Peterson Lumber

Dear Customer:

Often, rough-cut green lumber has a reputation of not being straight or strong. All of these negatives result directly from improper handling and drying. The following extension service publication shows the proper method of stacking and drying lumber. If you follow these directions, your lumber will be better than what you can buy.

Please contact us at ANY TIME with questions!!

Thanks for your business

Home Drying Lumber

Avoid the expense of kiln-dried lumber by processing and drying your own lumber at home.

Michael Kuhns, Extension Forestry Specialist
Richard Straight, NRD Forester

Anyone who has done much woodworking knows how expensive high quality, kiln-dried, hardwood lumber can be. Even kiln-dried construction lumber is expensive. Besides expense, there also may be problems with finding certain species of wood, highly figured wood, or hardwood boards thicker than one inch (4/4).

One way to avoid these problems is to dry your own lumber. Green, unsurfaced, or unplaned lumber can be obtained from many small sawmills.You may also want to obtain your own logs and hire a sawmill operator to cut them to your specifications. These logs could come from your own land or could be purchased from a woodlot owner. Even shade trees that need to be removed can sometimes be used in this way.

Log Processing

1. Remove logs from the woods and process into lumber as soon as possible after cutting. This is particularly important in hot, dry weather.
2. If logs are to be stored for any length of time, liberally coat the ends with a thick, waterproof coating. This will prevent end splitting and checking caused by log ends drying faster than the middle. Stored logs can also be sprayed with water to reduce checking.
3. If logs are to be stored for several months before sawing, support their ends to encourage air circulation and discourage insects and rot.
4. Determine the lumber sizes you will need and have the logs sawn accordingly. Remember, green lumber will shrink 2 to 12% during drying (*Table I*).
5. If logs were not end coated, coat the board ends immediately after cutting.
6. Lumber will dry best if its thickness is no greater than 2 inches and no less than 1 inch. If thicker pieces are needed, glue 1-inch dried and planed boards together to the desired thickness.
7. Avoid great variation in board thickness as it can lead to problems later in stacking and drying.

Air Drying

The simplest way to air-dry lumber is to randomly pile it on the ground. This practice is not recommended, however, since it can lead to problems with rot, discoloration, warp, and slow drying. A much better method is to neatly pile the lumber on a good foundation using stickers between layers of boards.

The foundation's purpose is to keep the wood off the ground and provide better air circulation. Any foundation will do as long as it is level and keeps the wood 12 to 24 inches off the ground. Railroad ties make good foundation timbers because they are strong and are treated to resist decay. An example of a good foundation is shown in *Figure 1*.

Once you have a foundation, you are ready to pile lumber. The pile consists of alternating layers of stickers and boards. Stickers are spacer boards that are generally 3/4 inch thick and 1 to 2 inches wide (up to 4 inches wide for softwoods). Narrower boards from the lumber being stacked may also be used as stickers. Stickers are kept narrow for better drying and to reduce staining where boards meet. Make sure all stickers are the same thickness to prevent warp.

Begin stacking by placing stickers over the foundation timbers (*Figure 1*). Space timbers and stickers evenly and 16 to 24 inches apart. Lay boards about one inch apart at right angles to the stickers. Be sure each board is well supported and does not protrude at either end of the pile. Non-supported ends within the pile will dry with less defect. Outer boards should be full length to stabilize the pile. Minimize large gaps between boards and make sure each board in a layer is of equal thickness to reduce warp.

Now build the rest of the pile, alternating layers of stickers and boards. It is important that stickers be carefully aligned vertically (*Figure 1*) so the weight of the pile will be transferred directly to the foundation. Remember, a board that can bend during stacking or drying will stay bent when it is removed from the pile. Being careful at this point will ensure good lumber quality.

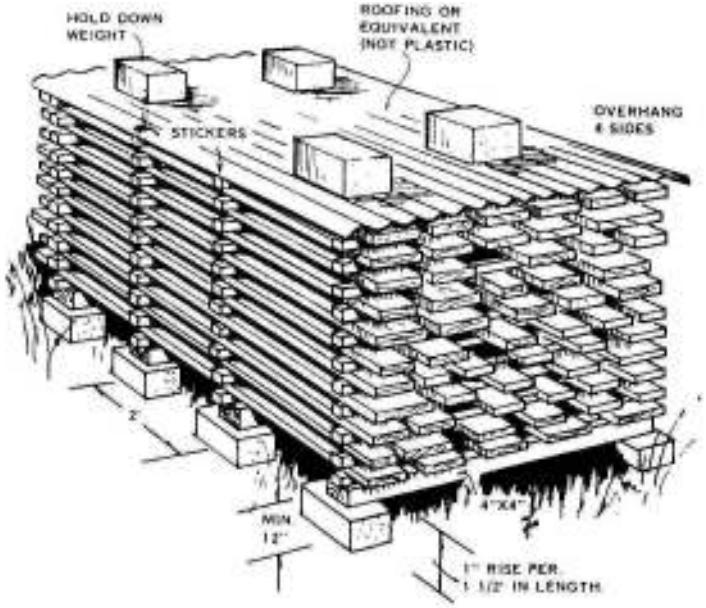


Figure 1. Features of a good properly stacked lumber pile.

Cover the top of the completed lumber pile with plywood, old boards, slabs, corrugated metal or anything that will shed water and protect the top layers from direct sunlight (*Figure 1*). Place concrete blocks or other weight on the roof to keep it in place and to reduce warp in the pile's top layers.

Drying Times and Characteristics

Approximate drying times and drying characteristics of various softwoods and hardwoods are given in *Table I*. Drying times in the table represent the number of days needed to air-dry one-inch-thick boards to a 15 to 20% moisture content. Times will generally be shorter when weather is warm and dry, and can double in wet weather or winter. Boards that measure 2 inches thick will take about 1.5 times as long to dry as 1-inch boards. A moisture content of 15 to 20% by weight is about the best that can be achieved by air drying in New England.

Table I gives approximate drying times that vary with temperature and humidity. Another way of telling if your lumber is dry is by testing a sample board. Start by removing a board from the mid-section of the pile. Crosscut a 1-inch piece from the middle of the sample board away from any knots. Weigh the cut piece immediately (a fairly sensitive kitchen scale should work). Now dry the piece in an oven or other warm place at low temperature (225°F) for 18 to 24 hours. Weigh the piece as soon as it is removed from the oven. Percent moisture content is then figured by the following formula:

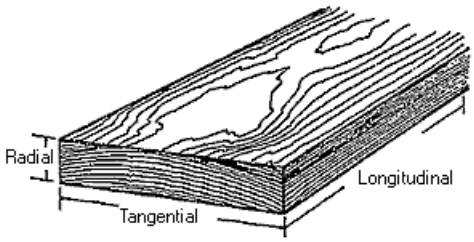
[% moisture content = **(** wet weight ÷oven dry weight **)** -1 x 100 **]**

If the moisture content is 15 to 20%, your wood is air dry.

Another method of determining dryness is to weigh a small board periodically. The board is dry when its weight does not change between measurements.

Table I. Approximate drying time and characteristics of various softwoods and hardwoods.

	Shrinkage (%)		Tendency to warp	Tendency to check	Time[a] (days)
	Radial	Tangential			
Softwoods					
Concolor Fir	3.3	7.0	M[b]	M	(1)
E. White Pine	2.1	6.1	L	M	60-165
Jack Pine	3.7	6.6	M	M	40-165
Ponderosa Pine	3.9	6.2	L	M	15-120
Blue Spruce	3.8	7.1	L	L	20-120
Eastern Red cedar	3.1	4.7	L	L	(1)
Douglas-fir	4.8	7.5	M	L	20-120
Hardwoods					
Green Ash	4.6	7.1	M	M	60-165
Basswood (Linden)	6.6	9.3	M	L	40-120
Paper Birch	6.3	8.6	L	L	40-120
Butternut	3.4	6.4	L	M	60-165
Black Cherry	3.7	7.1	L	L	60-165
Eastern Cottonwood	3.9	9.2	H	L	50-120
American Elm	4.2	9.5	H	L	50-120
Hackberry	4.8	8.9	M	M	30-120
Hickory	7.4	11.4	M	M	60-165
Silver Maple	3.0	7.2	M	L	30-120
Sugar Maple	4.8	9.9	M	M	50-165
Northern Red Oak	4.0	8.6	M	L	60-165
White Oak	5.6	10.5	M	H	70-200
Pecan	4.9	8.9	M	M	60-165
Sycamore	5.0	8.4	H	H	30-120
Black Walnut	5.5	7.8	L	M	70-165



[a]To air dry 1" lumber to 20% moisture content.
[b]M = Medium; L = Low; H = High.
(1) Rarely air-dried.

Figure 2. Shrinkage directions in a plainsawed board.

Besides drying times, *Table I* gives useful drying-related characteristics of many woods. Tendency to warp and check or split upon drying is presented as either H - high, M - medium, or L - low. Shrinkage (as a percent) is presented for the radial and tangential directions. Longitudinal shrinkage (along the grain) can be assumed to be minimal. The terms radial, tangential, and longitudinal are explained in *Figure 2*. *Figure 3* illustrates some common types of drying-caused shrinkage and distortion of shapes sawn from various parts of a log.

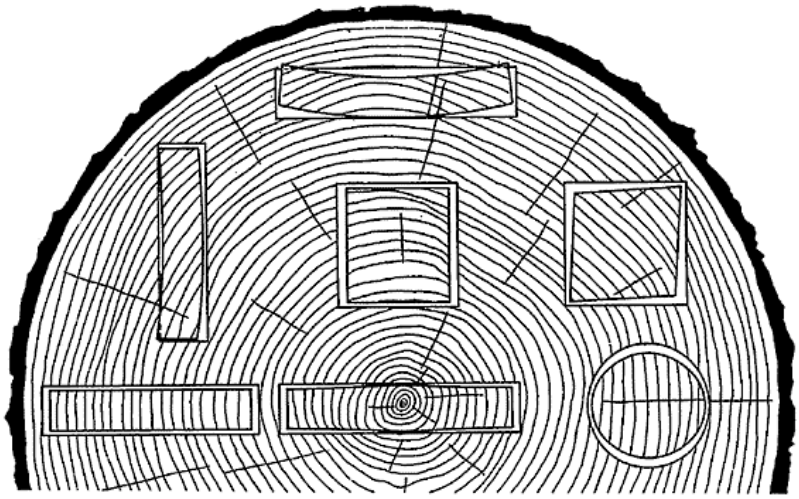


Figure 3. Characteristic shrinkage and distortion of flats, squares, and rounds as affected by the direction of annual growth rings. The dimensional changes shown are somewhat exaggerated.

Drying Wood for Furniture

A moisture content of 15 to 20% is fine for boards that will be used for rough applications outdoors. However, to minimize shrinkage, lumber must have a moisture content of 7 to 9% when used in indoor applications. A commercial dry-kiln can be used to reach this low moisture content, but few people have access to such facilities. Small amounts of air-dried lumber can be dried the rest of the way in a warm attic in summer or in a heated basement in winter. Stack the lumber as you did when you air-dried it outdoors. This method may take several months.

A solar kiln may be the best way to dry lumber for furniture. Solar kilns can be used for final drying of air- dried lumber or for complete drying of green lumber from start to finish. Typical solar kiln designs consist of a shed outfitted with a solar collector and a fan for air movement. A source for a solar kiln design is given at the end of this NebGuide.

Storing Dried Wood

If no further drying is needed, air-dried lumber with a 15 to 20% moisture content can be stored outdoors. Keep the lumber piled as it was during air-drying and cover the pile with plastic. If the lumber has been dried to a 7 to 9% moisture content, store it in a warm, dry area. A good rule to follow is to store lumber in an environment similar to the one in which it will be used. For example, store kiln- dried wood to be used in household furniture in the house or another heated, dry space.