

Firing a Kiln

Kiln Purposes and Types

Kilns transform clay artworks. Raw fragile clay work goes in and hard durable work comes out. Work prior to firing is referred to as greenware. Kilns have been around since 6000 BC and even before that pit fired work was produced for thousands of years. Merriam-Weber Dictionary defines a kiln as, “an oven, furnace, or heated enclosure used for processing a substance by burning, firing, or drying.”

Modern kilns are freestanding pieces of equipment. They come in many shapes and sizes, can be front loading or top loading, and can be run by electric, gas or wood. We will focus on electric kilns, as they are usually the most practical for schools. Electric kilns have coils set into the kiln's inside walls. These coils heat up and radiate heat which is absorbed by everything inside the kiln. The heat drives off the water present in the work altering the materials permanently into ceramic.



a. Detail of kiln wall with coils



b. Example of programmable electric kiln

Bisque Loading and Firing

Only bone dry work should be fired. Greenware, work that has been formed and is ready to be bisque fired, that is cool to the touch is not ready to be fired. Even mildly damp ware poses a risk of cracking or exploding when fired and damaging other ware.

Kilns are designed to be loaded from the bottom up. The potter uses kiln furniture to hold and support the work. Furniture includes shelves, posts, and stilts. Placing work of similar heights on

one shelf will use the kiln space most efficiently. Do not place work on the kiln floor but rather put short stilts down and then a full shelf. You place artwork on the shelf, then stilts of the same height to support the next shelf. You can use half or full shelves, half shelves usually allow for the most versatility. Varying the height and using half shelves also allows for improved air flow. Half shelves will have a 1/4 inch gap between the shelves and the potter should leave space around the shelves and the elements as well. Works expands as it is heated and contracts during cooling so allowances must be made for those changes. There should be a ventilation system running to remove kiln heat and fumes.

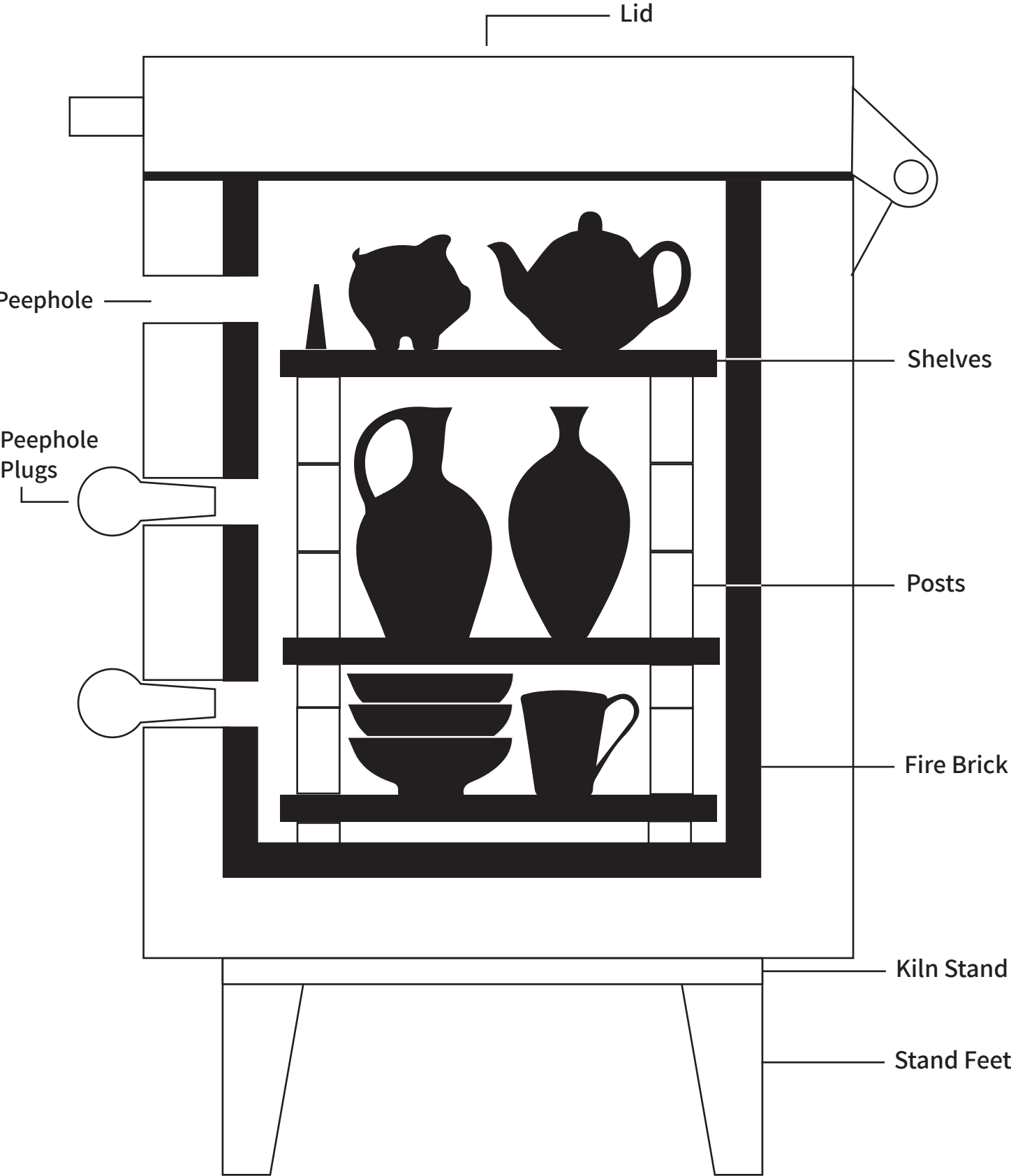


c. Example of a post



d. Example of a stilt

Firing a Kiln, Diagram





e. Far left shows a manual kiln with a cone set into the Kiln-Sitter

f. Near left shows a programmable kiln with a controller

There are two common types of electric kilns: manual and programmable. They both control the heating process in kilns in different ways. Manual kilns use pyrometric cones to help know when the target temperature is reached. These cones are manufactured and will bend at set temperatures. Cones are inserted in a Kiln-Sitter, a mechanism which will trigger the kiln to turn off when it slumps. These mechanisms can fail so there is often a timer that will turn off the kiln as a back up. It is always good practice to note how long a kiln takes to fire. It will vary by the volume of ceramic work, the more work is present the longer it will take to reach temperature and cool down. Some potters will place a witness cone, also known as “visual cones”, to double check the kiln’s firing temperatures by observing the cone through a peep hole.

In programmable kilns there is a controller sitting on the outside of the kiln to follow a firing schedule inputted into a digital display based on final cone temperature (determined by the type of clay) and speed. A thermocouple sends information about the kiln chamber temperature to the controller. The controller looks at the information in the program and decides whether it needs to send power to the elements or not. Whether you are using an electronic controller or a manual kiln witness cones, also known as “visual cones” that you can see through a peep hole can verify that systems are working correctly and accurately.

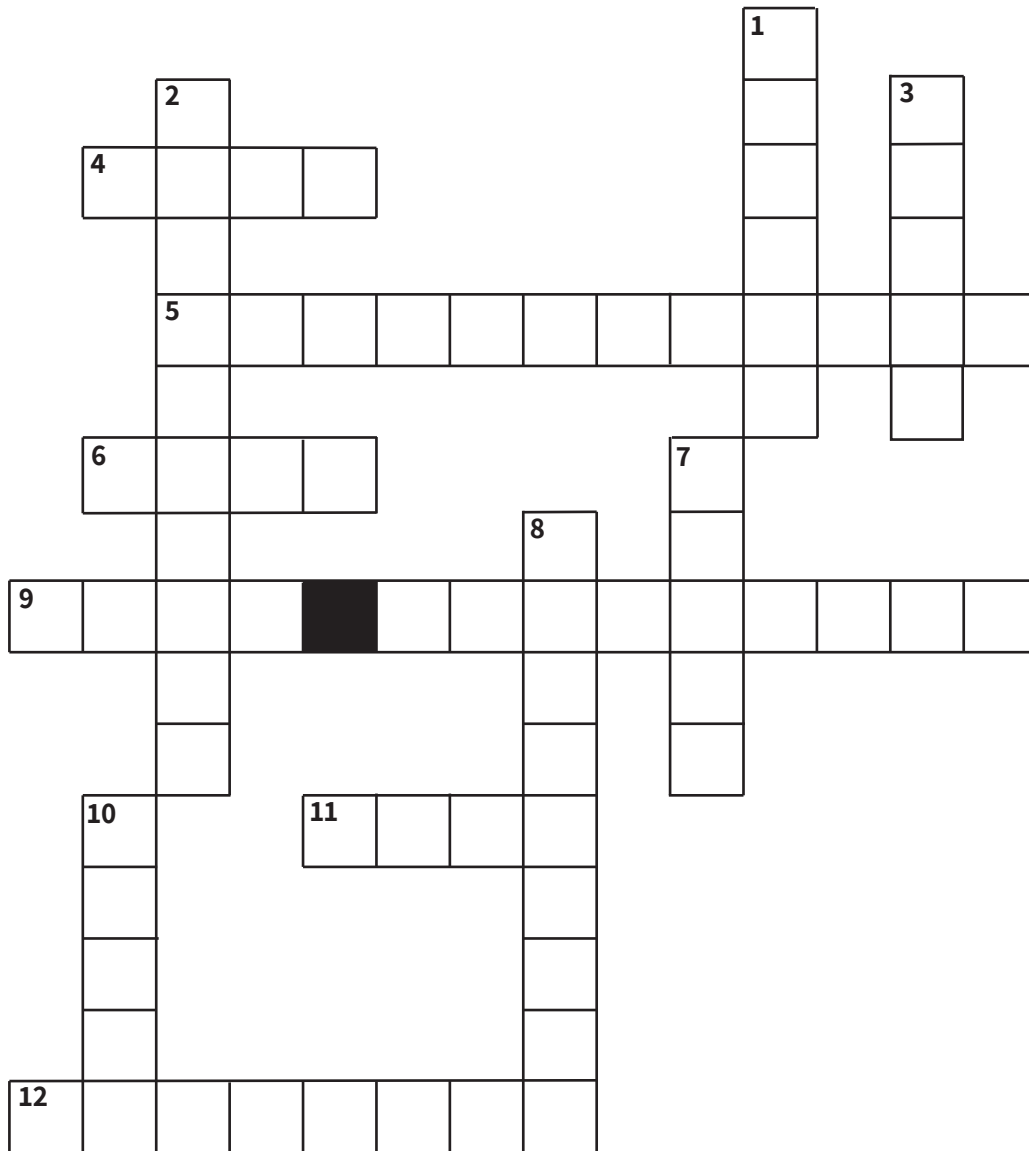
Glaze Firing

Work is typically fired twice. The first is the bisque firing. Then the bisqueware typically has an application of glaze. Glaze is a glassy layer that protects the work, making it water resistant and, depending on the glaze, food safe. In glaze firings, works can not be stacked or in any way touch each other. Otherwise, the glaze will cause the ware to fuse together. Stilts, small supports, may be used to prevent the melting glaze from fusing the work to the shelf. Like the bisque firing, the kiln is fired to maturity and then allowed to cool.

Stay Cool

Both Bisque and Glaze firings can only be emptied after the work is sufficiently cooled. Resist the urge to crack a kiln to expedite cooling. Some glaze's finish is effected by the cooling rate. When can you unload? When you could safely touch and transfer the work with your bare hands. With a programmable kiln that is when the kiln is reporting about 200 degrees.

Firing a Kiln, Crossword Puzzle



Across

4. A type of kiln furniture that is stacked to determine the height of the kiln shelf which is placed on top.
5. A temperature sensor. It reads the temperature in the kiln relays the information to the controller.
6. A pyramid composed of clay and glaze, made to melt and bend at specific temperatures. It is used in a kiln to determine the end of a firing or in some electric kilns it shuts off a kiln setter.
9. Refractory posts and shelves used for stacking pottery in the kiln for firing.
11. An oven, furnace, or heated enclosure used for processing a substance by burning, firing, or drying.
12. A small observation hole in the wall of a kiln.

Down

1. Pottery which has been fired once, without glaze, and becomes durable.
2. A device that sits on the outside of the kiln and automatically controls kiln temperatures, following preset programs.
3. These elements heat up the kiln
7. Kiln furniture used in stacking a kiln for a glaze firing to prevent objects from touching shelves.
8. Unfired pottery. Ready to be bisque fired.
10. A thin coating of glass.