



Kiln Drying of Wood –

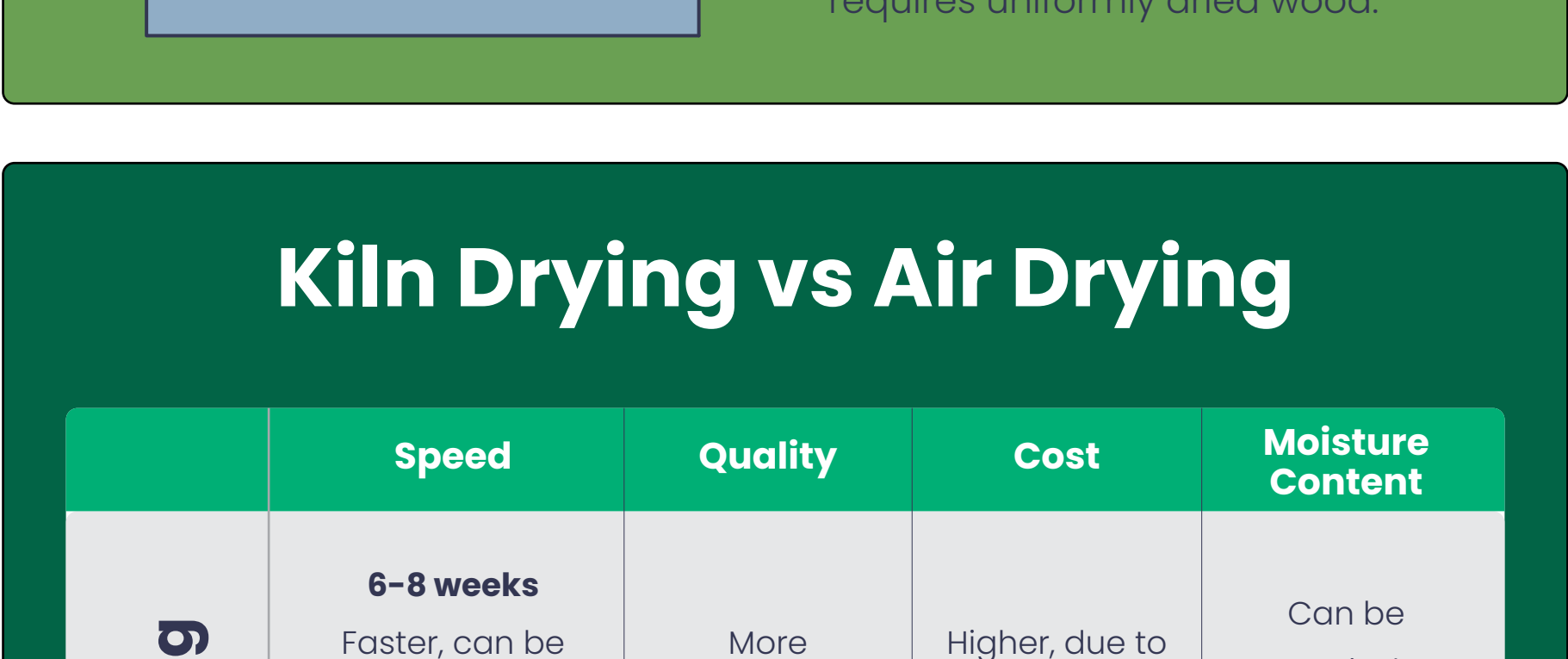
The Ultimate Guide to How Kiln Dried Logs & Firewood Are Made



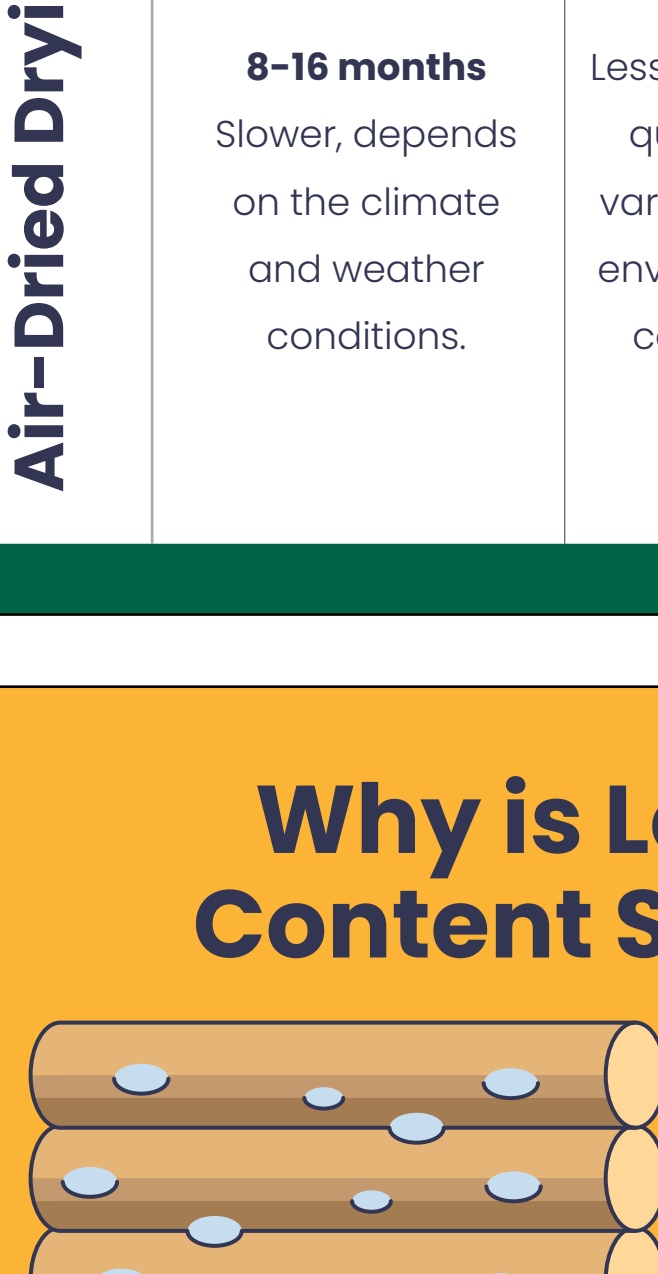
Kiln drying is crucial for the efficient use of wood products. It reduces weight, enhances strength, and increases resistance to biological deterioration. Proper machining, gluing, and finishing of wood are only possible once moisture content is reduced to an appropriate level.

What is Air-Drying?

Air-drying is a natural process where logs are left in the open air to reduce moisture content. This process can take up to **8-16 months** and results in a non-uniform drying process, with the wood often being moister in the middle compared to the edges.



What is Kiln Drying?

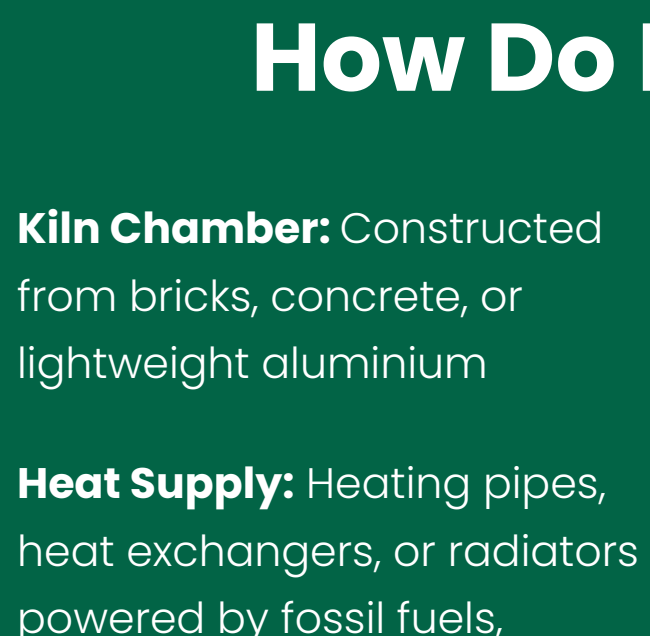


Kiln-drying takes place in a closed chamber where airflow, temperature, and humidity can be controlled. The goal of kiln-drying is to move the moisture to the surface of the timber and let it into the atmosphere. The drying time varies depending on usage but usually takes 1-2 weeks for firewood and 6-8 weeks for furniture which requires uniformly dried wood.

Kiln Drying vs Air Drying

	Speed	Quality	Cost	Moisture Content
Kiln-Drying	6-8 weeks Faster, can be controlled and optimised for different types of wood.	More consistent, reduces the risk of defects like warping and splitting.	Higher, due to the need for specialised equipment and energy use.	Can be precisely controlled, usually reduces to 20% or below [1]
Air-Dried Drying	8-16 months Slower, depends on the climate and weather conditions.	Less consistent, quality can vary based on environmental conditions.	Lower, as it uses natural processes and requires less equipment.	Less control, but properly stacked will dry to about 15-20% [3]

Why is Low Moisture Content So Important?

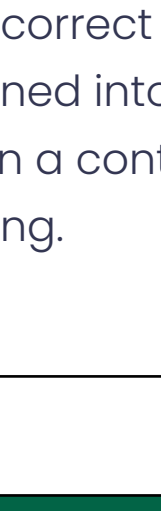
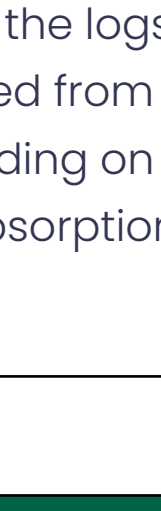
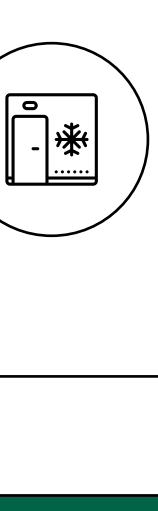


A low moisture content of **20%** or below is a crucial factor that underpins many of the advantages of kiln-dried wood, ensuring:

- optimal burning efficiency
- reduced smoke and emissions
- minimal creosote build-up
- extended shelf life
- enhanced heat output
- decreased risk of chimney fires
- easier ignition
- eco-friendliness

How Do Kilns Work?

- 1 Kiln Chamber:** Constructed from bricks, concrete, or lightweight aluminium
- 2 Heat Supply:** Heating pipes, heat exchangers, or radiators powered by fossil fuels, electricity, or renewable energy
- 3 Humidifiers:** Maintain humidity through atomised water sprays or perforated pipes, injecting steam into the wood
- 4 Fans:** Positioned on the roof and walls, providing essential air circulation to release moisture into the atmosphere



Types of Kiln Drying

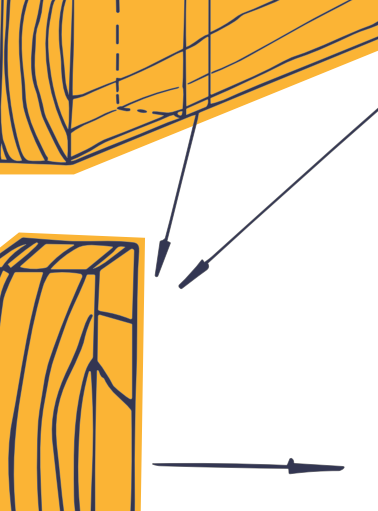
	Operation	Speed	Cost	Quality	Energy Efficiency
Conventional Kilns	Uses steam flow into the kiln through pipes and radiates heat into the kiln's atmosphere.	Moderate	Lower initial cost, but higher operating cost due to energy use.	Good, but can vary based on conditions.	Lower, due to the need to constantly heat air.
Dehumidification Kilns	Uses a dehumidifier to remove moisture from the air, recycling heat within the kiln.	Moderate	Higher initial cost, but lower operating cost due to heat recycling.	Good, and more consistent due to controlled environment.	Higher, due to recycling of heat.
Vacuum Kilns	Uses vacuum pressure to remove moisture from wood.	Fastest	Highest initial cost, but lower operating cost due to efficiency.	Excellent, due to precise control over drying conditions.	Highest, due to efficient use of vacuum pressure.

The Process of Kiln Drying: Step-by-Step

- 1 Harvesting:** Trees are cut down, and logs are prepared for drying by species, size, or by end-use. The logs are then cut into timber or lumber as required and sorted.
- 2 Pre-drying:** Logs are air-dried to reduce the initial moisture content.
- 3 Loading the Kiln:** The pre-dried logs are stacked in the kiln, a chamber where air circulation, relative humidity, and temperature can be controlled.
- 4 Kiln Drying:** The kiln is heated to around 170°F, and moisture is slowly removed from the logs. This process usually takes 6-8 weeks.
- 5 Cooling and Conditioning:** The kiln is cooled, and the logs are conditioned to equalise moisture content.
- 6 Unloading and Storage:** Once the logs reach the correct moisture level, they are removed from the kiln, planed into final dimensions, and sorted depending on the grade in a controlled climate to prevent moisture absorption and swelling.

Understanding Kiln Performance & Stresses

During the kiln-drying process, drying stresses develop in three stages:



When the wood is freshly cut and placed in the kiln, it has a lot of moisture throughout its structure (**~60%**). There are no stresses and the wood is in a relaxed state.



As the kiln is heated, the outer surface of the wood starts losing moisture faster than the inner core. This creates stresses because the outer shell wants to shrink, but the inner core resists it.



As the drying continues, the inner core eventually loses enough moisture to catch up with the outer surface. At this point, both the outer shell and the inner core have similar moisture levels, and the wood is more balanced.



Kiln performance can be monitored by taking kiln samples. The number of samples depends on the condition and drying characteristics of the wood being dried, the type of kiln, and the final intended use of the material.

Kiln Schedules

- Kiln schedules involve specific temperature and humidity levels in the kiln to dry wood without defects.
- A typical schedule includes various stages of drying with corresponding temperatures and relative humidity.
- Schedules vary based on wood species, thickness, grade, and intended use.
- The process may require multiple cycles depending on wood characteristics.

6 Benefits of Kiln Dried Wood

- Reduced Weight:** Easier to handle and transport.
- Increased Strength:** Generally stronger than green wood and less warping or twisting due to reduced moisture content.
- Improved Workability:** Better for machining, finishing, and gluing.
- Better Heat Insulation:** Enhanced electrical and thermal insulation properties.
- Decay and Insect Prevention:** Less susceptible to insects, mould, and fungi, ensuring longevity.
- Environmentally Friendly Choice:** The heat treatment eliminates the need for harsh chemical treatments.

Interesting Facts and Statistics



In comparison to well-seasoned or kiln-dried wood, the emissions from burning newly felled wood are more than twice as high. **1**



Newly felled wood can contain up to **60%** moisture content, while naturally dried or seasoned wood, as well as kiln-dried wood, typically has an average moisture content ranging from 12% to 20%. **2**

- Wet wood starts at ~60% moisture content
- Generally, air-drying wood for 3 to 6 months can reduce its moisture content by approximately 30%
- Extending the air-drying period for an additional 6 to 9 months and sheltering the wood under a storage shed can further reduce its moisture content to 12% **3**
- Therefore, kiln drying saves 9 to 15 months compared to air drying **3**

Kiln dried wood complies with the requirements of the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 that now apply in England. This states that wood fuel sold in volumes under 2m³ must be certified as Ready to Burn **4**

An infographic from CoziLogs

Why not visit the CoziLogs website? All our firewood is kiln dried and is available in bags, nets, and crates and comes certified as Woodsure 'ready-to-burn' and comes from UK forests and woodlands.

