

# Softwood Lumber Grades and You

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Softwood lumber prices play an important role in timber prices, but there is not a one-to-one relationship. Other factors such as housing starts, volume of lumber in the distribution system, weather as it impacts construction, imports and exports, and interest rates also impact lumber prices.

Not all lumber is equal. The price per board foot depends on the grade of the individual boards. In general, bigger and stronger boards are worth more money. This publication is designed to help landowners, foresters, and others understand what drives the price of lumber and, in turn, the price of timber.

## Definitions

Following are some terms that are used in softwood lumber manufacturing.

Knowing these terms will help you understand the differences in lumber. This is not a complete list, but is a good primer.

**Board foot** — a unit measure for the volume of wood equal to 12 inches x 12 inches x 1 inch, or 144 in<sup>3</sup>.

**Warp** — a deviation from flat from one end of a board to the other, often referred to as crook, bow, or twist.

**F<sub>b</sub>** — the maximum allowable fiber stress in bending used for designing structures using lumber; a basic measure of how much weight an individual board is rated to support.

**Lumber grade** — for softwood lumber (pine), grade is a measure of strength and stiffness; in hardwoods (oak, hickory, walnut, and others), grade refers to appearance.

**SPIB** — Southern Pine Inspection Bureau, is a non-profit organization that administers grading procedures of Southern pines (loblolly, slash, longleaf, shortleaf, and others) based primarily on visual characteristics.

**Strength** — the ability to hold weight; the more weight a board can hold, the stronger it is said to be.

**Stiffness** — the ability to resist bending; the stiffer a board is, the less it will bend under a load.

**Wane** — bark or lack of wood on the edge of a piece of lumber.

## Lumber Grades

There are several pine grades in manufacturing lumber. All graded softwood lumber carries a grade stamp. **Figure 1** shows a typical grade stamp. There is a great deal of information found on the grading stamp. “SPIB” is the grading organization used; “No.2 Prime” is the grade of the board; “KD 19” is the way the board was dried (in this case, it was kiln dried to 15 percent moisture content); “HT” indicates the board was heat treated; and “63” indicates the mill where the board was manufactured (in this case, Weyerhaeuser in McComb, Mississippi). All of this information is important because it helps us understand the board’s species or species group, its expected properties, its moisture content, and the mill from which it came.



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Figure 1. Typical lumber grade stamp.

The four major grades are select structural (SS), No. 1, No. 2, and No. 3. Of these, select structural is the stiffest and the strongest. Next in ranking are the numerical grades. The lower the grade number, the greater the strength of the boards. A No. 1 two-by-four has an  $F_b$  of 1850 psi, while a No. 2 has an  $F_b$  of 1500 psi, a reduction of approximately 20 percent. A No. 3 two-by-four has an  $F_b$  of 850 psi, a reduction of approximately 24 percent from a No. 2 and 38 percent from a No. 1.

SPIB describes a No. 1 board as being lumber recommended for general utility and construction where high strength and stiffness are required and good appearance is desired. Strength and stiffness are determined when grading lumber by looking for certain visual cues, like knot location, number, and size, along with wane and bow. If a board has too many knots or knots that are too large, the board is degraded to a lower grade, until it matches the standards of the grading rules.

The next grade is No. 2, which is recommended for most general construction use where moderately high design values are required. This grade allows for more and larger knots. This is the most widely produced grade and often the most widely used grade for wood-based construction in the United States.

No. 3 has many more knots, can have splits and cracks, and does not have the strength values of the other two grades. This grade is often used in light load instances. Less often, it is used for large supporting beams of a building.

With appropriate engineering, virtually any of the grades can be used for any construction or utility pur-

pose. If a stronger grade of lumber is specified, often fewer pieces (for example, studs or floor joists) will be needed. Alternatively, smaller pieces can be used (for example, two-by-eights instead of two-by-tens).

If weaker grades of lumber are used, typically deeper members or closer joist spacings must be specified. Value engineering is the key to proper use. Value engineering attempts to calculate the various costs associated with using various lumber grades and their corresponding correct amounts and sizes. Then, the lowest cost solution can be chosen when building homes and other structures.

### Price Differences

As with many products with varying measures of quality, the lower the grade, the lower the value of the product. The following prices represent a current snapshot. These vary with time, but the trends are relatively consistent.

No. 1 demands the highest price at approximately \$320/thousand board feet (\$0.32/board foot). No. 2 sells for approximately \$285/thousand board feet (\$0.29/board foot). And No. 3 sells for approximately \$220/thousand board feet (\$0.22/board foot). This decrease in value is related to the usefulness of the lumber. Because No. 1 is stronger by design, it brings a higher value. With decreases in strength and stiffness, the lumber becomes worth less for construction because there are fewer applications for it; more pieces and larger pieces must be used to carry the same structural loads.

**Table 1. Current product mix of grades.**

Size	Grade	Percentage
Two-by-four	No. 1 & Btr. *	18
	No. 2	51
	No. 3	16
	Other	15
Two-by-six	No. 1 & Btr.	21
	No. 2	55
	No. 3	16
	Other	8
Two-by-eight	No. 1 & Btr.	25
	No. 2	55
	No. 3	13
	Other	7

\*No. 1 & Btr. denotes lumber that meets or exceeds No. 1 grade standards.

## Changes to the Resource

Currently the mix of grades for two-by-fours, two-by-sixes, and two-by-eights is determined by the size trees being harvested, the age of the trees, the quality of the wood in the trees, and the sawmill practice. **Table 1** shows the current percentages of each grade being produced.

About half of the lumber produced for the three sizes in **Table 1** goes to producing No. 2 lumber. No. 2 lumber is frequently used in home construction because of its cost, strength, and availability. This product mix of grades is dependent on the trees that we grow. If the properties of the trees being grown changes, the product mix also changes. For example, a decline in general wood quality and properties causes more lumber to rate lower than No. 2. In such a case, the intrinsic value of the lumber is less and mills become less profitable. Such a change would then decrease the amount that mills are able to pay for standing timber and logs. This loss would be felt by mill owners and landowners (including pension funds that hold TIMOs and REITs in their portfolios), as well as those who make their livelihoods buying or selling wood.

## Summary

The strength of lumber relies on many things, one being the quality of the logs that go to the mill. Any changes in the forest resource can cause serious changes in the lumber market.



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