boards are the ultimate in small-knot material for appearance

uses, but less expensive. No. 2 and No. 3 Commons are most often used in housing for paneling, siding and shelving. Boards are generally available at building material dealers in 1 x 2 through 1 x 12. A better grade of wood than those suggested may be used, but the small amount gained in efficiency may not offset the added cost. Where several species have the same rating, choose the cheapest. The species listed are the ones commonly used in house construction. However, all may be available in your locality.

OTHER WOOD PRODUCTS

In addition to being sawn into boards, logs can be sliced into veneer that is glued together to make plywood. Actually, the log is not cut but peeled along its length by an 8-1/2 foot long knife blade as the log rotates at high speed.

The veneers are dried, cut into plies or sheets, and glued together with the grains at right angles to each other. This staggering of the grain gives plywood its great strength and helps make up for defects in any of the plies. Plywood always contains odd numbers of plies so the grain always runs in the same direction on the front and back of the sheet.

Plywood usually comes in 4 x 8 foot sheets, although longer panels can be ordered, specially when used as exterior siding. Thicknesses range from 1/4 inch to 1 inch, although thicker panels may be special ordered. Plywood also comes in exterior (marine) and interior grades, determined by the type of glue used and the water resistance of the outer plies.

Like board lumber, plywood comes in a number of grades based on appearance and engineered qualities. The best grade of appearance plywood is N (available under certain conditions) with remaining grades ranging from A to D. N is relatively free of defects. The other grades will have more defects than the higher quality N. The engineered plywood group is further graded from 1 to 5 for strength, with 1 being the strongest and stiffest.

The most widely used plywoods are softwood types made from fir, pine, or spruce, and are graded according to the quality of the outer plies. Hardwood types include those with all-hardwood veneers and combination types with softwood interiors and hardwood exteriors. Hardwood plywoods (oak, walnut, mahogany, and so on) are generally used where appearance is a factor, as in the construction of furniture. Hardwood plywood usually has a lumber core construction, while softwood types have a veneer core.

Particleboard, also called chipboard or flakeboard is made from sawdust, shavings, and other mill residues. These are ground to uniform size and bonded under pressure to form 4 x 8 foot sheets. Particleboard ranges from 1/4 to 1 inch thick and is available in underlayment and industrial grades. The latter is denser, stronger, and easier to finish. Particleboard has poor bending strength, is vulnerable to moisture, and holds nails poorly. Still, it is excellent for use under veneers and laminates, for rough shelving, and for subflooring.

Hardboard, also called fiberboard, is stronger than particleboard but costs about twice as much. Made from wood chips that have been reduced to fibers then combined with resins and subjected to high heat and pressure, hardboard comes in 4 x 8 foot sheets that are 1/8 inch or 1/4 inch thick. The material can be "tempered" to increase its resistance to water. Hardboard serves best when used for drawer bottoms, cabinet backs, underlayment, and templates for cutting or routing. Perforated hardboard, when equipped with proper hooks and clips, can be used to hold tools and utensils.

DIMENSION LUMBER/ALL SPECIES

CATEGORY	GRADES	USE
Light Framing (2" to 4" thick) (2" to 4" wide)	Construction Standard Utility Economy	For studs, plates, sills, cripples, blocking, or any use where high strength values are not required.
Framing	Stud Economy Stud	All-purpose grade for 10 foot spans or shorter suitable for all stud uses, including load bearing walls.
Structural Light Framing (2" to 4" thick) (2" to 4" wide)	Select Structural No. 1 No. 2 No. 3 Economy	Grades designed for engineering applications where higher bending strength ratios are needed in light framing sizes. Use for trusses, concrete pier wall forms, etc.
Structural Joists and Planks (2" to 4" thick) (6" and wider)	Select Structural No. 1 No. 2 No. 3 Economy	Grades designed to fit in engineering applications of lumber 6 inches or wider. Use for joists, rafters, and general framing uses.

