

The Vocabulary of Clay

Bisque: Clay that has been fired once. The bisque firing may be the most important firing you do to the clay. It removes the physical water, and goes on to remove the chemically retained water in the clay. The bisque firing is also the clay's main opportunity to get rid of its acquired impurities of sulphur, carbon, and other trace elements. If these are not purged in bisque firing, they may burn out during glaze firing and create flaws that often cannot be remedied.

Clay: Clay is an elementary lesson in geology. It's a mineral formed from decomposed granite-type igneous rocks, worn down by weathering of rain, sun, and ice into feldspars and "primary clays" (kaolin). Primary clays take a journey as they are transported far from their original locations by wind, rivers, and glaciers. They acquire impurities and organic matter along the way as they continue to weather. They become smaller particles changed in color and texture, and they become PLASTIC. There are three main types of clay.

EARTHENWARE Earthenware is a LOW-FIRE clay. It remains porous, never fully vitrifying. It may be white in fired color if it contains a high degree of the mineral TALC in proportion to the amount of ball clay. The combination creates a clay that is less likely to warp -- great for making tile, but less working time for forming. The lower firing temperature of earthenware offers a brighter and wider color palette for decorative enhancement. White earthenware bodies are the choice for wall tile (a highly decorative art), majolica decorative art, and schools (especially at elementary levels, where the kids are attracted to bright primary colors). Earthenware clay also comes in RED, as in a terra cotta flower pot. The terra cotta clays are made from clay mineral materials very rich in iron. **Earthenware clays fire at cone 04 (bisque) and cone 05 (glaze).**

STONEWARE Stoneware clays mature in firing at a much wider and higher degree of temperature. They can become more dense, VITRIFIABLE, without deforming. This nature makes them more durable and well suited for functional work. These bodies are very PLASTIC, easy to form and have great versatility for the potter or clay artist. Commercial stoneware clays are offered in two firing ranges, cone 6 and cone 10. **Cone 6 (or ^6) clays bisque fire at ^04 and glaze fire at ^6. Cone 10 (^10) stoneware clays bisque fire at ^06 and glaze fire at ^10.**

PORCELAIN Porcelain clays are made from the finest primary clays with the purest and whitest feldspars and silica. They are the least PLASTIC of all clays, but offer translucency. The nature of porcelain requires great skill from its users, as well as limiting the size of their work. Porcelain work is generally smaller, fine and delicate. **Cone 6 porcelain bisque fires at ^04, and glaze fires at ^6. Cone 10 porcelain bisque fires at ^06 and glaze fires at ^10.**

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Cone: “Cone” is short for pyrometric cones, or cones used to measure HEAT WORK in a kiln. Cones are physically cone-shaped, more or less, and come in four configurations to use in different ways in kilns. They are made with materials carefully selected to melt when exposed to certain temperatures for certain lengths of time. HEAT WORK is this combination of time and temperature. The caret symbol, or ^, and the Greek letter Delta, or Δ, are often used in place of the word “cone.”

Cones are rated from Cone 022 (a very low temperature, 1094°F) to cone 10 (2381°F). It might help to think of cone numbers with a leading zero as “negative” numbers: the higher the number, the lower the temperature. Cones that don’t have leading zeroes are positive numbers: the higher the number, the higher the temperature. This is VERY IMPORTANT, because cone 6 and cone 06 ARE NOT THE SAME. Clays or glazes rated for higher temperatures, like ^6 or ^10, can be fired to lower temperatures (though they will not reach full maturity, or their final fired state, at those lower temperatures). Clays or glazes rated for lower temperatures, like Δ04 or Δ06, CANNOT be fired at higher temperatures. They are likely to melt down and create disastrous messes in the kiln.

(And did you see what we did there, using the word “cone” and both symbols?)

Cones are still the most accurate measurement of HEAT WORK. We recommend using witness cones, even in computer-controlled kilns, to verify that all areas of the kiln reached the temperature specified by the computer.

Glaze: Glaze is a layer of glass fused onto the clay body. GLAZE = GLASS. There is a huge, almost endless variety of glazes for various colors, surface finishes and effects. The most important thing to remember about glazes is that GLAZES MATCH CLAYS. Choose glazes formulated for the same firing temperatures as your clay. For specifics, see the definitions on the first page for the three kinds of clay.

Glaze Fire: The firing to mature/melt the glaze onto the clay piece.

Leatherhard: Clay that has dried some, but not all the way. It is firm and may not be worked or added onto, but there is still moisture in the clay. This is a good time to apply engobe under-glazes or burnish the surface.

Oxidation: Firing that uses lots of oxygen. Electric kilns fire cleanly, which produces an oxidation firing. Oxidation offers bright, clean and clear color.

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Overglaze: Overglazes are products like GOLD, MOTHER OF PEARL, or DECALS. They require a third, very low temperature firing. The process of using these products requires that the piece has been bisque fired (first) and glaze fired (second). These products are applied to the surface of the fired glaze -- they literally go OVER the GLAZE -- and fired to ^018 (1265°F). The type of glaze matters: if you want the gold to be shiny, the glaze must also be shiny. Liquid overglaze products often contain solvents which burn off in the firing; good ventilation for your kiln is very important to maintaining a healthy working environment.

Reduction: In a reduction firing the kiln atmosphere is "reduced," or choked off, depriving it of oxygen. Creating a reduction atmosphere requires a fossil-fueled kiln. This type of kiln can retain an abundance of carbon in the atmosphere, and the carbon is available to the clay body and the glazes inside the kiln. High-iron clay bodies become warm and rich, as well as "spot." Glazes are altered by the atmosphere too, as copper turns red rather than green, and iron-bearing glazes can turn green rather than brown.

Underglazes: Underglazes are exactly what they say: they are color products intended to go onto the clay body and be applied UNDER the GLAZE (the layer of glass fired onto the clay during GLAZE FIRING).

Using underglazes is a three-step process:

1. Clay is the substrate (like a canvas to paint on).
2. Underglaze is applied.
3. GLAZE is applied directly over the underglaze decoration. Do not fire the underglaze independently unless you're using ENGOBE or SLIP underglazes. For COLOR-ONLY or HYBRID underglazes, you can fire underglaze and the glaze at the same time.

ALL UNDERGLAZES ARE NOT EQUAL! There are three types of underglaze:

1. ENGOBE or SLIP - These underglazes are basically clay + color. Because they have a clay base, and clay shrinks, they must be applied to clay before the first bisque firing. The underglaze needs to BOND and SHRINK with the clay. Duncan Cover Coats and Amaco Velvets or LUGS are engobe underglazes.
2. COLOR-ONLY - Duncan EZ-Strokes, Mayco One Strokes, and Mason Stains are color-only underglazes. They offer transparent watercolor-like effects. They may be applied to leatherhard clay, bisque-fired clay, or used as decorative oxides over unfired glaze.
3. HYBRID - Duncan Concepts and Mayco Stroke 'n Coats are hybrids of color + glaze (glass). They can only be used on bisque-fired pieces.