Gas Fired Raku Kilns

by Laguna

OWNERS REFERENCE MANUAL

LE-201 (Models RST, RIN, RSU)

Manufactured By:
Laguna Clay Co • City of Industry, CA • (626) 330-0631

Thank you for selecting a Laguna Gas Fired Raku Kiln. The success, safety and enjoyment you experience with your new kiln will be greatly enhanced by a thorough reading of this manual prior to your initial firing.

Raku firing the way we know it today had its inception in late 16th century Japan at the hands of Chorigo, a Korean immigrant. Now, more than four centuries later, potters have re-embraced this process for the truly remarkable results of Raku firings. Your new Laguna kiln will not help you "duplicate" the look of your previous Raku work, but rather it will make your creation of each unique piece easier and more enjoyable.


Photo A

While Laguna's Raku kiln is designed for Raku firings, it may also be used for standard, periodic firings up to Cone 5. The purpose of this manual is to acquaint you with your kiln and to provide important operational and safety information. As valuable as this information is, there is no substitute for common sense in the safe operation of this equipment. **You are dealing with fire. Always put safety first!**

DANGER. HOT! A RAKU KILN GENERATES A LOT OF HEAT. ALWAYS WEAR FLAMEPROOF AND HEAT RESISTANT GLOVES AND CLOTHING WHEN PERFORMING RAKU FIRINGS. Even during periodic firings, always wear proper kiln gloves when removing the peep hole plug or touching the handles or any other part of the firing kiln.

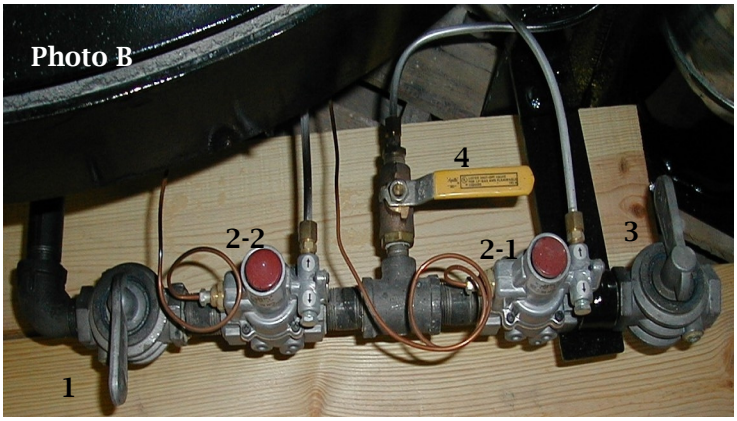
Location & installation. Many counties and municipalities regulate kiln installations whether that installation is inside or outside. So before spending time and money constructing the "perfect spot" for your new kiln, call your local building department and discuss your plans.

Where? From a safety perspective, the placement of your kiln is extremely critical. Although we occasionally hear of Raku firings being performed inside large warehouses, **for safety reasons we recommend Raku firings always be conducted outside!** When performing periodic (non Raku) firings indoors, utilize the same precautions you would with any other periodic kiln. Whether indoors or outdoors, position your kiln on a **level, stable and noncombustible surface**. The surface around the kiln should be without obstruction. This will facilitate safe loading and unloading of the kiln while providing easy access to the container in which your red-hot pots are reduced.

Clearance & Venting. Always allow a minimum of 6 feet of clearance from structures built of combustible material and 4 feet from noncombustible walls. These clearances apply to the kiln and reduction container alike. Kilns located inside a building must be vented. This usually includes a kiln hood mounted approximately 6 inches above the top of the kiln's frame and extending in a diameter at least 1 foot greater than the diameter of the kiln. **Remember, the manufacturer does not recommend ever performing Raku firings inside a building.**

Under the stars. For safety's sake almost all Raku kilns are installed outdoors. If they are in a covered space, the same clearance and venting considerations need to be addressed as with an indoor installation. The roof over the kiln needs to be noncombustible unless a full hood is utilized. **If the kiln is used outside in an uncovered area, it should be covered with a waterproof tarp when not in use** to keep it from rusting. Also, when used outside, it is important that no potentially combustible vegetation is anywhere near the kiln or the reduction container.

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 an alternative gas supply, the kiln's burners can be easily modified by substituting the natural gas orifices with LPG orifices or visa versa. An alternate set of orifices is included with your kiln.



Gas Pressure. There are two points at which gas pressure should be evaluated – at the gas meter (or LP tank) and at the point of entry to the burners. The natural gas pressure into most residences and commercial businesses is typically one PSI or less. This pressure is regulated at the meter by the gas company. The pressure at the burners can be manually regulated by adjusting the main burner valve (Photo B #1 and diagram at end of manual). This pressure can be measured by installing a water column gauge (Photo C) that measures pressure in "inches of water column". Six inches of water column pressure is typically required to fire a natural gas kiln properly.

Gas Line. Three factors determine the size of the gas line to your kiln: (1) the size of your kiln in BTUs (indicated on the specification plate mounted on the kiln); (2) the kiln's distance from the building's gas meter; (3) the number of 90˚elbows in the gas line. A ¾" line is usually adequate for a run of 50 feet or less. The licensed plumbing contractor installing the kiln will be able to assess your situation and determine the proper line size.

LPG. If you fire with propane (LPG), contact your local supplier to determine the size of the tank and line required for your kiln. The LPG tank should include a 2 stage regulator (available from Laguna Clay Company or from your LPG supplier) that reduces the pressure from the tank to 0.5 psi. This adjustment should be made when all the burners are on and at full combustion. Actual pressure to the burners is then controlled by the main burner valve (Photo B #1). For additional pressure control you can install an optional gauge (Photo C) as described in the "Gas Pressure" paragraph above. As with natural gas, a licensed plumber should perform the initial installation. Laguna Clay Co. now carries a 2-stage regulator for your LPG Raku kiln. Call 1 800 4 LAGUNA for more information.

Cure your kiln floor first. The floor in your kiln is made of high-strength, lightweight, castable refractory. It is normal for hairline cracks to develop in this material over time, and these cracks will not adversely affect the structural integrity or the performance of the kiln. To avoid excessive floor cracking, **FOLLOW THESE FOUR STEPS BEFORE YOUR FIRST FIRING:**

1. Heat the kiln to approximately 195ºF for 18-24 hours. During this process it is normal for moisture to wick out the bottom of the floor.
2. Fire the kiln at 1500ºF for five hours.
3. Turn off burners, close damper and allow to cool.
4. You are now ready for your first Raku firing.

Lighting instructions.

If you smell gas, call your local gas company or plumber to check for leaks, and DO NOT begin the lighting sequence described below. Also, cure your kiln floor as described in the previous section before your first firing.

Review and understand the following lighting instructions prior to attempting to light your kiln.

Kiln Lighting Instructions:

1. Close all gas valves (Photo B – 1, 3, & 4).
2. Remove damper cover completely.
3. Raise the firing chamber 12”- 18”.
4. Wait several minutes for any escaped gas to clear the firing chamber.
5. While depressing the large red button on the Baso safety shut-off valve (Photo B #2-1), ignite the corresponding pilot light (Photo D #1) with a long handled lighter or fireplace match. You will need to continue to depress the red button for 30-45 seconds for the pilot to remain ignited. If the pilot flame goes out, repeat this step until the flame remains lit.
6. Open the pilot ring valve (Photo B #4) and the pilot ring (Photo D #2) should ignite within a few seconds.
7. Once the pilot ring ignites, depress the large red button on the second Baso safety shut-off valve (Photo B #2-2), The Pilot ring which is now open, should light the corresponding pilot light. Depress the red button for 30-45 seconds for the second pilot light to remain ignited. If the pilot flame goes out, repeat this step until the flame remains lit. **Note:** If your kiln is located in a windy neighborhood be sure to position wind screens around your kiln to shield the pilot lights. A slight wind can extinguish your pilot lights and shut down your kiln.
8. Very slowly open the main burner valve (Photo B #1). The kiln’s 3 main burners should ignite within a few seconds.
9. Once the main burners have ignited, close the pilot ring valve (Photo B #4) thereby extinguishing the flames on the pilot ring.
10. Lower the firing chamber to its fully closed position.
11. Adjust the main burner valve (Photo B #1) to increase or decrease gas pressure. Installation of a water column gauge at the main burner valve (Photo C) will allow you to monitor gas pressure to the burners.
12. Always use witness cones to accurately determine firing temperature.
13. Once the desired temperature is achieved, turn off the main gas valve.
14. If you are performing a periodic firing, you will now want to close the damper completely and slowly cool the kiln as you would with any other gas kiln.
15. Before removing fired ware always lock the raised firing chamber in the fully open position with the chain or locking pin provided (varies with different models).
16. Using approved kiln gloves, protective clothing and Raku tongs, remove the red-hot pottery, and continue with the Raku process.

Photo C
Water Column Gauge

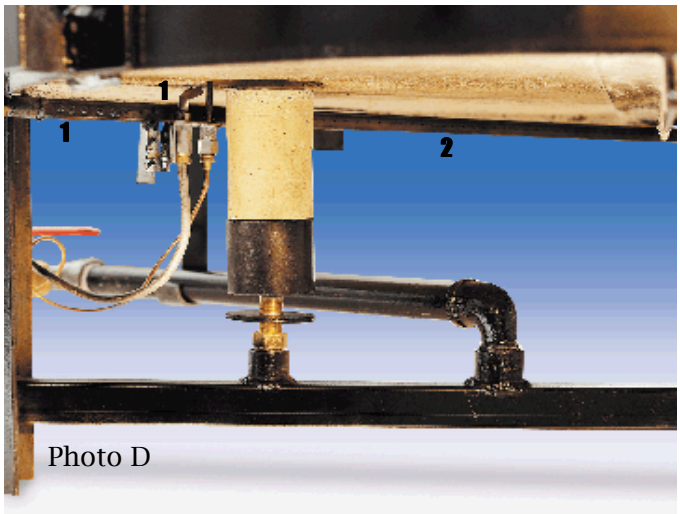


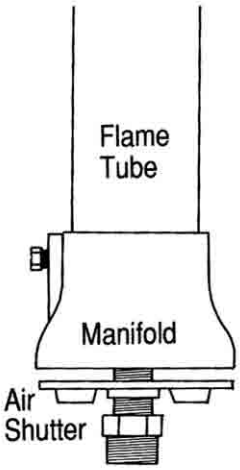
Photo D

REMEMBER, once the kiln's burners have been lit, always wear flameproof and heat resistant gloves when loading or unloading or touching the handles or any other part of the kiln. When Raku firing, use long, Raku tongs to remove the red-hot pottery and flameproof and heat resistant gloves and protective, non-combustible clothing when opening the red-hot kiln. Long hair should be controlled.

Burners. Your Laguna kiln utilizes high efficiency, natural draft, ceramic tip, venturi burners. Prior to shipping, your kiln was test fired, and the burners were adjusted to 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 (Photo E) were inadvertently rotated, changing the gas/air mixture and subsequently the quality of the flame. If the burners require adjustment, either when your kiln is new or sometime in the future, the following steps should be followed:

Burner adjustment:

1. Open-air shutter on each burner to create a gap of approximately ⅝ inch (Photo E).
2. Remove the damper and raise the firing chamber completely.
3. Light your burners as instructed under *Lighting Instructions* in this manual.
4. Set the main burner valve about ⅓ open. This should create a flame approximately 6" to 7" high. If you are using a water column gauge (Photo C), adjust the burner valve to register about 2 inches of water column pressure on the gauge.
5. Within 3-5 minutes the burners should emit a strong, steady, "pointed" flame. The flame will usually be blue, but not always.
6. If burners do not emit a strong, steady, "pointed" flame, close the air shutter one full rotation.
7. If a burner still does not emit a quality flame, close the air shutter one more full rotation.
8. Once you have a quality flame on each burner, open each air shutter ½ rotation.
9. Your burners are now ready to fire properly.
10. If your kiln is at a higher elevation (3500 ft. or more) you may need to install a smaller orifice to compensate for the lack of oxygen at higher altitudes.



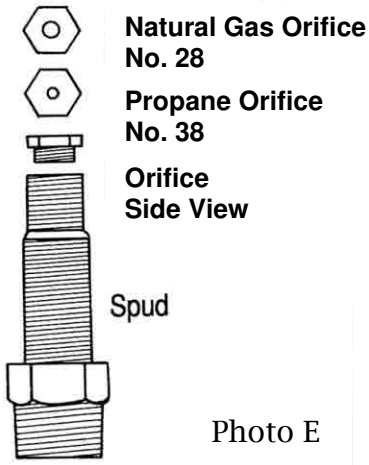


Photo E

The kiln's rate of temperature increase (degrees/hr) relates directly to the amount of gas flowing through the main burner valve (Plate B-1) to the burners. By adjusting this 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 will allow you to fine-tune the firing atmosphere to your individual requirements.

Damper. A small kiln shelf has been provided for use as a damper over the kiln's flue. By sliding the damper over the flue you will control the kiln's atmosphere. Start with the damper ⅓ closed, closing it down ½" by ½" over the course of the firing to help even the temperature and regulate the kiln's atmosphere. It may take several firings to "get the hang of it," but before long you will achieve amazing control over your firings.

Kiln furniture and loading your kiln.

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"

Guidelines:

1. Hard Soaps (½ fire bricks, designated RF420 in the Laguna catalog) are ideal for supporting the bottom row of shelves 2½" 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. The shelves should not cover any portion of the burner holes in the floor of the kiln.
3. Turn ("flip") shelves often to minimize warping.

Tidbits.

Raku firing techniques. There are about as many Raku firing techniques as there are Raku results. Our staff has found that Laguna Raku Industrial clay (WC-549) bisqued to Cone 07 for 6½ hours and Raku fired at about 1850˚ for about 40 minutes creates great results. The choices for organic combustibles in the reduction can (a metal trash can works great) are many, but good, old wadded up newsprint (avoid color pages) or shredded computer paper are hard to beat. Also, a little paper goes a long way. Put a few "wads" on the bottom of the can and another wad or two on top of red-hot pottery once you have placed the pottery in the can. When the flames begin (which they will almost immediately!), cover the can and let the process begin! Using less paper will cut down on excessive smoke created by unignited paper, and the unignited paper contributes nothing to the firing!

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. NEVER USE A MATCH OR LIGHT BURNERS TO SEARCH FOR A LEAK!

Rats! We were notified by one of our customers that kiln damage can come in the most unexpected forms. His advice: "Cover the flue and burner ports when the kiln is not in use to avoid pack rat damage."
Yes, apparently the little rascals find the fiber nearly irresistible!

Witness Cones. We recommend the use of witness cones with every firing. Cones are consistent, reliable and the best possible means of accurately checking kiln temperature. Unlike periodic firings, you may fire your Raku kiln several times in rapid succession on the same day.

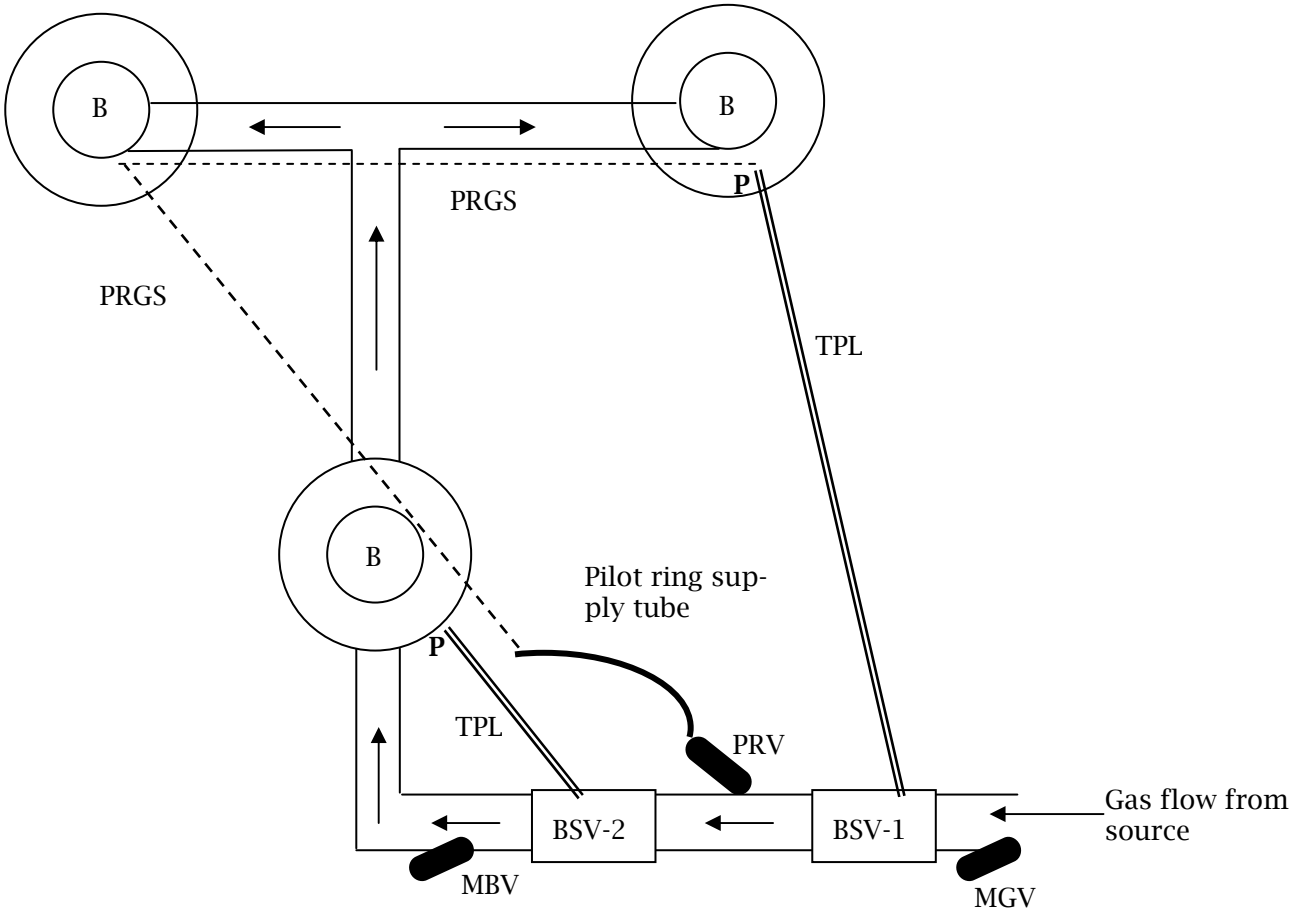
The kiln will hold heat, and temperature will be reached more quickly with successive firings. Therefore, time becomes less of a guideline and cones become more essential.

Accessories.

Gloves	High temperature gloves or mittens are a must. In addition to catalog listed items [#FS-222 (gloves); FS-223 (mittens)], other Kevlar and Vertex choices are available from Laguna by special order.
Leather Apron	Available from Laguna by special order.
Safety Glasses	Laguna catalog. – Item #MY-107
Raku tongs	Both short (36”) and long (52”) available through Laguna catalog – Items #TM-635S or TM-635L.
Water column gauge	Laguna catalog – Item #FS-115.
Wheels	Roll your kiln from the storage shed to its outdoor firing location. Laguna special order.
Clay & Glaze	Clay and glaze formulated specifically for Raku firing – Laguna catalog.

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.

Raku burner, manifold and valve diagram:



⟶	Direction of gas flow
BSV	Basso safety shut-off valves; regulates thermocouple and gas supply to pilot burners.
PRV	Pilot ring valve
PRGS ------	Pilot ring line of gas supply
PR	Pilot ring
P	Pilot burner
(B)	Main burner (3 burners total)
MBV	Main burner valve
MGV	Main gas valve
TPL ═══	Thermocouple sensor and pilot burner gas supply (2 lines).

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