

The Etruscan Kiln Series from Potclays Ltd

Operating & Maintenance Instructions.

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**POTCLAYS ETRUSCAN KILN OPERATION MANUAL
2004 EDITION**

Kiln Siting

- 1 Select a level, dry and well ventilated position with room to allow easy loading and unloading of the kiln, preferably away from corridors and thoroughfares.
- 2 Ensure that the floor is strong enough to carry the weight of the kiln, furniture and ware load. Ideally, the floor should be constructed from non-combustible material such as concrete. However, where this is not possible a layer of bricks or tiles may be used as a base on which to stand the kiln. This will protect the floor from damage by radiated heat.
- 3 Remove all flammable materials such as curtains, plastics, paper etc, which are near to the kiln, especially those which may overhang the kiln.

Kiln Assembly

- 1 Place the stand in position and check that it is firm and, using a spirit level, that it is level. If necessary use packing shims or tiles under the feet of the stand. **DO NOT** use packing under the base of the kiln, which may result in damage to the kiln structure.
- 2 The kiln must now be placed into position on the stand.
- 3 Lift the kiln carefully into position using the lifting handles provided. **DO NOT** lift kilns by means of the brickwork. Take particular care of the very fragile bottom bricks that are further weakened by the bottom element groove.
- 4 Position the kiln so that the vent holes, control switches and kiln controller are within easy reach, and ensure that the kiln body is not within 230mm (9 inches) of the nearest wall.
- 5 Fit the lid stay by passing it upwards through the retaining bracket with the right-angle bend pointing away from the kiln body and secure it to the mounting on the kiln lid by means of the domed securing nut provided. Ensure that the stay moves freely through the retaining bracket and that the slot engages with the latching peg in the bracket.
- 6 Fit the vent plugs.
- 7 If the kiln is supplied with a wall mounted control box and automatic controller, this must now be fitted to the wall ensuring that it is placed to the side of the kiln **NOT** above it to prevent damage from radiated heat.

Electrical Installation

Etruscan Kilns are designed to operate from a minimum 230 volts (under load) single phase electricity supply. All Etruscan Kilns may be connected to a standard household supply but only the Etruscan 1314 and Etruscan 1418LT are suitable for connection by means of a 13 amp plug.

All Etruscan Kilns may be connected to an electric cooker point using the cooker switch as an isolator.

Refer to the data plate for load requirements.

Warning; Incorrect connection or installation may be hazardous and we strongly recommend that such work is carried out by a qualified electrician.

Electrical Connections

- 1 Connect the supply cable to the terminal block inside the kiln first. This is located in the box containing the element connections and is marked L, N, E or colour coded brown, blue and green respectively.
- 2 It is important to ensure that the correctly rated fuse and supply cable is used. Failure to do so may result in a fire in the control box and/or supply cable.

Note: Potclays Limited cannot be held responsible for any electrician's charges.

Test Firing

The kiln should be test fired twice to ensure that it is working correctly. Additionally the two firings serve to develop a protective oxide coating on the elements.

The first test firing should be done with the kiln empty, the second one can be a biscuit firing but should not be a glaze firing (due to harmful glaze vapours which can attack the elements which have not properly developed the protective oxide coating).

First Test Firing

- 1 Insert one of the 06 test cones (supplied) into a small pat of clay, just sufficient to hold the cone upright when placed in the kiln. Place the cone on a shelf or support in the centre of the kiln where it can be seen through the spy hole.
- 2 Close the kiln lid and remove all vent plugs.
- 3 Enter a program on the controller (see separate instructions) to fire up to 750°C taking about 5 hours with no soak period. (Approximately 150°C per hour.)
- 4 If energy regulators are fitted, ensure these are turned to the FULL position.
- 5 Switch the instrument to the 'RUN' position. The energy regulator amber lights should now illuminate and a 'humming' sound will be heard. Note that the 'humming' sound will diminish as the temperature rises.
- 6 At about 4 hours into the firing insert the spy hole bungs.
- 7 Begin checking the cone at 15 minute intervals once the temperature has reached 700°C (normally about 4³/₄ hours into the firing).
- 8 The kiln will automatically shut off at the set firing temperature. Note some 'overshoot' may occur due to manufacturing tolerances in the instrument and the speed of the firing, but this is normal.

Second Test Firing

- 1 Repeat the above procedure but this time set the controller to 1000°C.
- 2 Once the interior of the kiln begins to glow orange instead of red, inspect the cone at 30 minute intervals. Once the cone has bent tip to base, the kiln should shut down within 30 minutes. If it does not do so, switch the kiln off and contact us.

Loading the Kiln

General Inspection

Brush any loose material from the interior of the kiln and inspect props and kiln batts for chips and cracks.

Kiln Furniture

A kiln batt may be placed directly onto the base of the kiln to spread the load, with ware and props placed directly onto this. However, it is preferable to use half inch props between this batt and the kiln base, ensuring that these props are positioned directly over the steel stand on which the kiln base is supported. Prop columns are then placed on this base shelf.

Full size shelves would normally be supported using three separate prop columns placed equidistantly around the edge. Columns of props supporting a shelf must be placed directly over columns of props supporting lower shelves so that the weight is transferred down through a continuous column of props to the brick base, and through the bricks onto the steel stand. Place the shelves carefully and try to maintain an even gap between shelf and kiln bricks all the way around.

The height between shelves can be varied to suit the ware being fired, but always try to keep an equal number of elements showing between the shelves to aid heat distribution.

Batt Wash

Batt wash should be used to prevent sticking of glazed ware to the shelf. Apply mixed batt wash to the top side of the shelf, never the underside, and generally two or three coats are sufficient for complete coverage. (Batt wash is supplied as a dry powder which is mixed with water to give a paintable consistency.)

Note; Never use batt wash on elements or holders since this will shorten the life of the element.

Cone Placement

Position a suitable cone (determined by the firing temperature being used) so that it can be seen through the spy hole, and remember to leave sufficient space around the cone to allow it to bend.

Loading the Ware – General

- 1 Load only bone dry green ware into the kiln. Wet ware may crack or explode during the firing resulting in damage to other ware placed alongside it.
- 2 Plan the load before starting. Arrange the load so that thick and thin walled pieces are intermixed throughout the kiln.
- 3 Place smaller lower pieces on the bottom layer, and taller pieces on the top shelf. This enables loading with shorter props.
- 4 Allow at least one element groove between each shelf.
- 5 Keep shelves and ware at least 12mm from the walls of the kiln.
- 6 At least one element groove must lie between the top shelf and the top of the kiln.
- 7 If large flat pieces are to be fired, they should be placed so that their edges lie between element grooves. This will lessen the risk of damage to ware by uneven heating.

Loading the Ware – Biscuit Firing

- 1 Greenware can be placed directly onto kiln shelves, can touch and can be stacked.
- 2 Ensure pieces are level to avoid unequal strain, particularly if large flat pieces are to be fired.
- 3 Small pieces may be placed inside larger ones.
- 4 Do not place large or heavy pieces on top of smaller ones.
- 5 Do not stack bowls or dishes above 3 high.
- 6 Cups and tumblers (shapes which are prone to distortion) are best fired 'boxed', i.e. one placed upside down on top of another, rim-to-rim.
- 7 Lidded pots should be fired with the lid in place to ensure shrinkage matches. Where this is not possible, ensure that the lid is fired on the same shelf alongside the pot, otherwise variations in firing temperature (or kiln atmosphere) throughout the kiln may cause differential shrinkage resulting in the lids no longer fitting the pot.

Loading the Ware – Glaze Firing

- 1 Load the ware onto kiln shelves coated with 2 or 3 coats of batt wash. The batt wash layer will require periodic replacement and may also need to be 'touched up' from time to time.
- 2 Pieces CANNOT touch. They should be spaced at least 3mm apart and 16mm from the kiln walls.

- 3 Pieces which are 'dry footed' can be placed directly onto the coated kiln shelf ('dry footing' means pieces which have an unglazed foot ring or where the glaze has been removed by sponging). All pieces which have glazed bases must be placed on stilts.
- 4 Large flat pieces should be dry footed to minimise warping.
- 5 If lids are to be fired on a piece to prevent warpage or deformation, glaze must be thoroughly cleaned from the lid flange and skirt and from the surface where it rests.

Loading the Ware – Overglaze Decoration

- 1 Load the kiln as for a glaze firing.
- 2 Ensure good spacing between shelves to allow maximum air circulation.
- 3 Leave kiln bungs open until at least 600°C to clear away fumes from combustible mediums. This is important to reduce scumming of colours and lustres.

Firing the Kiln

- 1 Refer to separate instructions for setting of controllers.
- 2 Ensure energy regulators are set to FULL on position.
- 3 After completion of firing, allow the kiln to cool naturally, DO NOT force cool the kiln as this may result in damage to the ware and kiln structure.
- 4 If necessary, controlled cooling may be obtained by programming the controller to 'fire down' thus slowing down the cooling rate. Please refer to controller instructions.

Maintenance

The life of a kiln can be extended for many extra trouble-free years of service if routine maintenance is done. The following suggestions may be helpful.

Kiln Structure

- 1 Every 5 firings, examine the interior of the kiln and ensure it is clean and free of dust. Check the lid and wall brick for loose fragments, and if possible vacuum the interior to remove any dust from element grooves. Remember that elements become fragile after a few firings.
- 2 Check the condition of the batt wash on kiln shelves and touch in as necessary.
- 3 Check condition of kiln furniture for cracks or warping.
- 4 Continued heating and cooling of the kiln structure will eventually cause the clamps retaining the jacket and lid and base rings to loosen. These should be re-tightened using a screwdriver when the kiln is warm.

- 5 Remove any glaze spots from the walls, bottom or shelves. Pay particular attention to any glaze contamination of element grooves. Failure to remove any such contamination will result in reduced element life.
- 6 Fine cracks in brickwork are usually surface imperfections and do not normally require attention. However, when sections of brick are in danger of falling out of place, a satisfactory repair can be made using Refractory Cement which is applied to clean, dry brickwork.
- 7 When more severe damage has occurred, it may be necessary to replace the brick. The bricks can be purchased and cut as required to fit the individual application.
- 8 Remove elements from the affected bricks (see Element Replacement)
- 9 Remove the complete switchbox housing by removing the self tapping screws securing it to the outside of the kiln.
- 10 Remove the securing screws to release the lid hinge bracket assembly from the kiln.
- 11 Remove the self tapping screws securing the reflector plate, and carefully withdraw it over the element insulation tubes, to reveal screw-type clamps which keep the metal skin in tension.
- 12 Slacken these clamps using a screwdriver.
- 13 Carefully remove the damaged brick by depressing it back into the fibre to create sufficient clearance to allow the brick to be withdrawn.
- 14 Slide the new brick into position taking care not to ruckle or damage the ceramic fibre.
- 15 Tighten the clamps to secure metal skin.
- 16 Re-assembly of other components is a reversal of the above.
- 17 Cracks in lid or base can normally be ignored. They are generally expansion cracks which will close up on heating, and do not normally penetrate right through the brickwork.
- 18 Cracking in the cement surrounding the bricks is normally an indication that the kiln has exceeded 1300°C, but again these are surface cracks and do not require attention.

Electrical

- 1 Periodically check the tightness of the element connectors as their repeated heating and cooling during use can through creep cause them to slacken. These should be as tight as possible. (This is of particular importance after a few firings with a new kiln or when elements have been installed.)
- 2 Check that the elements are seated correctly in the grooves.
- 3 Check condition of elements.

Note: Kiln elements age with repeated firings, and this cause a slowing of the firing speed as the resistance gradually increases. This will eventually lead to the kiln not achieving the top temperature and can only be rectified by fitting new elements.

Element Replacement

- 1 Ensure that all power to the kiln is off and that all kiln switches are set to off.
- 2 Remove the cover of the switch box housing.
- 3 Using a suitable screwdriver, remove the element connectors securing the faulty element in position.
- 4 Carefully bend each element tail if necessary to enable it to be pushed back through its porcelain lead-in insulator tube. The element should now be free to remove from the groove in the firing chamber.
- 5 Inspect the groove and ensure that any metal debris is completely removed. If necessary dig out the debris using a screwdriver and fill the hole with insulation brick or china clay. **DO NOT** use refractory kiln cement on surfaces which come into contact with the element as this will shorten the life of the element.
- 6 Installation of the new element is a reversal of the above procedure. Ensure that the element connector is tightly secured. If in doubt replace this also. **Please note that elements are supplied too long.** This is deliberate and is to allow the fitter to compress the coils slightly so that the element is a tight fit at the very back of the element groove.
- 7 Check that the element tail does not protrude excessively into the switch box which may result in shorting when the cover is replaced. Cut off any excess element tail and replace the cover.
- 8 Fire the kiln empty or carry out a biscuit firing. This should be done twice to allow the protective oxide coating to form on the element, before allowing the element to come into contact with glaze vapour.

Energy Regulator Replacement

- 1 Ensure all power supplies are off.
- 2 Pull off the knob from its spindle, to reveal the mounting for the energy regulator. This will consist of either a threaded portion held in place by a single nut, or two screws passing through the kiln casing into the energy regulator dependant upon type of regulator fitted.
- 3 Remove the control panel cover (or switchbox housing) to gain access to the electrical connections at the rear of the regulator.
- 4 Identify and make note of the cables at the connections. These cables will be crimped onto terminal connectors which can be easily pulled from the terminals on the regulator.
- 5 Push the terminal connectors onto the respective terminals on the new energy regulator and refit the new regulator into the control panel.

ELECTRICAL CIRCUITRY AND TROUBLE SHOOTING

Most problems with newly installed kilns arise from installation of the electricity supply to the kiln. Even if installed by an electrician a common problem is voltage fluctuation or the supply voltage generally being too low. Do please check out that the electrical supply is adequate (normally 230 volts under load in the UK) before requesting service under guarantee because in the event of the kiln being in order, charges would be made to cover the cost of the visit. Similarly do bear in mind that elements age. Their resistance increases with firings and this causes a drop in current drawn by the kiln with attendant slower firing rate. If a kiln fires slowly both the voltage and the current should be checked and the elements replaced if necessary. Kilns should be serviced every 6 - 12 months or at least have a preventative maintenance check. This helps avoid problems and is a warranty condition.

Important

- a) When working on repairs be sure all power is isolated from the kiln. Remove plug or supply fuse(s).
- b) An electrician or competent service person should carry out any repairs.
- c) The electrical supply to a kiln can be dangerous if not correctly installed
- d) Check all electrical specifications.
- e) If in doubt, ask.

Lights and Operation Sequence.

An understanding of the following is of great assistance in fault location.

- 1) When power is switched on to the kiln control box from the mains supply, the red power-on light on the control box will illuminate.
- 2) Power is then simultaneously fed via a 3 amp fuse (on the face of the control box) to the temperature controller. If this lights up the fuse is obviously OK.
- 3) When the temperature controller starts to send power to the kiln (via the contactor) the amber light illuminates on the control box. This intermittently cycles on and off as the instrument power output is switched on and off and in this way confirms that the instrument is working correctly. With controllers that do not control firing speed (eg Limitronic) the amber light will stay on until the kiln is shut off by the controller.
- 4) Some Silver kilns are fitted with energy regulator(s). If the temperature controller is of the type which controls firing speed, these regulators should be set full on in which case the amber neon lights adjacent to them will illuminate in phase with the amber light. If the firing speed of the kiln is being controlled by the regulators then the cycling frequency of the lights will often **not** be in phase with the amber light. These regulator lights illuminating in this way show however that the energy regulators are sending power to the kiln.
- 5) The power is fed from the energy regulators to the kiln lid safety switch. If this is correctly set then power is fed to the kiln elements. A failed element or element connection or safety switch should be suspected if all the lights illuminate on the control box but the kiln does not power up correctly.

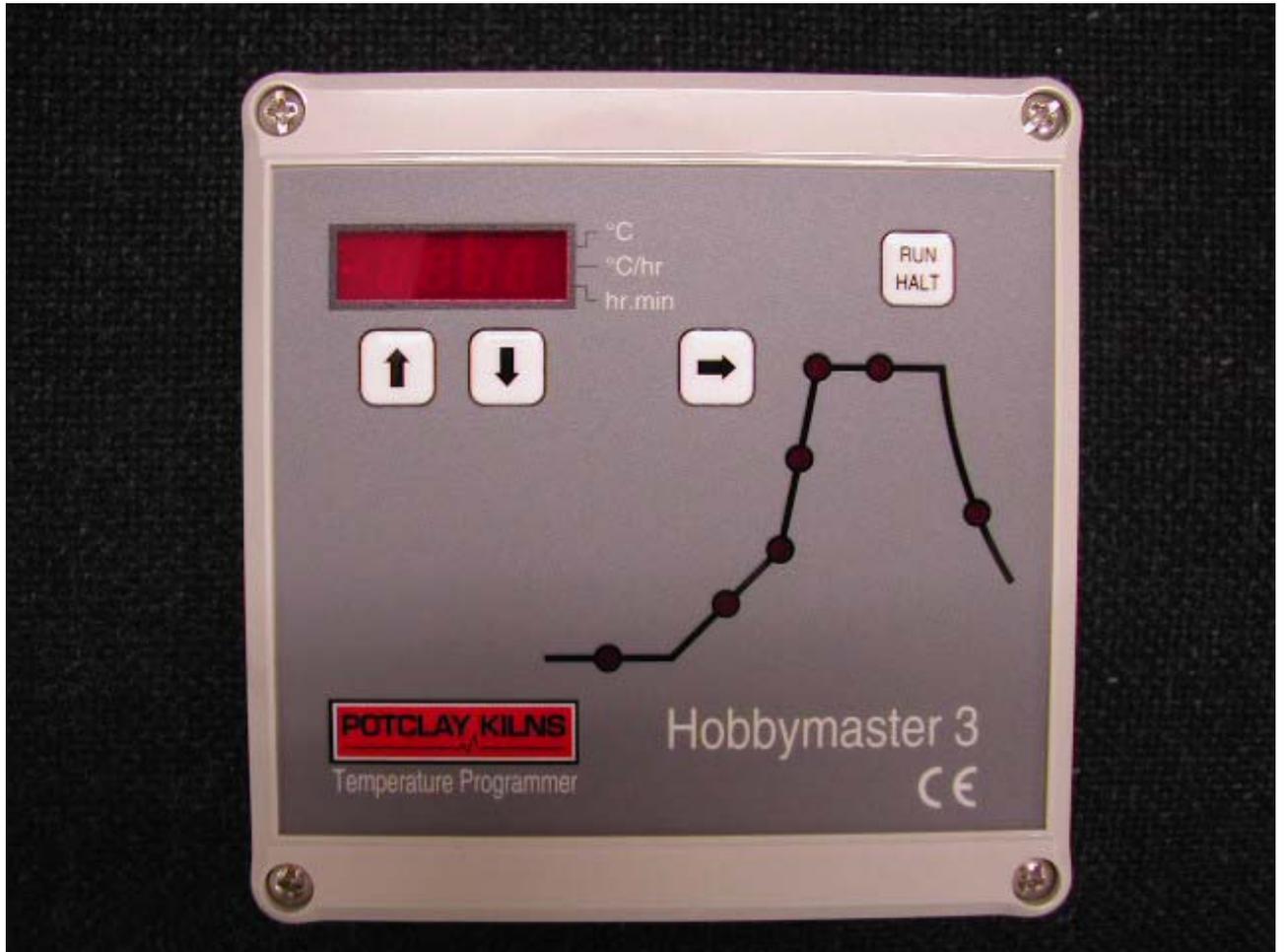
This lighting sequence is therefore valuable confirmation that all is well but is also helpful in detecting where a fault is located.

Other Problems.

TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
1) No power-on light.	Defective power supply to kiln.	Check fuses in main supply Reset circuit breaker. Check power supply.
2) Red power-on light on, Amber power-on light off and kiln will not operate.	Blown Fuse. Lid open. Faulty safety switch. Faulty controller.	Replace 3 amp fuse
3) Energy regulator switches click or pop when on low and intermediate positions.	Normal - these switches control the heating rate by cycling on and off.	
4) Energy regulator amber cycling light illuminates but elements do not heat up and no 'humming noise'.	a) Broken element. b) Loose or burned out element connection lug or wires. c) Lid not closed d) Safety switch not operating e) Faulty connections to Safety switch.	a) Visually check for a break to determine which element needs replacing. b) Examine and replace if necessary. Isolate supply, remove kiln switchbox cover to inspect switch and connections. Replace or repair/adjust ditto
5) Energy regulator amber light does not come on but humming noise is heard and all other lights are on Does not affect kiln functioning.	Faulty regulator light.	Replace if necessary
6) No amber light, no humming noise when energy regulator first switched on but both red and amber power lights on	a) Defective Energy regulator or connections. b) Detective supply from contactor. c) Defective contactor. d) Blown fuse (will isolate all energy regulators and temp. controller).	Check and replace if necessary. Check supply line from safety switch and contactor. Replace 3 amp fuse in control box fuse carrier
7) Kiln will not exceed mid temperature	a) Defective element or element connection b) One of the lid safety switches not working c) One of the line connector terminals not connected to the mains supply d) Faulty contactor connection	
8) Kiln will not reach top Temperature	a) Low supply voltage b) Aged elements c) Excess draught around kiln.	Check voltage when kiln is firing If low, fire off-peak, or longer at highest temperature or fit lower voltage elements Replace with new set Shield

For additional help or servicing, contact:

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IMPORTANT NOTE REGARDING YOUR TEMPERATURE CONTROLLER

There is no warranty to cover against over-firings. Although it is unlikely that the temperature controller will over-fire, it is important that you check firings using Orton Cones and have your controller regularly serviced.

Do not assume that your controller will, for ever, switch off the kiln at the right temperature.

For SPARES AND SERVICE requirements and technical assistance please contact;

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IMPORTANT INSTRUCTIONS ON RECEIPT OF YOUR KILN

DAMAGE IN TRANSIT

DO NOT SIGN for the kiln until you have thoroughly inspected it. **ALL DAMAGE** must be reported to the carrier **IMMEDIATELY**, followed up in writing to them, with copies to Potclays, within **THREE DAYS**. Failure to do so will render any subsequent claim for damage void.

DO NOT RETURN the kiln to Potclays without authorisation, and all such returns must be accompanied by a Returns Number issued by Potclays Limited. Failure to obtain an authorised Returns Number may mean refusal of the delivery at Potclays Limited.

IMPORTANT NOTICE TO ELECTRICAL CONTRACTOR/INSTALLER

All electrical connections were securely tightened during manufacture and checked before despatch. However, it is possible that connections may loosen. **We therefore strongly recommend that a check of all electrical connections, particularly those at the contactor and element tails, is carried out prior to use.**

We would also advise that all electrical connections are periodically checked for tightness as a matter of routine maintenance and the suggested interval for this is every 6 months.

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