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INSTRUCTIONS FOR AIR SEASONING

LUMBER AND SAWED PRODUCTS

by

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The successful air seasoning of lumber and other wood products depends largely upon the correct handling of stock from the time it leaves the saw until it reaches a moisture content suitable for use.

The following points summarize the general rules for laying out the yard and piles, for piling, and for evaluating the factors which control the drying rate. A method for determining the moisture content of wood is also included.

(Note: Following numbers refer to corresponding numbers on diagram on page 3.)

I. General Yard Practice:

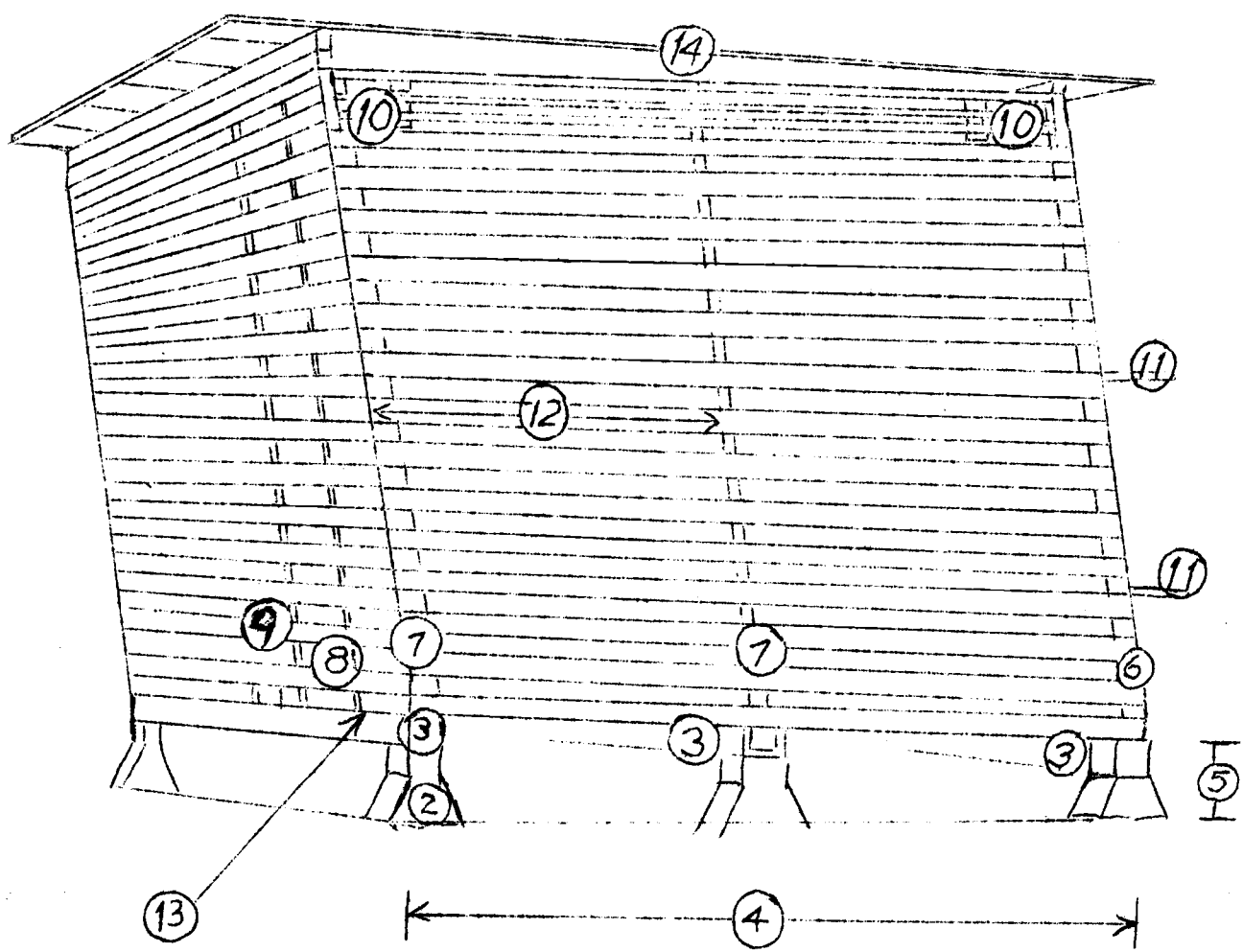
1. Select well-drained area and locate piles so prevailing winds blow through alleys.
2. Use adequate footings or foundations to support the lumber pile to prevent sag in the boards. Concrete or rock foundations are preferable.
3. Use foundations of sound wood, preferably treated or of a durable species, large enough to support load of lumber pile without sag or breakage. Supports should be spaced not more than 5 feet apart.
4. Slope pile about one inch per lineal foot of pile. This facilitates drainage of water.
5. Allow at least 18 inches from bottom of stringer to ground level. This will allow moist air to drain out from under piles.
6. Pile stock as quickly as possible after being cut to prevent undue surface openings (checks).

II. Piling Practice:

7. Keep stickers (crossers of wood used to separate each course of board) placed one directly above the other, thereby preventing crooks in the boards. Stickers should be of uniform size, usually 1" in thickness by 3 or 4" in width.
8. Place stickers at the end of the boards. In fact, the end stickers should overhang the ends of the boards by $\frac{1}{2}$ inch to prevent rapid end drying and subsequent end checking.
9. Apply coat of end sealing, painting to the end of the boards to cut down rapid end drying and end checking. This is of considerable importance in thick stock and in valuable grades.
10. Pile only one length to a pile, if possible. If more than one length, make a pile with alternate short lengths extending first to the front and then to the rear of the pile. Stickers can then be easily placed under any ends less than the total length of the pile by making a line of stickers at the correct interval to support the shorter lengths.
11. Place 1x12 drip boards across the width and at 6-8' vertical intervals at rear of pile to prevent back of pile from getting wet.
12. Use not more than 6 feet between stickers for inch softwood and not more than 4 feet for inch hardwood. Closer stickering may be necessary if stock is cross grained or has a natural tendency to twist.
13. Pile boards close together and without center flues if slow drying conditions are necessary, such as in hardwoods; or pile boards so that 2 to 3 inches or more exist between the edges of the boards and with center flues of 8 inches or more, if stock will stand rapid drying.

III. Factors Influencing Drying:

14. Place cover boards over pile, allowing cover to extend out 2' in front and rear of pile. Cover boards keep rain from entering besides preventing discoloration and checks from the sun. Tie cover boards down to the pile so they will not be blown off.
15. If thick stock or very valuable stock is to be dried, such as turning squares, the whole pile may be boarded up to prevent undue checking from warm dry winds or direct rays of the sun.
16. Wood dries on the outside, first, and as the outside becomes dry some of the water from the interior of the piece moves out to replace the water which has been dried out. As soon as the wood dries down to a certain point (usually about 25% moisture content) shrinkage starts to take place. If the outside becomes too dry in relation to the inside, the outside will want to shrink but cannot because the inside is not yet dry enough to shrink, thereby causing stresses. This condition must be guarded against by controlling the rate of drying. The drying rate may be controlled by controlling one or all of the three physical factors of drying,



(Note: Numbers refer to the corresponding numbers in the general rules for piling.)

namely, air temperature, air moisture and air circulation. Obviously the temperature cannot be readily controlled in air drying because of the difference in summer and winter conditions. For the same reason, air moisture cannot be completely controlled because of the same conditions. The rate of air movement through the pile can be partially controlled, however, by piling the boards closer together or farther apart to allow for more restricted or freer passage of air. If the air movement is slowed up, then the moisture escaping from the surface of the board will not be removed so rapidly and hence the control of air movement can be made to partially control the air moisture. Experience will show just about how far apart the boards should be spaced in order to allow uniform fast drying and yet not fast enough to cause any serious checking.

17. No definite period can be assigned to drying lumber or any other stock to a given moisture content because of the variations in local weather conditions as well as variation in the wood itself. The following table shows the average drying time for different species of softwood lumber in different sections of the country. Wide variations from these averages may be found. (Table condensed from "The Air Seasoning of Wood", U.S.D.A. Technical Bulletin 174.)

Average Drying Period (in days) required for Stock,
piled in the Months indicated to reach 15% Moisture Content.

Stock and Region	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept	Oct.	Nov.	Dec.
Inland Empire 1" Pine	150	120	100	100	90	75	50	75	225	225	225	200
California 1 1/2" Pine	120	90	70	70	60	55	50	45	160	160	140	140
Redwood 1" Redwood	180	150	150	120	100	80	70	100	250	220	200	180
W. Ore-Wash. 1" D. Fir	145	120	100	70	45	40	40	45	270	240	210	180
W. Ore-Wash. 2" D. Fir	165	140	115	90	60	55	55	320	290	260	230	200

IV. Moisture Content and Its Determination:

In the home workshop considerable trouble is caused by using the stock before it is dry enough. For furniture and novelty work the moisture content should not exceed 6 to 7 percent. This moisture content is difficult to obtain in the winter months and even in the summer months in western Oregon. This condition may be partially overcome by placing the stock in a heated, low humidity storage room until the desired moisture content is reached.

For furniture, interior finish, and turned articles, the final usable moisture content should not be much over 7% moisture content. In order that the user may be sure that the stock under consideration is dry enough the following procedure may be followed for determining the moisture content at any period of the drying.

1. From the end of the piece cut off a 2' section (be sure to cut back 2' as the end dries faster than the middle of the board).
2. Cut a 1" cross section from the board.
3. Weigh the cross section to the nearest 1/10 of an ounce or as close as the scales at hand may conveniently weigh. Record weight as original weight.

4. Place in an oven at approximately 212°F. and leave until there is no further loss in weight, usually 24 hours.
5. Remove from the oven and weigh immediately. Record weight as Oven Dry weight.
6. Compute Moisture Content as follows:
Original weight minus Oven Dry weight divided by oven dry weight, multiplied by 100 equals % Moisture Content.
Example: Original weight - 5 ounces $\frac{5-4}{4} \times 100 = 25\%$ moisture content
 Oven Dry weight - 4 ounces
7. In thick pieces it may be desirable to cut away the outside half of the piece in order to arrive at the maximum moisture content of the inside. If stock with a wet center is cut or turned to a deep pattern, the wet center will dry and shrink at a faster rate than the outside, thereby making the wet portion subject to considerable checking.
8. If the moisture content of the stock is not between 7-8% it should be dried until that moisture content is reached before putting into place or use.

Suggested References:

Air Seasoning of Western Softwood Lumber, U.S.D.A. Bulletin 1425. 20¢
Air Seasoning of Wood, U.S.D.A. Tech. Bulletin 174. 35¢
Above available from Superintendent of Documents, Washington, D. C.