

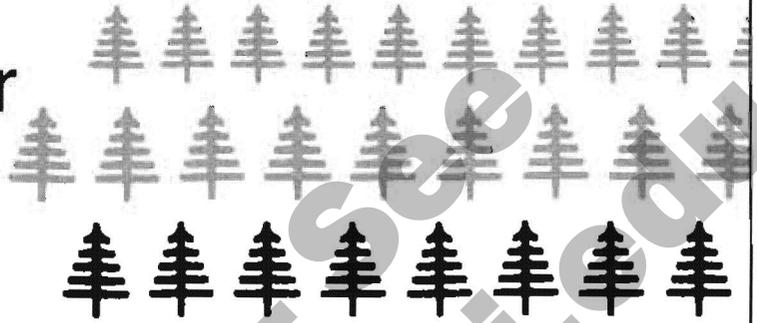
AGRICULTURAL GUIDE

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Lumber

Softwood Lumber Grades

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Every year, a considerable volume of softwood lumber is used in residential, commercial, and industrial construction in the United States. The lumber is used either as primary framing members, temporary scaffolding, or decorative finish. When purchasing lumber, the buyer must realize that certain grades of lumber are intended for specific uses.

For example, there are specific grades of lumber to be used as scaffolding. Scaffold planking has very specific requirements that are not met by most lumber. This guide sheet will explain the basic divisions of softwood lumber and their intended uses.

To most people, softwood means wood from trees like pines, cedars, redwood, firs, hemlocks, etc. (evergreens). This is correct, but there is at least one instance when a hardwood (aspen) is placed in this broad category. In some circumstances, aspen is graded the same as softwood construction lumber and, therefore, can be used in construction.

It is also important to remember that when people refer to a 2 x 4, the actual size of this piece of material is something less than 2 inches by 4 inches. These sizes are commonly referred to as *nominal dimensions*; this means in name only. The actual dimensions are usually going to be less. This applies to most softwood lumber. But there are always exceptions (such as scaffold plank).

Now let's look at some ways of classifying softwood lumber. One method is by its intended use: either in construction (houses, etc.) or remanufacture into other products (furniture, millwork, etc.). Construction lumber is graded based on the assumption that it is going to be used in the same size in which it was produced. If the lumber is going to undergo significant changes in its shape, size, appearance, etc., before it is sold as a product, it is called remanufacture lumber. Because many of these uses

are very specific to a certain industry (stiles and rails for doors, crossarms for utility poles, etc.), they will not be discussed in this guide sheet.

Lumber can also be classified by size. Usually, softwood lumber is manufactured in lengths of 2-foot multiples (8, 10, and 12 on up to 24 foot), although it can be made in 1-foot increments. It is also usually between 2 and 16 inches in width. Lumber less than 2 inches in nominal thickness is referred to as boards. When the nominal thickness is between 2 inches and less than 5 inches, it is referred to as dimension lumber. Lumber 5 inches or more in nominal thickness is referred to as timbers. Softwood lumber can also be classified based on whether it is rough-sawn, planed, or patterned. Rough-sawn lumber has all the saw marks still visible and has not been surfaced to a final dimension. Most lumber that people buy for construction and framing is planed to its final dimensions (all the sides are smooth). This lumber is also referred to as S4S, surfaced 4 sides. Patterned lumber has had something extra done to it. Perhaps a tongue-and-groove pattern has been machined into the sides.

Construction lumber

Within this category, softwood lumber is classified in three ways: stress-graded, non-stress-graded, and appearance lumber. Almost all softwood dimension lumber found in a typical retail/wholesale lumberyard is stress-graded. This means that there should be a grade stamp on the piece and a set of allowable design stresses assigned to that grade of lumber. The American Softwood Lumber Standard, PS 20-70, provides a National Grading Rule for dimension lumber (from 2 up to, but not including, 5 inches in nominal thickness). Special products, such as scaffold planks,

are excluded from these rules. (They have their own rules.)

The national grading rules establish lumber classifications and grade names for the visually stress-graded lumber as shown in Table 1.

These grades are based on the assumption that the lumber is going to be used as is with no remanufacturing. In other words, the grade assigned to a 12-foot 2 x 4 is based on the location and size of defects over the *entire* length. Grades themselves are based on location, size and placement of knots, slope of grain, manufacturing defects, wane, warp, and other factors that must be considered. Within each grade, there is a range of values that are allowed. Thus, not all STUD grade studs are exactly the same in appearance, but they all have the same structural design capabilities.

Grade stamps

The grade assigned to an individual piece of dimension lumber is stamped on each piece about 18 to 24 inches from the end. It is called a *grade stamp*, and for lumber graded under PS 20, it must contain certain information. A sample grade stamp is shown in Figure 1. This stamp contains the following information:

- The grading agency that wrote the rules and issued the grade stamp.
- The species of lumber.
- The grade itself.
- The mill identification (name or number).
- The moisture content of the wood *at the mill when the stamp is applied*.

In the United States, there are six associations that publish grade rules: Redwood Inspection Service (RIS), Northeastern Lumber Manufacturers Association (NELMA), Northern Hardwood and Pine Manufacturers Association (NHPMA), Southern Pine Inspection Bureau (SPIB), West Coast Lumber Inspection Bureau (WCLB), and Western Wood Products Association (WWPA). Also, there are several agencies that are licensed to use these grade rules and apply stamps of their own. (There is a similar set-up in Canada, and their rules are essentially the same as ours.) See Figure 1.

In the stamp in figure 1, WWPA is the grading agency, STAND is the grade, 12 represents the mill identification number, D FIR represents the lumber species used (Douglas-fir), and S-DRY is the moisture content of the wood at the time the grade stamp was applied.

Moisture content. Of all the aspects of the grade stamp, this may be the most confusing to consumers. When a log is sawn into lumber, the wood contains very large amounts of water. Wood is much like a sponge in that regard. If we wring the sponge out, the sponge is relatively dry. You wring the water out



Figure 1. Sample grade stamp.

of the wood by drying the wood. The weight of the water that you “wring out of the wood” divided by the oven-dry weight of the wood is the fractional moisture content. Multiply this by 100 and you have the moisture content expressed as a percent. The oven-dry condition is 0 percent moisture content. Typically, freshly cut logs have moisture contents of 80 to 150 percent depending on the species of wood.

After the lumber is sawn into whatever sizes are desired, the wood is dried. Lumber is dried for several purposes. These include reducing the risk of insect or fungal damage, reducing shipping weight (and therefore shipping costs), controlling the amount of shrinkage that takes place, and making gluing and finishing more feasible. Notice that drying only controls shrinkage, it does not eliminate the fact that wood shrinks and swells in response to changes in the relative humidity of the surrounding air.

Under the National Grading Rule, there are three moisture content conditions: S-GRN, S-DRY, and MC 15. S-GRN (surfaced green) means that the moisture content is above 19 percent. Most lumber is probably dried to the S-DRY (surfaced dry) condition. This means that the moisture content is less than 19 percent. MC15 means that the moisture content is less than 15 percent. Remember, this is the moisture content at the time the grade stamp has been applied at the mill, **not** after the lumber has sat in a puddle of water for two months!

Species and species groups. Dimension lumber is the principal stress-graded lumber product available at most retail lumberyards. This lumber will probably be used where strength, stiffness, and size uniformity are important. Floor joists, ceiling and roof rafters, and studs are common examples. Although there are many sizes and species of material produced, not every lumberyard stocks every item. Usually, a lumberyard will have only the most commonly requested items in stock in a few species groups. “Hem-fir,”

Table 1. National Grading Rule lumber classes.

Lumber classes	Grade name
Light framing (2 to 4 inches thick, 4 inches wide)	Construction Standard Utility
Structural light framing (2 to 4 inches thick, 2 to 4 inches wide)	Select structural 1 2 3
Studs (2 to 4 inches thick, 2 to 4 inches wide)	Stud
Structural joists and planks (2 to 4 inches wide, 6 inches and wider)	Select structural 1 2 3
Appearance framing (2 to 4 inches thick, 2 to 4 inches wide)	Appearance

Sizes are nominal.

“S-P-F,” and “DF-L” are typical species that you might find. Hem-fir stands for western hemlock and true firs. These woods are very similar in strength and appearance and it is not economical to separate them. S-P-F represents spruce-pine-fir, a common grouping for some of the eastern softwoods. DF-L refers to Douglas-fir and western larch. In each of these cases, the stress rating applied to a given grade is based on the weakest species in the group.

Since the Redwood Inspection Service and Southern Pine Inspection Bureau grade only redwood and southern pine respectively, their grade stamps do not have a species designation. Southern pine is actually lumber obtained from several pines found primarily south of the Mason-Dixon Line. Sometimes referred to as “southern yellow pines,” the principal species used are loblolly, shortleaf, longleaf, and slash pine. In some areas, Virginia pine is used. The wood of these species is virtually identical in appearance and very similar in strength properties.

Under the WWPA rules, there is a species grouping referred to as “Western woods.” Some mills produce lumber from several different species. It may not be economical for that mill to separate out each individual board by species. These mills can apply the species symbol for western woods, an all-encompassing term, to their lumber. The stress ratings are based on the weakest species in all the western woods even though much of the lumber will be much stronger.

Grading agency. As was just explained, RIS and SPIB publish rules for California redwood and southern pine respectively. NELMA publishes rules for species found in the New England and Middle Atlantic States while NHPMA covers those species found in the lake states. WWPA provides coverage for the 13 western states while WCLB covers the Pacific coast states. Obviously, there is some overlap between the

various agencies.

Grades. The grades of softwood lumber vary with the categories as shown in Table 1. For example, lumber classified as Light Framing will have grades of CONSTRUCTION, STANDARD, or UTILITY, with CONSTRUCTION being the best. Lumber classified as either Structural Light Framing or Structural Joists and Planks will have the basic grades of SELECT STRUCTURAL, No. 1, No. 2, or No. 3. Some dimension lumber in this category will have the word DENSE included in the grade. This has to do with the growth rate and the amount of latewood (also known as springwood). Remember, these are the grades permitted under the National Softwood Grading Rule.

There is a grade of lumber known as Economy that is not permitted under these rules. Usually, lumber with this grade stamp on it is not permitted to be used in load-bearing walls, roofs, etc., in areas where there are building codes. If you plan to use this material, check with your local building inspectors first.

Mill identification. Mills and companies pay for the right to place a given grading agency’s grade stamp on their lumber. When the mill subscribes, they are assigned an identification number by that agency. No other mill or company may use that number without permission. Some companies stamp their name or trademark on the lumber as well. This is primarily done for advertising purposes.

Summary

When you go to your local retail lumberyard, remember that the grade was placed on the lumber at the mill—not at the store! The grade is placed on the lumber for the protection of both the consumer and the producer. If you have questions about which grade of lumber to use, ask the salesperson.

