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Hardwood Lumber Grades

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More people are becoming involved in do-it-yourself activities, ranging from putting up a bookshelf to renovating an existing structure. All too frequently, though, they don't know what grade of lumber they might need for a particular project.

Most hardwood lumber is used for cabinets and furniture, while most softwood lumber is used for structural rough carpentry such as framing, studs and construction. But there are exceptions.

How is lumber graded?

Most hardwood boards are graded with the assumption that they will be cut up and glued back together. Most softwood lumber is graded with the assumption that it will be used full size.

For both hardwood and softwood lumber, the actual grade is assigned at the sawmill. This usually is done visually, although some softwood lumber is machine graded. The process is relatively simple. A trained grader looks at the board, takes some quick measurements and assigns the grade. With softwood lumber (2 x 4 inches and up), that grade is stamped on the wood. In most instances, no grade stamp is placed on finish boards, whether they are hardwood or softwood.

What are grade defects?

The grade is based on the number, size and location of defects in the wood. A range of values are possible for each grade.

Defects include knots, knotholes, bird peck, decay, bark, splits and wane (wane refers to non-wood areas of the rectangular shape of the board — bark or air). Warp, which includes cupping, bowing and twisting, is allowed in varying amounts.

Remember that these grades are assigned at the sawmill at the time of manufacture. The wholesale or retail lumber yard where you purchase your material is not responsible for grading material.

What are the hardwood lumber grades?

The standard grades for hardwood lumber used in Canada and the United States are written by the National Hardwood Lumber Association (NHLA). Although these grades vary slightly from species to species, there are six basic grades. Figure 1 shows these basic grades and the simplified requirements for each grade. Hardwood lumber usually is graded on its poorest face.

Note that the first and seconds are combined into a single grade referred to as FAS. For all six grades, there are minimum sizes to the boards, minimum cutting sizes and required clear area yields. For example, for a board to be classified number 1 common, the board must be at least 3 inches wide and 4 feet long. Depending on the actual size of the board, a certain number of CF (clear face) cuttings are allowed in visualizing the grade. In any event, there is a

minimum cutting size of either 3 inches x 3 feet or 4 inches x 2 feet cutting. The clear area of the board contained in these cuttings must be 66 percent or two-thirds of the surface area of the board. Remember that this is the poorest face.

Example: Look at the board in Figure 2. It is 8 feet long and 9 inches wide. Assuming that it is a scant 1 inch thick, it contains 6 board feet (BF) of lumber.

To calculate board feet, multiply the length in feet by the width by the thickness. Divide that amount by 12.

$$\frac{\text{L (feet)} \times \text{W (inches)} \times \text{T (inches)}}{12} = \frac{8 \times 9 \times 1}{12} = 6 \text{ board foot}$$

This board has a surface measure (SM) of 6. That's the number of board feet divided by the thickness.

This board contains defects. They could be large knots or groups of knots. With the requirements for various grades in mind, examine the board. This board is eligible for the grade FAS because it is bigger than 6 inches by 8 feet.

But does it have the 83-1/3 percent clear area? The easiest way to figure the amount of clear area is by cutting units. That's the width times the length. In this example, the board has 9 x 8 (forget the inches and feet) or 72 cutting units.

To make the FAS grade, 10/12 of the 72 cutting units must be in the allowed number of clear face cuttings. FAS allows one-fourth of SM cuttings per board. This board has a surface measure (SM) of 6. Six divided by 4 equals 1 clear face (CF) cutting (drop the fraction). This means that the largest possible cutting is 6 inches wide and 6 feet by 9 inches long. This piece contains 40-1/2 cutting units or 56 percent of the total 72 units. Because this is less than the required 83-1/3 percent, the board doesn't qualify for FAS. And because we can't see the other side of the board, we don't know whether the board qualifies for select.

Let's look at #1 Common: this grade allows

$$\frac{\text{SM} + 1}{3} \text{ OR } \frac{7}{3} = 2 \text{ cuttings (drop the fraction)}$$

They must be at least 4 inches by 2 feet or 3 inches by 3 feet. Figure 3 shows where another cutting, 3 inches by 6 feet 6 inches, can be placed along the top of the board. This cutting contains 19-1/2 units. Adding this to the 40-1/2 cutting units from the first cutting yields a total of 60 cutting units, 83-1/3 percent of the total board area of 72 units. So the board easily qualifies for #1 Common.

Remember that the placement of the cuttings by the grader is completely arbitrary. For example, look at the same board as shown in Figure 4. Another grader could visualize the cuttings as shown. Cutting number 1 is 6 inches by 5 feet 3 inches and contains 31-1/2 cutting units. Cutting number 2 is 3 inches by 8 feet and contains 24 cutting units. Together there are 55-1/2 cutting units, 77 percent of the total board area. So it qualifies as a #1 Common board.

There are many more rules, some of which apply only to certain species. However, if you look at your lumber using the guidelines offered in this publication, you will have a good grasp of hardwood lumber grades.