

Kiln-Drying

What is kiln-drying? Kiln-drying is a science of carefully controlling the extraction of moisture from wood at a rate which will not cause damage to the wood.¹

All wood gives off moisture until it obtains equilibrium content. If the logs used in a log home have not been dried to equilibrium moisture content, changes in the dimensions of the log will take place (the logs will shrink). When the logs shrink, problems begin. Consider that most air-dried, green, and standing-dead log home producers make allowances for logs to settle as much as three inches per eight feet of wall height. They also give instructions to the homeowner for adjusting jacks, bolts, and other mechanisms to keep the logs drawn together. Every few years it may become necessary to go under the house to adjust bolts; re-caulking may be required. Doors may stick, floors may become unlevelled, and roofs may sag. These things are not uncommon when using logs with high moisture content.

Moisture content is the amount of water in wood. Moisture can exist in wood as liquid water (free water) or water vaporing cell lumens and cavities and as water held chemically (bound water) within cell walls.² Free water affects thermal conductivity and permeability. Free water has an effect on thermal conductivity which is simply put, the more water in the log walls the lower the insulation value will be. Some log home companies recommend a shell be allowed to set as much as a year before putting a finish on it, chinking it, or staining it in order for the logs to dry out and settle. If the exterior and interior faces of a wet log are stained and sealed, the water has no way to escape. The moisture is locked in, and this can cause mold and mildew to grow behind the sealer and cause the logs to decay. Bound water affects many physical and mechanical properties, and its removal causes changes that affect the use of wood.³

Fiber Saturation Point is defined as the moisture content at which the cell walls are saturated, but no free water remains in the cell cavities. The fiber saturation point of wood averages about 30%, but in individual species it can vary by several percentage points. The fiber saturation point is often considered as the moisture content below which physical and mechanical properties would begin to change as a function of moisture content. Shrinkage of wood does not happen until moisture content inside wood cells goes below the fiber saturation point.⁴

Wood loses or gains moisture until the amount it contains is in balance with that in the surrounding atmosphere. The amount of moisture at this point of balance is called equilibrium moisture content. Expect changes in a log home until the logs reach equilibrium moisture content. Unless the logs have been properly kiln dried, changes will happen over time.⁵

“Wood in service” is exposed to both long term and short term changes in relative humidity in temperature of the surrounding air. Thus wood is always undergoing at least slight changes in moisture content. These changes usually are gradual, and short term fluctuations tend to influence only the wood’s surface. Moisture content changes can be retarded but not prevented by protective coatings.⁶

¹Folkner, Josph C. The Kiln Dried Difference.

²The Wood Handbook. 1999 Forest Products Society. 3-5 p.

³Dry Kiln Operator’s Manual. 1988 Hardwood Research Council. Forest Products Laboratory. 1-6 p.

⁴Dry Kiln Operator’s Manual. 1988 Hardwood Research Council. Forest Products Laboratory. 1-6 p.

⁵Dry Kiln Operator’s Manual. 1988 Hardwood Research Council. Forest Products Laboratory. 1-7 p.

⁶The Wood Handbook. 1999 Forest Products Society. 3-5 p.