

Why Proper Storage

Storing lumber properly is important for maintaining the quality, value and serviceability of the wood. Good storage practices help prevent twist, cup, warp, and other characteristics that can result in degrade or material loss.

Proper storage also protects the sales appeal by keeping lumber clean and bright. Product appearance is especially important to the customers who make up the remodeling and do-it-yourself market.

For kiln-dried lumber and other value-added products, proper storage is essential to retain the investment made in drying and other services that are reflected in the cost of the finished wood products.

Lumber buyers today have many expectations about the appearance and quality of the wood they purchase and use. Proper lumber storage practices are a key element in meeting those expectations.

The lumber storage recommendations listed in this publication are for informational purposes only and are not intended as mandatory standards.

Lumber and Moisture Content

Proper storage is primarily a means of protecting the lumber's appearance and controlling moisture changes in the wood. Rapid or uneven moisture change can result in degrade and material loss. Understanding how moisture changes occur in lumber is the key to proper storage.

Wood either absorbs or loses moisture depending on the difference between its moisture content and the moisture content, temperature and relative humidity of the surrounding air. When the air is cold, moisture changes occur slowly. Warm humid surroundings, by comparison, may cause dry wood to quickly gain moisture.

When lumber dries, moisture moves from the interior of the piece to the surface and evaporates into

the air. The reverse is true for absorption as moisture travels from the wet exterior to the drier interior. During this process of moisture loss or absorption, wood shrinks or swells accordingly.

Wood science research indicates that for 1,000 board feet of lumber, it takes approximately three gallons of water to change the moisture content of the wood 1 percent. Good storage conditions can minimize the changes in the lumber that could happen as this volume of moisture either leaves or enters the wood.

Problems begin when shrinkage or swelling occur unevenly or too quickly. This action breaks down the wood fibers, often causing grade loss in the form of twist, cup, crook, bow, splits or checks.

The length of time lumber can be stored without significant changes to the condition of the stock is dependent on climate at the time of storage, the exposure of the stock to weather and the conditions where the lumber is being stored.

Mold and Decay

Surface moisture on lumber – either from the wood drying, from exposure to rain or prolonged humidity in excess of 70 percent – may lead to mold or decay fungi growth on the surface of the lumber that can progress throughout the cross-section. Storage conditions that avoid moisture accumulation and provide ways for the moisture to evaporate

and move away from the lumber can reduce the chances of mold and other fungi forming on the wood.

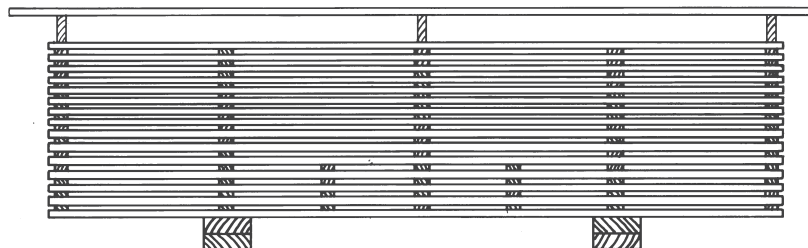
Warmer temperatures, when combined with moisture accumulation, can create conditions for mold growth on wood products. Mold fungi primarily grow on sapwood and have fairly broad temperature requirements, but most grow best at temperatures between 70 and 85 degrees Fahrenheit.

Many mills offer anti-stain treating on unseasoned lumber to protect against mold and other fungi growth. These treatments can protect against mold and stain for several months. The effectiveness of these treatments depends on the concentration of the formulation used, how it was applied, exposure to moisture following treating and handling of the lumber.

The presence of mold does not necessarily indicate there is decay in the lumber. Mold and stain fungi grow primarily on the surface of the wood. Decay causing fungi, which grow when wood products are exposed to chronic moisture for an extended time, attack beyond the surface of the wood into the structural polymers of the fiber, reducing its strength.

For more information about mold and lumber, see the WWPA publication *Mold, Housing and Wood* (TG-2) available on the Association's web site at www.wwpa.org.

A typical unit package air drying roof.



Pile roofs protect the upper courses from direct sunlight. They can be made from old lumber ends and should extend beyond the end of the lumber pile.



Common Sense for Storing Unseasoned and Seasoned Products

Improperly stored or unprotected lumber is prone to rapid or uneven moisture content changes and other problems. To prevent this, certain measures should be taken depending on whether the material is unseasoned or dry and the type of storage facilities available.

■ Unseasoned Lumber

Green or unseasoned lumber may be stored outdoors without protection in cool weather, provided the storage period is not extensive. Some wetting is acceptable as the moisture content of green lumber is little affected by rainfall. Unseasoned lumber may be stored in cool arid climates for longer periods than in warm humid surroundings.

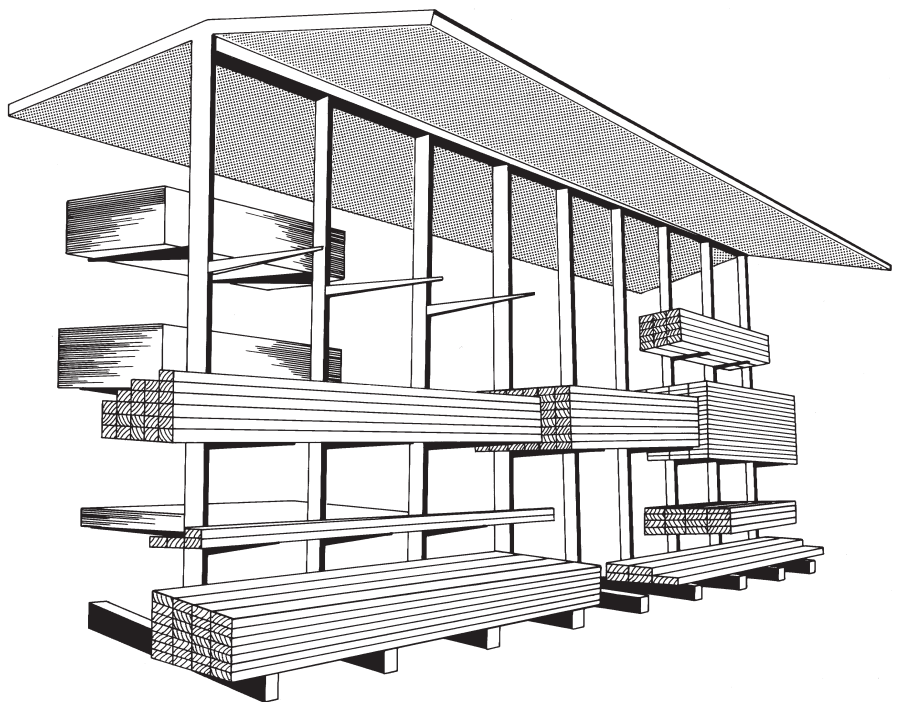
Storage of bulk-stacked unseasoned lumber for prolonged time periods should be avoided whenever possible.

When temperatures rise, green lumber will begin to dry and the moisture in the wood cells will be released. If this moisture is trapped near the surface of the wood, it may create conditions that can promote the growth of mold fungi.

Air circulation is a key element in moving the moisture away from the wood. The most effective way of moving the evaporating moisture is by providing adequate air space around all sides of the lumber.

Unseasoned lumber stored for extended periods or wood that is experiencing seasoning degrade can benefit from placing stickers between each course. This can provide the necessary space for air circulation that will move moisture away from the wood. While stickering is often done at the mill to facilitate drying during manufacture, it may not be practical for those distributing and selling lumber.

Green lumber is most often shipped from the mill in solid packs, reflecting the fact the wood is typically used in construction within a few weeks after it is cut at the mill. As such, inventories of green lumber should be moved quickly using the first-in, first-out rule. Tarping lumber



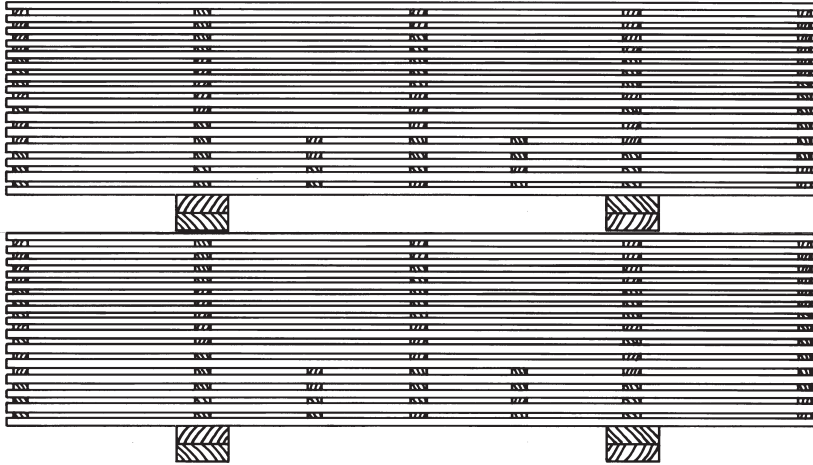
Covered T-stands provide excellent storage and ready access for such items as timbers or other unseasoned products.

during transit can minimize checking and splitting caused by the phenomenon known as “truck drying.”

Exposure to the sun and the elements can affect the lumber with the most exposure to such conditions. Pile roofs or cover boards can be placed on the upper courses to protect lumber from exposure to the sun, which can cause seasoning checks. Pile roofs may be made of old lumber ends or scrap wood panels and should be long enough to overhang the ends of the lumber pile. The roofs can be placed on the top package before it is lifted into place. Pile roofs or covers should be strapped or positively attached to the tops of units to prevent being blown off by wind gusts.

“Pile burn” is another hazard of warm weather outdoor storage. Here, the center of a solid stack absorbs a great deal of heat which promotes the rapid growth of decay fungi, causing the wood fibers to rapidly decompose. Stickering the lumber, which encourages better air circulation, and/or treatment with anti-sapstain biocides can reduce the chance of pile burn.

Posts, beams and timbers are typically manufactured as unseasoned products, as it is impractical or expensive to air or kiln dry such items. In storage, seasoning checks will usually occur, but these will have no significant effect on the performance of the piece in structural applications.



When lumber is placed on stickers, both the stickers and spacer blocks must be in perfect alignment with the pile foundation. Otherwise, sagging may occur.

However, there are storage practices for these products that can prevent excessive checking. To keep them from drying too quickly, timbers should be solid stacked. In especially hot weather they should be treated with anti-sapstain biocides and kept under a roof. And when possible, wetted burlap or sprinklers can be used to slow the checking process. Sealing the ends with wax or paint treatment is effective in reducing end-checking and end-splitting.

Covered metal T-stands provide excellent storage for such items. The product is protected from direct sunlight, yet is readily accessible to forklift handling. The stands can also provide space for good air circulation.

■ Dry Lumber

Unlike unseasoned lumber, kiln or air dried lumber should not get wet, as the product may lose the value that was added by careful seasoning. (Redrying the product may not be a good solution because degrade often occurs during redrying.)

Rain wetting of any dried lumber may impair its dimensional stability

and encourage mold growth. If stored outdoors, dry lumber should be protected by tarpaulins, canvas, plastic wrap or paper wrapping and separated from ground contact. Torn wrappers should be repaired promptly.

Care should be taken when covering dry lumber to avoid trapping moisture underneath. Remove any surface moisture before wrapping the lumber. Providing some air space between the wood and the wrapping will help any moisture move away from the lumber.

For dry lumber, open or closed storage sheds are preferable to outdoor storage. High-grade items such as shop, moulding and mill-work should be solid piled in a closed heated shed that has a clean paved floor. Upper common grades and mouldings are frequently stored in vertical bins for ease of handling.

Outside Yard Storage

Whether at the mill, distribution center or retail outlet, air flow and protection from wetting are key factors in the lumberyard layout. A large volume of air should circulate

through the yard freely to help evaporate and move moisture from the lumber. Make certain the yard is open, with no trees or buildings blocking the air flow. Weeds and other vegetation should be removed because they can harbor mold spores.

Good water drainage is equally important. Standing water can add to the yard's humidity, which increases the possibility of mold and stain. Paved surfaces provide a barrier to moisture vapor movement out of the soil. Proper site grading can reduce the chance of water pooling in the lumber yard and may lead to faster evaporation of surface water.

Providing air space under lumber piles allows cool moist air to move downward and away from the piles. The supporting stringers should be sturdy, level and high enough to allow air circulation.

In more arid climates such as the Southwest, where drying may occur too quickly, lumber piles can be oriented so prevailing winds travel perpendicular to the main alleys to slow drying of rows further downwind.

When lumber is placed on stickers, the stickers should be aligned vertically with one another and with the foundation stringers. Otherwise, sagging can occur, causing the lumber to bow or have a "belly." Also, avoid stacking piles to excessive heights because it can add weight that crushes the lumber at the bearing points and causes the wood to kink. Some stickers should be placed as near the ends as possible to reduce checking and splitting.

Solid-stacked lumber is often stored in packaged units banded with tie straps for easier forklift handling. Units should be separated by spacers, aligned with the supporting beams to prevent sagging.

Storing lumber in sheds under a permanent roof offers good protection by keeping the material dry and bright. Material with a moisture content greater than 15 percent can be stored in an open shed. Lumber with a moisture content at or below 15 percent should be stored in closed sheds for added protection.

Closed, unheated sheds are often used for storing kiln or air

dried lumber. The protection provided can help maintain the low moisture content in the wood gained by seasoning. Closed heated sheds are often reserved for the higher grades of lumber used for interior work. Such lumber products need particular care because of their required lower moisture content (less than 15 percent).

Lumber Handling

Careless handling and poor storage practices can cause degrade and material loss and may create conditions that can lead to the formation of mold on lumber.

Lumber shipments should be checked upon receipt for damage, mold, moisture content (in the case of dry lumber) and proper tally.

Rough or finished dry lumber is usually protected by tarpaulins or by waterproof paper packaging during truck transport. Such packaging is also commonly used for flatcar shipment. Closed truck or boxcar shipment offers the best protection for such products.

Unitized package wrapping has made it possible to adequately protect dry lumber on open flatcars. Such packaging uses a waterproof kraft that is glassfiber reinforced and polymer coated.

If possible, packages should be inspected periodically during transport and storage for damage and moisture buildup. Any ripped packaging should be quickly repaired to keep moisture out.

Unseasoned lumber should be protected when shipped from the sawmill or distribution center. Even for short truck hauls, a simple tarpaulin will help protect the lumber from direct sunlight, rain, snow and rapid drying.

Other common-sense measures include not standing on exposed lumber (and leaving black boot marks) and leaving enough room between rows so that forklifts can operate without gouging the lumber stacks.

Jobsite Delivery and Storage

As a convenience for the builder, materials should be loaded on the delivery truck in proper sequence. Because most deliveries are either dropped or removed by forklift, those materials that are used first should be loaded last. For example, sill plates should be on top of the load with floor joists and wall framing lumber underneath.

Lumber stored at the jobsite should be adequately protected. Avoid placing unprotected lumber directly on the ground, where it can be exposed to moisture in the soil or vegetation. Instead, use supports under the lumber units to keep the wood away from mud and ground water.

Lumber at the jobsite should be protected by a tarp or other type of cover to protect the lumber units. If plastic is used, leave enough open room at the bottom of the pile for airflow. Otherwise, plastic that reaches to the ground may act like a greenhouse, trapping ground moisture within the stack, promoting mold growth or other changes to the lumber.

Risks can be further minimized with appropriate delivery schedules as work progresses. With good scheduling, the contractor can keep the volume of exposed lumber to a minimum until the roof is completed and storage space within the building becomes available. Avoid delivery in the rain when possible.

Paneling, mouldings, millwork and other profiled lumber should always be stored on supports indoors and with good ventilation. Keep such products away from newly poured concrete or freshly drywalled surfaces, as these may greatly increase the humidity of the storage space.

Also, the wood should be acclimatized to allow the lumber to reach a moisture content equilibrium in its new setting. Acclimatizing can help accommodate any shrinking or swelling that may take place before the material is installed.

To acclimatize the lumber, place it on stickers and store it for 7 to 10 days in the room in which it is to be used. Again, the room should not have freshly drywalled surfaces or a new concrete floor. If installed in a conditioned space, mechanical systems (HVAC) should be operating prior to acclimation.

For siding and decking products, store the wood in a covered, unheated area such as an open garage or carport at the jobsite. Keep them protected from rain, snow or sun and off the ground. Siding and tongued-and-grooved decking should be acclimatized to the onsite atmospheric conditions. This will allow for a more dimensionally stable product ready for installation or prefinishing.

Additional Information

Technical information on Western lumber products manufactured by WWPA mills is available through the Association's web site at www.wwpa.org. The site features sections on lumber grades, design values, specifications, properties and environmental information on Western lumber.

Information on mold and lumber is available on the WWPA web site at www.wwpa.org. The site also features a full description of technical publications available for purchase online.



Western Wood Products Association
1500 SW First Avenue, Suite 870
Portland, OR 97201-5861
503/224-3930
fax: 503/224-3935
email: info@wwpa.org
web site: www.wwpa.org