

Ceramic Arts Daily Assignment

Testing Your Clay

by Paul Andrew Wandless

At some point we all change clay bodies for one reason or another. Whether you want a body that shrinks less, has more absorption/less absorption, a lower/higher maturation point or just a different color, there are hundreds of commercial clays to choose from. While most commercial clays have pretty good general catalog descriptions of what they are and what they can do, once we apply our specific working and firing processes, other issues can arise. Alternately, when a combination of tests can give you plenty of information that makes choosing and learning about a clay body a little easier.

Why Test

- Testing clay bodies provides you with information that you can observe, touch and feel first hand in your own environment.
- While a catalog photo shows what a clay may look like fired at one or several cones, it may not tell you what it will do at the cone you're firing to.
- Basic clay bar tests give you information more specific to your needs, and a 25-pound sample is usually enough to complete all the tests you need.

What to Test

Tests should be done at multiple temperatures to yield the widest range of information on the clay body. You need to understand the same general characteristics at every temperature you fire to, and even at temperatures you may want to fire to in the future. I test at every potential cone I may fire to and keep records of all the results.

- The three important general characteristics to take note of are shrinkage, absorption and warping/slumping.
- Other important qualities to note are color, texture, plasticity and hardness.

The more you know about the materials you use the better off you'll be. These tests are valuable in revealing general qualities about a clay body at different temperatures. This kind of information goes a long way in helping you decide if a clay body is really matching your needs in the studio.

- Some results are determined with visual and touch tests while others require simple formulas. All require consistency of procedure so the results you achieve are created under the same conditions.

Firing Box and Stilts

When firing above a recommended temperature—either on purpose or by mistake—clay bodies start to melt and fuse or stick to the shelves.

- To test clay bars, you'll need a shallow firing box to protect your kiln shelves and to make handling and transportation easier.
- Using a high-fire clay, make a simple slab-built clay box that's 8–10 inches square with a 1-inch tall wall. Make several boxes at the same time so you can test multiple bodies in the same firings or just have them on hand for future use (figure 1).
- You'll also need clay stilts for the warping test. Make triangle stilts about the thickness of your pinky and long enough to span the width of the clay bar (figure 2). All stilts must be the same height.

Clay Bars

- You'll need three clay bars for each body you're testing.

- For consistency and accuracy of results, use the same dimensions for all your clay bars. While some tests yield correct results regardless of the bar dimensions, you can always rule out size and dimension as variables that could cause any irregularities.
- Make ¼-inch-thick bars measuring 2 inches wide by 6 inches long. If your work is thicker, make bars to match, but don't exceed ½ inches in thickness.
- After cutting the bars to size, draw a 10-cm-long line on one of them with a hash mark at each end. This will be used for a shrinkage test later (figure 3).
- For the tests here, I've selected four bodies to test: two white bodies from Standard (#257 Grolleg Porcelain Cone 8–10 and #181 White Stoneware Cone 6–10) and two from Amaco (#29 Brown Stone Earthenware Cone 06–04 and #77 Terra Cotta Clay Cone 5). All four bodies have different characteristics at the temperatures to which I'm interested in firing them, and testing several bodies at the same time takes better advantage of each firing. Remember to write the clay number on the back of each tile.
- Once all bars are cut and firing boxes are built, let them dry to bone dry. The boxes and bars can be stacked with newspaper layered in between and a board on top for a little weight to keep them from warping. It's important that the firing boxes and clay bars stay flat while drying to assure accurate test results (figure 4).



Prepare test trays from high fire clay.



Prepare triangular stilts to support bar.



Four test bars with 10 cm. line.

Before the Bisque

- At the bone dry stage, visually examine the bars for a color change if any. Use a ruler to measure in centimeters the shrinkage line to see if it has changed from its original 10 cm length. Record the results.
- For each firing, place the bars side by side in the firing box, and place one of them on the triangle stilts. The stilts should be placed about ¼- to ½-inch in from the ends of the bar. If the stilts are too close, the bar may not warp or slump to its fullest potential.
- The shrinkage bar and the other regular bar are simply placed in the bottom of the box.

Firing

- While the test firing can be done in any kiln, the results are most applicable if done in the same kiln used for your work.
- Indicate in your notebook or worksheet if it's an electric or gas kiln, oxidation or reduction firing, salt, wood, soda, etc.



Dry trays and bars slowly and evenly.

- For best results, start firings at the lowest cone temperature and then progressively refire the bars at higher cones until the highest desired cone is reached.
- A sample for progressive test firings for a cone 10 clay body would be cone 06, cone 01, cone 6 then finally cone 10.

Clay Bar Tests

The following traditional tests give a good range of basic information that helps you to better understand your clay body. Keep good records in your notebook so you'll have the results for future reference. If there are other specific qualities, such as glaze fit or color effect, test for these also.

- **Warping/Slumping**

Visually examine for any warping or sagging movement in the center. Remove the bar from the stilts, turn it over and place it on a flat surface so the gap (if any) can be measured (figure 6). This test informs you at what temperature the walls may start to warp or deform or a plate may begin to slump. The information can be applied to the sculptural or structural applications of the clay body. An exact percentage for this is not as important as just knowing when the clay body starts to move.

- **Shrinkage Test**

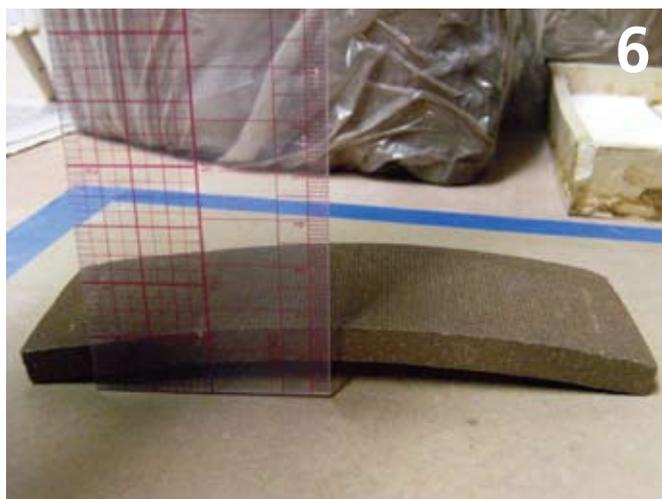
Measure the length of the line in centimeters on the shrinkage bar (figure 7), and subtract it from 10 (based on the original 10 cm line). For example, $10 \text{ cm} - 8.5 \text{ cm} = 1.5 \text{ cm}$. An easy way to convert this result to a percentage is to move the decimal to the right one place, so 1.5 cm means 15% shrinkage. Knowing the shrinkage rate helps in determining which glazes will fit the body and even which two bodies can be used together.

- **Absorption Test**

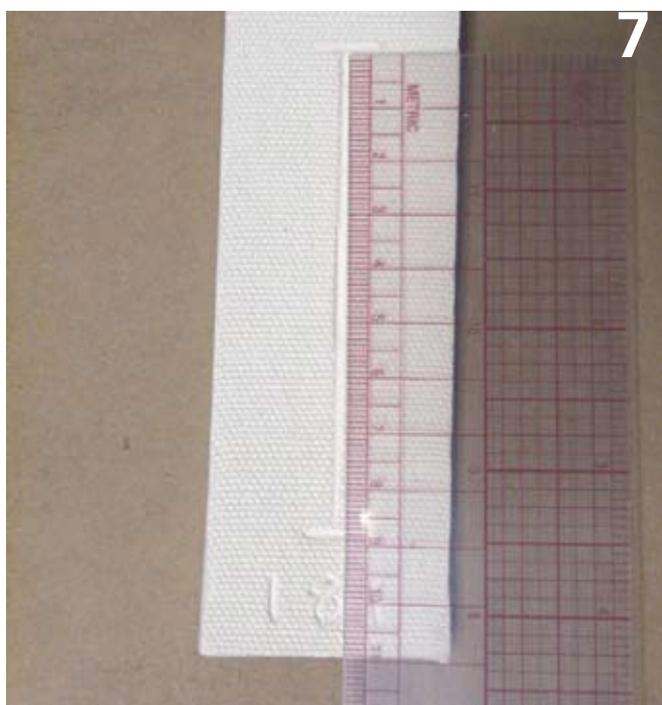
There are two types of tests that can determine the absorption of a clay body. One is a simple visual test and the other is a weight calculation. For the visual test, place a few drops of a liquid (like ink) on the surface of the bar to create a stain. Let it soak in for an hour then wash off the surface with water. The darker the stain, the more absorbent the clay. This is not



Place one bar on stilts and two of them flat in the tray.



After each firing, measure the amount of deflection.



Measure the 10 cm line to determine the shrinkage.

an exact test, but it gives a quick and useful general result.

The weight calculation test is more specific. Weigh the fired bar on a gram scale and record the result (figure 8). Soak the bar in water for 24 hours, pat dry, then weigh again and record the result. Subtract the first weight (dry bar) from the second weight (water soaked bar) to get the weight of the absorbed water. Divide the weight of the absorbed water by the original dry weight and move the decimal two places to the right to find the absorption rate.

Example: Original bar weight of 4.2 grams is subtracted from soaked bar weight of 4.6 grams giving you an absorbed water weight of .4 grams. Divide .4 by 4.2 which equals .095 making absorption 9.5%.

- **Color Test**

Visually examine a bar to see if there has been a color change (figure 9). The color change can sometimes be dramatic depending on the cone it was fired and is important for aesthetic purposes. It can also help you determine the best glazes to work visually on the surface.

- **Surface/Texture**

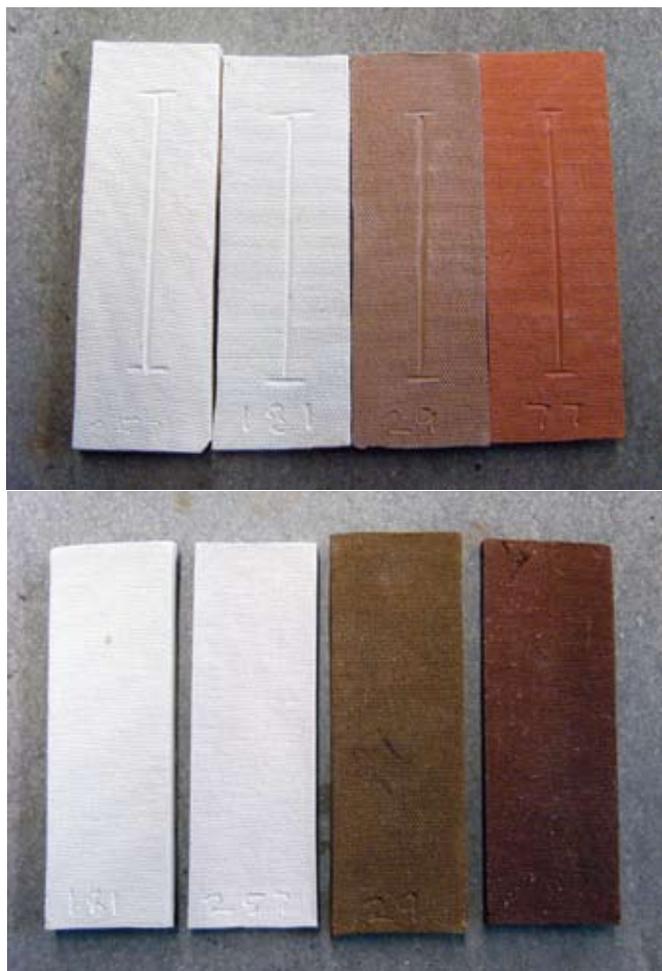
Visually examine the bar to determine if the surface has changed. Run your fingers across the bar to see if it's the same, smoother or coarser. This information is important aesthetically and helps you determine if it meets your visual and tactile needs.

- **Hardness**

Using a nail, see if you can scratch the surface to see how hard or soft it is at the fired temperature. This test helps determine the surface durability at different temperatures.



Soak bars in water and weigh them after 24 hours.



Note the color of the clay after each firing. Here are four clays fired to cone 04 (top) and cone 7 (bottom).