


Gas Fired Pottery Kiln

by

The logo for Laguna, featuring the word "Laguna" in a stylized, cursive script. The letter "L" is particularly large and extends upwards and downwards, with a horizontal bar crossing it. A registered trademark symbol (®) is located to the right of the word.

OWNERS MANUAL

(This manual is for a standard kiln and does not include information on the Programmable Controller, which is an optional feature available for your kiln.)

Manufactured By:

Laguna Clay Co., 14400 Lomitas Avenue, City of Industry, CA 91746, (626) 330-0631

Thank you for selecting a custom built, Laguna Gas Fired Pottery Kiln. The finest in workmanship and materials have been used to construct your kiln, and with proper use and care your kiln will provide decades of dependable firings.

The purpose of this manual is to acquaint you with your Laguna kiln and to provide important operational and safety information. Because Laguna kilns are custom built to the specifications of each individual customer, some photos and instructions provided in this manual may deviate slightly from your actual kiln. These discrepancies, should not negatively affect your use of the manual. As you learn to operate your kiln, remember, **there is no substitute for common sense in the safe operation of this equipment. Always put safety first!**



Location & installation. Many counties and municipalities regulate kiln installations, whether the installation is inside or outside. So before spending time and money constructing the “perfect spot” for your new kiln, call your local building department and discuss your plans.

Where? From a safety perspective, the placement of your kiln is extremely critical. It should be placed on a **level, stable, noncombustible surface**. That surface should be without obstruction, not only under the kiln, but also in front of the kiln where loading and unloading will take place. With a car or shuttle kiln, this includes the area on all sides of the car when the car is withdrawn from the kiln.

Once you have positioned your kiln in the best possible location, adjust the leveling bolts on each kiln leg until the floor of the kiln is perfectly level.

Clearance. It is recommended that you allow a minimum of 4’ clearance from walls built of combustible material and 3’ from noncombustible walls. In addition to safety considerations, be sure to allow adequate accessibility to all sides of the kiln for future cleaning and repairs.

Fuel Supply. Your kiln can be successfully fired with either natural gas or propane (often referred to as LP gas). The specification plate on the kiln indicates which gas supply the kiln’s original burners were designed to accommodate. If a change is made to a different gas supply, burners can be easily modified by substituting the natural gas orifices in each burner with the smaller LPG orifices or vice versa (see Plate 6). Orifices can be purchased through Laguna Clay Co., or contact your local gas company for the location of a source in your area.

Gas Pressure. There are two types of pressure to be considered. The pounds per square inch of pressure (PSI) in the gas line and the inches of water column pressure (WC) of the gas entering your kiln. The natural gas pressure into most residences and small commercial businesses is typically one PSI or less. The gas company regulates this pressure at the meter. The second measurement of pressure is in “inches of water column” which provides a precise measurement of low gas line pressure at the point of entry to the kiln’s burners (Plate 4-a). A minimum of 6” water column pressure is required to fire a natural gas kiln properly.

Gas Line. The size of your kiln in BTUs (indicated on the specification plate mounted on the kiln), the kiln’s distance from the building’s gas meter and the number of 90°elbows in the gas line will dictate the diameter of the gas line required to carry an adequate volume of gas from the main gas meter to your kiln’s burners. The licensed plumbing contractor installing the kiln will be able to assess these three variables and provide the proper size line.

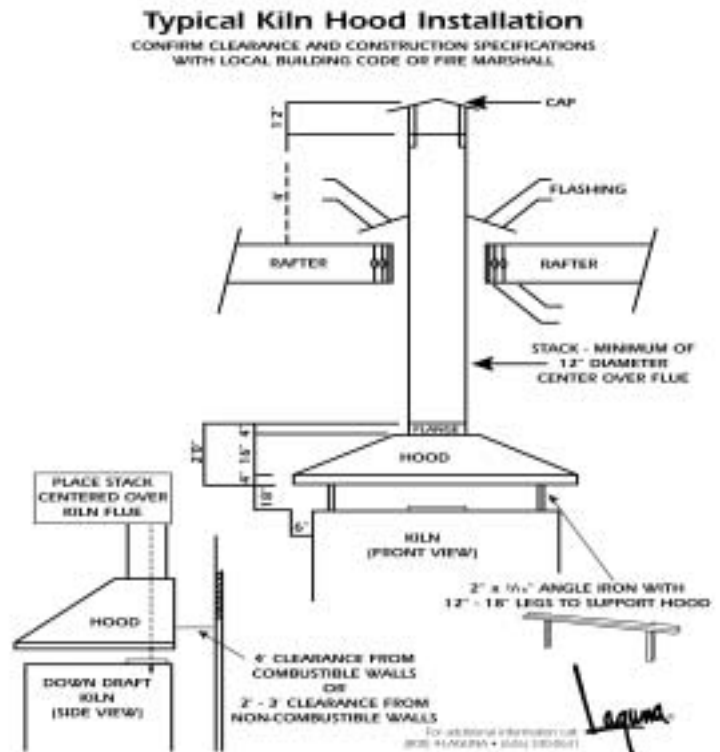
LPG. If you are firing with propane (LPG), you will want to contact your local supplier to determine the size of the tank required for your kiln. A two-stage regulator should also be used with LPG – the first stage regulating the pressure from the tank down to approximately 5 PSI, and the second regulator reducing the pressure to approximately 15” of WC. As with natural gas, the size of the gas line is critical. Your local LPG supplier will help with this information, and a licensed plumbing contractor should perform the necessary work.

Never begin the lighting sequence described below (Lighting Instructions) if you smell gas! Call your local gas company or a licensed plumber to check for leaks!

Air. An adequate air supply is critical to proper ventilation and combustion in your kiln. Be sure the kiln room you select provides an adequate air supply.

Venting. Kilns located inside a building must be vented. This usually includes a kiln hood which is mounted approximately 12”- 18” above the kiln and which overhangs the outside walls and flue of the kiln by a minimum of 4-6 inches. The hood not only vents the heat emitted through the flue, but it captures much of the kiln’s ambient heat radiated from burners, peep holes, etc. Again, advice should be sought from your local building department, and a licensed HVAC contractor should perform the work. The ideal material for the hood is stainless steel. (Refer to Typical Hood Installation)

Under the stars. Many kilns are installed outdoors. While outdoor installation mitigates some of the venting issues dealt with inside, there are still necessary precautions required to protect your kiln. Most outdoor installations include a noncombustible corrugated steel roof installed 6-8 feet above the flue. The roof size should be adequate to protect the kiln from blowing rain or snow. Moisture is the “enemy” of the steel, firebrick and electrical components of your kiln. Mount a hood above the flue and vent it through the roof. Be sure to install a “flue cap.” The ideal material for the hood is stainless steel; galvanized steel will deteriorate fairly quickly under the kiln’s intense heat. A “full” hood as described for indoor use is not necessary since ambient heat radiated from the kiln will easily dissipate in the outside air. A security/safety perimeter fence is recommended to prevent access to the kiln area by children or other unauthorized individuals.



Safety Start Button. Is a temporary 'on' switch that allows the operator to manually restart the kiln in case of a power interruption. (See plate 3, 3-b).

High Limit/ Shut-Off Controller. A maximum kiln temperature (set-point temperature) is easily programmed into the controller (from 0° to 2500°F), and once the kiln's temperature exceeds this figure, the controller sends a signal to the solenoid valve (e. in Plate 4) automatically shutting down the gas supply to the kiln. **The high limit/shut-off controller is an excellent safety feature, but it is not a firing "computer"**.

Although a comprehensive instruction manual for your controller is included with your kiln, the following instructions summarize the functions you will use most often. Unless otherwise requested, your high limit/shut-off controller set point has been pre-set at the factory to 2350°F. If you desire to reprogram the set-point temperature, follow the instructions provided below (see Plate 2).



Reset Key Lower Key Raise Key Function Key

Setting the High Limit/Shut-Off Controller:

1. Before turning on the power to your high limit/shut-off controller, close all three gas valves (Plate 4-b, 4-c, 4-f).
2. Turn on the power at the main control panel (Plate 3-a).
3. Allow the controller several seconds to complete its power-up self-test.
4. Firmly press the raise key ▲ and function key simultaneously. "ULOC" will appear on the display.
5. Use the raise and lower keys ▲▼ to reach your designated security code (the factory-set code is 10).
6. Press the function key, and "SP" will appear in the lower display indicating your set-point temperature.
7. If you desire to change the set-point temperature, use the raise and lower keys ▲▼ to enter a new set-point temperature. Although High-limit controller are usually often factory preset, you should verify that preset temperature before your first firing. Most people select a temperature a few degrees (10°-15°) above the maximum, desired firing temperature. This will protect you from an accidental meltdown, but it will not interfere with your standard firing procedure.
8. Press the reset key to store the newly designated set-point temperature.
9. Press the function key several times to scroll through the LED screens returning to the display indicating the kiln's ambient temperature in the upper display and the set-point temperature in the lower display.
10. Press the reset key to allow the High Limit/Shut-Off Controller to power up the DSI electronic ignition system, and follow the lighting instructions provided below.

Plate 3



Lighting instructions. It is important that you review and understand the following lighting instructions prior to attempting to light your kiln.

The kiln's direct spark ignition system (DSI) provides a safe, 3-stage process by which the kiln's burners are ignited. Your activation of the DSI (1) ignites a standing pilot flame that subsequently (2) ignites a pilot ring that then (3) lights the kiln's burners. If the standing pilot ceases to operate due to gas interruption or power loss, the DSI will shut down the main gas solenoid valve (Plate 4-e) in 0.8 seconds.

Follow the steps provided below, and you will ensure the safe lighting of your kiln each and every time. **You may know or learn of shortcuts to the instructions prescribed below, but shortcuts can cause accidents!**

Kiln Lighting Instructions: (Refer to Plate 4)

1. Close each of the following valves:

Plate 4



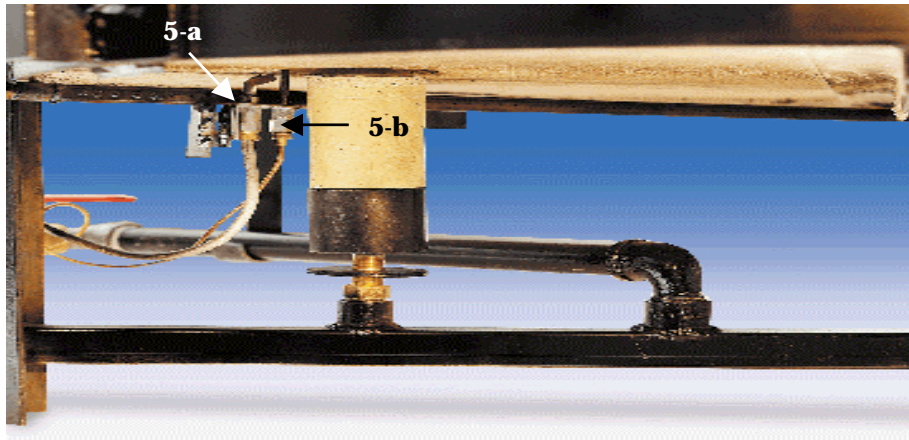
- The main gas valve (Plate 4-b)
 - The pilot ring valve (Plate 4-c)
 - The pilot burner valves (Plate 4-f)
 - The main burner valve (Plate 4-d)
2. Open the kiln door.
 3. Slide the damper (Plate 7) to a $\frac{1}{2}$ to $\frac{1}{3}$ closed position.
 4. Wait at least 5 minutes before continuing the lighting process.
 5. Open main gas valve (Plate 4-b).
 6. Press and hold ignition button (Plate 3-b) for one second. Within 1-2 seconds, you should hear the “tick, tick, tick, tick” of the spark igniter (Plate 5-b). Make sure “out” and “exceed” are not lit in the read-out of the High Limit/Shut-Off Controller.
 7. Immediately open pilot burner valves (two red handles) (Plate 4-f) about 20%. Opening the 2 valves too far will allow too much gas pressure at the pilot burners. As soon as the pilot burner flames ignite (Plate 5-a), the “ticking” will cease.

8. Once the pilot burner flames burn steadily, open the pilot ring valve (yellow handle) (Plate 4-c). *(The valve with the yellow handle controls the pilot ring allowing it to be shut down once the kiln reaches 1400 degrees (red heat). The benefit of this feature is one of gas savings without loss of safety. The igniter system now controls the two pilots (right and left side) independently of one another. If either of the pilots goes out, the entire kiln shuts down.)* The pilot ring, or ribbon burner, is a perforated gas line that operates on the same principal as the gas burner in a BBQ grill. The small flames, which emanate from the pilot ring act as pilot lights to ignite the kiln's main burners. Once the pilot ring is fully lit, open the main burner valve, and within seconds the kilns burners should ignite. Visually check to see that all burners are lit.
9. Once the main burners are all ignited, leave the valves to the pilot ring open. These valves can remain on until 1400 degrees (red heat). When you see red heat you can turn the pilot valves off. **The pilot burner should remain lit during the entire firing cycle.**
10. To shut down the kiln at the end of a firing, turn off the gas at the main valve, close the damper completely.

If the pilot doesn't light in the above sequence:

1. Make sure you have electrical power to the control panel.
2. Ensure the gas company's valve is open at the meter as well as the main gas valve at the kiln (Plate 4-b).

Plate 5



3. If you hear air hissing through the pilot during an attempted lighting, excess air will need to be bled from the main gas line. This is most likely to occur during the kiln's initial firing when the gas line was not completely bled at the time of installation. The air may bleed through the pilot as you progress through the lighting steps provided above, but if there is an excessive amount of air in the line, it may be necessary to open the main gas valve (Plate 4-b) and slightly open the pilot ring valve (Plate 4-c) to allow the air in the line to escape. When the air hissing stops and you smell gas, the line should be free of air and both gas valves should immediately be closed. No attempt to light the kiln should be made for at least 5 minutes following this procedure. **Unless you are familiar with this process, it is recommended that you seek the help of a licensed plumber.**

Burners. Your Laguna kiln utilizes high efficiency, natural draft, ceramic tip, venturi burners. Prior to shipping your kiln, it was test fired, and the burners were adjusted to ensure the proper air/gas mixture. Although not likely, it is possible that during the shipping and installation of your kiln one or more of the air shutters (see Plates 5-b and 6) were inadvertently rotated changing the gas/air mixture and subsequently the quality of the flame. If you want to adjust the burners, either when your kiln is new or sometime in the future, the following steps will accomplish that process:

Burner adjustment:

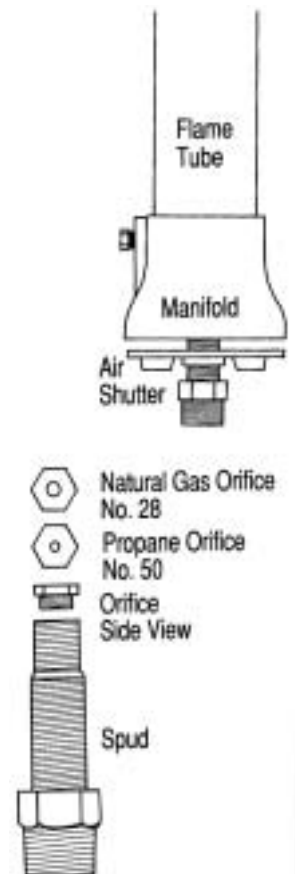
1. Open the air shutter on each burner approximately $\frac{5}{8}$ inch.
2. Set the damper approximately $\frac{1}{3}$ closed.
3. Open the kiln door fully, or on a shuttle kiln pull the car out approximately 18" providing a clear view of all burners. You may have to view some of the burners from one side of the car and the balance of the burners from the other side.
4. Light your burners as instructed under Lighting Instructions in this manual.
5. Adjust the main burner valve to create 2" water column on the WC gauge (Plate 4-a).
6. Within 3-5 minutes the burners should emit a strong, steady, "pointed" flame. The flame will usually be blue, but not always.
7. If burners do not emit a strong, steady, "pointed" flame, close the air shutter one full rotation.
8. If a burner still does not emit a quality flame, close the air shutter one more full rotation.
9. Once you have a quality flame on each burner, open each air shutter $\frac{1}{2}$ rotation.
10. Your burners are now ready to fire properly.

The kiln's rate of temperature increase (degrees/hr) relates directly to the amount of gas flowing through the main burner valve (Plate 4-d) to the burners. By adjusting the main burner valve from wide open (the valve handle parallel to the gas line) to closed (the valve handle perpendicular to the gas line) you will control the volume of gas to the burners and subsequently the temperature of the firing.

The adjustment of your burners and the kiln's damper (below) will allow you to fine tune the firing atmosphere to your individual requirements.

Visually check your burners *before* each firing for foreign matter that may have fallen into them during your previous firing. Remove such debris with needle-nose pliers, a shop vacuum or disassemble the burners for a thorough cleaning.

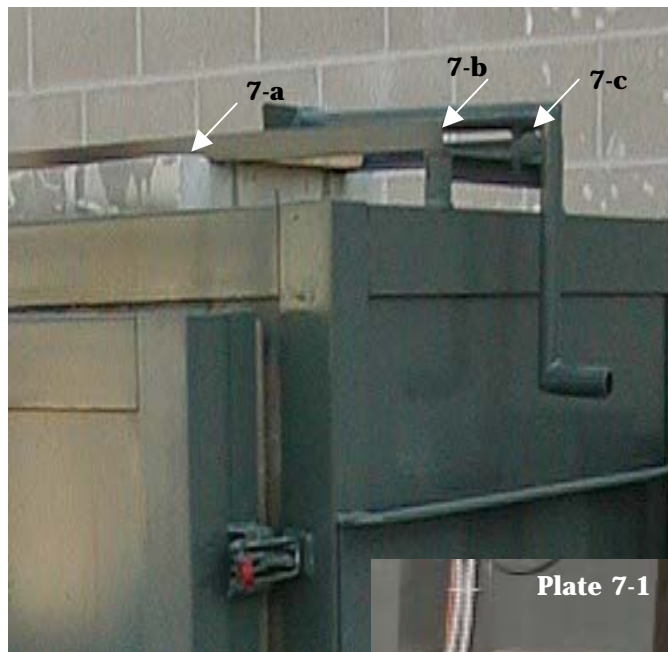
Plate 6



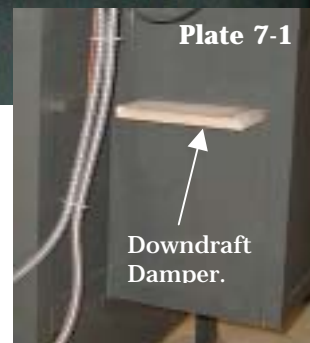
Damper. Your kiln is equipped with an adjustable slide damper immediately above the flue (Plate 7-a), or in the case of a downdraft kiln, slotted into the side of the flue (Plate 7-1). By sliding the damper toward the kiln and away from the kiln you will control the kiln's atmosphere. By "trial and error," you will learn the idiosyncrasies of your kiln, and you will achieve amazing control over your firings. You should start your kiln with the damper $\frac{1}{3}$ closed, and push the damper closed, inch-by-inch (or smaller increments), over the course of the firing to help even the temperature and regulate the kiln's atmosphere.

Plate 7

The "damper stop" (Plate 7-b) prevents you from inadvertently closing the damper completely during a firing (which you never want to do!). As indicated above, when the "damper stop" contacts the "stop bar" (Plate 7-c), the damper will still be open approximately 1 inch. **Once a firing is complete and the gas is turned off**, the "damper stop" can be circumvented by lifting the damper handle up and sliding the "stop" over the "stop bar" to allow the damper to fully close.



Initial Firing. We recommend that the first firing of your new kiln be a bisque firing – a **slow firing with a long candling period and a very gradual increase in gas pressure**. This initial firing, between Cone 07 (1803°F) and Cone 04 (1940°F), will depend on the clay you are using. Also, be sure your pottery is thoroughly dry before the firing. (If you are uncertain about the dryness of your ware, we recommend candling overnight).



Procedure for Bisque Firing:

1. Adjust the damper to approximately $\frac{1}{3}$ closed.
2. Position witness cones.
3. Light your kiln following the Lighting Instructions provided previously in this manual.
4. Close the kiln door (car) to 2".
5. Close the main burner gas valve (Plate 4) to the first line on the WC gauge.
6. Candle in this manner for one hour.
7. At the beginning of hour 2, close the kiln door (car) leaving the gas pressure unchanged.

At beginning of hour

3
4
5

Increase WC pressure to:

<u>Fiber Kiln</u>	<u>Brick Kiln</u>
$\frac{1}{4}$ "	$\frac{1}{2}$ "
$\frac{1}{2}$ "	1"
1"	2"

1. Each additional hour, turn up the gas pressure by $\frac{1}{2}$ " (fiber kilns) or 1" (brick kilns) carefully observing witness cones during the firing.
2. When the kiln reaches temperature, turn off electric power, close all manual gas valves, and close the damper. If you are using a programmable controller, you may find the following bisque firing information helpful:

Suggested Bisque Firing Schedule for Programmable Controllers:

- ◇ With door fully open, ignite burners
- ◇ Close door to ½ open; close damper to approximately ⅓ closed (damper adjustments will be fine-tuned by trial-and-error over several firings)
- ◇ Segment 1: Room temperature to 600°F in 3 hours
 - Close door to ¼ open after ½ hour of firing time
 - Close door to 3” after a total of 1 hour firing time
 - Close door completely after a total of 2 hours firing time
- ◇ Segment 2: 600°F to 950°F in 1.5 hours
- ◇ Segment 3: 950°F to 1400°F in 3 hours
- ◇ Segment 4: 1400°F to maximum desired temperature in 2.5 hours
- ◇ Segment 5: hold at maximum desired temperature for 20 minutes
- ◇ Firing complete. Close main gas valve and close damper

High Fire & Glaze Fire Procedure. While you will want to develop the firing schedule that best meets your needs, you may find the following suggested procedures helpful as you begin using your new kiln. If you have a High Limit Controller, make sure that the set-point (SP) is correct for your intended firing temperature. (See the High Limit Controller section in this manual)

1. Check to make sure the flame is strong, steady, and pointed as referred to in the Burner section of this manual.
2. Situate the damper approximately ⅓ closed.
3. Position witness cones.
4. Light the kiln in accordance with Lighting Instructions provided above.
5. Close the main burner valve enough to achieve a reading at the first line on the WC gauge. Fire one hour at this setting.

At beginning of hour

Increase WC pressure to:

	<u>Fiber Kiln</u>	<u>Brick Kiln</u>
2	¼”	½”
3	½”	1”
4	1”	2”
5	1 ½”	3”
6	3”	6”

6. During the firing, the damper and gas pressure can be adjusted to achieve reduction atmosphere if desired.
7. Once the gas pressure is at the maximum pressure described above, observe witness cones regularly until the desired temperature is achieved (**see safety warning below**). Turn the gas pressure down to approximately 1½” WC and open the damper completely. Wait 5 minutes while the kiln’s atmosphere is “cleared.”
8. Turn off the main burner valve and the main gas valve and close the damper completely.
9. Turn off electric power.
10. Cool to below 350° F before beginning to open the kiln’s door.
11. **Open the door SLOWLY!**

Suggested Glaze Firing Schedule for Programmable Controllers:

- ◇ With door fully open, ignite burners
- ◇ Close door to ½ open; close damper to approximately ⅓ open (damper adjustments will be fine-tuned by trial-and-error over several firings)
- ◇ Segment 1: Room temperature to 600°F in 2 hours
 - Close door to ¼ open after ½ hour of firing time
 - Close door to 3" after a total of 1 hour firing time
 - Close door completely after a total of 1.5 hours firing time
- ◇ Segment 2: 600°F to 950°F in 2 hours
- ◇ Segment 3: 950°F to 1400°F in 3 hours
- ◇ Segment 4: 1400°F to maximum desired temperature in 1 - 2.5 hours (for example: 1 hour to Cone 06; 2.5 hours to Cone 10)
- ◇ Segment 5: hold at maximum desired temperature for 20 minutes
- ◇ Firing complete. Close main gas valve and close damper

Safety Warning: ALWAYS

- ◇ stand at least 24 inches from an open peephole
- ◇ use industry approved gloves when removing a peephole plug
- ◇ wear industry approved, dark, safety glasses when observing firing and witness cones.

Kiln furniture and loading your kiln. There is typically more than one size of kiln shelf suitable for any one kiln. Considerations such as the size of the pieces being fired, firing temperature, kiln atmosphere (oxidation or reduction), frequency of firings and budget will all contribute to the selection process. Cordierite and silicon carbide are the two most popular types of shelves.

The following chart provides basic guidelines for shelf selection, with additional kiln furniture information available in the Refractory section of Laguna's Catalog & Reference Guide.

FIRING TEMPERATURE	KILN ATMOSPHERE	SHELF COMPOSITION	SHELF THICKNESS
Cone 06	Oxidation	Cordierite	½" or 5/8"
Cone 1	Oxidation	Cordierite	5/8" or ¾"
Cone 5	Oxidation	Cordierite	¾" or 1"
	Reduction	Cordierite	¾" or 1"
		Silicon Carbide	5/8" or ¾"
Cone 10	Oxidation	Cordierite	1"
	Reduction	Cordierite	1"
		Silicon Carbide	¾"

Guidelines:

1. Hard Soaps (½ fire bricks, designated RF420 in the Laguna catalog) are ideal for supporting the bottom row of shelves off the floor of the kiln. Soaps will provide a level, solid base to support the mass of refractory and pottery stacked above them.
2. In downdraft kilns a one-inch space between shelves (on each level) is essential to allow proper airflow and heat distribution from the top to the bottom of the kiln.
3. Maintain a minimum of one-inch clearance between the shelves and the front and back of the kiln. The shelves should not cover any portion of the burner holes in the floor of the kiln, nor should your pieces being fired ever come in direct contact with the flames.
4. Turn (“flip”) shelves often to minimize warping.
5. The quality of firings will be enhanced by varying the space between the firing levels in your kiln (e.g. one level 10”, the next 4”, another 8”, etc.).
6. **In a downdraft kiln, never block the exit flue in the bottom center of your kiln with either kiln furniture or pottery.** Draw a semicircle of 6-8” from the exit flue and leave it void of pottery, kiln posts, etc., otherwise you will impede the flow of air resulting in an under fired kiln. In an updraft kiln, allow at least 3” distance from your ware and the exit port of the flue.

Tidbits.

Adjustable hinges (Front loading kilns only). The hinges on the door of your Laguna kiln are adjustable, allowing you to attain the best possible seal between the door and the kiln. The door has been properly adjusted at the factory, but in the years to come as the bricks and the door’s ceramic fiber seal wear, this adjustment feature will allow you to easily maintain a positive seal. If you have ever seen a gas kiln with licks of flame emanating from gaps around the door, you know why we have introduced the adjustable hinge feature on Laguna gas kilns.

Bricks crack. It is normal for the firebricks in your kiln to crack. It is the nature of the insulating firebrick (IFB) to expand and contract during the heating and cooling process often resulting in hairline cracks. These cracks will not affect firings or the integrity of the kiln. If your kiln has firebrick walls, there is an inch and a half of insulation board behind the bricks, which eliminates heat loss as a result of brick cracking.

Gas smells. If you smell gas when firing your kiln, shut down the kiln immediately and call your local gas company to check for leaks in the plumbing servicing your kiln. The same action should be taken if you smell gas around your kiln when it is not in operation.

Witness Cones. Even with an automatic controller, we recommend the use of witness cones with every firing. Cones are a consistent, reliable source of information, and the best possible means of accurately checking kiln temperature.

A keen eye. If you are not using a programmable controller, never leave a firing kiln unattended for a significant period of time. Meltdowns happen; but not when a kiln is attended.

Assistance. If you have questions, need kiln furniture, accessory items, repair parts or require assistance in any way, contact Laguna Clay Co. at (626) 330-0631, (800) 452-4862 or info@lagunaclay.com.

LAGUNA KILN LIMITED WARRANTY

Your new Laguna Clay Kiln is guaranteed to be free of *defects in materials and workmanship*. This warranty is limited to the original purchaser. Should warranty repairs be required, Laguna, or a service representative authorized by Laguna, will perform all necessary repairs. This warranty covers total cost of parts for 12 months and all necessary labor costs for 90 days from date of purchase. Any transportation costs shall be borne by the purchaser. Proof of purchase is required to verify the date of purchase. In the absence of such verification, the date of manufacture shall be considered the date of purchase.

This warranty does not cover: (1) damage created by firing at a temperature above that for which you kiln is rated or at temperatures which exceed the melting temperature of the material being fired - regardless of the reason or cause for such a firing; (2) damage as a result of moving or transporting the kiln; (3) negligence or abuse to the kiln or any element of the kiln, whether intentional or unintentional; (4) unauthorized changes or alterations to the original kiln; (5) the firing of reactive materials; (6) damage resulting from excessive moisture being introduced into the kiln; (7) damage caused by an improper gas connection and/or installation; (8) any use of the kiln for purposes other than the firing of ceramic materials; (9) damaged contents of the kiln (furniture, ware, etc.).

All inquiries regarding this warranty should be directed to the dealer from whom the kiln was purchased or directly to:

Laguna Clay Company
14400 E. Lomitas Avenue
City of Industry, CA 91746
(626) 330-0631 • Fax: (626) 333-7694

LAGUNA KILN WARRANTY REGISTRATION CARD

Complete and return this card immediately to ensure full warranty coverage on your new kiln. In lieu of a properly returned Warranty Registration Card or the providing of an original purchase receipt at the time warranty work is required, the warranty period for this product will commence on the date your kiln was manufactured.

Purchaser's Name _____

Address _____
No. & Street _____ City _____ State/Zip _____

Dealer _____
Name _____ Location (City/State) _____

Model or Serial # _____ Date of Purchase _____

**Detach and return this card immediately to:
Laguna Clay Co., 14400 Lomitas Avenue, City of Industry, CA 91746**