

**SEASONING, STORAGE, AND HANDLING OF
SHIP PLANKING AND DECKING:
SUGGESTIONS TO SHIP
AND BOATBUILDERS**

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SEASONING, STORAGE, AND HANDLING OF SHIP PLANKING
AND DECKING: SUGGESTIONS TO SHIP AND BOATBUILDERS¹

By

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The use of properly seasoned material for planking and decking promotes strength and stiffness, reduces maintenance costs, and prolongs the service life of ships and boats. Much of the heavy timber that is used in the fabrication of the larger wood ships must as a matter of expediency be used in a green or only partially seasoned condition (5).² Ship and boat parts that serve to keep out water, such as planking or decking, should, however, be seasoned before installation. Green material, to be satisfactory for even under-water planking, should be seasoned before fabrication, so that there will be no shrinkage during construction, and to allow for some slight swelling after launching to make all joints tight. Green topside planking will subsequently dry and shrink during construction or in service, opening up the seams and splitting at the fastenings or causing the fastenings to loosen. Unseasoned decking will shrink on drying, causing open seams (6). Where, because of design requirements, the total thickness of exterior planking exceeds 4 inches, double planking is recommended because of the difficulty of seasoning thicker material.

In view of the wet conditions under which all types of water craft are operated, the recommended average moisture content for planking and decking is 15 percent, with a minimum of 12 and a maximum of 18 percent, which is somewhat higher than that for land structures. Underwater planking that is installed at an average moisture content of 15 percent will swell moderately after the ship is launched, but such swelling should not be sufficient to force out the caulking. Topside planking and decking installed at a moisture content of 15 percent should give satisfaction when the ship is put in service. No serious deterioration should be experienced while the ship is on the buildings ways, because wood at a moisture content of 15 percent is in approximate equilibrium with ordinary outdoor conditions.

¹-This report was prepared in cooperation with the Bureau of Ships, Navy Department, to assist builders of ships and boats on problems of lumber seasoning, storage, and handling.

²-Numbers in parentheses refer to other publications listed under "Literature Cited."

Testing for Moisture Content

When a shipment of planking or decking is received by a ship or boatbuilder, the lumber should be tested to determine its state of seasoning, because its moisture content at the time of receipt will determine the treatment needed to bring it to the proper moisture content for installation on the boat. Four or five pieces per thousand board feet should be selected at random and tested for moisture content. Electrical moisture meters (1) in good calibration and used according to the manufacturer's instructions are convenient for making moisture content tests. The contacts with which the meter is supplied are generally suitable for testing lumber up to 1-3/4 inches in thickness. For thicker lumber, nails should be driven at the same distance apart as are the contacts of the meter, to a depth equal to one-fifth the thickness of the lumber. An extra cable and terminals are required for use with the nails. If the average moisture content, as shown by the meter, is about 15 percent and individual pieces do not vary more than 3 percent above or below that value, the lumber is at the proper moisture content. If the average is considerably above or below 15 percent, or if individual values vary considerably, measures should be taken that will bring the moisture content of the individual pieces to about 15 percent.

Seasoning

If the average moisture content of the planking or decking, or the moisture content of certain individual pieces, is above 15 percent, the shipment will require further seasoning. The lumber can be air seasoned (2) at the shipyard or kiln dried (7) in any suitable kiln that is available.

Air Seasoning

For air seasoning, lumber is piled outdoors or in an unheated shed and exposed to the drying action of the outdoor air. The pile should be placed in a well-drained area that is free from vegetation. Firm and appropriate foundations should be provided to support the lumber pile, raising the pile about 18 inches off the ground or shed floor (fig. 1). For outdoor piles, sills in contact with the ground (fig. 1,A) should be pressure treated with a good preservative to protect them from decay. Other foundation timbers should be heartwood of a decay-resistant species or similarly preservative treated. Where termites exist, posts should be pressure treated. Stickers should be placed between the courses of lumber and spaces should be left between the edges of the boards. Outdoor piles should have a slope, a pitch, and a good roof for protection against rain, snow, and sunshine (fig. 2).

Thoroughly air-seasoned lumber will attain a moisture content of from 12 to 15 percent in most parts of the United States. During the

winter, in most parts of the country and during long damp periods, air-dried lumber will not reach a moisture content of 15 percent, although the final moisture content attained will not necessarily be high enough to make the planking or decking unfit for use. During the winter in some regions, such as the coastal area of the Pacific Northwest, air-seasoned lumber will not dry below a moisture content of about 25 percent. Under such circumstances, lumber to be used for planking or decking must be placed in a kiln or heated shed to reduce the moisture content to the desired figure. The time required for thorough air seasoning is influenced by a number of factors, but lumber from 3 to 4 inches in thickness will require from 1 to 2 years to dry sufficiently.

* Planking and decking that are over-dry should be handled as is material to be air seasoned. The lumber may be piled on stickers outdoors or in an unheated shed, the object being to permit the lumber to pick up moisture rather than to lose it.

Kiln Drying

Planking and decking can be kiln dried (7) in a much shorter time than is required for air seasoning. To avoid over-drying, which might result in excessive swelling of the planking and decking when the ship is put in service, the relative humidity within the kiln for the final condition should be controlled so that the moisture content of the lumber will not be below about 15 percent. The temperatures and relative humidities given in table 1 will cause lumber to attain a moisture content of about 15 percent.

Handling and Storage

Handling of lumber involves all loading, unloading, transporting, and temporary piling operations that precede storage or fabrication. Storage (3) may extend for relatively long periods of time. During both handling and storage, lumber should be protected against exposure that may cause deterioration or have an undesirable effect on its moisture content.

Lumber is sometimes unloaded from a railroad car or truck and piled roughly on the ground (figs. 3 and 4). Such piles are usually of temporary nature but sometimes, because of lack of labor or the press of other duties, the lumber remains in these piles for a longer time than was intended. During stormy weather the lumber will become wet, while during clear hot weather the exposed areas will become excessively dry. As a result of such exposure, the moisture content of seasoned lumber may become higher and stain and decay may develop. Subsequently, checking, splitting, and warping are likely to occur as the lumber dries. The damage suffered by planking or decking may cause the rejection of some pieces or the enforced use of inferior material.

Planking and decking are seldom used immediately after receipt at the shipyard and must be stored for a considerable period. Storage practices during this period may decrease or increase the utility value of the material. Poor storage may result in increasing the moisture content of the wood and permit stain, decay, surface and end checking, splitting, and warping to occur. Good storage minimizes all forms of deterioration and in addition may improve the moisture content of the material.

Well-seasoned planking or decking should be piled in a shed, either on stickers or in a solid pile. While well-seasoned planking and decking are sometimes solid piled outdoors, this practice is not recommended because any water that seeps into the pile is not readily evaporated. If such material must be stored outdoors, the pile should be built exactly as is an air-seasoning pile (fig. 1). The storage shed need not be heated, except in very damp climates, but should be well-ventilated. The shed should be built on a dry site and should have a tight roof. It need not be completely enclosed, but open sides should be protected by an overhanging roof (fig. 5).

Lumber piles within a shed do not require the slope and pitch recommended for outdoor piles. Pile foundations should provide adequate support to prevent the lumber from sagging and should provide a clearance of about 18 inches from the floor or ground. If the planking or decking is solid piled, occasional cross strips will be required to prevent the pile from tipping over (fig. 6).

End Coatings

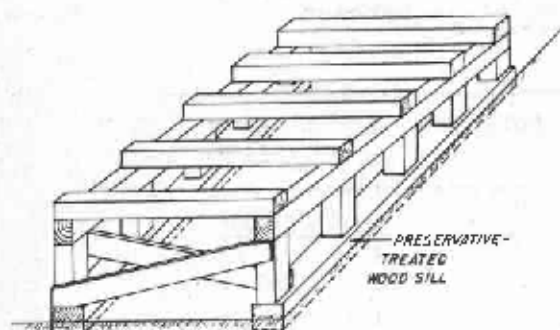
Thick planking or decking to be kiln dried or air seasoned should be end-coated (5, 6). Unprotected ends of lumber in outdoor piles are subject to alternate wetting and drying, which cause end checking (fig. 7). Although it is not always essential that lumber in storage sheds be end-coated, end coatings will prevent rapid changes in moisture content on the ends of the planking and decking during weather fluctuations.

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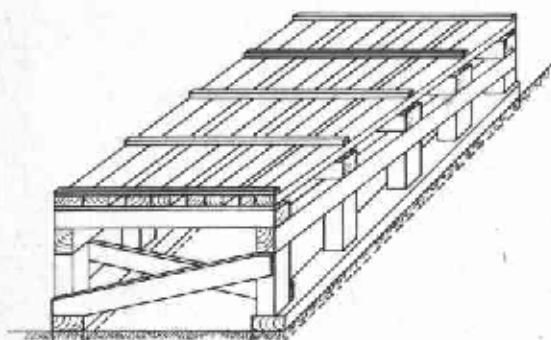
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Table 1.--Temperatures and relative humidities that cause wood to reach a moisture content of 15 percent

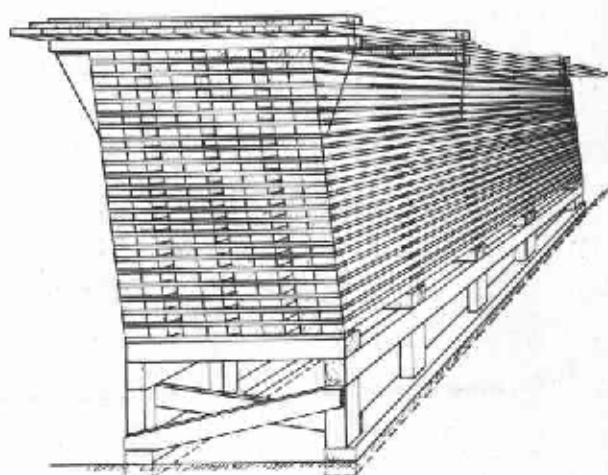
Temperature	:	Relative	:	Temperature	:	Relative
	:	humidity	:		:	humidity
<u>° F.</u>	:	<u>Percent</u>	:	<u>° F.</u>	:	<u>Percent</u>
90	:	78	:	150	:	86
100	:	79	:	160	:	87
110	:	80	:	170	:	88
120	:	82	:	180	:	90
130	:	84	:	190	:	91
140	:	85	:	200	:	92



A



B



C

Figure 1.--Essential features of a good air-seasoning pile of lumber. A, foundation for pile, sloping from front to rear 1 inch per foot of length, with rear of pile 18 inches from ground. Ground sills must be pressure treated with a good preservative and posts and all other foundation timbers either heartwood of decay-resistant species or similarly treated. B, first tier of lumber in place on foundation, with stickers; total flue width one-fifth of total pile width, stickers 1 to 1-1/2 inches thick depending on thickness of lumber and spaced not more than 4 feet apart. C, completed pile, with temporary roof overlapping pile 18 inches at front; stickers aligned above each other to keep lumber flat; roof in two sections to permit use of short boards; upper roof boards centered over joints between lower boards; roof tied to pile with wire.

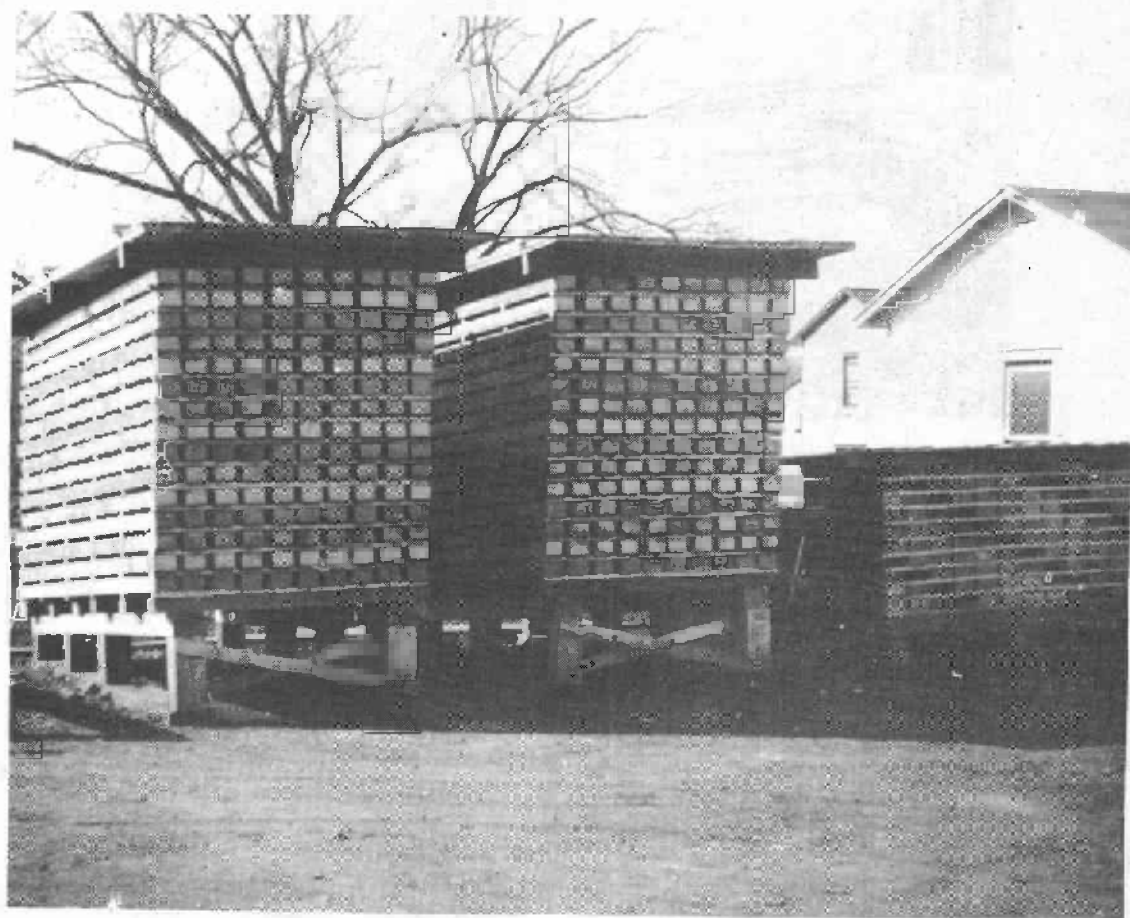


Figure 2.--A well-constructed outdoor air-seasoning pile.
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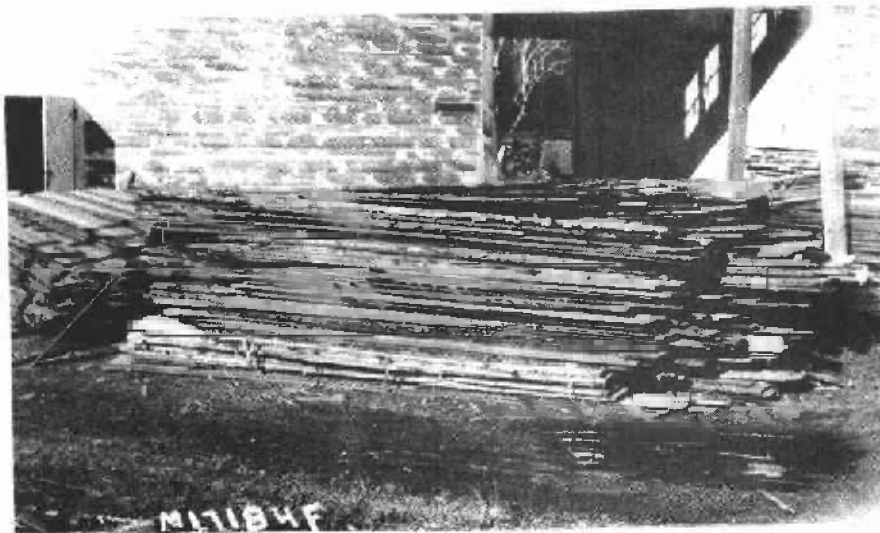


Figure 3.--Rough pile of lumber on the ground, subject to wetting, staining, decay, checking, splitting, and warping.

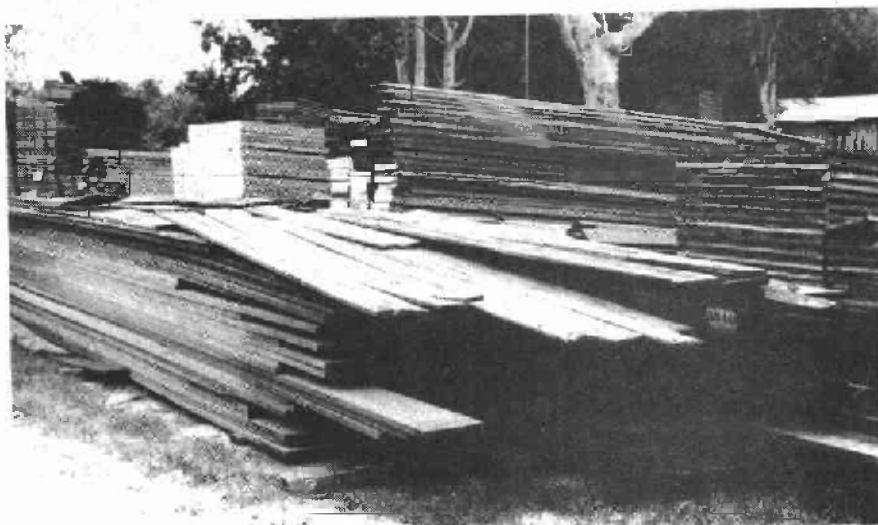


Figure 4.--Temporary pile in the foreground solid piled on strips and provided with a makeshift roof. Lumber left in this pile for any considerable period will deteriorate because of wetting, warping of overhanging ends, and checking and splitting of exposed areas.

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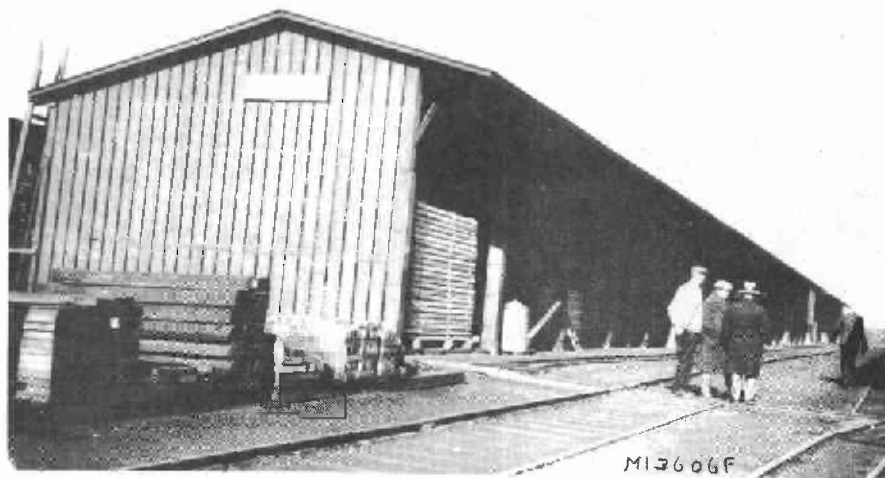


Figure 5.--Open-sided storage shed with overhanging roof (overhang is too short). Note lumber piled on foundations with ground clearance and with stickers.



Figure 6.--Lumber solid piled in a storage shed. Note cross strips used to stabilize pile.

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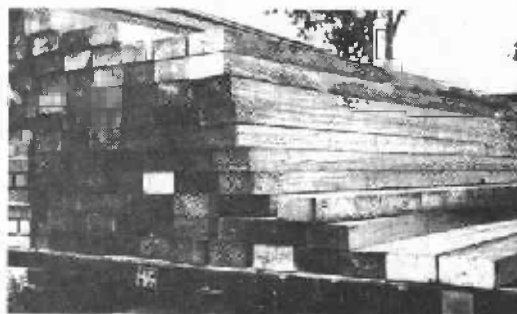


Figure 7.--Ship lumber solid piled outdoors. Alternate wetting and drying cause checks and splits.