

# Loading the Kiln

## Loading the Kiln at South Newton

### Projects to be loaded are:

- Bone dry
  - This stage is very fragile. New greenware should feel no cooler on your cheek or forearm than an old piece. If it does, water is still evaporating from it.
- Projects are Graded
- Glazed projects have no glaze on the bottom edge.
  - If the foot has some glaze, scrape it off with a metal rib and a wet sponge.
- If the entire bottom is glazed, use stilts located in the bottom of the kiln.

### Organizing the Load

- Fire the kiln only when it is full.
- Load the kiln slowly and have a plan.
- Load only the projects on the west wall shelf that are bone dry or glazed.
- Do not hit the thermocouple with the shelves, stilts, or projects. It is fragile and vital to the computer.
- Shelves should be all the way in, clear of the door.
- Bottom of kiln – bone-dry projects more likely to blow up from thickness and floating.
- Top of kiln- bone dry and glazed projects not likely to blow up.

## Stacking the Kiln for Bisque Firing

Many more greenware than glazed pieces can be stacked in a kiln. Greenware can be set directly on kiln shelves and can touch and be stacked inside other greenware.

During the bisque firing it is important that the pieces are level to avoid unequal strains. This is especially true of flat pieces, which tend to warp more than others. Small pieces may be placed inside larger ones, but heavy pieces should not be placed on top of thin or lighter ones. Clay softens during firing and too much weight will cause warping or cracking. Do not stack bowls and dishes over three high. Cups and tumblers, which warp easily, should be "boxed." That is, one piece is placed upside down on the other so the rims rest one on the other. Canisters and boxes should be bisque fired with lids in place for assurance of good fit. For more efficient production, you may wish to experiment with nesting bisque. Just remember never to strain the rims.

## Stacking the Kiln for Glaze Firing

The top surface of all kiln shelves is given two or three coats of **kiln wash**. Stacking of glazed ware is quite different from greenware. Since glaze becomes molten during firing, it will adhere to anything it touches. Pieces must be spaced about 1/2" apart and from walls. All pieces, which are glazed on the bottom, must be placed on stilts to raise them off the kiln shelf. Pieces, which are **dry footed**, can be placed directly on the shelf. Large, flat pieces should be dry footed because they will usually warp or slump if placed on stilts. As glaze flows during firing, even dry footed pieces may stick, but they can be loosened if adequate kiln wash has been used on the shelf. If a lid is to be fired on a piece to prevent warping or deformation, glaze must be thoroughly cleaned from the lid lip and from the surface where it rests.

## Kiln Components & Firing - Glossary

**Dry footing-** A piece that has not been glazed on the area where it will touch the shelf or that the glaze has been wiped off that area with a damp sponge.

**Earthenware-** A category of pottery ware fired below cone 4(low fire). It is relatively soft and porous and requires glaze to render it waterproof. The fired clay may be any color and is opaque.

**Element-** A coil of iron-aluminum-chromium resistance wire through which current passes, creating the necessary heat for firing. Element life will vary depending on whether the kiln is used primarily for low firing of bisque or greenware, or high firing of stoneware and porcelain. Keep the element grooves free of debris: bits of bisque, glaze, metal or kiln wash will immediately fuse to an element and proceed to eat right through it. Elements become brittle after repeated firings so be extremely careful not to break them by scraping.

**Firebrick-** The insulating blocks which form the chamber of your kiln. All bricks are precision cut and grooved to assure tight fit, perfect element support and ease of replacement. Because of their porous composition, insulating firebrick is fragile. Always handle your kiln and its brick with care. The brick in your kiln may begin to show some fine cracks after the first few firings, especially after Cone 10 high firings. This is normal and does not harm the structural integrity of the kiln or impair its functioning.

**Firing-** The process of heating clay work in a kiln to at least a glowing or white heat. Firing permanently transforms the clay to a rock-like state and also melts glazes.

**Greenglaze-** In some instances you can satisfactorily glaze a piece of greenware and complete it in a single firing, maturing the clay body and the glaze at the same time. *However*; because there may always be moisture in the clay body; cratering, pin holing, and cracking may occur, as well as off-color spots from impurities burning out of the clay.

**Kiln Wash-** A mixture painted on the top surfaces of kiln shelves to protect them against glaze drips and runs.

**Maturation-** The ideal condition of fired clay, when it has been fired as high as possible, stopping short of sagging or slumping of the form from excessive melting. The clay is as hard as it can be in the fire and still had its form.

**Nesting-** Place one piece of greenware within another for bisque firing.

**Peephole-** An opening in the kiln wall, which allows visual inspection of the chamber during firing.

**Pyrometric Cone-** The temperature gauge used when firing a kiln. It automatically turns the kiln off when melted.

**Soaking-** Holding a kiln at a given temperature.

**Stainless Steel Jackets-** Stainless steel is used in EXCEL kiln jackets, selected for its expansion qualities so that the bricks are never stressed, yet are fully supported during all stages of heating & cooling.

**Stilts-** Various single and multi-pointed supports used to hold ware up off the shelves during the glaze fire, thus preventing adhesion.

**Stoneware-** A category of clay wares which reaches maturity at higher temperatures.

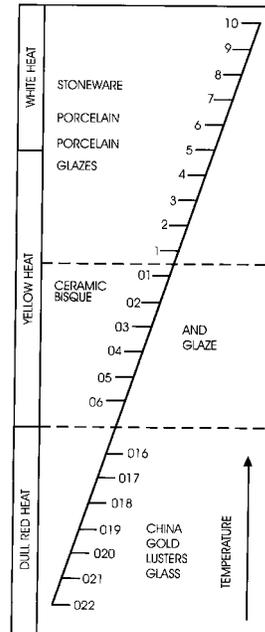
**Thermocouple-** A pair of wires that are inserted into the firing chamber to serve as the temperature-sensing element of the pyrometer or controller.

**Vitrification -** A stage of stoneware clay after high firing. The clay is waterproof without having applied glaze.

# Orton Pyrometric Cones

Cone Number	Final Temperature	Cone Number	Final Temperature
10	2345°F	07	1787°F
9	2300°F	08	1737°F
8	2273°F	09	1683°F
7	2228°F	010	1632°F
6	2199°F	011	1607°F
5	2165°F	012	1575°F
4	2142°F	013	1542°F
3	2109°F	014	1488°F
2	2091°F	015	1452°F
1	2080°F	016	1411°F
01	2046°F	017	1353°F
02	2017°F	018	1314°F
03	1990°F	019	1243°F
04	1926°F	020	1159°F
<b>05</b>	<b>1891°F</b>	021	1112°F
06	1819°F	022	1087°F

# Firing Reference Chart



# Automatic Kiln & Select Fire™ Control Features

**Digital Readout**  
Shows prompts, messages and temperature throughout firing and cool down.

**Temperature Scale Selector**  
Lets you work in degrees F or C.

**Action Controls**  
Let you start or stop kiln operation.

**Ramp/Hold Mode**  
Lets you select up to eight segments of temperature change and hold.

**View Current Segment**  
Shows you what Ramp/Hold segment the kiln is currently in.

**Cone Table**  
Converts Cone numbers to temperature.

**Review**  
Reviews your current firing program.

**Touchpad**  
Smooth surface pads are easy to clean and have no moving parts.

**Delay Option**  
Lets you delay start of firing.

**Alarm**  
You can set alarm to sound at any temperature.

**Cone Fire Mode**  
Lets you fire by simply entering the desired Cone number.

**Firing Speeds**  
Choose from Slow, Medium or Fast heating.

# Digital Readout Prompts

## **PF**

Power Failure may indicate that the controller was just turned on or plugged in. Press **ENTER** to clear the "PF" message and display internal kiln temperature. PF also signals when the controller has experienced a power failure of more than two minutes.

## **ConE**

The kiln is in CONE FIRE mode and needs the operator to input an appropriate Cone value from 022 to 10. Be sure to enter the correct number keeping in mind that cooler firing temperatures have a "0" in front of the number.

## **SPd**

The controller is in Cone Fire Mode. It requests the speed of firing, slow, medium or fast.

*Medium* is the speed you will probably use for your firings of cast earthenware and low-fire glazed pieces. It will take approximately 7 1/2 hours to fire a Cone 04 firing. The actual time depends on the selected cone value. Use this speed when the kiln is packed tighter or your greenware has thicker sides or a higher moisture content.

*Fast* is a speed that will take approximately 7 1/2 hours to fire a Cone 04 firing. Fast speed is probably not the best choice to use during a bisque firing as it does not allow enough time for the physical water to bum off and the structural changes to occur.

## **-ON-**

Briefly displayed indicating that the kiln has started.

## **deLA**

Indicates the amount of time in hours and minutes to delay the start of firing. A maximum of 99 hrs 99 mins is allowed. Digits to the right of the decimal are minutes, to the left are hours.

## **ALAR**

Signals the operator that the kiln has reached a pre-programmed temperature. The default setting is 9999<sup>0</sup>F for no alarm.

## **----**

Flashes while the Select Fire<sup>TM</sup> is processing.

## **Err**

A software error has occurred. Press any key to display the elapsed firing time and the temperature when the error occurred.

## **FAIL**

The thermocouple and controller are not properly connected. Fix the connection, then press **ENTER** to display the kiln's current temperature. Press **START** after the connection is fixed. The thermocouple could be damaged. Check the connections. If still no luck you may need a new thermocouple.

## **CPLt**

The controller has completed a firing profile. The firing time in hours and minutes is displayed. Press **ENTER**. The controller will display the current internal temperature of the kiln.

## **Flashing Temperature**

The kiln is off and the display is showing the kiln's current temperature.

## STOP

Designates the intentional termination of a program while in operation.

## Decreasing Time

When the kiln is in a **DELAY** start segment of a CONE FIRE Mode, the display shows the remaining time before the kiln starts to heat.

## CONE FIRE Mode

The CONE FIRE mode is extremely easy to use but gives you access to many advanced features. **You only have to enter three pieces of information -- cone number, speed and hold time.** Cone values range from Cone 022 through Cone 10.

### 5 Steps to the CONE FIRE Mode Firing

1. **Venting** - Bone-dry greenware still contains moisture which must vaporize and escape from the kiln. Vent slowly at the beginning of the firing by propping the door open about an inch until the temperature reaches 500<sup>o</sup> or above.
2. Press **CONE FIRE**, then enter the Cone number (**05**). Press **ENTER**.
3. Press one of the firing speeds (**Medium**). Press **ENTER**.
4. Enter a **hold time** in hours and minutes or **leave at zero** for no hold time. Press **ENTER**.
5. Press **START**.

↪ When entering a cone number, if you make a mistake simply clear the display by pressing all zeros. Press **ENTER**. This will take you back to **ConE**. The display will flash the last value that was input correctly Enter the correct value and Press **ENTER**.

↪ Pressing the **STOP** key will turn the controller's output off and cause the display to flash the internal temperature of the kiln. You can stop any time during operation. During a firing operation the only function of **STOP** is to terminate a program

### After Each Firing

1. When the firing is completed, the display will alternately indicate **CPLt** for complete and show the firing time in hours and minutes. Press Enter to display the current internal temperature and to deactivate the touch pad.
2. Allow the kiln to cool naturally. Never unplug peepholes or open the door until the ware is cool enough for bare-handed unloading, about 130<sup>o</sup>F. A general rule concerning time required for cooling a kiln is to allow the same length of time as required for firing. However, many potters allow their kilns to cool overnight then open them gradually.

## **Additional Information**

- Irregular clicking noises are normal. The switches constantly cycle on and off at all setting other than High.
- The elements will hum at first, but as the kiln progresses up to red heat it will stop.
- For best results in firing earthenware, bisque should be fired to Cone 04 (1940<sup>0</sup>F). Glaze firing is then done to Cone 06 (1830<sup>0</sup>F) / Cone 05 (1915<sup>0</sup>F).
- Slow bisque firing of not over 300<sup>0</sup>F per hour is very important. If the ware is fired too fast, cracking and splitting may occur due to unequal expansion.
- If the firing is just slightly under-fired, program 5 minutes of hold time at the final firing temperature. This will allow the sections of the kiln that are somewhat cooler to catch up to the hotter sections.
- Cracks may appear in the walls of your kiln in time. It is to be expected and will not affect the operation of the kiln in any way.

## **Ensure a Longer Kiln Life Span**

- Your kiln should only be used in well-ventilated areas.
- Do not allow glaze or kiln wash to come in contact with heating elements.
- Before each firing, brush bottom of kiln shelves and the inside of the kiln door soft brush.