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equalizing-conditioning-lumber

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Information on Equalizing and Conditioning Kiln Dried Lumber

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Information by Global Energy Container Kiln for equalizing and conditioning kiln dried lumber.

PDF Version of the webpage (first pages)

Equalizing and Conditioning Treatments

This is the Appendix A section of Dry Kiln Schedules for Commercial Woods.

Equalizing Treatments

Equalizing treatments are used to reduce the moisture content (MC) spread within boards as well as between the wettest and driest boards, in a kiln charge of lumber. An equalizing treatment is suggested when the spread between the dries and the wettest kiln sample boards exceeds about 3 percent MC in the final stages of drying. Begin the equalizing treatment when the driest sample is 3 percent below the final target MC and continue until the wettest piece has dried to the target MC. (1) Suggested dry-bulb temperature (DBT) and wet-bulb temperature (WBT) combinations for several final target MC's are presented in table A-1. Always operate at the highest temperatures at which you can control both DBT and WBT dependably. For example if the final target MC is 7 percent, then use 180 deg. F DBT and 137 deg. F WBT, or a 170 deg. F DBT and a 127 deg. F WBT, etc.

Conditioning Treatments

Conditioning treatments are used to relive the drying stresses and tension set (often called casehardening) that are present at the end of kiln drying and equalizing. Any lumber that will be resawed, ripped, or machined non-uniformly should be conditioned to relieve stresses. Failure to do so will result in warping (cupping, crooking, bowing, or twisting) during machining and will cause difficulty in boring. The conditioning treatment should be the final step in kiln drying after reaching the target MC and completing the equalizing treatment.

Time required for conditioning can vary from 4 to 72 hours, depending on thickness of lumber, density of species, the speed with which the proper depression can be achieved, and the amount of stress relief required. In general, more effective stress relief can be achieved in less time with thinner boards or lower density species than with thicker boards or more dense species. Evaluation of stress relief achieved is made by cutting stress sections, sometimes known as the prong test (fig. A1). A final analysis for freedom from stress cannot be made until the test prongs have air-dried 16 to 24 hours, but a noticeable turning-out of the transverse test prongs immediately after they are cut often indicates that the transverse stresses have been relieved. Good stress relief is commonly defined as straight or nearly straight prongs after the 16- to 24-hour drying period.

Occasionally, the transverse prong test will show no stress, but the lumber will bow when resawed. The cause of the bowing is longitudinal stress resulting from either longitudinal shrinkage differentials due to reaction wood (tension wood in hardwoods). These stresses are most likely to be unrelieved when conditioning temperature or equilibrium moisture content is too low or when conditioned time is too short.

A different kind of stress test can detect longitudinal stress (fig. A2). To be judged stress-free, sawcuts should be visible in every cut with no deflection in the strips either way. If stresses are a problem, conditioning should be at 180 deg. F or higher. The lumber must have been equalized, and the recording instrument must be in calibration. If longitudinal stresses are a problem, the wet-bulb setting can be raised 1 deg. F over the recommended value. Also, the conditioning period can be extended about 4 hours per inch of thickness. Following are suggested DBT and WBT combinations for several final MC's (table A2). Always operate at the highest temperature at which you can control both DBT and WBT dependably. For example, if the final target MC is 7 percent, then use 180 deg. F DBT and 170 deg. F WBT, or 170 deg. F DBT and 159 deg. F WBT, etc.

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