

Gas Kilns Instruction Manual

*Firing Your Olympic Gas Kiln
TORCHBEARER, RAKU & DOWNDRAFT Kilns*



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P.O. Box 1347, 4225 Thurmond Tanner Road, Flowery Branch, GA 30542

Building the Finest Kilns for Your Creative Spirit!

Congratulations!

You have just purchased the sports car of kilns – an Olympic Gas Kiln! Get ready to move ahead with the power to raku, reduce, bisque, cone 10 firing – you name it, you can do it, with your Olympic Gas Kiln.

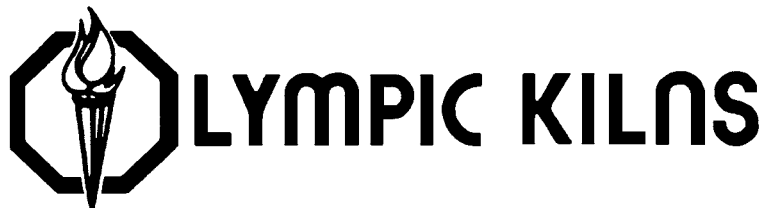
This manual will discuss the how tos of operating your gas fired kiln and review frequently-asked questions for troubleshooting and maintaining your kiln. The first section discusses the Torchbearer and Raku gas firing kilns and the second section provides information on the Olympic DownDraft kilns.

People, who still feel that quality and workmanship are of the utmost importance, make Olympic Kilns. We make your kiln of the finest materials available and each Olympic Kiln is built to order, handcrafted and created for each customer. Your Olympic Kiln is designed to provide you with many years of dependable firings.

It is important that you read this manual carefully. The time spent understanding your kiln will pay off many times over in the form of good firings and peace of mind.

Your Olympic dealer will gladly answer any questions you may have, or you may contact Olympic Kilns. Please provide the model and serial number of your kiln when information is needed.

MANY HAPPY FIRINGS!



Sales: 800-241-4400 • Help Line: 770-967-4009
E-mail: info@kilns-kilns.com

Receiving Torchbearers, Rakus & DownDraft Kilns

Olympic Kilns packs and ships its merchandise so that it will arrive at its destination undamaged. Olympic Kilns' responsibility ends when the shipment is accepted by the carrier at our factory. We do not allow any deductions from invoices for damage.

It is the receiver's responsibility to understand and comply with standard shipping and receiving practices as described in this section. **The carrier is responsible for moving your freight but not for unloading it.** If you do not have a loading dock, a lift gate for moving freight that is shipped on pallets smaller than 6 ft. x 6 ft. is recommended at delivery. You will need to request lift gate service when ordering your kiln from your Olympic dealer. Otherwise additional freight charges will be incurred upon delivery of freight. It is your responsibility to move the freight from the truck to its place of use.



Olympic Rakus Packed & Palletized



**Olympic Downdraft Kilns
Packed & Palletized**

Olympic DownDraft kiln models DD20 and above cannot be shipped on pallets as small as 6 ft. x 6 ft. You will need to have a forklift that can move the kiln from the truck to the desired location. If you do not have access to a forklift, check the yellow pages for small moving companies that can take the freight off the long distance carrier and move the freight to the desired location. Give any prospective mover a physical description of the kiln, the weight, and inform them that it is designed to be picked up with a pallet truck or forklift only. Check several sources for quotes so that you can get the best price.

Upon Delivery

You have the option of refusing delivery if the freight appears to be damaged. If any damage appears on the outside of the package, have the driver inspect the package(s) and note the damage on the carrier's delivery receipt.

Immediately after delivery, open all cartons to determine if there is any concealed damage.

- Retain all damage items with their packaging
- Call carrier to report damage and request an inspection within 24 hours. If a call is made later than 36 hours, the carrier can deny your claim.
- Confirm call in writing by registered mail and keep a copy for your records.

Upon Carrier Inspection

Allow the inspector to inspect damaged items, cartons, inner packing materials and freight bill. Be sure to retain your delivery receipt, it will be required as supporting documentation when a claim is filed. Once the inspector has filled out the inspection report, read it carefully and make sure you agree with the report. Unless repairs will be completely satisfactory, be sure the inspector requests replacement on the inspection report; otherwise a new item cannot be ordered to replace what can be repaired.

After Carrier Inspection

Continue to retain damaged merchandise even though the inspection has been completed. Damaged items cannot be used or disposed of without written permission from the carrier. Do not return damaged items to the shipper without written authorization from the supplier. Secure receipt, if damage items are picked up by the carrier for salvage.

Documents Required for Filing a Freight Claim

- Your carrier's loss or damage claim form
- Shipper's original invoice or copy
- Original bill of lading
- Original paid freight bill
- Carrier's inspection report
- Repair invoice

It is the customer's responsibility (as consignee) to file any claim. Olympic Kilns is willing to assist you in collecting claims but this willingness does not make us responsible for collection of claims or replacement of materials damaged or lost.

OLYMPIC KILNS CANNOT MAKE FREIGHT CLAIMS FOR CUSTOMERS.

Safety

Your Olympic Gas Kiln has been built to fire at high temperatures and to run on natural gas or propane. A few notes before you begin firing your gas kiln will add to your enjoyment and safety. Your gas kiln should be installed on a concrete, masonry or brick floor that is non-combustible. Keep all flammable materials at least 6 feet away from the kiln and do not use highly flammable, combustible materials around the kiln such as gasoline, paint thinner, etc. The surface of the kiln is hot and individuals should not touch the kiln when it is firing.

LIGHTING - The flame source (blow torch, gas match, fireplace match) needs to be long enough to keep the operator well away from the burner openings. When lighting, keep kiln door or lid open.

VENTILATION - A room must have adequate airflow into the room and exhaust gases must be vented in accordance with local requirements or codes.

GAS LEAKS - Whenever gas piping is modified, it should be leak tested. Never check leaks with an open flame.

KILN WATCHING - A gas kiln should not be left unattended.

FIRE EXTINGUISHERS - The best extinguisher for a gas fire is to turn the gas off. Make certain that everyone in the area knows where the gas valve is and how to turn it off. If the valve requires a wrench, hang it nearby. Appropriate extinguishers should be available and everyone involved instructed in their use.

OBSERVATION/PEEPHOLES - Care should be used when viewing through the kiln's observation holes.

Safety suggestions are never complete and every situation will not be covered. Above all, use common sense and good judgement when firing your gas kiln.

Frequently Used Terms – Gas Firing Kilns

BISQUE - The term given to ceramic ware which has been given a preliminary firing prior to glazing. Also called biscuit.

BURNER - A device in which air is combined with gaseous fuel and ignited at the burner tip.

BURNER BLOWER - An air fan, or blower, is used to provide air in quantities greater than the natural draft situation provides. This allows a greater amount of heat to be obtained from a burner of a given physical size.

BTU BRITISH THERMAL UNIT -

1 Cubic Foot Natural Gas = 1000 BTU / 1 Cubic Foot Propane = 2,200 - 2,500 BTU

CANDLING - The gradual heating of the kiln usually overnight, with a low flame (candle-size). The period of slow drying of the greenware before the kiln temperature is increased. Omission of the candling period can likely cause explosion of greenware when the moisture expands as steam.

CFM - Cubic feet per minute, refers to volume of gas flow.

CFH - Cubic feet per hour, also refers to volume of gas flow.

COMBUSTION AIR - The total air intake to the firing chamber, which is used for combustion. Combustion air is introduced in two ways: Primary air: Air passing through the burner. (The air mixing plate controls the primary air intake. Secondary air: Air entering around the burners through the top of the burner and the bottom of the kiln. There needs to be 1/2" space between the top of the burner and the bottom of the kiln.

CONE - A small clay pyramid made of ceramic materials which reacts to time and temperature the same as ceramic ware. Two sizes are available: small (Junior) cones or bars (1 1/8" h) used only in kiln sitters; and large (Senior or Witness) cones (2 1/2" h) used for observation.

DAMPER - A cover (brick, kiln shelf, etc.) used to partially restrict the exhaust opening. A damper also restricts air into the burner and is used to regulate oxidation and reduction firing.

DOWNDRAFT KILN - A more complex system than the updraft kiln in that the exhaust as well as the intake is at the bottom. It requires a chimney or stack to induce enough draft to pull in fresh air for combustion.

FURNITURE - The shelves and posts, which are used to stack ware on multiple levels while firing the kiln.

GREENWARE - Refers to any unfired ceramic ware, but usually in the dry state.

HEAT TRANSFER - Heat energy is brought into the kiln by way of the fuel. The heat is released from the fuel by combustion (burning) and is absorbed by the bricks, shelves, ware within the kiln chamber. Likewise, heat is transferred from the inside of the kiln through the brick walls, to the outside air, where it is lost for productive purposes. This is called heat loss.

KILN SITTER - A mechanical device that will shut the kiln off when a small pyrometric cone matures.

INCHES OF WATER COLUMN - A unit of pressure: 1" of water = .577 ounces/sq. in.; 1" of water = .0631 pounds/sq. in.

ORIFICE - An opening through which gas passes into the burner. Orifice size determines the heat output of the burner; i.e., BTUs - propane due to the higher output will have a smaller orifice than natural gas.

OXIDATION FIRING - Occurs in a kiln combustion atmosphere with approximately 6% excess oxygen. This is the most common kiln firing. An electric kiln normally has an oxidation atmosphere. A gas kiln must be adjusted for this atmosphere.

PSI - Pounds per square inch. A unit of pressure.

PYROMETER - An instrument that enables accurate temperature monitoring during the kiln's firing.

RAKU FIRING - Raku, a Japanese word often interpreted as "enjoyment" or "happiness" is a form of ceramic art in which a piece is subjected to a post-fire reduction process using sawdust, paper or other materials to change its color and chemistry. Raku artists value the technique for its ability to produce a wide range of colors and effects-since no two pieces of raku pottery ever look alike.

REDUCTION FIRING - Occurs when the air supply is restricted to an amount below that needed for complete combustion of the gas present resulting in a consumption of oxygen from the clay and glaze compounds. Reduction produces colors based upon the metallic compounds in the clay and glazes rather than the oxides of these metallic compounds.

REFRACTORY - Materials, which will withstand high temperatures, and includes fireclay products, firebrick, shelves, and posts.

SOAKING - The process of bringing a glaze to maturity, i.e., a cone end point, and holding it at that temperature to allow the bubbling and pinholes, which are a natural part of the glaze process, to heal over and become smooth. Soaking is also used for crystal growth. Proper time determined through experimentation.

SOLENOID GAS VALVE - An on-off gas valve, which is electrically operated.

THERM - A heat energy unit being used by gas companies because the cubic ft. per hr. measure does not properly describe energy usage. 1 Therm = 100,000 BTU.

THERMOCOUPLE (S) - Two types of thermocouple may be used when firing a gas kiln. The first type is the one used with a pyrometer or electronic wall unit. The second type of thermocouple is for the magnetic base valve on a gas kiln. This thermocouple senses the temperature and flame from the pilot of the gas kiln and causes the magnetic base valve to open and is used as a safety device to shut down the kiln when there is no flame on the pilot.

UPDRAFT KILN - A gas kiln that introduces heat at the bottom and exhausts at the top. It does not require a chimney to induce a draft.

VENTURI BURNER - Type of burner used on Olympic gas kilns. It is non-mechanical and very efficient.

Approved Gas Components

The following information is a list of approved components used on Olympic gas kilns.

The electronic control when used is manufactured by Bartlett Instrument Company and bears UL's Universal File Number E37370 and is so marked on each board.

Transformer:	Signal Trans., - UL Recognized
Relay:	Potterbrumfield, T92P7022-12 - UL Listed
Plug:	Leviton - UL Listed
Cord:	American Insulated Wire 12-3 SJ - UL Listed
Single Receptacle:	15A - 120V - UL Listed
Magnetic Valve:	Johnson Controls, H15FA-1- AGA, CSA, ANSZ 21.20
Gas Thermocouple:	Johnson Controls, Penn Baso Thermocouple Model K15FA-24 & K15FA-48 - AGA, ANS Approved
Electric Valve:	Johnson Controls, Series H91 Basotrol - AGA, ANA, CSA Approved
Thermocouple:	Pyromation, Type K

This combination has worked successfully for many years and has been approved on its merits throughout the world.

Cone Numbering Chart

Cone Number	Temperature Equivalent 108°F/hr (Note 1)	Temperature Equivalent 270°F/hr (Note 1)	Approximate Color of Kiln Interior (Note 2)	Type of Ware & Glazes (Note 3)
10	2345	2381	White	Stoneware Glaze
9	2300	2336		
8	2257	2305		
7	2219	2264		
6	2194	2232		
5	2151	2185		
4	2134	2167		
3	2106	2134		
2	2088	2124		
1	2077	2109		
01	2043	2079	Yellow	Bisque, Lowfire Glaze
02	2014	2048		
03	1987	2014		
04	1922	1940		
05	1888	1915		
06	1816	1830		
07	1783	1803	Orange	Red Family Glaze Underglaze
08	1733	1751		
09	1679	1693		
010	1629	1641		
011	1627	1639		
012	1591	1623		
013	1558	1566	Cherry Red	Glass Sagging
014	1533	1540		
015	1454	1479		
016	1407	1458		
017	1341	1377		
018	1285	1323		
019	1234	1261	Dull Red	China Paints Metallics, Lusters Decals Glass Paint
020	1157	1175		
021	1116	1137		
022	1085	1112		

Note 1:
The temperature equivalents apply to large (2 1/2") pyrometric cones when heated at the indicated heating rate in an air atmosphere. Small cones in the automatic shut-off have approximately the same temperature equivalent.

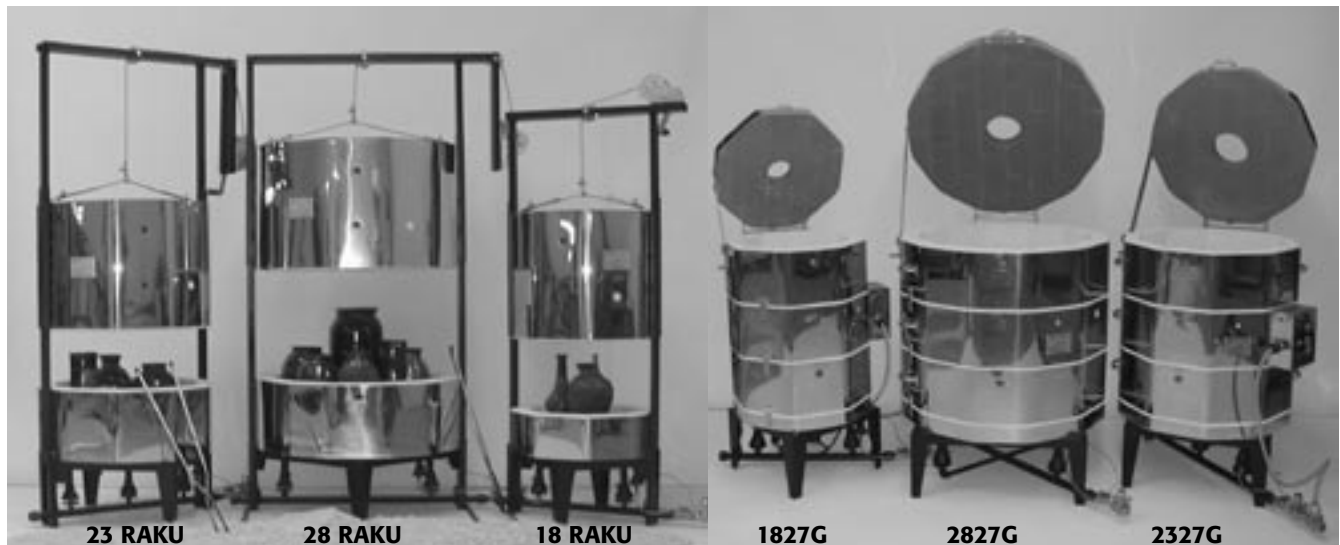
Note 2:
When looking into the observation hole, all objects that are near the same temperature will be near the same color. Brighter appearing objects are hotter than darker objects.

Note 3:
This table is for general information. Consult the manufacturer's instructions for the correct cone number to use.

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Torchbearer & Raku Gas Kilns



Locating and Installing Torchbearers & Rakus

1. Adequate space - at least 12 inches of space between the kiln and the wall. All flammable materials such as curtains, plastics, etc. in the area of the kiln should be removed.
2. Proper ventilation - if the kiln is located in a confined area it is essential that an exhaust hood be placed above the kiln and vented to the outside. This ensures removal of heat and exhaust gases including carbon monoxide. Even if the kiln is outside be sure that the hot exhaust gases do not cause damage.
3. A 120-volt outlet will be needed if either the kiln sitter system or electronic wall unit were purchased with the kiln.
4. A 3/4" gas pipeline is required for Torchbearers and Rakus; however, if the kiln is a long distance from the gas source, a 1" gas pipeline may be necessary.
5. If the kiln is to be placed outside make sure it does not get wet. Use a roof over the kiln or some type water resistant tarp when the kiln is not being fired.
6. Because all kilns generate heat, the burner system/stand should be placed on a cement floor. Vinyl tiles or linoleum could be damaged without this precaution. It is important that the kiln be fired only on the metal stand or frame provided with the burner system. The eleven - (11) inch height of the stand/frame is necessary for proper burner positioning and adequate cooling beneath the kiln. Remember to use sheet metal or non-flammable material to shim the legs when leveling the kiln.

Gas Usage for Olympic Torchbearer & Raku Kilns

• PROPANE

Olympic gas kilns burners are factory set for use on either propane or natural gas determined by the customer's order. If propane is used, your tank must have a low-pressure regulator like those on a camper or trailer. If an adjustable regulator is used approximately 1/2 pound of pressure is necessary. The larger the tank the better; however, a five (5) gallon tank is the minimum size for the 1827G or 18 Raku and a 15 gallon tank is the minimum size for the 2327G/23 Raku and 2827G/28 Raku kilns. Due to gas flow, the propane tank may have a tendency to freeze solid. If ice is observed forming on the outside of the tank, water can be run over it to help keep it melted. The tank can also be lowered into a large bucket of warm water.

• NATURAL GAS

A larger burner orifice is necessary when used on natural gas pressure, six (6) to eight (8) inches of water column is required. If your kiln was ordered for use on household natural gas, it is equipped this way.

Assembly of Kiln

Olympic Torchbearer kilns are built in rings and may be detached and reattached when moving from one location to another. When handling your new kiln rings, always be sure to grasp the rings by the outer surface only. Do not grasp the bricks as they are made of a porous material and may chip in your hand. Raku kilns are shipped fully assembled.

After making certain the stand is level, adjust the burner manifold so the pipe section on top of each air mixer is approximately 1/2 inch below the bottom of the kiln. The kiln bottom must be positioned on the stand so each burner is directly beneath one of the holes (see figure 5).

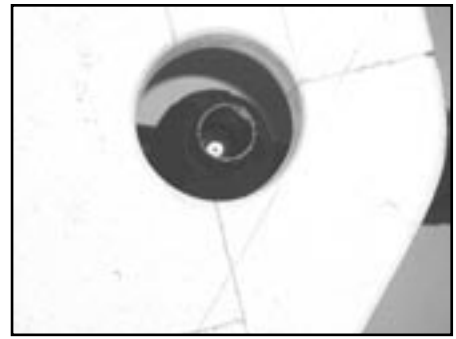


Figure 5

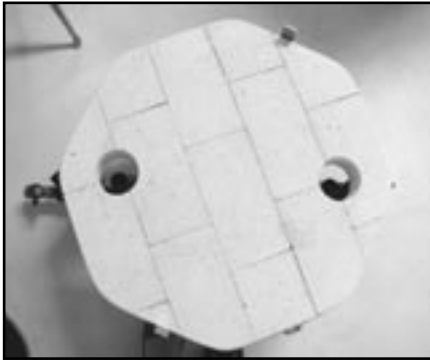


Figure 7

It is recommended that the burners be positioned with the gas valve on the right side when you are facing the kiln, however, if it is more convenient to place the manifold in another position be sure to align the burners with the holes in the kiln bottom (see figures 6 & 7).

The kiln rings may now be stacked with the hose clamps in back and the observation hose aligned in front (see figures 8, 9 & 10). If the kiln has the optional ignition system with safety shut-off, the thermocouple needs to be placed directly over the pilot (see figure 11). Once the kiln is assembled, be sure the inside is clean and free of dust. It may be necessary to vacuum the inside of the kiln at regular intervals.



Figure 6



Figure 8



Figure 9



Figure 10



Figure 11

Venting Torchbearers & Rakus

Proper ventilation is required when firing a gas kiln. Gas kilns fired outside may not require a vent. When purchasing vents it is often best to choose a local HVAC or sheet metal manufacturer, or Olympic Kilns can manufacturer one for you. Call for pricing. Vent dimensions need to be round or square in a cone shape and the bottom of the vent needs to be larger than the outside diameter of the kiln. Diameter at the top of the vent needs to be 10" discharging into an exhaust pipe required by building conditions or local codes (see figure 12).



Figure 12

Operating Torchbearers & Rakus

Once the kiln is hooked to a gas source, each burner may be ignited and the primary air adjusted for each of the air mixers or burners.

Air adjustment is accomplished by revolving the adjustment shutter plate up or down below the air mixer. The recommended starting point is 1/4" natural gas and 3/8" - 1/2" propane.

A properly adjusted kiln will have all flames uniform in appearance with transition from candle flame to intense flame occurring at the same time for each burner as the gas valve is opened. The kiln operates most efficiently when the intense flame has a maximum of blue color. **Propane gas will not generate as intense blue color flame as natural gas.** If the flame tends to blow out when the gas valve is opened the air inlet should be closed slightly.

The air adjustment of the burners need not be changed once the optimum settings are obtained; however, reduction firing in the kiln may be accomplished by closing the air inlets. The easiest and most reproducible reduction is done by dampering the vent hole in the lid.

VENTURI BURNER

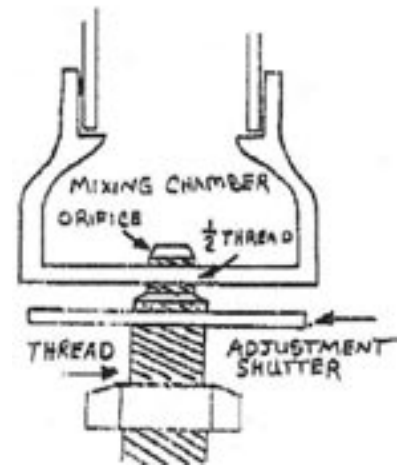
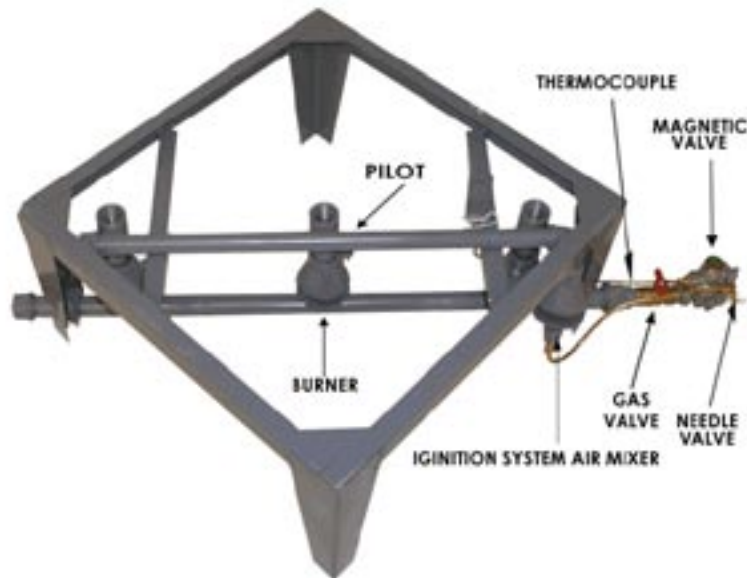


Figure 13

Lighting Torchbearers & Rakus

Turn on your gas supply. If you purchase either the Olympic Torchbearer or Raku kiln without an ignition system, you will use a fire stick to light each burner once you have turned on the gas valve.



Ignition System & Thermocouple Safety Shut-off Purpose

1. Light the multiple burner system from one point
2. Maintain the flame on each burner
3. Re-ignite any burner that may extinguish
4. Stop the gas flow after an interruption

Operating the Ignition System & Thermocouple Safety Shut-off

1. Depress the red button on the top of the magnetic valve
2. Light the pilot
3. The needle valve should be adjusted to allow sufficient gas flow to propagate a flame entirely around the pilot when it is ignited at any point.
4. Once the ring is ignited the thermocouple sensor is hot and the valve will stay open by itself
5. Turning the gas hand valve on the burner manifold lights the burners.



Figure 15

Loading Torchbearers & Rakus

It is recommended that kiln shelves need a 1" space in the middle as you stack for proper airflow in the kiln. The direction of the shelves can be alternated from one level to another and ware can be placed on the 1" space between the shelves (Figure 16).

The top layer of shelves may be less than 1" apart (Figure 17).

The first layer of shelves must be 3" above the kiln floor for proper airflow.

18" torchbearer and 18 Raku kilns have full shelves that may be used; however, the 3" stacking rule still applies.

Make sure the shelves are for a gas kiln. Gas shelves are smaller in diameter than electric shelves.



Figure 16

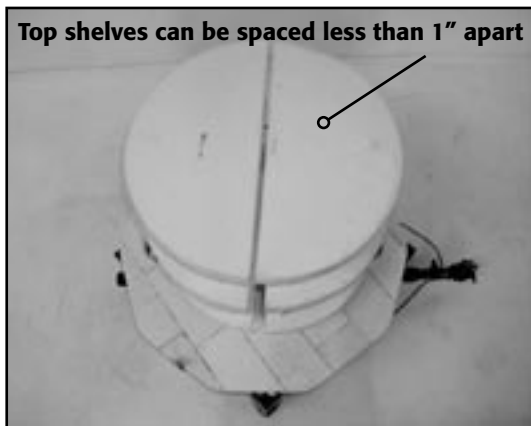


Figure 17

Torchbearer & Raku Options

Pyrometer

Pyrometers are not installed directly on gas kilns.

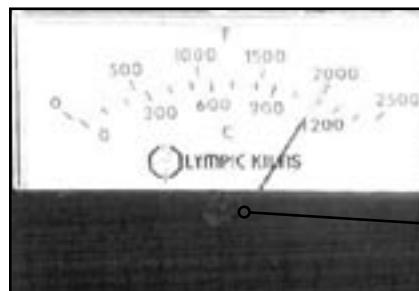
Wall Mount Pyrometer – Drill hole 1/4" through exposed brick of kiln and insert thermocouple. The thermocouple only needs to be inserted into the kiln about 1 1/2".

Hang wall mount pyrometer away from the kiln to prevent damage to the instrument. The lead wire from the instrument to the thermocouple is 6 feet.

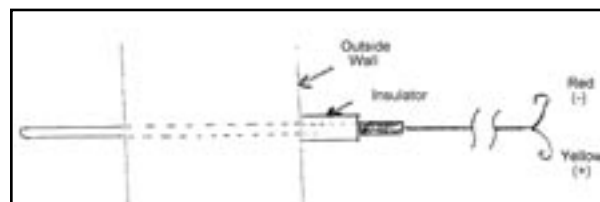
If calibration of the pyrometer is required, adjust the set screw located on the plate of the instrument with a screwdriver.



Exposed brick on a gas kiln is usually positioned in the rear of the center of the kiln.



Set Screw



Pyrometer Thermocouple Placement

Kiln Sitter System for Gas Kilns / Limit Timer

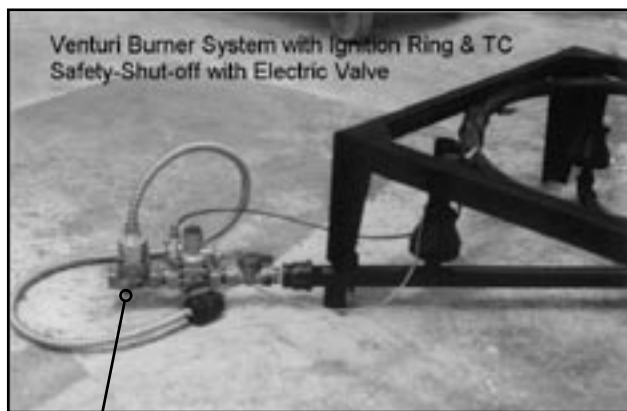
This option is only available for Torchbearers.



A kiln sitter may be ordered with your kiln or added later. If your kiln is installed with a kiln sitter, the kiln sitter electrical box on the kiln plugs into a standard 120-volt outlet. The electric valve plugs into the receptacle on the kiln sitter box.

To add a kiln sitter to a Torchbearer kiln, drill a 1" hole in the exposed brick area of the kiln for the kiln sitter tube assembly to go through. Mount the kiln sitter electrical box to the kiln and secure to the kiln body with #6 sheet metal screws. Screw the electric valve to burner manifold, paying attention to the gas flow direction embossed on the valve.

Gas kiln sitter systems may be retrofitted after the purchase of the kiln. Torchbearers do not require an ignition system for the kiln sitter option to work.



Electric valve on Torchbearer equipped kiln sitter option. Electric valve plugs into kiln sitter box on the kiln.



Torchbearer with Kiln Sitter System

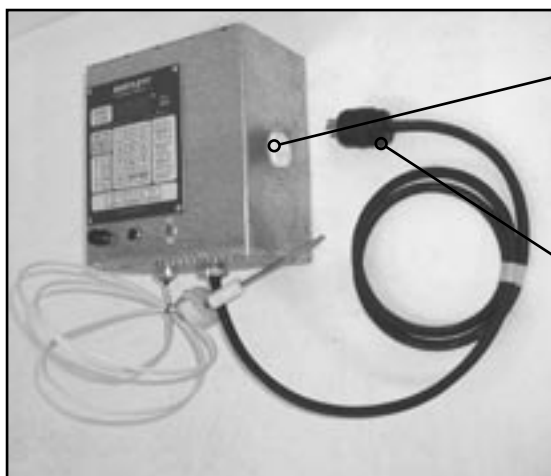
Electronic Wall Unit

Torchbearer or Raku Kilns must have an ignition system to equip kiln with an Electronic Wall Unit Controller

Installation

Olympic's electronic wall unit features programming by cone number or allows you to create your own programs. Each program has eight segments with ramp/hold profiles and controlled cooling rate. The controller also features numerous means for diagnosing problems and convenient program review before or during a firing.

1. Attach wall mount control vertically to wall.
2. Plug electric valve from the burner manifold into the wall unit.
3. Plug wall unit into a 120-volt outlet.
4. Drill a 1/4" hole through the kiln wall and insert thermocouple from wall unit into the kiln.
5. Read electronic control instructions thoroughly and following programming instructions that best suit your firing requirements.



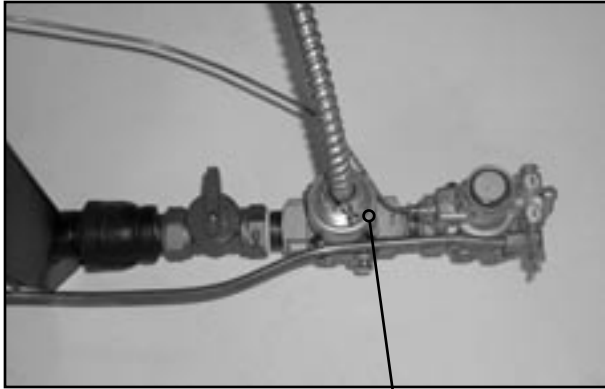
Electric Valve from kiln plugs into wall unit

Plugs into 120-volt receptable

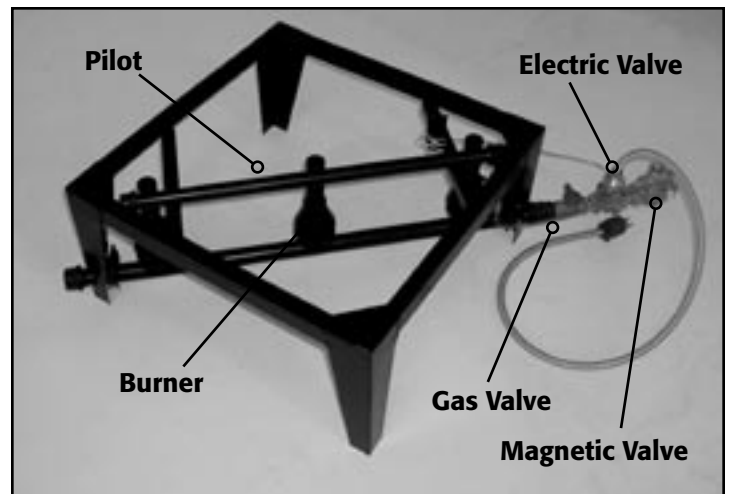
Electronic Wall Unit Controller

Electronic Wall Unit Operating Instructions

1. Turn wall unit on and set program. Press Start.
2. Depress the magnetic valve and hold for 60 seconds.
3. Light the pilot.
4. Slowly begin operating the gas valve. As temperature increases within the kiln, continue to open gas valve as needed.



Electric Valve on Torchbearer & Raku Kilns with Electronic Wall Unit



Because the electronic controller is on/off and not proportional, the gas kiln operator will need to adjust the gas flow before the electronic controller will take over the firing.

The gas valve will need three (3) increment adjustments once the kiln begins firing.

1. Adjust gas valve to have the gas fire to 500° F.
2. Make a second adjustment with the gas valve to fire the kiln to 1000° F.
3. The third adjustment of the gas valve will have the kiln firing at 1500° F. Once the kiln reaches 1500° F, the electronic controller will take over the firing schedule and shut the kiln off when the program is completed.

Please Note: Without manual adjustments, temperature changes will be violent or incomplete, and combustion will occur.

Torchbearer and Raku kilns purchased without an electronic wall unit may be retrofitted after purchase if the kilns are equipped with an ignition system.

Conversion from Propane to Natural Gas for Torchbearers & Rakus

The table shows orifice sizes for each Olympic Torchbearer and Raku kiln.

Gas Kiln Size	Propane	Natural Gas
18 Inch Torchbearer	3/32	1/8
18 Inch Raku	3/32	1/8
23 Inch Torchbearer	#40	9/64
23 Inch Raku	#40	9/64
28 Inch Torchbearer	#40	9/64
28 Inch Raku	#40	9/64

To convert propane to natural gas, you may enlarge the orifice according to the table shown above. If a conversion from natural gas to propane is desired, a new set of burner orifices can be ordered from Olympic Kilns.

DownDrafts



Olympic DownDrafts

A more complex system than the updraft, the DownDraft kiln's exhaust, as well as the intake, is at the bottom. DownDrafts require a chimney or stack to induce enough draft to pull in fresh air for combustion. Olympic DownDrafts fire to cone 10, 2350°F and can be built of fiber or brick.



Locating and Installing DownDrafts

1. Adequate space - at least 12 inches of space between the kiln and the wall. All flammable materials such as curtains, plastics, etc. in the area of the kiln should be removed.
2. Proper ventilation - if the kiln is located in a confined area it is essential that an exhaust hood be placed above the kiln and vented to the outside. This ensures removal of heat and exhaust gases including carbon monoxide. Even if the kiln is outside be sure that the hot exhaust gases do not cause damage.
3. A 120-volt outlet will be needed if either the kiln sitter system or electronic wall unit were purchased with the kiln.
4. A 3/4" gas pipeline is required for the DD9; and a 1" gas pipeline for all other DownDrafts.
5. If the kiln is to be placed outside make sure it does not get wet. Use a roof over the kiln or some type water resistant tarp when the kiln is not being fired.
6. Because all kilns generate heat, the burner system/stand should be placed on a cement floor. Vinyl tiles or linoleum could be damaged without this precaution. It is important that the kiln be fired only on the metal stand or frame provided with the burner system. The eleven - (11) inch height of the stand/frame is necessary for proper burner positioning and adequate cooling beneath the kiln. Remember to use sheet metal or non-flammable material to shim the legs when leveling the kiln.

Gas Usage For Downdraft Kilns

- Low Pressure Regulator (purchase from gas supplier)
- Propane - 11" Water Column (Water Column is the amount of gas pressure)
- Natural Gas - 7" Water Column
- 3/4" Pipeline for Downdraft 9 Kiln, All Other Models - 1" Pipe Line (purchase from gas supplier)

PROPANE

Olympic gas kilns burners are factory set for use on either propane, or natural gas determined by customer order. If propane is used, your tank must have a low-pressure regulator like those on a camper or trailer. If an adjustable regulator is used approximately 1/2 pound of pressure is necessary. The table below is the minimum size tank for a cone 10 firing for each DownDraft model. Purchase a larger tank than the minimum cone 10 firing requirement so that you are not having to refill the tank after each firing.

DownDraft Model	Propane (Gallons)
DD9	10
DD12	15
DD14	18
DD17	21
DD20	24
DD24	29
DD30	40
DD40	48

NATURAL GAS

A larger burner orifice is necessary when used on natural gas pressure, six (6) to eight (8) inches of water column is required. If your kiln was ordered for use on household natural gas, it is equipped this way.

Assembly of Kiln

Olympic DownDraft kilns are shipped ready to fire. There is some minor assembly for car kilns in that both the track and car require alignment before firing begins.

Venting DownDrafts

Proper ventilation is required when firing a gas kiln. Gas kilns fired outside may not require a vent. When purchasing vents it is often best to choose a local HVAC or sheet metal manufacturer, or Olympic Kilns can manufacturer one for you. Call for pricing. Vent dimensions need to be round or square in a cone shape and the bottom of the vent needs to be larger than the outside diameter of the kiln. Diameter at the top of the vent needs to be 10" discharging into an exhaust pipe required by building conditions or local codes (see figures 30-33).

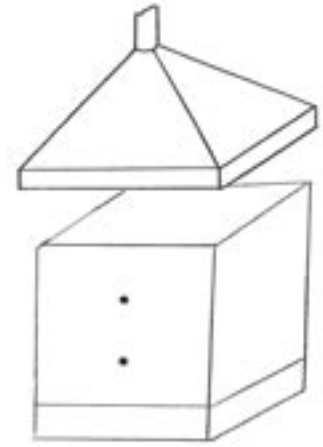


Figure 30

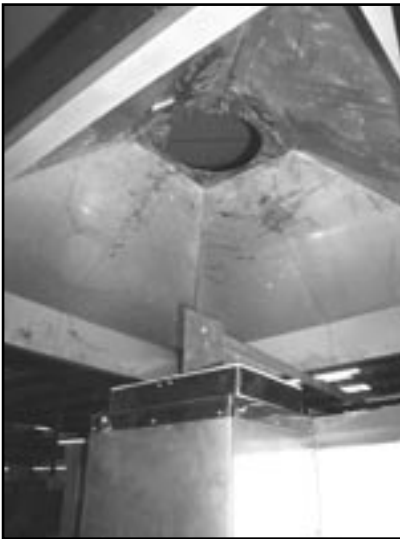


Figure 31



Figure 32



Figure 33

**Olympic Kilns hood design for DownDrafts
Inside, back & front views**

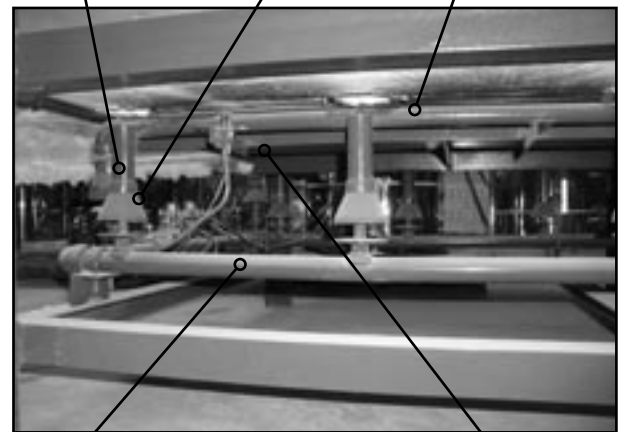
Operating Your DownDraft Kiln

Once the kiln is hooked to a gas source, each burner may be ignited and the primary air adjusted for each of the air mixers or burners. Air adjustment is accomplished by revolving the adjustment shutter plate up or down below the air mixer. The recommended starting point is 1/4" natural gas and 3/8" - 1/2" propane (see figure 34).

A properly adjusted kiln will have all flames uniform in appearance with the transition from candle flame to intense flame occurring at the same time for each burner as the gas valve is opened. The kiln operates most efficiently when the intense flame has a maximum of blue color. **Propane gas will not generate as intense blue color flame as natural gas.** If the flame tends to blow out when the gas valve is opened the air inlet should be closed slightly.

The air adjustment of the burners need not be changed once the optimum settings are obtained; however, reduction firing in the kiln may be accomplished by closing the air inlets. The easiest and most reproducible reduction is done by opening and closing the damper.

Ignition Bar Air Mixer Burner Ignition Bar Pilot



Burner Manifold Figure 34 Ignition Bar Pilot & Thermocouple

Lighting Your Kiln

Turn on your gas supply. Olympic DownDraft kilns are designed to light the left pilot bar first and then the right pilot bar. All Olympic Down-Draft kilns are equipped with two ignition systems, with the exception of the DD9, which has one.

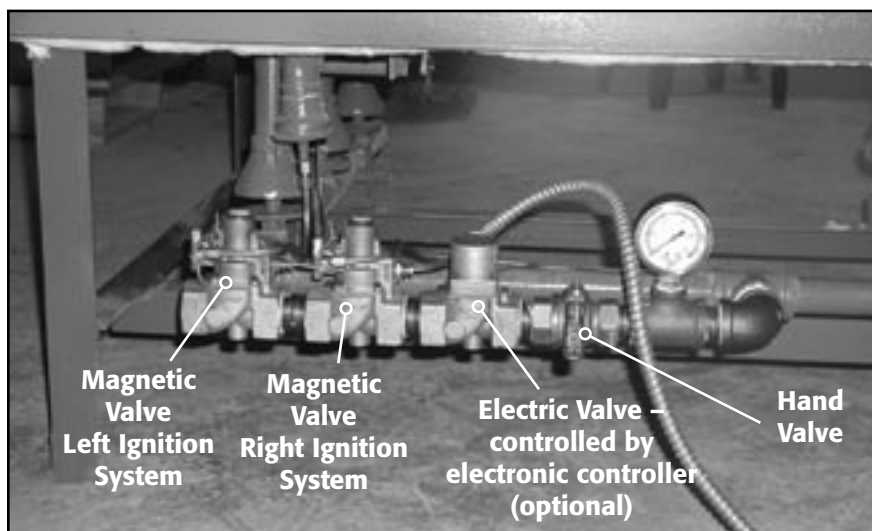


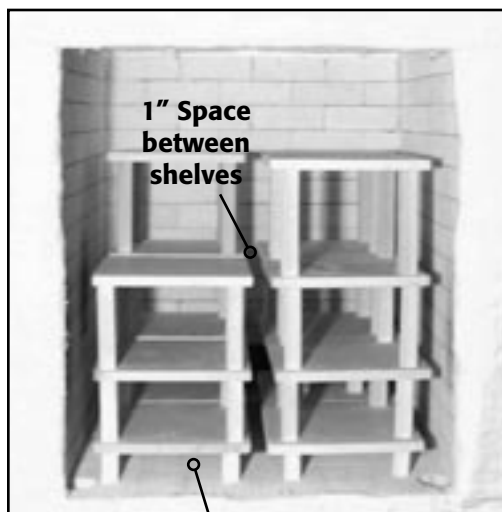
Figure 35

Ignition System & Thermocouple Safety Shut-off Purpose

1. Light the multiple burner system from one point
2. Maintain the flame on each burner
3. Re-ignite any burner that may extinguish
4. Stop the gas flow after an interruption

Operating the Ignition System & Thermocouple Safety Shut-off

1. Depress the red button on the top of the magnetic valve on the left side of the kiln and hold approximately 60 seconds
2. Light the left pilot
3. Repeat steps 1 & 2 on the right side ignition system
4. The needle valve should be adjusted to allow sufficient gas flow to propagate a flame entirely around the pilot when it is ignited at any point.
5. Once the ring is ignited the thermocouple sensor is hot and the valve will stay open by itself
6. Turning the gas hand valve on the burner manifold lights the burners.



Stack first layer of shelves
3" from kiln floor

Figure 36

Loading DownDrafts

It is recommended that kiln shelves have a 1" space in the middle for proper airflow in the kiln. The direction of the shelves can alternate and ware placed on the 1" space (see Figure 36).

The first layer of shelves should be 3" above the kiln floor.



Figure 37

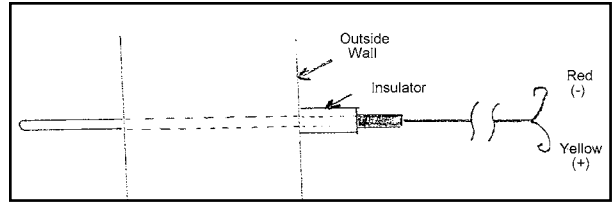
DownDraft Options

Pyrometer

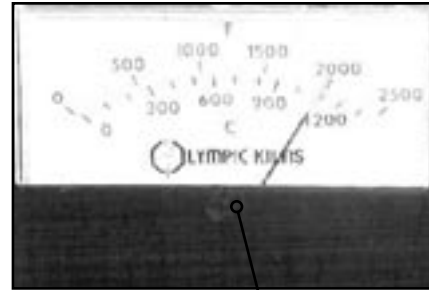
Pyrometers are not installed directly on gas kilns.

Wall Mount Pyrometer – Drill hole 1/4" through exposed brick of kiln and insert thermocouple. The thermocouple only needs to be inserted into the kiln about 1 1/2".

Hang wall mount pyrometer away from the kiln to prevent damage to the instrument. The lead wire from the instrument to the thermocouple is 6 feet.



Pyrometer Thermocouple Placement



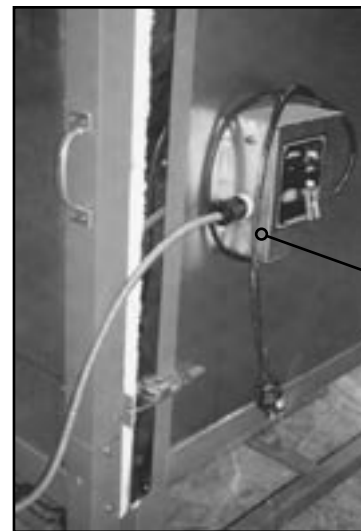
Set Screw

Kiln Sitter System / Limit Timer for DownDrafts

A kiln sitter may be ordered with your kiln or added later. If your kiln is installed with a kiln sitter, the kiln sitter electrical box on the kiln plugs into a standard 120-volt outlet. The electric valve plugs into the receptacle on the kiln sitter box.

To add a kiln sitter to a DownDraft, drill a 1" hole in the exposed brick area of the kiln for the kiln sitter tube assembly to go through. Mount the kiln sitter electrical box to the kiln and secure to the kiln body with #6 sheet metal screws. Screw the electric valve to burner manifold, paying attention to the gas flow direction embossed on the valve (see Figures 41-43).

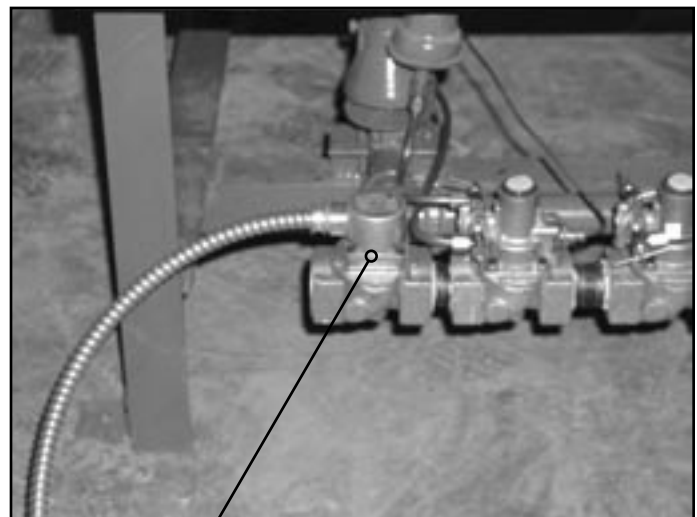
Gas kiln sitter systems may be retrofitted after the purchase of the kiln.



**Figure 41
Conduit plugs
into kiln sitter or
wall unit**



**Figure 42
DownDraft Kiln with Kiln Sitter
System Option**



**Figure 43
Electric Valve (1") on DownDraft equipped with Kiln Sitter**

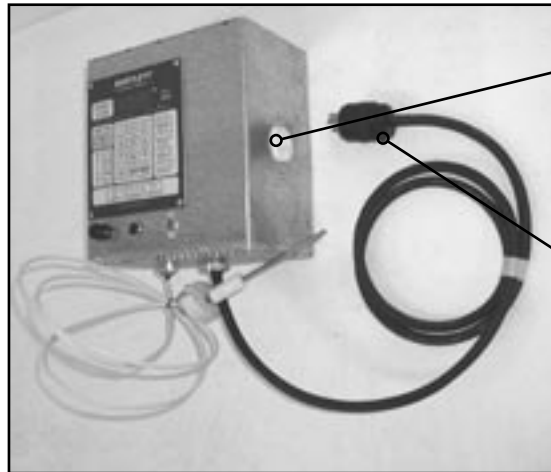
Electronic Wall Unit

Wall unit will not be attached to DownDraft kiln.

Installation

Olympic's electronic wall unit features programming by cone number or allows you to create your own programs. Each program has eight segments with ramp/hold profiles and controlled cooling rate. The controller also features numerous means for diagnosing problems and convenient program review before or during a firing.

1. Attach wall mount control vertically to wall.
2. Plug electric valve from the burner manifold into the wall unit.
3. Plug wall unit into a 120-volt outlet.
4. Drill a 1/4" hole through the kiln wall and insert thermocouple from wall unit into the kiln.
5. Read electronic control instructions thoroughly and following programming instructions that best suit your firing requirements.



Electric Valve from kiln plugs into wall unit

Plugs into 120-volt receptable

Electronic Wall Unit Controller

Electronic Wall Unit Operating Instructions

1. Turn wall unit on and set program. Press Start.
2. Depress the magnetic valve and hold for 60 seconds.
3. Light the pilot.
4. Slowly begin operating the gas valve. As temperature increases within the kiln, continue to open gas valve as needed.

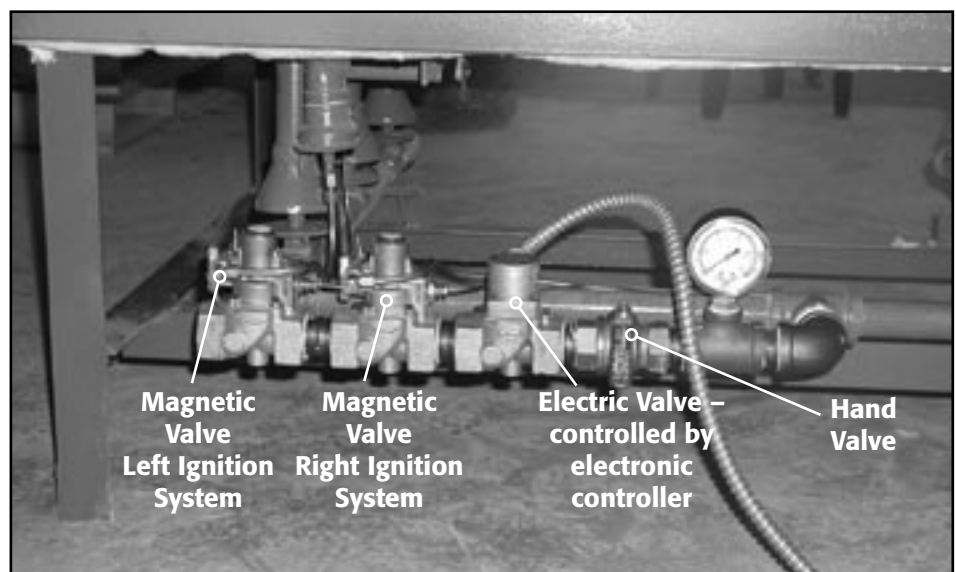
Because the electronic controller is on/off and not proportional, the gas kiln operator will need to adjust the gas flow before the electronic controller will take over the firing.

The gas valve will need three (3) increment adjustments once the kiln begins firing.

1. Adjust gas valve to have the gas fire to 500° F.
2. Make a second adjustment with the gas valve to fire the kiln to 1000° F.
3. The third adjustment of the gas valve will have the kiln firing at 1500° F. Once the kiln reaches 1500° F, the electronic controller will take over the firing schedule and shut the kiln off when the program is completed.

Please Note: Without manual adjustments, temperature changes will be violent or incomplete, and combustion will occur.

DownDrafts purchased without an electronic wall unit may be retrofitted after purchase.



200K Blower Burner Option - *Must be ordered at time of kiln purchase*

Standards & Approvals

AGA American Gas Association
ANS American National Standards
CGA Canadian Gas Association
CSA Canadian Standards Association
UL Underwriters Laboratory

Virtually all burners are, themselves, not approved by the above agencies because they become part of systems, which are field approved by local agencies. If you have problems with compliance to local codes, feel free to contact us or have inspectors contact us. We use the finest parts available.

Component List of Olympic's 200K Blower Burner:

Dayton Shaded Pole Blowers: Model 4C440, 4C442, & 4C443

CSA & UL (under the motor component recognition program) File E47479 for the thermal protection, File E37403 for impedance protection and File E40077

Vari-Speed Motor Speed Control: Model KBWC13-K

UL Approved

General Controls Series MR2 BASOTM Valve

AGA, CSA, ANS Z21.20 Auto Valves

Johnson Controls Series H91

Basotrol Electric Solenoid Valve

AGA, CSA, ANS Z21.21 Auto Valves

Honeywell Pilot Burner

Model Q314A

AGA, ANS Approved

Johnson Controls Penn BasoTM

Thermocouple Model: K24BT

AGA, ANS Approved

Watts Gas Cock Regulator Valve,

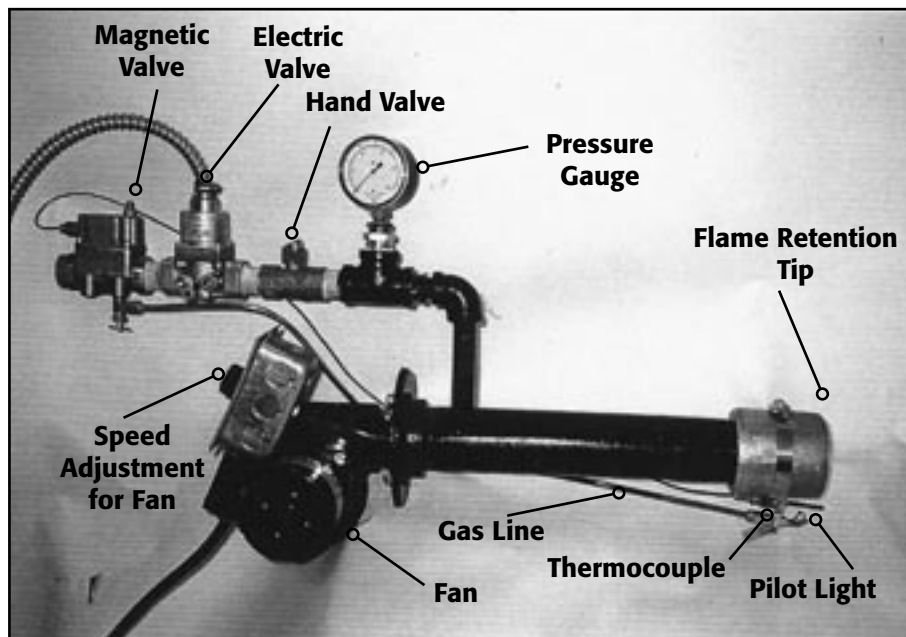
Model: 3/4 Inch 0545005

AGA, CSA, UL Approved

Carol Grounded 16/3 Cord Set,

Jacket Type

SJT, UL CSA Approved



Olympic Blower Burner Operating Instructions

Runs on 120 volts

1. Make sure burner shutoff valve is open and the flow of control valve is closed
2. Open needle valve to pilot burner
3. Hold down red BASOTM reset button and light the pilot burner while continuing to hold down the reset button for 30-45 seconds. Release.
4. Adjust blower to a low setting.
5. Slowly open flow control valve until the main ignition occurs.
6. Increases in gas need to be accompanied by increases in air. It is easier to adjust the air, than adjust the gas to match. Due to the circuitry involved in the speed control, you may experience a lag in the air setting.
7. To turn off blowers, shut flow control valve, turn off blower, close gas cock. Unplug after use.

Conversion from Propane to Natural Gas for DownDraft

Gas Kiln Size	Propane	Natural Gas
DD9	#40	9/64
DD12	#40	9/64
DD14	#40	9/64
DD17	#40	9/64
DD20	#40	9/64
DD30	#40	9/64
DD40	#40	9/64

The table shows orifice sizes for each Olympic DownDraft. To convert propane to natural gas, you may enlarge the orifice according to the table shown above. If a conversion from natural gas to propane is desired, a new set of burner orifices can be ordered from Olympic Kilns.

Firing Schedule Examples

(Bisque, Sculpture, Glaze & Reduction Schedules from *Gas Firing Kilns*, by Ralph W. Ritchie)

Firing Schedules

The following firing schedules are recommendations and should be considered a starting point for the method eventually adopted by the user of the kiln. Each kiln has its own individual characteristics that may be influenced by location, gas pressure, gas flow, weather, and the potter's own individuality. The user of a gas kiln needs to be willing to experiment with different firing techniques in an effort to express his/her own theories and develop methods which prove most satisfactory for the user's own unique situation.

All firing schedules need to be adjusted to conform to the thickness and mass of the ware being fired and the load density of the kiln. The more pieces the kiln contains the slower it should be fired. Finally, the clay body must be considered, remembering its strength, reaction to thermal shock, dryness, etc. Examples of firing schedules should be taken as that – examples only.

Bisque Firing

Dry the newly formed ware at room temperature until it is no longer cold to your sense of touch. Smaller pieces need seven to ten days drying time and larger pieces 10 to 15 days. Bisque or pre-firing is necessary to pre-condition the ware for glaze application and glaze firing. Bisque firing is a slow firing in which the physical and chemical water is driven off and the body becomes hard and solid. The ware is most susceptible to cracking during the early stages of bisque firing and several temperature zones should be crossed with extreme care.

The physical water leaves the clay at 212° Fahrenheit and the chemical water is driven off from 350° to 500° Fahrenheit. At 1073° Fahrenheit the quartz inversion occurs causing a size change in the body of approximately 2%.

To Bisque

1. Ignite the burners and adjust the gas valve to allow the flame to burn with a candle flame for 30 minutes. The pre-heating period should be extended if thick walled pieces are being fired or the kiln is densely loaded. Some soot may be observed during the candle flame period; however, it will burn out when the kiln reaches higher temperatures.
2. Open the gas valve enough to increase the length of the candle flame and cover the top port about 80%. Leave the kiln in this condition approximately one (1) hour.
3. Turn up the gas to allow the flame to burn with more force and with little yellow color. Open the top port about half way. After several hours at this rate open the gas valve half way. Leave the kiln at this rate for two hours or until the inside coloration is a dull red.
4. After the ware has passed through the quartz inversion indicated, by the dull red coloration, the burners can be turned up all the way and the top port can be completely opened.
5. When the cone has bent and the kiln has shut-off, cover the top port and plug the observation holes.



Bisque & Sculpture Firing Schedule Examples

Candle (Pre-heat) - Below 212°F All Night

Bisque Firing

150°F/hr to 600°F	Check & Log Every 30 Minutes
250°F/hr to 1100°F	Check & Log Every 60 Minutes
300°F/hr to Completion	Check & Log Every 60 Minutes
Within 100°F of End Point	Check & Log Every 10 Minutes

Sculpture Firing

100°F/hr to 600°F	Check & Log Every 30 Minutes
150°F/hr to 1100°F	Check & Log Every 60 Minutes
250°F/hr to Completion	Check & Log Every 60 Minutes
Within 100°F of End Point	Check & Log Every 10 Minutes

CONE 10 REDUCTION

The easiest way to obtain reduction effects is to wait until the kiln is near cone 9 and then cover the top port about one (1) inch. Wait for 30 seconds and watch for a slight flame coming from the top port and observation holes. If no flame is seen, cover another 1/2 inch and wait for the flame. Keep doing this in small increments until a slight flame is seen. Leave the kiln in this condition for about one hour then take the top port cover off completely and bring to final temperature. It is important to remember that over reduction will drop the inside temperature considerably and waste both gas and time. When firing with propane the flame is always evident at the top port. Turn the gas down a little if less flame is desired.

Body reduction may be accomplished by heating the kiln to cone 05 with top port open. At cone 06 cover the top port with the brick provided until the flame is evident from the top port and observation holes. The reducing atmosphere should be maintained for 30 minutes then the brick covering the top port should be pulled back until only an occasional flick of flame is seen from the observation holes. The kiln can then be heated to cone 9 and an additional reduction can be done as described above. A slightly reducing atmosphere from cone 06 to 9 will insure that the effects of the body reduction are not lost with additional heating.

Reduction can be accomplished by restricting exhaust gases by closing the damper on top of the stack or the covering the portholes on the kiln lid. Reductions can also be done by closing the air plates on the individual burners but the easiest way is to close the damper or lid porthole. Reduction is best determined by observing the flame from the observation holes and the exhaust port or stack of the kiln. A 2 1/2" - 3" yellow flame discharge from the observation hole is a good reduction.

GLAZE FIRING

The kiln should be warmed up with a slow flame for about one (1) hour. The flame can then be gradually increased at will until it is fully on. When kiln is fully on, the top port should be completely open. After the desired temperature has been reached, leave the kiln on for at least an hour at that temperature to properly soak the ware. Shut the kiln off as before, plug the observation holes and cover the top port. For best results do not reopen the kiln for 24 hours.

Glaze Firing Schedule Example

Glaze Firing

200°F/hr to 600°F	Check & Log Every 30 Minutes
250°F/hr to 1100°F	Check Every 30 Minutes & Log Every 60 Minutes
300°F/hr to Completion	Check Every 30 Minutes & Log Every 60 Minutes
Within 100°F of End Point	Check & Log Every 10 Minutes

RAKUING

Olympic Raku kilns are designed with an inverted firing chamber causing heat to be trapped even when the firing chamber is opened resulting in only a small temperature drop. Since temperature is critical during raku, a pyrometer will be helpful.

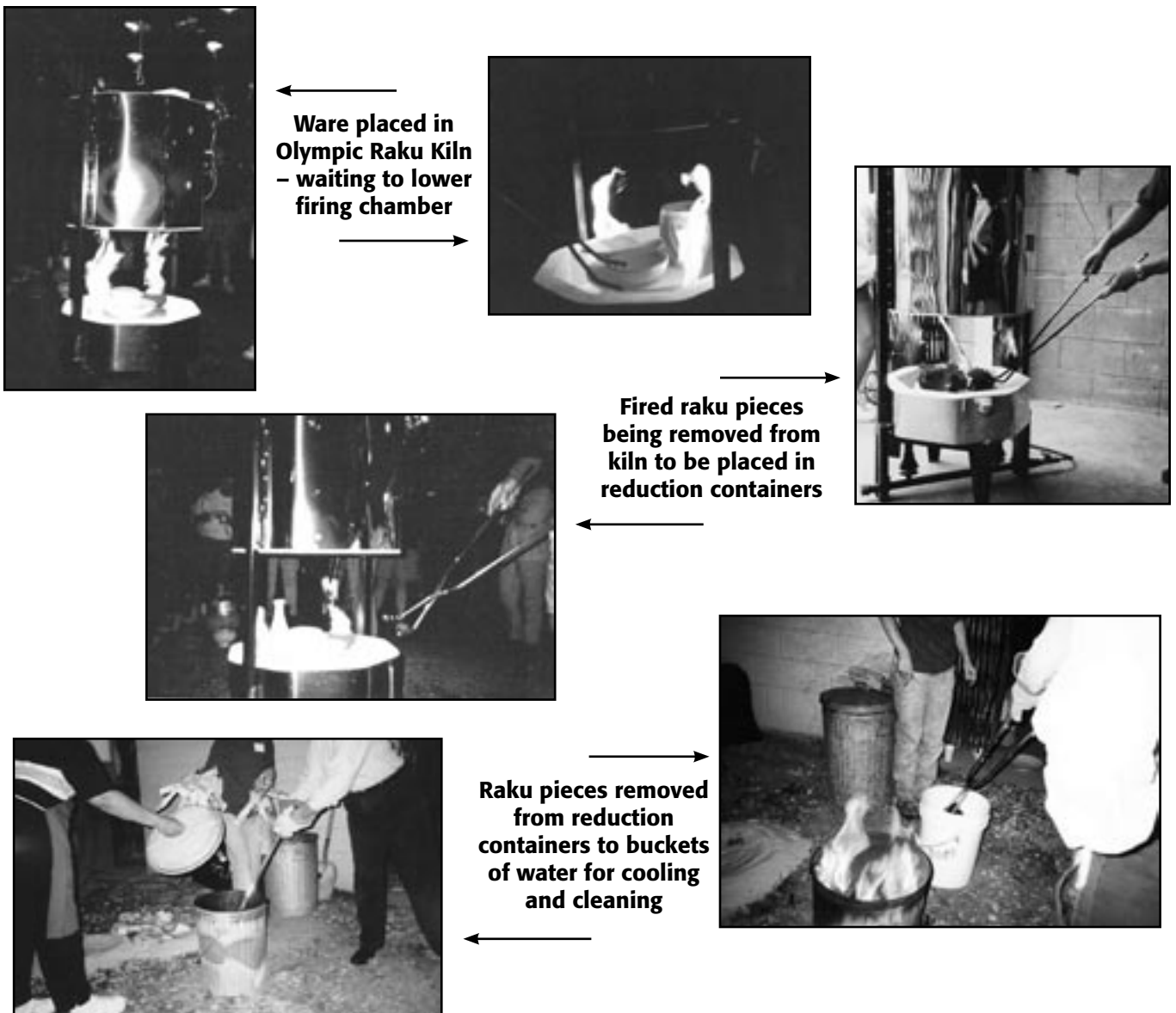
Planning –

- Adequate fuel supply
- Reduction containers that are the correct size (arrange for easy access and clear movement around the kiln)
- Combustibles should be at a safe distance from the kiln, yet easy to reach during post firing process
- Helpers that know their job
- Arrange water sources for cooling and emergency situations
- Provide safe, clear avenues for unencumbered movement

Lighting the kiln –

- Turn on the gas
- Open and light each burner, or if kiln has ignition system press the magnetic valve while lighting the pilot. After ignition system is lit, burners will light automatically.
- Carefully turn gas hand valve to bring the kiln up to temperature.

Preheat the kiln to 1900°F and at 1900°F, the firing chamber can be opened and loaded. Slowly close the firing chamber to preheat and prevent thermal shock to the ware. When the kiln returns to 1900-1950°F and the pieces appear wet and shiny, the firing chamber can be opened and pieces removed and place in reduction containers. Once ware is removed from the kiln to be placed in reduction containers, new items are ready to load.



Gas Kiln Maintenance

Easy Tips to Keep Gas Kilns Running Smoothly

- Buildup of soot and dirt on the gas pipeline occurs after many firings. We recommend that you use a brush to clean the burners and pilot periodically.
- You may also need to clean the orifices after a length of time because dust, rust, kiln wash flakes, and bugs can corrode operation. You can clean the orifice by straightening out a paper clip and inserting into the orifice and twisting the clip around in the orifice hole.
- Occasionally raku kilns' frame will become stiff as you try to lift the firing chamber. Simply lubricate the bars with WD40 to maintain smooth raising and lowering of the firing chamber.
- Periodically tighten the hose clamps on the stainless steel bands of the Torchbearer & Raku kilns. As you load and unload ware in the kiln and as the kiln expands when heated, rings will get out of alignment with the burners. Just tighten the hose clamp with a screwdriver when the kiln is firing to keep bands tight and rings in alignment. (This is also a good idea for raku kilns.)
- If you need to replace broken brick in a Torchbearer or Raku kiln: Remove the ring in the Torchbearer that needs brick repair; loosen the stainless steel skin on the ring slightly so that you have enough space to remove the brick but not enough to disengage all the brick in the ring. Replace new brick as needed and tighten the hose clamp.
- Brick or fiber replacement on DownDrafts is a major operation. Contact Olympic Kilns for installation instructions.
- Always use kiln wash on kiln shelves when glaze firing.
- When kiln shelves are not in use, stand shelves for longer life, do not lay flat or stack on top of one another.
- Periodically vacuum your kiln to remove dust, kiln wash, etc. from kiln.

Troubleshooting

Requirements	Cause	Firing	Limit
Ware must be very dry	Clay still contains water because: 1. Clay is still wet. 2. Humidity	Low, constant, small flame. Ports & door opened to control the temperature.	Keep below 212°F.
Chemically combined water must be allowed to escape gradually.	Water contained within the chemical structure of the clay inerals is released at a higher temperature.	Slow temperature rise through this region enables the moisture to escape without blowing up the clay.	842° – 1112°F Do not exceed 250° per hour temperature rate increase.
Carbonaceous material contained naturally in the clay must be burned out.	Vegetable matter, inherent in the clay, provides excess carbon in the clay.	Maintain strictly oxidizing flame until past this critical temperature.	Oxidation firing up to 1290°F.

Requirements	Burners	Damper	Ports	Limit
Candling especially important for bisque or large pieces.	Pilots on or burners on low.	Open door may be left ajar if temperature goes too fast.	Observation holes left open.	All night below 200°F or 5 hours to reach 200°F or 2 hours per 1/8 inch of thickness of thickest piece.
Oxidation firing.	Burners on, blue flame, clear atmosphere, inside kiln.	Temperature rise is a combination of damper and gas pressure settings.	Admit amount of air needed to get blue flame.	200°F per hour to 1290°F.
Reduction firing.	Tip of flames show yellow and orange.	Damper will probably have to be closed some to maintain temperature rise.	Close air ports to get flame color. Flame should shoot out of view ports.	Begin reducing after kiln has reached 1290°F.

Body Reduction @ Cone 06
Glaze Reduction @ Cone 8–10

Problem	Reason	Solution
Kiln refuses to maintain temperature increases.	Burners are supplying only enough heat to make up for losses. Wind has come up and burners are supplying only enough heat to make up for losses.	Increase orifice size. Build windscreen around kiln.
Atmospheric burners make fluttering sound. Flame burns back into tube. Burner tube is hot.	Gas pressure is too low for the amount of combustion air being supplied to the burner. Results in severely reduced burner efficiency, which could be the cause of the problem.	Increase gas pressure. Reduce combustion air by shutting air source damper. Attach a screen to burner/mouth so that flame remains seated at the mouth of the tube. Use flame nozzle tips on burners.
Kiln temperature erratic. Tends to lag, then runaway increase.	Gas line undersize, or a line loaded to capacity. Other heavy gas appliances going on and off.	Increase gas pressure. Increase gas supply line size.
Pyrometer does not indicate increase with the burners on.	Thermocouple inoperative.	Check thermocouple tip to see if thermocouple junction has not been eroded away. Check the leads to meter. Check lead terminals for loose or corroded connections.
Pyrometer reading is erratic or considerably different from previous readings under these conditions.	Meter isn't working.	Substitute a good thermocouple and see if the meter will indicate. Take meter to a reliable repair center. Calibrate meter by adjusting setscrew.

Frequently Asked Questions (FAQs)

Q: *I purchased an Olympic 23 Raku that fires on propane and it's suppose to go to cone 10 but it only manages to reach cone 06 and cone 05. Furthermore, the gas company came and checked my pressure and said I had more gas pressure than I needed. The consensus of opinion was there wasn't enough air going through the kiln to burn efficiently. Also, when I purchased the kiln I thought I could fire platters and plates. When I separate the shelves there is fire coming up through the shelves and now I can't fire my platters and plates. Help! Frustrated Potter*

A: The failure of your kiln to reach cone 10 is either too much or too little gas. Too much gas is identified by excessive flame discharge. Too little gas is probably from a small gas line. Your kiln should have a regulator of 11 inches water column with a 3/4" inside diameter pipe between the kiln and regulator. Have the air adjustments wide open for propane. Be sure and use 19" diameter shelves for a 23" Raku. The first layer should be 3" from kiln bottom. You can place ware over the space needed in the middle between shelves without harm.

Q: *I'm an owner of an Olympic gas kiln size 23 inch equipped for natural gas. I live in a rural area, so I must use propane gas. My kiln isn't hot enough, I need 1280° C and it only reaches 1200° C. I would like to know if I have to change the burner or not?*

A: It's probably not the burner but either the gas pressure or pipeline size. For propane you need 11" water column and a 23" Olympic gas kiln needs a 3/4" pipeline running from the gas source to the kiln.

Q: *When I turn my kiln to high, it shuts off. What's going on?*

A: The gas line is too small. When you open the kiln to high, the pressure drops so low the flame on the ignition system will no longer heat the thermocouple and the magnetic valve closes. Try a larger gas line or enlarge the holes on the pilot to 3/32" below the thermocouple tip.

Q: *I bought an old, used Olympic Kiln and I need a new bottom for the kiln. The kiln has five burners. I also need new orifices for the burners. Can you help me?*

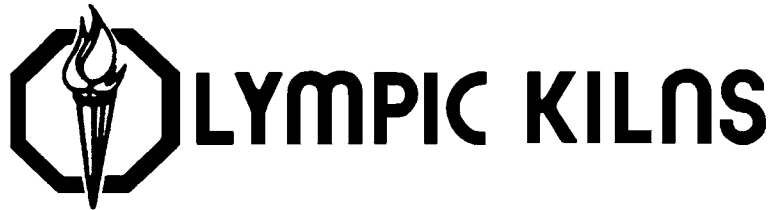
A: Sorry, but we no longer make our Torchbearer kilns this way and there is not a manufacturer making the orifices as they did back then. By the way the kiln is more than 30 years old. What you can do to make the kiln fire for you – purchase a new burner system and gas kiln bottom.

Q: *I recently purchase a new baso valve from you for my 2831G and now I find when I am trying to replace the valve, the threads on the manifold has rusted out. Can I purchase new threads from you?*

A: All you need to do is to go to a local hardware store and purchase two pipe nipples that are 3/4" in diameter. The new baso valve will work fine for you once you have installed the nipple.

Q: *I have an electric kiln that I want to gut the elements and make into a gas kiln. What do I need to do?*

A: You will need to purchase a burner system (with any options you wish to have) for the size kiln you are converting and cut portholes in the lid of the kiln and burner ports in the bottom of the kiln.



Limited Kiln Warranty

All Olympic gas kilns are guaranteed to be free of defects in materials and workmanship for 12 months (one full year) from the original date of purchase.

Haugen Manufacturing, Inc. will provide and replace at the factory any parts, which have become defective during normal and proper use during the 12-month period, providing all transportation costs are borne by the owner. Upon receipt of defective parts at the factory and after factory examination confirming said defect, replacement parts will be shipped postpaid to the owner.

Haugen Manufacturing, Inc. cannot and will not guarantee Olympic kilns when the owner has caused a condition of over-firing beyond the maximum temperature listed on the kiln nameplate, exceeding the melting temperature of material being fired, or if the kiln has been repaired by anyone other than a factory authorized dealer or repairman.

Any defect in an Olympic kiln should be brought to the attention of the Olympic dealer from whom it was purchased or by writing to Haugen Manufacturing, Inc. Upon receipt of notification, the dealer will be authorized to arrange for repairs or replacement of parts within the terms of this guarantee.

Haugen Manufacturing, Inc. neither assumes nor authorizes any dealer to assume for it any other obligations or liabilities in connection with the Olympic kiln.

Haugen Manufacturing, Inc.
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