



For your bench. At your side.

# Choosing An Electric Kiln

Over the years, the selection of kilns available to jewelry-makers, metal clay artists and glass/enamel artists has grown steadily—and the work these kilns are doing is almost as varied as the people who are using the kilns. To help prospective kiln owners distinguish between the many options available to them, this paper covers seven distinct selection criteria with a focus on the work that a prospective buyer will need the kiln to do.

## 1) Temperature Ratings

It is a good idea to buy a kiln that will fire hotter than you need it to. This is because, as heating elements age, they draw less and less power. Generally, the higher the kiln's maximum temperature rating, the longer the elements last. Even after the elements begin to wear, they still draw enough amperage to fire your pieces. So, if you are firing glass to 1500°F, buy a kiln rated to 1700°F. If you fire ceramics to cone\* 6, buy kiln rated for a cone 10.

Another advantage to higher temperature capacity is that during periods of low voltage, your kiln will still likely reach the temperature you need. In general, the maximum temperatures required for various materials are:

- 2350°F: Porcelain and stoneware
- 2300°F: Low-fire ceramics
- 1800°F: COPPRclay™
- 1650°F: PMC3™ and PMC+™
- 1550°F: BRONZclay™
- 1525°F: Fastfire BRONZclay™
- 1500°F: PMC® Sterling
- 1400°–1700°F: glass fusing, glass slumping, enameling, bead annealing, glazed china

\*Cone number refers to pyrometric cones. These cones, manufactured from various oxide mixtures, are used to provide a visible indication of how the kiln is heating. Pyrometric cones are numbered starting at 10 (the highest heat) and count down, each slumping over at specific levels of heat absorption (a certain length of time at a certain temperature; see temperature chart[link]). For absorption rates below cone 1, the numbering continues at 01, 02, and so on. Ceramics, particularly are fired to "cone level" rather than simply to temperature in order to ensure that the clay achieves the correct strength and durability. Properly fired cones bend to a 90° angle; a lesser angle means the kiln was under-fired, a greater angle, the kiln was over-fired.

## 2) Size

In general, the larger the kiln, the lower the cost per cubic foot of interior space. Divide the price of several kilns by their cubic feet, and you'll see how this bears out.

What size are the pieces you create? Do you make jewelry pieces only or are you creating hollowware, sculptures or larger vessels? Pieces need to fit easily into the kiln with plenty of space around and between them to enable the heat to circulate efficiently.

Will you be firing many small loads or a few large ones or some of both? Some users fire frequent small loads to test design elements or to see how special effects turn out before investing time creating larger quantities of something new. Others prefer firing fewer loads with larger quantities of pieces. This is another factor in choosing kiln size.

Choose a kiln that will fire the largest pieces that you produce, and evaluate how often you want to fire the kiln. Figure how long it will take you to make enough pieces to fill a kiln of a given size. Do you think your needs will expand later? Kiln owners will typically tell you to buy more capacity than you currently need, to allow yourself the room to grow into the future.

If you fire pieces of a particular size such as tiles or bowls, plan the kiln load on paper. Draw diagrams of different sized kiln shelves and determine how many pieces will fit onto each shelf. You may find that the pieces fire most efficiently in a particular size kiln. For instance, the 10- and 12-sided kilns can both fire 10"-dia. bowls. But since both kilns fire four bowls per shelf, the bowls fire more efficiently in the 10-sided kiln than in the 12-sided. [Tweak this sentence to make relevant to jewelry?]

The 10-sided kiln is also a good choice for those who need short firing cycles. Since 10-sided kilns are smaller than 12-sided, they can heat and cool faster. In addition, kiln shelves for 10-sided kilns are lighter than those for 12-sided kilns and are easier to lift.

### **3) Power & Wiring Requirements**

The electrical requirements of the kiln is an important consideration and will affect your choice of kilns. If you'll need a new circuit installed for your kiln, you'll need a licensed electrician to install a new circuit (and copper wiring, not aluminum, should be used).

Homes in the U.S. and Canada usually receive 120/240 volts. If your studio is in a business district, strip mall, or school, it is likely that your voltage is 208, not 240. It is important that you know your voltage before choosing a kiln. Outlets wired for 208-volt circuits look the same as those for 240-volt circuits, so you can't tell just by looking.

Call your power company or electrician if you're not sure about your voltage or phase. If you run a 240-volt kiln on a 208 volt circuit, the kiln will fire slowly and may never reach maximum temperature. This is an expensive mistake, because you will need to order new elements of the correct voltage and possibly have the switch box rewired to resolve the incompatibility.

Oh, and one more thing: as contrary to logic as it seems, a 240-volt kiln does not necessarily fire hotter or faster than a 120-volt kiln. Some 120 volt kilns can reach 1000° F. in five minutes! [is ramp speed noted on most kilns?]

### **4) Kiln Shape: Round or Square**

A "round" kiln is any kiln that has more than four sides. On a per-cubic-foot basis, the round kilns (6-, 7-, 8-, 10- and 12-sided) are less expensive than the square because they are easier to build. Artists who work with ceramics usually buy the round models while schools and potters sometimes buy the large square kilns, because they are especially durable and slow cooling.

### **5) Top- or Front-Loading Configurations**

Front-loading kilns are preferred for enameling, where pieces are removed from the kiln at 1450°F. This would be difficult with a top-loading kiln since the heat rises when you open the lid and you must lean into the escaping heat. In addition, front-loading studio kilns are easier to load than top-loading models because you don't have to bend down into the kiln.

Before purchasing a top-loading kiln, visit a studio that has one. Reach down inside the kiln to be sure you are tall enough to load it. This is important. If you get a top-loading kiln into your studio and then find you can't reach the base, you will likely have to raise the base by leaving a shelf supported by posts in the bottom permanently, wasting a good deal of firing room you may have counted on having. If you find depth is an issue, consider a shorter, but broader kiln.

## 6) Firebrick vs Ceramic Fiber Chambers

The firing chamber in any given kiln will be made with one of two materials: firebrick or ceramic fiber. Firebrick is a wall of interlocked refractory ceramic blocks, lightweight and somewhat porous, that withstand high temperatures but also offer low thermal conductivity (providing greater energy efficiency). Ceramic fiber is essentially spun brick. The same materials that make a brick are heated to melting, injected with water, and forced at high pressure through nozzles, forming fibers. The fibers are collected compressed and laid together to form a soft, pliable blanket. Because a lot of air remains trapped among the fibers, the blanket is a terrific high-temperature insulator.

Though ceramic fiber heats and cools faster—highly useful for short firing times and quick turnaround of work, insulated firebrick (used in most kilns) outlasts ceramic fiber and is easier to replace as needed. Heating elements in a firebrick kiln are exposed, set into grooves in the firebricks; the elements are simply removed and replaced. Most ceramic fiber kilns have elements that are embedded into the ceramic fiber and cannot be replaced. Instead, the entire firing chamber (fiber and elements) are replaced as a single unit.

The thickness of the chamber walls will also be a factor in how quickly the kiln reaches temperature, how efficiently it holds at temperature and how quickly it cools. Slower cooling can be a benefit when you're working with larger or heavier pieces or with fire-in-place gemstones where fast cooling can lead to thermal shock and cracking. If you're going to be firing stoneware or porcelain, choose a kiln with walls at least 3" thick.

## 7) Manual vs. Automatic Controls

Most manual-fire kilns operate with infinite-control switches, the type used on electric kitchen stoves. They contain a bi-metallic switch that cycles on and off. As you turn the switch clockwise, the heating elements stay on longer and longer to achieve/maintain temperature. On 'High,' the elements stay on continuously.

Manual-fire kilns are gradually being replaced by automatic models. Automatic kilns are easier to use than manual kilns and offer more precise control over the heat, ramp speed and other variables.

Automatic kilns are offered with either mechanical or digital controls. Mechanical automatics use timers to advance the switch settings and a separate kiln controller to turn the kiln off. Digital kilns use a built-in electronic controller. Many kilns now offer pre-set programs specially created for certain firing processes such as firing metal clay, glass or enamels, as well as programs that you can customize and save for your specific firing needs.

Digital kilns use a transformer and relays (generally not needed in mechanical kilns) but, when properly designed, are highly reliable and are easier to repair than mechanical models should the need arise. Its small circuit board can be removed in minutes and repaired or replaced.

Manual or automatic, mechanical or digital, however, every automatic kiln must have supervision, especially near the end of the firing cycle. Always arrange to nearby at the end of firing. If you are using pyrometric cones, a quick peek will tell you if the pieces inside have been adequately fired.

When you're ready to move forward on choosing a kiln for your shop, take some time to think through these criteria with your own work in mind. The right kiln will make a world of difference to the efficiency, convenience, and fun of your work. This information should help you narrow the many choices available these days to a handful of kilns that are best suited to you and your shop and then help you choose the one kiln from among that handful that is the one for you. Let me know how it goes; I'd love to hear about your experience. And, if you have questions, the Rio technical support team is always there, ready to answer your questions.