

Quality Control in Lumber Purchasing: Lumber Storage

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Once lumber is kiln dried to the specified moisture content, it must be properly stored or it will continue to gain or lose moisture in response to the relative humidity of the surrounding air. The wood is attempting to come to equilibrium with the moisture in the surrounding air; this is called the "equilibrium moisture content" or EMC of the wood. The moisture content to which lumber is kiln dried should be the same as the average moisture content it will equalize to in service. For woods used indoors in most parts of the United States, this is 6 to 8 percent. In the dry desert regions of the southwest the figure is somewhat lower, while it is higher in the damp coastal areas. If lumber is kiln dried to the 6 to 8 percent moisture content suitable for interior applications and then exposed to the outdoor atmosphere, it will gain excessive moisture and swell in most regions and seasons of the United States. If manufactured into a product and exposed to conditions inside a plant or house, for example, it will again lose moisture and shrink. End splits, open glue joints, and warping will likely result. These problems are particularly severe during the heating season because indoor relative humidities are reduced. To further complicate the situation, lumber is normally stored in bundles. In this case the outside boards and especially the ends will be the first to pick up or lose moisture, while the interior of the bundle will be slow to change. The moisture content between and within boards will no longer be uniform, and end-use problems are nearly certain. Table 1 shows the equilibrium moisture content by month for wood exposed to outdoor atmospheric conditions for selected areas of the United States. To illustrate the significance of these numbers, Table 2 presents the equilibrium wood moisture content for different relative humidities at 70o F. The dimensional changes for a six-inch-wide northern red oak board with an initial moisture content of 7.1 percent are also given. Note that as the board dries from 7.1 to 4.5 percent, it shrinks 0.05 inches or well over 1/32 inch. If the moisture content of the six-inch-wide board increases to 11.8 percent, it will have expanded in width by 0.08 inches or well over a 1/16 inch. Light-weight woods generally do not shrink and swell as much, whereas heavier ones, such as hickory and beech, will generally shrink and swell more. The point is that if kiln-dried lumber is to be maintained at the desired 6-8 percent moisture content level, it must be stored in an enclosed heated shed for all of the United States except the dry southwestern states.

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Summary: Lumber is kiln dried to the moisture content consistent with its intended end use. This practice limits the amount of shrinkage and swelling which will occur under normal circumstances. Unfortunately, kiln-dried lumber, when exposed to unheated storage conditions, will regain moisture and swell. Defects will likely result in products manufactured from this material and exposed to indoor conditions. Thus, lumber once kiln dried must be properly stored while in inventory or during the manufacturing process.

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