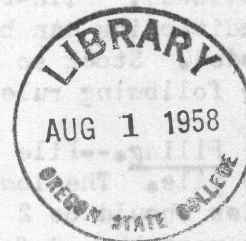


CONDITIONING AND STORING OF AIR-DRIED AND KILN-DRIED AIRCRAFT STOCK

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TO AID THE NATION'S WAR PROGRAM**

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**UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
FOREST PRODUCTS LABORATORY**

Madison, Wisconsin

In Cooperation with the University of Wisconsin

CONDITIONING AND STORING OF AIR-DRIED

AND KILN-DRIED AIRCRAFT STOCK¹

Preparing Air-dried Stock for Manufacture

Usually air-dried stock is not in satisfactory condition for aircraft use, thus the common procedure is to place it in a kiln for final drying and relief of casehardening stresses. If a kiln is not available and if sufficient storage space is available in sheds or rooms heated to or slightly above ordinary factory temperature, and time not important, it might be practical to store air-dried lumber in such rooms until the moisture content complies with the specific requirements. (See Forest Products Laboratory mimeograph No. 1365, "Moisture Content of Aircraft Lumber"). Before use, however, any existing casehardening stresses must be removed by a conditioning treatment in a kiln or in the storage room if the relative humidity can be raised by temperature adjustments or by humidification. The kiln method is described in Forest Products Laboratory mimeograph No. 1367 (Revised), "Kiln-Drying Essentials for Aircraft Stock". Low temperature conditioning can be accomplished similarly except that more time will be needed. Stock so room conditioned may then be used without kiln drying. The following rules should be observed in room drying:

(a) Piling.--Pile foundations should be designed to permit circulation below the pile. The lowest layer of lumber should be 18 inches above the floor. Piles should be 2 feet apart, not nearer than 2 feet to outside walls, and not more than 6 feet wide. Stock should be placed on 1-inch stickers when it is not over $6/4$ inch thick. For thicker material of random length, 1-1/2-inch stickers should be used for greater stiffness and strength. Stickers should be evenly aligned with spacing not to exceed 2 feet for stock up to and including $6/4$ inch in thickness.

(b) Circulation.--If temperatures do not vary more than 56° F. between different parts of the room, effective control of moisture content can be obtained. Small fans may be used to circulate air sufficiently to keep temperatures relatively uniform.

(c) Temperature, humidity, and moisture relations.--By referring to the equilibrium moisture content curve (see accompanying figure) the necessary temperature and humidity conditions required to maintain a desired constant moisture content readily can be determined. To hasten the final drying process, the humidity may be 15 percent below that required to maintain the final moisture content specified. In most cases it should be possible to secure the desired temperature and humidity conditions by controlling only the temperature. For conditioning treatments, however, steam or water sprays may be required.

¹This mimeograph is one of a series of reports issued by the Forest Products Laboratory to aid the Nation's war program.

Storage

Aircraft lumber should be dried to meet moisture content and casehardening specifications, and subsequent storage should be relied upon merely to obtain additional benefits in the form of more nearly uniform transverse moisture distribution and further relief of casehardening stresses. For kiln-dried stock at least two weeks storage is desirable for this purpose, but to maintain the stock in satisfactory condition until used in the shop, the storage conditions should be controlled within the moisture-content range specified. The stock then may be either left on stickers or solid piled.

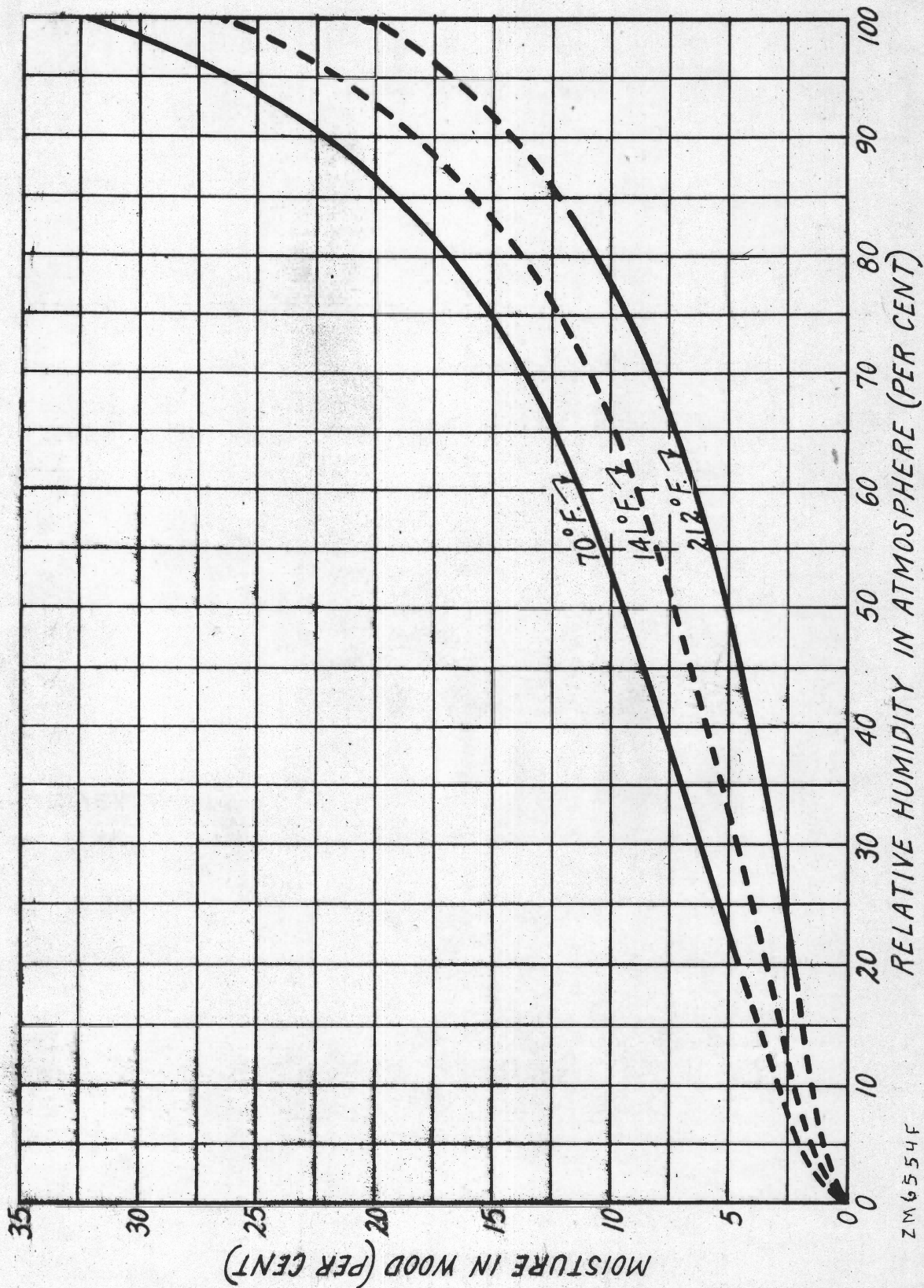
Stock stored under uncontrolled conditions may become unsatisfactory regardless of the method of piling, because a longitudinal moisture gradient may develop in a solid pile and a general moisture pick-up may occur in an open pile.

Storage of all material before manufacture should be under conditions that will deliver the stock sound, free from seasoning defects, and at suitable moisture content. In order to reduce moisture changes or to secure wood at a given moisture content, it may be necessary to equip the storage shed, or factory, with humidity-control equipment so that the range of moisture change may be controlled. The humidity should be so controlled that the moisture content of stock other than propeller material cannot fall below 8 percent or rise above 12 percent. Propeller stock should be stored under conditions that maintain the moisture content between 5 and 7 percent.

Effect of Storage on Defects

Stock that has been dried to the acceptable moisture content, if kept dry, may be held for an indefinite period without deterioration from seasoning defects, such as checking, honeycombing, stain, and decay. Certain woods are subject to insect attack even after drying. The Lyctus powder-post beetle attacks especially the seasoned sapwood of hickory, ash, and oak, and it also damages other hardwoods such as walnut, maple, cherry, elm, yellowpoplar, and sycamore. Other powder-post beetles attack both heartwood and sapwood, and both hardwoods and softwoods. Stored stock that is subject to insect attack should be moved in rotation, so that none of it will remain exposed to infestation for an excessively long time. Such stock should be examined regularly and carefully, and borer-infested stock should be either heat-sterilized or destroyed. Infestation of adjacent stock is merely a matter of time if proper preventive measures are not observed. The larvae of the Lyctus beetles bore inward, giving little or no early indication of their presence and thus making prompt recognition of infestation highly difficult. Borers eat holes from 1/16 to 1/4 inch in diameter and leave wood powder in them. When a hole penetrates an exterior surface, the powder can be jarred out. Badly tunneled wood can easily be broken.

Figure -- Relation of the equilibrium moisture content of wood to the relative humidity of the surrounding atmosphere at three temperatures.



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