

TESTING 1-2-3: The Way to Firing Success

by David L. Gamble

Why do glaze tests? For a number of reasons. With so many glazes and underglazes being manufactured by different companies that label and number them differently, it can be confusing. Though some of the properties are similar, many are different. Glazes can be influenced by the cone or temperature they are fired to, the clay body they are placed upon and the thickness of the application.

Most manufacturers are now creating more low-fire and mid-range glazes for electric kilns that simulate the effect of a higher-fire, gas-reduction firing. These glazes, which are made to break and move to create interesting surfaces, can also be affected by the speed of the glaze firing. The same glaze fired for eight hours may change surface color when fired for 12.

Different color clay bodies can also affect a glaze's look. In fact, some glazes are specifically formulated to react to the iron content in a red clay body. These same glazes will look quite different on a white clay body. I find it best to test to find out what options I have in using both clay and glazes, and what combinations look the best for my pots and sculptures.

PRACTICE MAKES PERFECT Clay test tiles are an easy way to test a new glaze. Testing the glaze reveals how thick of an application is needed, whether the glaze runs on a vertical surface, if the glaze fits the clay body it has been applied to, and what kind of surface qualities the glaze has (transparent, matte or



- < A kiln full of test tiles allows experimentation with new glazes before putting them on good pots.
- ✓ Seen here are different styles of test tiles, and small extruded, pinched and thrown test pots.



This simple die was made to extrude test tiles that were cut into 1- to 1.5-inch sections.

somewhere in between).

New and different clay bodies can also be tested the same way. This ensures the glazes will give you the result you want before you and your students begin time-consuming projects with a new clay body.

I suggest taking the clay body you are using, or a new clay body, and create a large number of test tiles to be bisque-fired in your normal bisque kiln loads. Once bisque-fired, the tiles can be placed in a regular glaze load. Because the test tiles take up so little space on the shelf, it's easy to check out new glazes. Make sure to take notes or write the information on the tile in underglaze.



Determine if the glaze moves or runs by drawing horizontal lines with black underglaze across the bottom section of your test tile. Be sure to also label the test tile with the cone number you are firing to, clay body and glaze.

THE WISDOM OF THE CONE

Pyrometric cones have been around since late 1896. They are formulated from many ceramic materials and are designed to bend at certain temperatures. Pyrometric cones can deliver accurate readings on the heat work created in a kiln, measuring the relationship of both time and temperature absorbed by the ceramic ware.



Go to artsandactivities.com and click on this button to download a complimentary cone chart provided by the author.



Small thrown test pots with moats: Glazes ran on the middle and far-right pots, but were captured in the moat at the bottom of the pot, saving the pot from sticking to or ruining the kiln shelf.



Two test pots, both fired to glaze maturity: Left clay body and glaze are OK. Right pot still had organic matter that was not totally burnt off during the bisque firing, thus it escaped in the glaze firing, causing pinholes and blisters in the glaze surface as it was released from the clay body. The solution to this problem is a longer/slower bisque firing to help burn out all the organic matter.



Pyrometric cones help you understand possible glaze problems. **^** The cone on the left is erect and under-fired, explaining why the glaze surface has a dry, rough and matte finish. The cone and pot on the right show a good firing and the same glaze has matured to a glossy surface on a slightly darker clay body.



These are all acceptable cone bends that are very close to the ideal time/temperature. The cone on the far left is perfect. Over-fired cones lay down onto the shelf and eventually puddle if drastically over-fired.

Small test tiles or test pots can fit easily between your pots in **>** normal kiln loads, providing you with vital information for the successful firing of future pots.



MAKING AND USING YOUR OWN TEST

TILES There are many of possibilities for designing test tiles: pinch a tile from a small ball of clay; make a die and extrude tiles, cutting them into 1-inch pieces; or make tiles out of small pots with moats to catch any running glaze. Once thoroughly dry, bisque-fire the tiles with your other bisque loads and have them ready for glaze testing.

To see if the glaze has moved when fired, use black underglaze to place a line across the bottom of the vertical surface. Write the type of clay body, the glaze name or number, and the cone it is to be fired to on the base of the test tile. All this information is valuable when you have a number of tiles to compare.

To see how various coats of coverage will fire, paint one coat on the surface above the line. Once dry, place a second coat over two-thirds of the surface, and a third coat over half of the second coat. Once fired, this allows you to see one, two and three coats of coverage.

THE CONES KNOW Use pyrometric cones to monitor when you have

reached temperature. I like self-supporting cones with a built-in stand because they can easily be placed anywhere in the kiln. The cones measure heat work, which measures both time and temperature. It's similar to when you cook a turkey in the oven. It is not the 350 degrees you reach, but the number of hours *maintained* at 350 degrees that cooks the turkey.

Pyrometric cones will also tell you if the kiln has reached the perfect time and temperature or has been under- or over-fired. They can confirm the accuracy of your kiln sitter or the newer controllers that fire your kiln automatically. Placing the cones in the top to middle area of your kiln and on the bottom shelf will also reveal how evenly the kiln has fired. It is common for some kilns to fire with a cone or two difference from top to bottom, depending on how the ceramic ware was stacked.

Cones can help you determine any problems or successes caused by under-

or over-firing. Knowing that the kiln was over-fired, under-fired or reached the perfect temperature gives you valuable information to determine a glaze and clay body's performance. Some glazes have a wide range of temperature and application, while others may be very specific and need extra attention.

Take advantage of a teachable moment and have your students help in the process. They can be taught the importance of testing to obtain information, which ultimately creates more successful projects. ■

For over 30 years, David L. Gamble has been involved with ceramic arts and businesses, and continues to make clay art and teach. He has conducted hundreds of workshops in the United States and Canada, and helped organize and participated in five clay symposiums in Eastern Europe.