

INTRODUCTION

to

KILN DRYING

Straightforward Answers To 25 Important Questions

Here's a Sample

Why Dry Lumber?

What's The Difference Between Drying Hardwoods & Softwoods?

What Are The Different Types of Kiln Drying?

How Does A Dehumidification Kiln Work?

How Do I Determine What Size System I Need?

Are DH Kilns More Expensive To Run Than Conventional Kilns?

What Is The Nyle XDH System?

What Type Of Heating System Should Be Used For Initial Warmup?



DRY KILN SYSTEMS
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TABLE OF CONTENTS

Basic Facts on Drying Lumber

<i>Why dry lumber?</i>	2
<i>How much water is in lumber?</i>	2
<i>What is “free water” and “bound water”?</i>	3
<i>What’s the difference between drying hardwoods and softwoods?</i>	3
<i>Once wood is dry will it remain dry?</i>	3
<i>Can drying cause the wood to split or check?</i>	4
<i>Does the thickness of lumber affect the drying rate?</i>	4
<i>Can the pitch be set in pine?</i>	4

Different Drying Methods

<i>What is air drying?</i>	5
<i>What is shed drying?</i>	5
<i>What is forced air or fan/shed drying?</i>	5
<i>What is predrying?</i>	5
<i>What is kiln drying?</i>	6

Different Types of Kiln Drying

<i>What is a solar kiln?</i>	7
<i>What is a conventional kiln?</i>	7
<i>What is a vacuum kiln?</i>	7
<i>What is a dehumidification kiln?</i>	8

Facts of Dehumidification Kilns

<i>Aren’t DH kilns more expensive to run than conventional kilns?</i>	9
<i>Is a DH kiln as fast as a conventional kiln?</i>	9
<i>What about ozone problems with refrigerants?</i>	9
<i>What is the Nyle XDH System?</i>	9
<i>How important is airflow?</i>	10
<i>Should the fans reverse?</i>	10
<i>What type of heating system should be used for initial warmup?</i>	10
<i>How do I design the kiln chamber?</i>	11
<i>How do I determine what size system I need?</i>	11
<i>Should the drying unit be in the kiln or in an equipment room?</i>	12
<i>What is conditioning?</i>	12

Capacity Chart for Nyle L-Series Lumber Dryers

<i>Annual Production, Drying Times, Drying Costs</i>	14
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DRY KILN SYSTEMS

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The World Leader in Lumber Drying Systems

Since 1977, Nyle Corporation has been building the world's most energy efficient lumber dryers. We pioneered the development of dehumidification drying as a practical, economical drying method. Today our systems set the standard for performance and efficiency around the world.

Nyle drying systems are easy to install and use, yet they give you the power, precision control, and outstanding reliability you need for optimum drying performance in almost any drying application. Our patented XDH system, a breakthrough in dehumidification drying, constantly monitors and regulates the airflow within the dehumidifier. It enables Nyle XDH Systems to work over a wider temperature range and with greater energy efficiency than any other system in the world. Compared to conventional kilns, which waste energy by venting heated air, our total recovery dehumidification systems use 60% to 80% less energy, and give you much lower operating costs.

#1 in Quality and Service

With Nyle, you get the kind of horsepower other companies don't offer. We give you up to three times more horsepower per dollar than our competition. We give you year-in, year-out reliability. And our units offer extra quality features like corrosion resistant aluminum cabinets, and dehumidification coils that are coated in a five-step process with a special coating. And more of the features that make your system last longer and perform better.

But you get more than just great systems with Nyle. You also get the best support in the industry. When you call us, you can talk with the people who actually built your system. As the largest manufacturer of dehumidification drying systems in the U.S., we have the know-how to answer your questions and give you the expert advice you need. If you're not sure what size drying system you need or how best to design and build your kiln chamber, we won't give you a selling pitch: we'll give you a realistic analysis of the numbers, and a straight answer on what type of system will work best for you.

We Invite You To Call

To answer some of your questions on lumber drying, we've prepared this booklet. It takes a look at things like the drying process itself, the different kinds of systems available, and the way dehumidification drying works.

Call us with your questions. Let us show you why Nyle is the world's number one choice for economical, optimum performance drying systems.

BASIC FACTS ON DRYING LUMBER

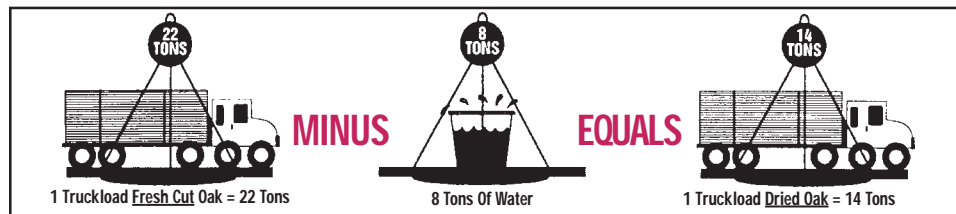
Why Dry Lumber?

Fresh cut lumber contains a great deal of water. If the water is not removed, the lumber can't be used to produce a high quality finished product. Properly dried lumber sells for a higher price and is much easier to work with than lumber that hasn't been dried. When lumber is dried right, it machines better, glues better, and finishes better. Drying also improves the strength of the lumber, kills infestations, hardens pitch, preserves color, reduces weight and controls shrinkage. Lumber that is not dried under controlled conditions is prone to warping, staining, and other degrade that diminishes its selling price and workability. With a Nyle dehumidification kiln, successful lumber drying for better profitability is easy and affordable for virtually any size operation.

How Much Water Is In Lumber?

A lot. In fact, some species of wood are more than half water in terms of their weight when they're fresh cut.

Moisture content in lumber is generally expressed as a percentage of the dry weight. For example, if a fresh cut board weighs five pounds per board foot, then weighs 3 pounds per board foot after it's been dried in an oven to 0% moisture content, that means it had two pounds of water in every board foot. Two pounds of water per board foot compared to the lumber's dry weight of three pounds per board foot is a ratio of 2:3—so the lumber has a moisture content of $\frac{2}{3}$, or 67%. That's similar to oak, for example, which is usually about 65% moisture content when fresh cut.



It's really astounding how much water has to be removed from wood to make it suitable for finished products. Take the example of a truckload of oak. Fresh cut oak weighs about 5.4 pounds per board foot. So a truckload of 8,000 board feet weighs about 43,560 pounds—just under 22 tons. Once you remove enough water to get the oak down to a moisture content of 6%-8%, it weighs about 3.5 pounds per board foot. So that truckload now weighs 28,000 pounds, or about 14 tons. That means that to completely dry a truckload of 8,000 board feet of oak, you have to remove 15,560 pounds of water—almost eight tons! That's why choosing the right drying system and using the proper method are so important.

What Is “Free Water” and “Bound Water”?

When trees are growing there is liquid water moving through the cells of the wood. This water is called “free water” because it exists in water form and can be removed relatively easily from the wood. “Bound water” is water that becomes part of the wood fiber itself, and is more difficult to remove.

When wood is dried, the first thing that happens is that the free water evaporates until the lumber drops to what’s called “Fiber Saturation.” Fiber saturation is generally reached when the moisture content gets to about 28%. At that point, all the free water is gone and only bound water remains. Wood does not shrink until it is below fiber saturation and the bound water begins to be removed from the cells of the wood.

What’s The Difference Between Drying Hardwoods And Softwoods?

This is a commonly asked question, but the actual species of the wood is really more important to consider than just whether it’s a hardwood or a softwood. The terms hardwood and softwood generally refer to whether the wood comes from a tree with leaves (hardwood) or a tree with needles (softwood). But some hardwoods are actually softer than many softwoods, so there’s no general drying method that applies as a rule to all hardwoods or all softwoods.

Different species require drying at different temperatures and different speeds to produce the best results. Oak has to be dried slowly or it degrades badly. White pine needs to be dried at a fast rate or it stains and molds. But that doesn’t mean all hardwoods should be dried as slowly as oak, or that all softwoods can be dried as quickly as white pine. There’s a proper method that’s been determined for nearly every species of lumber to produce the best results. Check with your Nyle representative for information on drying a particular species.

Once Wood Is Dry Will It Remain Dry?

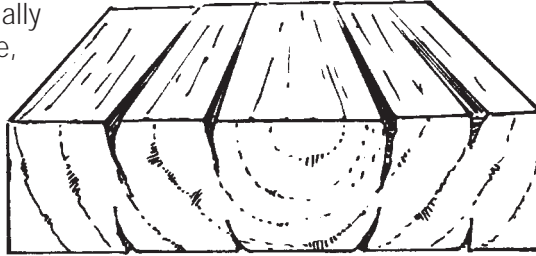
Wood is always trying to come into equilibrium with the air surrounding it, so its moisture content can change somewhat after it’s been dried. In dry air, the wood gives up water to the air until it is in equilibrium. When the air is more humid, wood absorbs water from the air. Wood expands when it absorbs water, and shrinks when it gives up water.

In worst-case winter heated conditions in northern climates, wood may dry to a moisture content of 6% as it gives up water to the dry air. In the humidity of summers, it may pick up moisture to about 15-16%. If dried lumber is exposed to outdoor conditions long enough, it will eventually reach about 12% moisture content, which corresponds to the average annual equilibrium point in most geographic areas.

Can Drying Cause The Wood To Split Or Check?

Wood does shrink as it dries, but the shrinkage doesn't start until the lumber is below fiber saturation, about 28% moisture content. If the outside surface is below 28% while the center of the board is still above fiber saturation, the outside will try to shrink while the center doesn't—and if this continues until the surface becomes too dry in relation to the core, the lumber will split or check.

Controlled drying in a kiln, especially when drying from the green state, reduces or eliminates splitting and checking. When lumber is air dried, however, there is no control over the drying process, and the weather can easily cause splitting and checking that results in losses.



This type of costly splitting can be eliminated with controlled kiln drying.

Does The Thickness Of Lumber Affect The Drying Rate?

Yes. The lumber industry generally refers to lumber thickness in terms of quarter-inch multiples. Therefore, one-inch thick lumber is referred to as 4/4, one and one-half inch lumber is 6/4, etc. Generally speaking, drying times are roughly proportional to the thickness. That is, 8/4 lumber usually takes a little more than twice as long to dry as 4/4.

Can Pitch Be Set In Pine?

When softwoods are dried, pitch sets at the final temperature of the drying cycle. For example, if the last step of drying is 120°F (approx. 50°C), then the lumber has to be heated to 120°F again before the pitch starts to run. Some high-speed sanding equipment used by major furniture manufacturers heats the wood to 160°F, so these manufacturers require pitch set to that temperature to avoid wasting sanding belts. If the pitch must be set, it can be done by heating the lumber at the end of the drying cycle to the necessary temperature. This can be done even if the dehumidifier is not rated to operate at that temperature, because during pitch setting you're not removing water with the dehumidifier, you're just applying heat.

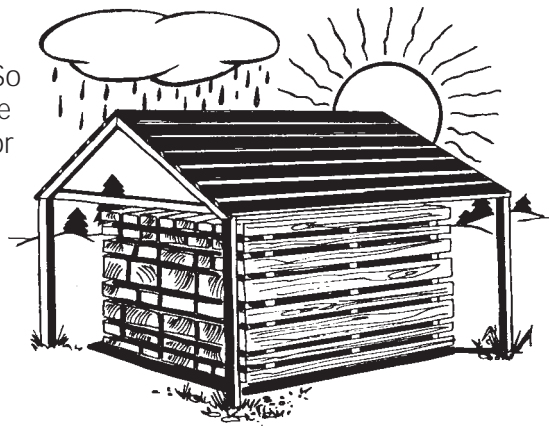
DIFFERENT DRYING METHODS

What Is Air Drying?

Air drying refers to drying that takes place using the natural wind and sun. Lumber is stacked on stickers and placed in a manner that allows the prevailing winds to blow through the pile and dry it. The drying is strictly dependent upon the weather, which can dry lumber too fast and cause checks and damage, or dry it too slowly, which is expensive. For lumber that is to be used in furniture or some other finished product which requires a 6-8% moisture content, air drying by itself can't do the whole job. It's often used as a first step, with the lumber being placed in a kiln for final drying. Air drying poses real problems with damage and degrade. And it's often the most expensive way to dry once you include interest on the money tied up, labor, land costs, and degrade loss.

What Is Shed Drying?

Rain and direct sun can severely damage wood while air drying. So instead of air drying lumber, some people put lumber under a roof or shed to protect it from the elements. This enhances quality somewhat over air drying, but it extends the drying time. It also requires an investment in sheds—and it still doesn't allow much control over factors like humidity, air flow, and temperatures.



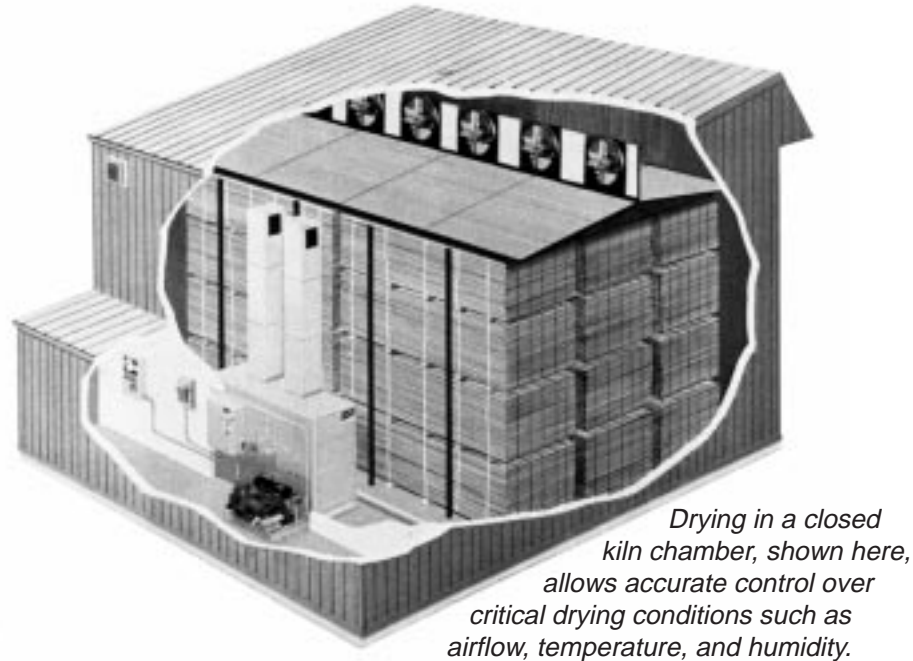
What Is Forced Air Drying Or Fan/Shed Drying?

This is shed drying as described above, except fans are used to force air through the lumber rather than relying upon the natural wind. This is faster than air drying or shed drying, but the cost of operating the fans is quite high. Also, the capital investment is fairly high in proportion to the amount of drying that can be accomplished.

What Is Predrying?

Predrying is used to remove most of the free water from lumber before it is placed in a kiln for final drying. In a predryer, lumber is stacked in a building where heat and humidity are controlled. The temperature is usually kept around 90-100°F (35°C). The lumber is dried to 20-30% moisture content, then placed in a kiln for final drying.

Though predryers cost about the same to build as kilns when you compare costs on the basis of your annual production, they require extra handling of the lumber, and they actually cost more to run than dry kilns. They are usually only used in combination with dry kilns that are old or inefficient and cannot be used to dry green lumber.



What Is Kiln Drying?

In kiln drying, lumber is placed in a chamber where airflow, temperature, and humidity are controlled to provide as rapid drying as can be tolerated by the lumber without increasing defects. There are several types of kilns. The different types are defined by the manner in which the temperature and humidity are controlled. The three most common types of kilns are Conventional, Dehumidification, and Solar.

DIFFERENT TYPES OF KILN DRYING

What Is A Solar Kiln?

There are several types of solar kilns, but they all generally rely on some type of solar collector to provide the heat energy that evaporates the water in the lumber. Unlike solar heating for an office or home, in lumber drying it's not possible to reduce the heat requirement to the point where solar heating can be competitive. When you've got a certain amount of water to remove from a certain amount of wood, you need a certain amount of total heat to do it, and that heat requirement can't be changed.

Solar kilns are slow, and dependent upon the weather. In hot climates they can degrade lumber due to excessive drying. In colder climates they are unreliable and slow. Some solar kilns use electric-powered fans to circulate air through the lumber, but the cost of running these fans is high—and because of the long drying times, you've got to run the fans for a long time, making solar drying quite expensive.

What Is A Conventional Kiln?

A conventional kiln uses heat provided by either steam or hot water coils or a furnace to heat the kiln chamber and remove water from the wood. The water removed from the wood is turned into water vapor by evaporation, then exhausted from the kiln with the heated air. This process takes a great deal of heat and requires constant heating of air, so these systems are not as energy efficient as dehumidification kilns. To remove one pound of water from the lumber, a conventional kiln has to draw in about 400 cubic feet (or 12 cubic meters) of air, heat the air, then exhaust it with the evaporated water. Between heating these large quantities of air and heating the water to evaporate it, conventional kilns have a very high heat requirement. They can provide a very good quality of lumber if a good method of kiln control is provided, but their energy consumption is much higher than that of a dehumidification kiln.

What Is A Vacuum Kiln?

When lumber is placed in a vacuum, the water evaporates quickly. Vacuum kilns take advantage of this fact to achieve drying times that are usually only a fraction of the time required for conventional or dehumidification kilns. A major drawback of vacuum kilns, however, is that the chambers are small, so the kilns cannot dry large quantities at any one time.

It is also necessary to provide heat to the lumber continuously in a vacuum kiln. To do this, some systems use electric blankets in contact with each piece of lumber, while some use heat coils or microwaves. All of these systems are extremely expensive to run when compared to dehumidification or conven-

tional kilns. Operating costs are usually three to four times higher than costs for dehumidification kilns. Initial or capital costs are also much higher. When compared on the basis of cost per thousand board feet of annual production, the costs for a vacuum system are much higher than dehumidification.

What Is A Dehumidification Kiln?

A dehumidification kiln uses a heat pump system to remove the water from lumber. One primary advantage of this type of system is that it recycles heat continuously instead of venting away heated air, as a conventional kiln does. So it is more energy efficient and its operating cost is usually lower. This is true even though a dehumidification kiln uses electric energy to run the fans, the blower that draws the air over the dehumidification coil, and the refrigeration compressor; while a conventional system burns less expensive fuel such as gas or wood. The reason a dehumidification system costs less to run even though a conventional system burns cheaper fuel lies in the dehumidification system's ability to conserve energy by recycling heat. With the heat being constantly recycled, the amount of electricity demanded by the system is small, so it comes out ahead of a conventional system that may use cheaper fuel, but needs a lot more of that fuel to do the same job.

In a dehumidification kiln, heated air (usually starting at a heat of about 80°F, or 27°C) is circulated over the lumber with separate circulating fans, evaporating the water contained in the wood. The hot, moist air then passes over a cold refrigeration coil where air is cooled to about 60°F (15°C). At the cooling coil, the evaporated water in the air condenses into liquid form and flows down the drain as a stream of cool water—instead of as a cloud of steam carried by heated air, as in a conventional kiln.

When the air is cooled at the cold coil, the heat removed from the air is immediately used by the system to heat the air back up again. The energy efficiency of the heat return is such that each time this process occurs, the air leaves the dehumidifier at an even hotter temperature than when it entered. As the air temperature in the kiln rises, it can ultimately reach temperatures as high as 160°F (72°C). If the temperature becomes higher than desired, the operator can vent surplus heat to the outside.

Dehumidification kilns are very easy to operate and are very popular with beginning lumber dryers. They are also popular with experienced operators who want a system that requires minimum attention to get zero defect drying. Dehumidification is usually the least expensive system to install by a wide margin. Drying times are about the same as conventional kilns that operate at comparable temperatures.

FACTS ON DEHUMIDIFICATION KILNS

Are Dehumidification Kilns More Expensive To Run Than Conventional Kilns?

No. They're actually a good deal less expensive. First of all, a dehumidification kiln is much more energy efficient, so that cuts its operating cost dramatically compared to a conventional kiln. Additionally, with a conventional kiln you have to amortize the higher cost of the boiler, you have to pay additional taxes and insurance, and you have higher handling and labor costs for your operation. When you add it all up, dehumidification kilns are usually much more economical.

To make your own detailed cost comparisons, give us a call. We'll help you do a complete operating cost analysis based on your local electric rates and other fuel costs.

Is A Dehumidification Kiln As Fast As A Conventional Kiln?

With a Nyle XDH system, the answer is usually yes, because of its unique ability among dehumidifiers to dry at temperatures up to 160°F (72°C). Not all dehumidifiers, however, can dry at these higher temperatures. Some dehumidifiers can only operate to 120°F, and those take up to 2½ times as long to dry as a conventional kiln. Others can go up to 140°F, but those still take 50% longer to dry than a conventional kiln. The Nyle XDH system allows a greater temperature range for the unit, and speeds drying times significantly.

What About Ozone Problems With Refrigerants?

Nyle uses new, ozone-friendly refrigerants in all its systems. We conduct constant testing and research to make sure that both our existing systems and new systems use the right refrigerants for efficiency, environmental sensitivity, and practicality. For more information on our ozone-friendly refrigerants, give us a call.

What Is The Nyle XDH System?

The Nyle XDH System is a unique self-regulating feature patented by Nyle. It increases the operating efficiency of the system and allows the dehumidification system to operate to temperatures as high as 160°F (72°C). No other dehumidification system sold in North America has this feature, or can operate over the wide temperature range that Nyle XDH systems handle. The XDH system constantly monitors the air temperature leaving the cooling coil and modulates the airflow over the coil to maximize the system's water removal. That makes the dehumidification cycle operate at optimum efficiency, and it minimizes electricity use. The modulating function also carefully controls the

temperature of the refrigerant returning to the compressor, preventing overloading or overheating and prolonging the life of the refrigeration system. The XDH System is provided as standard equipment on all Nyle systems of 3HP and larger.

How Important Is Airflow?

The airflow in the kiln chamber is very important. The velocity of the air over the wood affects the drying rate and provides even drying. You should discuss air velocity with the kiln manufacturer to be sure that the air velocity in the kiln will be adequate for the species and thickness of the lumber you are drying and the type of kiln you are using. Generally, wetter lumber requires a higher velocity of air through the lumber.

Should The Fans Reverse?

Fans usually reverse in larger kilns. This prevents uneven drying by forcing the air to enter the lumber pile first from one direction and then from the other. It also corrects for dead air spots which may result from the way the lumber is stacked. Generally, lumber that is stacked over 12 feet (3.5 meters) deep in the direction of airflow should have reversing fans.

What Type Of Heating System Should Be Used For Initial Warmup?

It is only necessary to heat the kiln to about 80°F (27°C) to start the dehumidification process. Once started, the process feeds itself by recycling the heat recovered from the air.

Initial warmup can be done with nearly any type of system. Usually, small kilns or single kiln chambers use electric heat, because the additional money required for a more traditional type of heating system doesn't make economic sense when the heat is only used for a few hours a month. When larger kilns are used or more chambers are added, it may make sense to install a gas, oil or wood boiler to provide heat through steam coils. This is an economic decision based upon local energy costs, weather, type of lumber being dried, etc. Nyle can provide operating cost estimates to help with this decision. However, in most cases, electric heat provides the most economic choice for initial warmup.

How Do I Design The Kiln Chamber?

The chamber for a dehumidification kiln can be built from wood, concrete block, steel, aluminum, or almost any combination of these materials. It is important that the chamber be tight and insulated to about R30. At Nyle, we provide you with technical drawings and expert advice on kiln chamber construction.

Generally, the first step is to determine the proper stack of lumber for the operator's needs. Then the chamber is designed around that stack. A tight, well insulated chamber serves two important purposes: it allows the recovery of as much heat as possible

to provide low drying costs; and it prevents damage to the wood that can result from loss of control of temperature and humidity when there are air leaks and poor insulation. This is just as critical in hot climates as it is in cold climates.

Nyle can help with the design of your kiln, or provide a complete turnkey system, building and all, or give you any degree of assistance in between. We're the experts in lumber drying, and we are ready to give you experienced advice not only in the design of your kiln structure, but in the layout of your yard and operating as well.

Some manufacturers provide complete kiln chambers. Nyle can also provide prefabricated chambers, but generally they are no more effective than what can be built using locally available materials. The decision to use a prefab chamber is not based on operating cost or effectiveness, but rather on how much you want to spend.

How Do I Determine The Size System I Need?

The first step is to project how much lumber you'll dry in a year. Then figure your average drying time for each of the species you'll be drying, and you can calculate the size kiln you need from there.

For example, say you need to dry 500,000 board feet of oak per year. Fresh off the saw, oak takes about 28-30 days to dry, so you'll be able to do 12



loads in a year. Each load will need to be 42,000 board feet to give you the 500,000 board feet you need for the year. That means you could build a single 40-45,000 board feet chamber or two 20-25,000 board foot kilns. For more specific information, see the Capacity Chart on page 14.

Another option would be to air dry the lumber first so it requires less kiln drying time. That increases the number of loads you can get in during a year, so each load doesn't have to be as large. For example, if the lumber is air dried to 30% moisture content, it only has to be kiln dried for about 10 days as opposed to 28 to 30 days. Allowing for loading and unloading, you can assume 33 loads per year—so one kiln that holds about 15,000 board feet will let you dry the 500,000 board feet you need for the year. This kind of system, though, does require a substantial investment in an air drying yard and in lumber on hand.

The number of species of lumber you'll be drying also affects your decision about the size of the kiln. It's not a good idea to mix species and thicknesses of lumber in one kiln, because it adversely affects drying times, and possibly drying quality. Therefore, if you're going to be drying several species and thicknesses of lumber during the year, it's better to use more smaller chambers rather than one large one, so you can keep each species and thickness in its own kiln.

Should The Drying Unit Be In The Kiln Or In An Equipment Room?

Generally, the most efficient configuration is to have the blower coil cabinet inside the kiln chamber, with the compressor, controls, and electronics in the control room. This offers the best environment for the machinery while reducing installation and operating costs. Nyle can also build one-piece units designed to be housed entirely in the control room when that is the best choice.

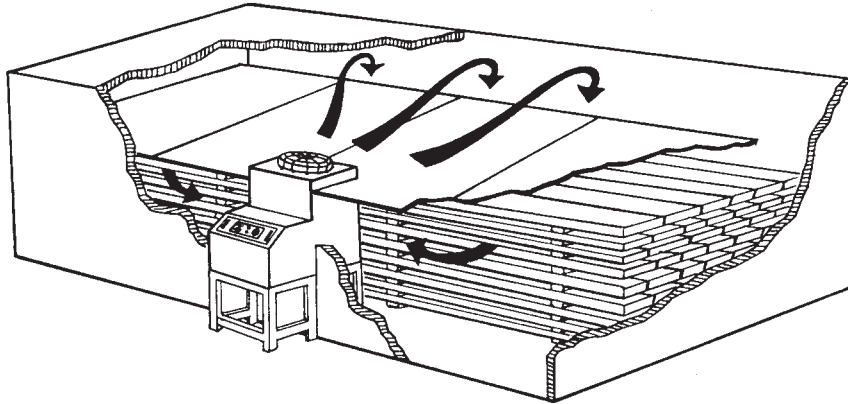
What Is Conditioning?

Conditioning is when moisture is added to the surface of the lumber to relieve the stress that occurs when the outer surface, which dries faster than the interior, tries to shrink as water is removed.

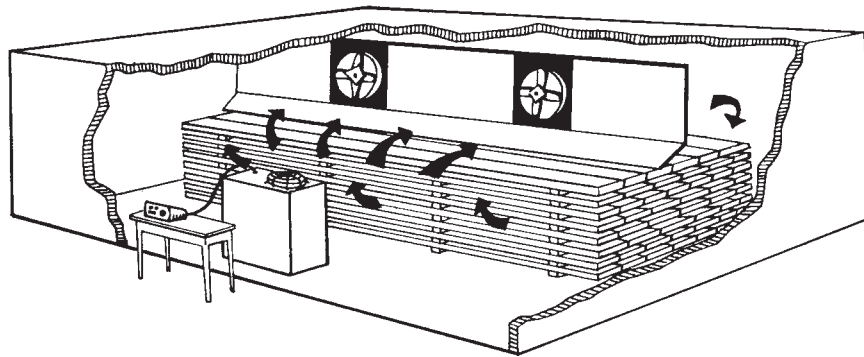
Since the outer surface of the lumber dries faster, it tends to shrink more than the interior, and it is "stretched" somewhat. This stress remains after the lumber is dried, and if it is not relieved it can cause the wood to deform, especially when it is being worked.

If the lumber isn't used immediately out of the kiln, it can condition itself naturally with time. Also, it may not need conditioning if it is a particular species that isn't prone to stress, if the use of the lumber doesn't require it, or if the lumber is dried in such a way as not to create the stress in the first place.

Most small dehumidification kilns, up to 4,000 board feet (about 10 cubic meters), do not require stress relief, since they don't dry as fast as larger kilns. The test for stress is a simple one that's conducted at the end of drying with a bandsaw and sample board. Nyle offers a simple and inexpensive water spray system to condition lumber. A steam generator can also be used during drying for positive conditioning at the end of the drying cycle.



Typical set-up for the NYLE L50 Dehumidification Kiln



Typical set-up for the NYLE L200 Dehumidification Kiln

CAPACITY CHART

You can use this chart to compare annual production, drying times, and drying costs for different Nyle L Series lumber dryers. It's important to remember that the purchase of a Nyle system is an investment, and should be treated as such. The return on investment will depend on lumber prices in your area, the cost of electricity, the construction of the kiln chamber, and the amount of lumber processed during the year. While you do need to consider these and other variables, the numbers in this chart will prove close for a majority of applications.

Lumber Groups: These reflect woods that dry at similar rates and times, all based on 4/4 (25mm) lumber.

Group 1-Pine, Fir, Poplar, Cedar, Aspen (softwoods and fast drying hardwoods)

Group 2-Cherry, Maple, Birch, Ash, Beech, Elm, Walnut (medium drying hardwoods)

Group 3-Red Oak, White Oak, Rock Elm (slow drying hardwoods)

MBF=thousand board feet. A thousand board feet is equal to 2.36 cubic meters.

Drying costs are based on an electric rate of 7¢ per kilowatt hour, a 50°F (27°C) outside temperature, and the kiln is in a separate building.

Model	Wood Group	Wood Load Size	Moisture Content 70% - 7%			Moisture Content 30% - 7%		
			Annual Production	Drying Days	Drying Cost	Annual Production	Drying Days	Drying Cost
L50	1	400 bf	18,000 bf	8	\$17.48 / mbf	36,000 bf	5	\$9.66 / mbf
	2	600 bf	13,200 bf	16	\$24.61 / mbf	35,400 bf	8	\$10.31 / mbf
	3	1,200 bf	12,000 bf	36	\$30.52 / mbf	31,200 bf	16	\$11.81 / mbf
L200	1	2,000 bf	70,000 bf	10	\$16.94 / mbf	180,000 bf	5	\$7.09 / mbf
	2	2,500 bf	52,500 bf	17	\$23.87 / mbf	125,000 bf	8	\$9.77 / mbf
	3	4,000 bf	40,000 bf	35	\$28.23 / mbf	116,000 bf	16	\$11.97 / mbf
L300	1	3,000 bf	117,000 bf	9	\$20.64 / mbf	270,000 bf	4	\$8.34 / mbf
	2	3,000 bf	78,000 bf	14	\$30.70 / mbf	210,000 bf	5	\$11.76 / mbf
	3	6,000 bf	66,000 bf	30	\$28.23 / mbf	192,000 bf	11	\$12.67 / mbf
L500	1	5,000 bf	140,000 bf	9	\$20.25 / mbf	450,000 bf	4	\$8.17 / mbf
	2	5,000 bf	130,000 bf	13	\$29.06 / mbf	360,000 bf	5	\$11.02 / mbf
	3	10,000 bf	120,000 bf	30	\$33.43 / mbf	390,000 bf	9	\$10.79 / mbf

L1200	1	12,000 bf	480,000 bf	9	\$20.43 / mbf	1,080,000 bf	4	\$8.25 / mbf
	2	12,000 bf	312,000 bf	13	\$29.23 / mbf	840,000 bf	5	\$11.12 / mbf
	3	24,000 bf	288,000 bf	30	\$33.74 / mbf	768,000 bf	11	\$12.54 / mbf
L2500	1	25,000 bf	1,000,000 bf	9	\$19.63 / mbf	2,225,000 bf	4	\$7.4 / mbf
	2	25,000 bf	650,000 bf	13	\$28.30 / mbf	1,750,000 bf	5	\$10.72 / mbf
	3	45,000 bf	540,000 bf	27	\$32.55 / mbf	1,575,000 bf	10	\$12.15 / mbf

Initial green moisture contents vary by species, and the difference will affect drying time and cost. Drying times for 6/4 (1½", 37mm) thick lumber will be approximately 50% longer for Group 2 and 3 woods, and energy costs about 25% higher. 8/4 (2", 50mm) Lumber will take about 250% longer than the chart shows and cost about 75% more.

How Profitable Are Nyle Machines? Here's An Example:

Consider this example. Assume that Red Oak sells green in the rough for \$800.00 / MBF (\$0.80 /bf) and kiln dried Red Oak sells for \$2500.00 (\$2.50 bf). The costs to dry are \$32.00 MBF (3.2¢ /bf) for electrical costs, and \$10.00 (1¢ /bf) for handling. With these numbers, your profit per board foot is \$2.50 - \$0.80 - \$0.032 - \$0.01 = \$1.66 per board foot.

We'll also assume the cost to build the chamber is the same as the equipment, and that you will amortize this over three years. A L200 with chamber could be set up for \$8000.00. The L200 is capable of drying 40,000 board feet of Green Oak per year, with one year's amortization of equipment and chamber at about \$2,700.

With your amortized cost, your potential profit per year is (40,000 bf/yr x \$1.658) - \$2,700 = \$63,620.

Try this equation with numbers from your own marketplace, then do the calculations with our competition. Remember to use the annual production at the correct moisture content removal. You'll find that among equally priced units, Nyle dryers outperform the competition. Why? Because Nyle systems have larger compressors for more capacity, and patented technology for higher efficiency over a broad operating range.

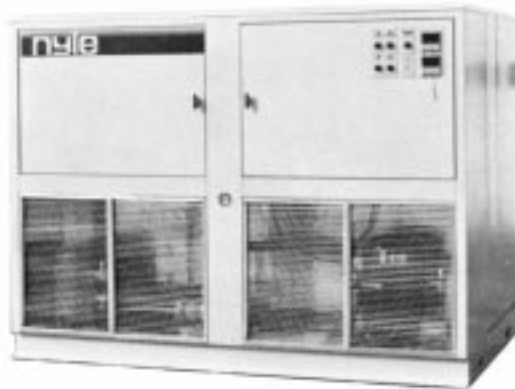
Do the math yourself. It won't take long to see what company offers the most value and return for your investment.



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THE L50 DH SYSTEM
(300-1,200 BD. FT.)

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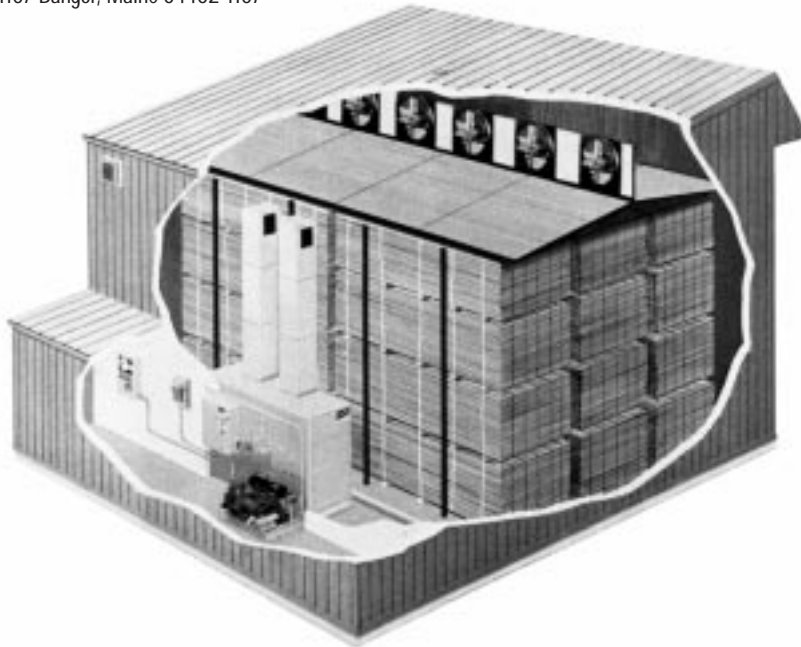
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