

December 1953

SCORING AIR-DRYING PRACTICES

—by *Walt Smith, President, Southeastern Dry Kiln Club.*
Presented at the Southeastern Dry Kiln Club meeting, October.

The Southeastern Dry Kiln Club had a 2-day meeting on October 8-9, 1953. One of the more interesting discussions was on air-drying practices. The discussion was under the leadership of Walt Smith. He pointed out that in 1945 and 1946 he and Mr. J. S. Mathewson of the Forest Products Laboratory, Madison, Wis., made a rather extensive survey of air-drying practices in the southeastern area. Detailed information was obtained from 45 different plants in Virginia, North Carolina, and South Carolina, and supplemental observations were made at a large number of other plants in the southeastern region. Eighteen of the plants studied were furniture factories. At that time, Smith said, air-drying practices needed immediate improvement. The yarding practices that were considered poor were: confinement, poor housekeeping, improper stickering, low pile foundations, and inadequate roofing. Of the plants studied, these improper air-drying practices caused footage losses due to end checks and splits at 96 percent of the plants visited, excessive stain at 63 percent of the plants, enough warp to cause trouble at 55 percent of the plants, surface checking at 33 percent of the plants, and honeycomb at 4 percent of the plants.

Since 1946, Smith said that there has been a very marked improvement in air-drying practices in the Southeast. Though a detail check on this improvement has not been made, his observations have indicated a substantial reduction in footage losses as caused by splits, checks, stain, warp, honeycomb, and in some instances the control of decay. In order for people attending the kiln-club meeting to rate their own air-drying practices, Smith set up a scoring method that was received with great interest. Here is the way he worked it out: If the yard superintendent can score himself with 80 or more points, he is doing an excellent job; if the score is 60, improvements can be made to increase his score. If his score is 55 or less, he'd better get busy and do something about the practices that keep his score down. The factors of piling lumber for air drying on which the score is based, were as follows:

1. Height of pile foundations **10 points**
 - a. If the pile foundation is less than 12 inches at its lowest point above the ground, the score is zero points.
 - b. If the pile foundations are 12 inches above the ground, the score is 10 points.
 - c. If the pile foundations are 18 inches or more above the ground, the score is 10 points.

2. Foundation supports **10 points**
 - a. If less than half of the tiers of stickers are supported by good cross beams, the score is zero points.
 - b. If half of the tiers of stickers are supported by cross beams, the score is 5 points.
 - c. If all of the tiers of stickers are supported by cross beams, the score is 10 points.

3. Sticker alignment **10 points**
 - a. Poor alignment with no attempt to better alignment by the use of sticker guides, the score is zero points.
 - b. Fair sticker alignment without sticker guides being used, the score is 5 points.
 - c. Good sticker alignment with or without sticker guides, the score is 10 points.



4. End sticks **10 points**
- a. If sticks are not placed within 2 inches of the ends of the boards, the score is zero points.
 - b. If the sticks are within 2 inches of the ends of the boards, the score is 10 points.
5. Sticker spacing **5 points**
- a. If the sticker spacings on 4/4 hardwood lumber are more than 2 feet apart, the score is zero points.
 - b. If the sticker spacings on 4/4 hardwood lumber are 2 feet or less apart, the score is 5 points.
6. Pile roofs **10 points**
- a. If no roofs are used, the score is zero points.
 - b. If the roofs are sunlight but not raintight, the score is 5 points.
 - c. If the roofs are raintight, the score is 10 points.
7. Space between top layer of pile and roof **10 points**
- a. If no space is provided between the roof and the top layer, the score is zero points.
 - b. If the space between the top layer and the roof is less than 6 inches, but some space is provided, the score is 5 points.
 - c. If the space between the top layer and the roof is 6 inches, the score is 10 points.
8. Method of piling **10 points**
- a. If random-length lumber is not box piled, the score is zero points.
 - b. If the random-length lumber is box piled or sorted for length and properly piled, the score is 10 points.
9. Moisture-content checks **5 points**
- a. If the yard superintendent does not check moisture content with a meter or by other methods before the pile is taken down, the score is zero points.
 - b. If moisture content checks are made before the pile is taken down, the score is 5 points.
10. Pile spacing **5 points**
- a. If the pile spacings are less than 3 feet, the score is zero points.
 - b. If the pile spacings are 3 feet or more, the score is 5 points.
11. Rear alley spacings **5 points**
- a. If the rear alleys are less than 5 feet, the score is zero points.
 - b. If the rear alleys are 5 feet or more, the score is 5 points.
12. Weed control **10 points**
- a. If weeds are not kept down, the score is zero points.
 - b. If a fair job of weed control is practiced, the score is 5 points.
 - c. If weeds are eliminated, the score is 10 points.

Have you checked the air-drying practices in your yard lately? Try this scoring method of Walt Smith and see how you would rate your air-drying methods.



How Does You Air-Dry Yard Stack Up ?

A Focus on the Important Elements: High, Low, and In-Between

Often neglected details..

Some of the items mentioned in the previous checklist are discussed below. Future newsletters will cover some of the other topics, including how to layout, and properly “operate” an air-dry yard, and drying defects and their causes.

Pile foundations

The pile foundation provides a number of different functions, including: 1) supporting the weight of the pile, 2) allowing air to circulate beneath the lumber pile, 3) allowing cool, damp air that drops downward as it moves through the pile to exhaust, and 4) elevating the pile above ground moisture.

The lumber pile foundation should stand at least 12-18” in height, and should not block airflow in any major direction. Therefore, cants piled on top of each other in the same direction are not the best choice for a foundation. A better alternative is to place the bottom cant parallel to the long axis of the pile, and the top cant parallel and in alignment with the stickers in the pile (Figure 1). The bottom cant should be preservative treated, or be placed on top of a preservative treated mudsill. Other alternatives include using posts, or piers that have been set into the ground, or concrete blocks stacked on the surface of the ground. A stringer is then laid on top of the piers, posts, or blocks, parallel to the direction of the lumber in the pile, and crossbeams are laid perpendicular to the stringers, and in alignment with the stickers in the pile (Figure 2).

Regardless of the foundation system used, it is important that the crossbeams are in vertical alignment with the stickers. Crossbeams that are misaligned will result in kinked lumber in the bottom courses of the pile. Likewise, if an inadequate number of foundation elements are used to support the pile, the lumber will tend to bow along the unsupported lengths. Ideally, there should be a foundation element under each tier of stickers.

It is also important that the tops of the foundation elements are level relative to each all the way along their lengths. Foundation elements that are not level can result in twisted or otherwise warped lumber.

Stickers

Stickers placed between lumber in the pile 1) permit air circulation between lumber courses, 2) help to restrain warpage that can occur during drying, 3) transfer the weight of the pile to the foundation, and 4) reduce end checking, splitting, and cupping, when aligned with the ends of the pile.

Stickers are typically approximately 3/4” thick, 1.5-2” wide, and as long as the width of the lumber package. Often, stickers 1” thick, and 4” wide are used with softwood lumber. The thickness of the stickers should be consistent, as mixing thick and thin stickers can result in “kinked” lumber.

Likewise, stickers containing wane should also be avoided as they fail to provide even support. Wet stickers should be avoided as they can promote stain and fungal growth on the lumber surface. Similarly, stickers composed of heartwood are generally favored due to the heartwood’s resistance to decay and insects.

Typically, it is recommended that stickers be placed every 18-24” along the length of hardwood lumber, with slightly greater spacing used with softwoods. However, as Rocky Mountain pines tend to be prone to warp, the 18-24” spacing may be more appropriate.

Often, two additional stickers are placed in each of the lower 6 or 8 courses of lumber, particularly 1” lumber, to provide support when the pile is lifted with a forklift. The stickers are placed so that they correspond to the width of the forks (Figure 3). In addition to providing support in lumber courses directly over the forks, the stickers also prevent the stickers near the end of the lower courses from dislodging when the pile is moved.

Pile Roofs

Pile roofs are used to protect the top courses of lumber in a pile from degrade caused by exposure to direct sunlight, and moisture in the form of rain or snow. Excessive exposure to direct sunlight can result in surface checks, splits, and warp due to rapid drying. Besides lengthening the time required for drying, rewetting of the lumber can lead to drying defects and warp.

Pile roofs can be constructed of a variety of materials, including corrugated roofing material, roofing paper or felt, or low grade boards (Figure 4). If boards are used, they should be double piled, with the second course placed over the joints in the first course, to prevent rain or snow from reaching the interior of the pile. The roof should be elevated above the pile to allow for air circulation.

The roof is often built with a slight slope from end to end to allow a run-off for rain and melting snow (Figures 1, 4). An overhang of up to 2’ can be included on three sides, however, an overhang on the side facing the fork-lift will interfere when the pile is lifted.

The roof will also need to be “tied” to the pile to prevent it from being blown off by the wind. This can be accomplished as easily as placing concrete tie blocks on the roof, or using a series of ratcheting tie-down straps.



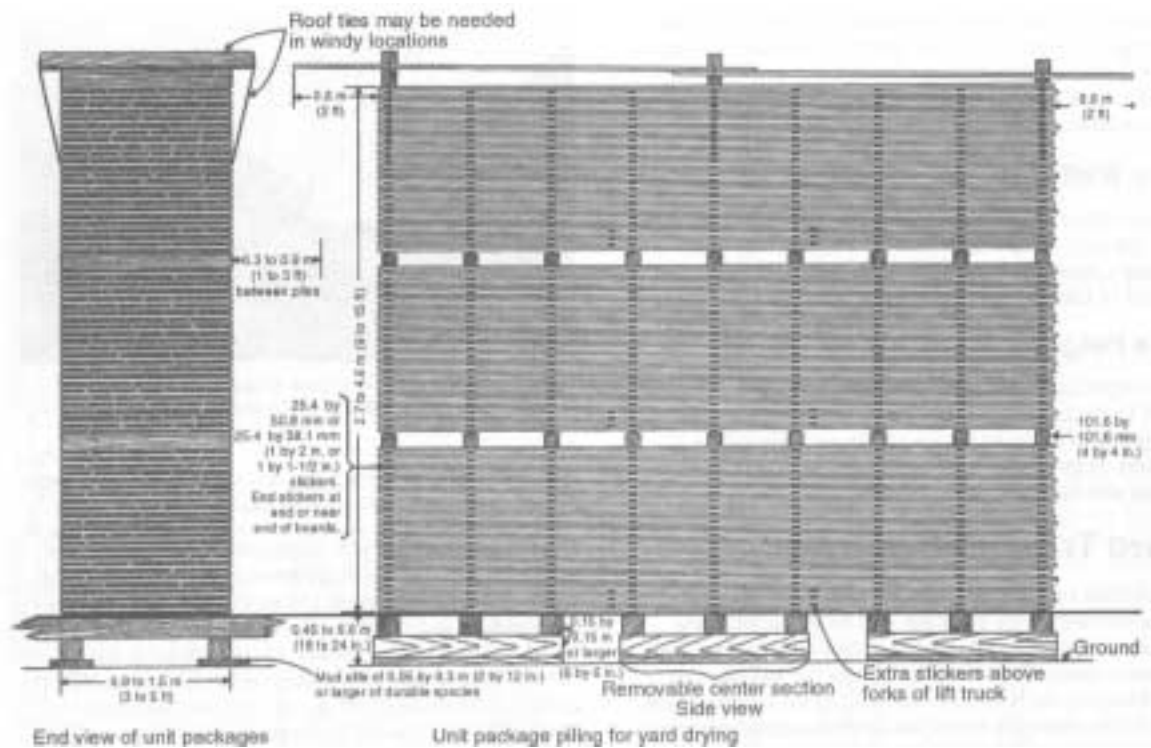


Figure 1. Properly piled lumber packages illustrating: 1) proper foundation construction and alignment, 2) proper sticker alignment, 3) extra stickers used for support above forklift lifting points, 4) roof overhang, slope, and tie-downs. (Source: *Air Drying of Lumber, USDA FPL-GTR-117*)

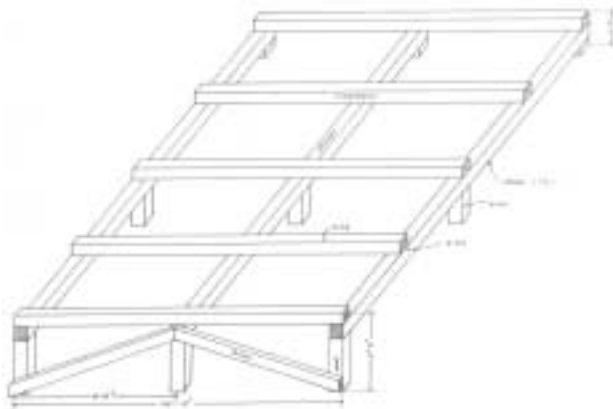


Figure 2. Pile foundation constructed of posts, stringers, and crossbeams. (Source: *Air Drying of Englemann Spruce, FPL Report R1944-5*)



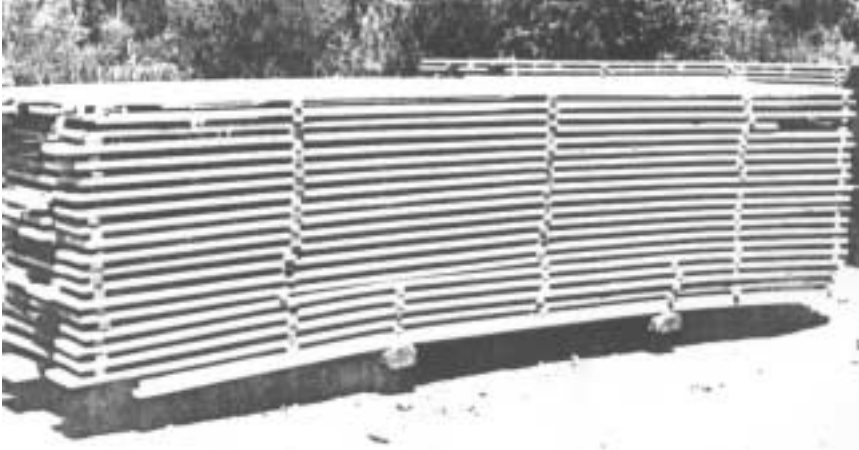


Figure 3. Extra stickers placed in pile of lumber to help support the load when lifted by a fork lift.
 (Source: *Air Drying of Lumber, FPL Report 1657*)

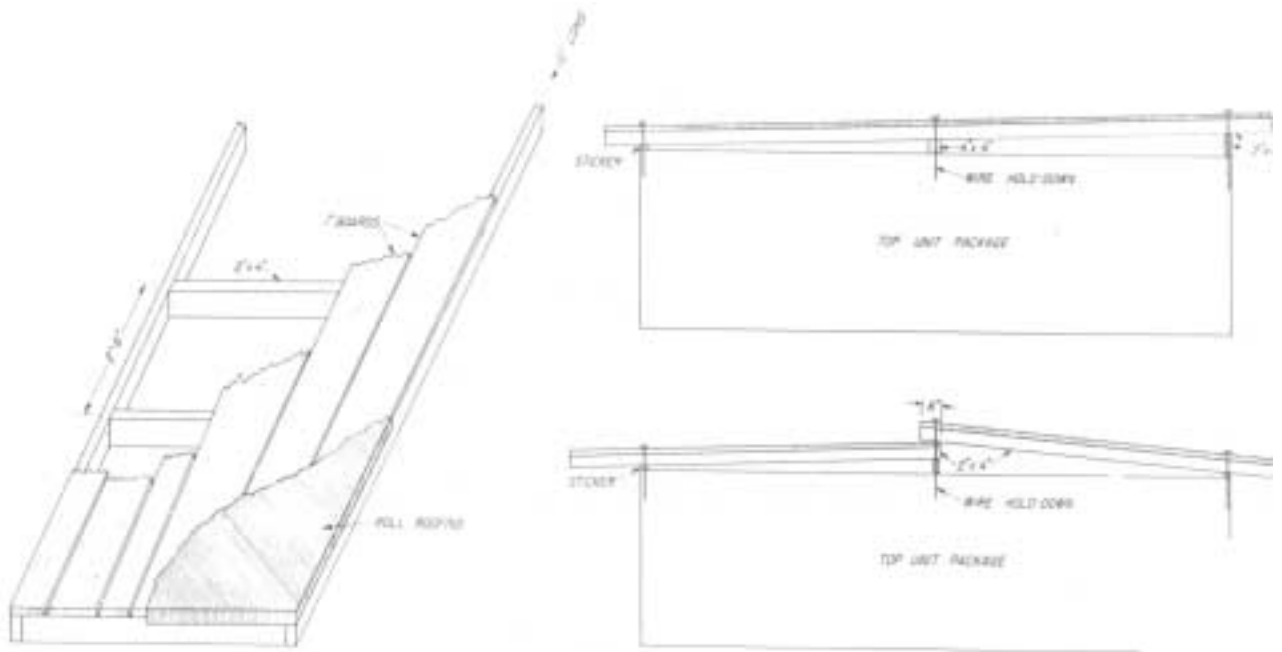


Figure 4. Pile roof constructed of 2x4s, boards, and roofing paper.
 (Source: *Air Drying of Lumber, FPL Report 1657*)

References

- (1956). *Air Drying of Lumber*. Madison, USDA Forest Products Lab.
- (1999). *Air Drying of Lumber*. Madison, USDA Forest Products Lab. FPL-GTR 117 *This is one of the most comprehensive handbooks available on Air-Drying, and can be obtained by contacting the Wood Education and Resource Center at (304) 487-1510.*
- Peck, E. C. (1960). *The Air Drying of Engelmann Spruce*. Madison, USDA Forest Products Laboratory.
- Smith, W. (1998). *Scoring Air-Drying Practices. Lumber Drying Sourcebook - 40 Years of Practical Experience*. G. Wengert and R. Toennisson. Madison, Forest Products Society.



This Bulletin...

The checklist in this Technical Bulletin was taken from the Lumber Drying Sourcebook, published by the Forest Products Society (this book was included in the reference material that was provided at the Wood Drying Workshop, held in March 2002 in Mancos, CO). The checklist was created in 1953 by Walt Smith, then President of the Southeastern Dry Kiln Club. Although much time has past from when the checklist was first created, the issues it addresses are still valid.

CSU/CSFS Wood Utilization and Marketing Bulletins...

The Technical Bulletins produced by the CSU/CSFS Wood Utilization and Marketing Effort are aimed at addressing needs and questions raised by industry members throughout the state on the topics of wood processing and marketing. The first four Technical Bulletins will be focused on drying of lumber, specifically on air drying. The first will “quiz” you, the air drying operator, on how your air dry yard stacks up, and where there might be room for improvement. This bulletin includes a checklist taken from the *Lumber Drying Sourcebook*, published by the Forest Products Society. The

second and third Technical Bulletins will be reprints of a two-part article written by drying expert Dr. Fred Lamb, of the Department of Wood Science and Forest Products at Virginia Tech. These articles are entitled *Operating and Effective Air Drying Yard*, and although were originally focused on drying hardwoods, the same principles covered hold true for softwoods. The fourth Technical Bulletin will cover drying defects, and will include an article entitled *Causes and Cures for Warp in Drying*, written by drying expert Gene Wengert and Dan Meyer of the University of Wisconsin.

These first four Technical Bulletins supplement *Air Drying of Lumber* (FPL-GTR 117), a comprehensive, guidebook for air drying lumber. The guide is highly recommended for operators of any size and scale, and can be obtained for free from the Wood Education and Resource Center by calling (304) 487-1510, or emailing: education@werc-hdw.com.

If you have specific questions, please feel free to contact us: Chris Jennings (970)-491-2958, Tim Reader (970) 247-5250, or Kurt Mackes (970) 491-4066, or check out our website at: www.colostate.edu/programs/cowood.

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