

SCIENTIFICALLY SPEAKING: THE FACTS

About Kiln-Dried Solid & Laminated Logs

Shopping for your dream log home?

Then you've probably noted conflicting claims
about air-dried versus kiln-dried logs,
and solid versus laminated logs.

Sorting out the truth from the fiction can be
a confusing and challenging task.

Let us help you...read on!



www.timberhavenloghomes.com

LEFT

Timberhaven kiln-dried
solid logs

RIGHT

Timberhaven kiln-dried
laminated logs

THE GREAT LOG DEBATE...

Kiln-dried log products—solid or laminated—provide the best building materials possible, and this approach is backed by independent experts in the wood technology industry.

Do your due diligence and acquire all the facts before you buy your log package...after all, what's more important than the quality of the logs in your dream home?

Why does Timberhaven kiln-dry its products?

After decades of collective experience in the wood products business, we have found compelling evidence that kiln-dried log products provide the most stable, trouble-free building material. Over the years, we have collaborated with leading independent researchers – including Penn State University's Dept. of Forestry, Montana University's Wood Science Associates, and PFS Corporation – who agree, and help us continually refine our technologies.

How does the process work and the final moisture content determined?

The process begins by placing a large stack of dimensional lumber (cants or 2x laminate plies) in a sealed building and slowly raising the temperature to 170 degrees Fahrenheit. Large fans maintain a consistent drying rate, and moist air is removed with dehumidifiers. The drying rate is carefully monitored, as the outside perimeters of lumber tend to dry faster than the centers. Uncorrected, this imbalance may cause severe checking (cracking).

The final moisture content is measured in accordance to grading rules set forth by the Log Homes Council. After the solid cants (average 19 percent moisture content) or the 2x laminate plies (average 9 percent moisture content) are properly dried, they are ready for milling. The moisture content of our log products is guaranteed in writing.

What benefits do I get?

Wood must be conditioned to the moisture content it will assume during its service life—otherwise, it will have a tendency to shrink and twist.

- a) Kiln-dried logs & timbers are “pre-shrunk” before milling so they are stable and uniform; no severe shrinking or warping occurs.

- b) Any in-service checking, warping and twisting is minimized, because it occurs in the kilns prior to milling. Defective logs are graded out by trained inspectors, and graded logs & timbers are stamped with the Log Homes Council's certification.
- c) Logs & timbers are sanitized, killing mold and fungi, plus any insects, eggs or larvae.
- d) Pitch in wood is crystallized, reducing the possibility of it seeping to the surface.
- e) Finishes can be applied promptly after construction, which provides immediate protection. Also, applications absorb deeper and last longer.
- f) More than 10,000 pounds of water are removed from the typical home, significantly reducing the weight of the logs – even the longest logs can be easily handled by two people.
- g) Properly dried logs provide higher insulation values and reduced energy costs.

What is a laminated log and how is it manufactured?

An individual 2x lumber ply is dried to an average 9 percent moisture content. The dimensional size of the cant needed to produce the desired log profile / timber determines the number of 2x plies required. Each ply within the cant is a ‘full-length’ ply. In other words, Timberhaven does not utilize any finger jointing techniques within our laminated cants & timbers. The utilization of individual 2x plies provides the ability to control the interior and exterior quality and aesthetics of the final log & timber. In addition, it provides the ability to alternate the grain of the individual plies, which results in a consistent structurally higher grade log & timber that meets or exceeds a beam grade certification based on the Log Homes Council grading rules.

After the lamination process is completed, a sample is taken from each piece to ensure it meets or exceeds the strict breaking of 1300 PSI in accordance to ASRM D905 and AITC tolerances set forth by the industry.

Timberhaven's laminating process is monitored and certified through an independent third party quality assurance company (PFS Corporation) whose certification mark is recognized worldwide.



Kiln-dried logs are lighter and easier to handle.

THE EXPERTS SPEAK OUT

KILN-DRIED VS. AIR-DRIED

Air-drying large timbers usually takes longer than a year to achieve moisture content levels that are reasonably acceptable for construction. Proper kiln-drying provides much more predictable, controllable results.

Dr. Paul Smith
Professor of Forest Products Marketing
Penn State University

Proper kiln-drying procedures control the drying environment and reduce the amount of severity of drying induced defects. Drying wood prior to installation provides an opportunity for the wood to maintain relatively stable dimensions during service.

Paul Blankenhorn, Ph.D.
Professor of Wood Technology
Penn State University

The recommended moisture content of wood should be matched as closely as is practical to the equilibrium moisture content (EMC) conditions in service.

USDA, Forest Service
Forest Products Laboratory

There are two important differences between Air-Dried and Kiln-Dried. In a kiln, the wood is usually heated above 130F, which kills all insects, eggs, and fungi. Second, with resinous softwoods, the heat drives off the resin that would be liquid and runny at room temperature.

Dr. Gene Wengert
Dept. of Forestry
University of Wisconsin

LAMINATED

Laminated building logs produced by Timberhaven have demonstrated compliance on a continuous basis with the in-plant quality assurance program described in The Log Homes Council Log Grading Manual. Bending strength and stiffness were verified by tests of 150 full-size specimens in accordance with ASTM D 198.

Larry Beineke, Ph.D., PE
Vice President
Southeast Region PFS Corporation

Strength - *My laboratory has tested the long-term exposure performance of Timberhaven's laminated logs. Our tests for static bending and gross strength found that laminated logs performed at a higher level than solid logs.*

Lamination Integrity - *The laminated test logs were stacked outside, fully exposed to the weather, with no exterior finish applied. During the last 9 years the overall integrity of the logs, with particular attention paid to the glue lines in the laminated logs, are performing well, with no failures noted in over 100 test sections. They are still performing as well as when the logs and joists were originally tested. No failures of any kind have been observed during the 9-year evaluation.*

Overall Evaluation - *I find Timberhaven's laminated logs to be an exceptional product. Structural strength and dimensional stability during severe weather exposure shows these logs provide a mechanically strong, functionally durable and aesthetically attractive log structure. I look forward to another observation cycle, but I doubt my tenure at UM College of Forestry will be long enough to witness any diminishment in the performance of these examples of excellent manufacturing.*

Edwin J. Burke, Ph.D.
Director, University of Montana
College of Forestry and Conservation

What are the additional benefits of laminated logs?

The lamination process is a time-tested procedure that provides additional benefits beyond the benefits of traditional kiln-dried solid logs & timbers, including:

- Virtually no checking.
- Dryer (average of 9 percent moisture content) than other log options.
- More refined appearance—Individual plies allow us to control the interior and exterior aesthetics of our products. Accepts stain and preservative the same as the conventional logs and timbers.
- Stronger—As an engineered product, the alternating grain of the individual plies provides significant strength and stability.
- Laminated cants provide additional log profile options.

Can air-dried logs provide the same benefits?

The rate and degree at which moisture is removed from wood is dependent upon the temperature, relative humidity and air velocity of the environment. Air-drying typically takes place in an open-air storage yard—with little or no control over the environmental conditions. Kilns provide control over these factors.

While it is technically feasible to air-dry logs to 19 percent moisture content, it could take as long as two years of storage to reach that target. Local weather conditions impact the seasoning of the logs, so the results are much more unpredictable. In addition, air-dried logs are not sanitized, pitch can seep to the surface, and there is typically a waiting period after construction prior to the application of preservatives and finishes. Finally, when building with unseasoned logs, allowances must be made for “settling” (shrinking) after construction.

Will the air-dried logs in the wall shrink after construction?

With unseasoned logs, yes—and it can be severe. Temperatures and humidity levels on the inside and outside of the home impact the dynamics of shrinkage. When logs are placed in service, the interior surface is exposed to relatively stable conditions compared to the outside environment. We kiln-dry our logs to best condition them to these two fluctuating conditions. The inside profile of our logs sometimes shows a small amount of shrinkage, but the center and outside portions remain stable and weather-tight. Our logs require no provision for settlement after construction.



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Do kiln-dried logs & timbers reabsorb moisture?

After the wood is kiln-dried the moisture content remains relatively constant unless subjected to high humidity or water. Logs exposed to a constant high humidity (90 – 95 percent) gain moisture on the outside portion only – but this occurs at a slow rate. In constant high humidity, the moisture content can increase to a maximum of 20 percent after a very long period of exposure. Logs exposed to occasional rain may have the moisture content increase above 20 percent; however, the water evaporates from the log after the rain. Note that the immediate application of water-repellent wood preservative, which we recommend for all our homes, plays a vital role in retarding reabsorption.

If I choose a kiln-dried manufacturer, what questions should I ask?

More and more log home manufacturers claim to kiln-dry their logs, but unfortunately there are no industry standards. Some companies' logs spend only a few days in the kiln; our controlled process requires more than 30 days. There are huge differences in the logs that kiln-dried manufacturers supply, so qualify the companies you are considering by asking these questions:

- How and where are the logs dried?
- What temperature levels are achieved in the kiln?
- What moisture content are the logs dried to, and is the moisture content guaranteed in writing?
- How is the moisture content measured?



Moisture content of our products is guaranteed

How can I find out more?

Timberhaven offers two great choices:

Kiln-Dried Solid Logs & Timbers – The choice for traditionalists who prefer the rustic appeal of a log home—one filled with the distinctive character and charm so valued by log home purists.

Premium Kiln-Dried Laminated Logs & Timbers – The strongest, most stable and virtually check-free products available.

Contact your Timberhaven Sales Representative to learn more about the advantages of kiln-drying and the added benefits of laminated logs. Or, why not sign up for one of our **Planning and Construction Workshops**? Tours of our plant are part of the workshop agenda, and you'll also learn more about the manufacturing, design, and construction processes. For more information on workshops please see your Sales Representative or visit our website. We look forward to hearing from you!

