

# KAC Ceramics Glazing Guide:

## THE BASICS

### **What glazes & firings we offer:**

Kirkland Arts Center offers a wide range of glazes and firings for currently enrolled students. We currently have 6 electric kilns, 1 raku kiln, 1 soda kiln, and two gas kilns. We regularly offer Cone 10 reduction gas firings, Cone 6 Oxidation firings, and Cone 05 Oxidation firings (Low-fire Glaze) as well as specialty firings on occasion. All studio glazes are made in-house by the KAC Ceramics Team unless they are in a commercial container. Our cone 10 reduction firings make up the majority of our firings and all beginners start at Cone 10 at KAC.

### **BISQUE FIRING (CONE 04)**

What is bisque firing?

Bisque firing is the first firing in the ceramics process, converting greenware to bisqueware. These firings are done in our electric kilns and reach peak temperature at 1945°F. This makes the ware resistant to damage during handling, and porous for glazing.

### **HIGH FIRE (CONE 10 REDUCTION)**

What is Cone 10 Reduction?

Cone 10 Reduction firings happen in either our Bailey or Rocket gas-fired kilns and reach peak temperature at 2345°F. This type of firing is preferred by production potters and remains an esteemed and sought-after traditional firing technique.

Benefits: High range of depth and variation to glazes, creates strong and dense wares, extremely low porosity makes them able to be dishwasher and microwave safe. Allows the maker to focus on form, and let the kiln do the magic with glazing.

Setbacks: Flatwares often crack or warp under stress from high temperatures, less control over glaze outcome.

### **MID RANGE (CONE 6 OXIDATION)**

What is Cone 6 Oxidation?

Cone 6 Oxidation firings happen in our electric kilns and reach peak temperature at 2200°F. These types of firings are becoming more and more popular as electric kilns can be installed in homes.

Benefits: Bright color glazes, predictable results, best for underglazes, and detailed surface design.

Setbacks: Glazes can lack dimension, and ware is not as dense as Cone 10.

### **LOW FIRE (CONE 05 OXIDATION)**

What is Cone 05 Oxidation?

Low Fire glaze firings happen in our electric kilns and reach peak temperature at 1888°F. These firings are best for handbuilt forms and flatware.

Benefits: Low risk of warping or cracking, bright colors, ware can be fired repeatedly with low risk.

Setbacks: Ware is much less dense than Cone 6 or Cone 10 and remains porous.

## **SPECIALTY FIRINGS:**

Below are firings not regularly offered at KAC but may be offered on occasion. Please consult the KAC Ceramics Staff to find out about any possible next firings.

### **SODA FIRING (CONE 10 REDUCTION SODA)**

What is a soda firing?

Soda firing is an atmospheric firing, done in our handbuilt soda kiln. Soda ash is sprayed into the kiln and the firing reaches its peak temperature at 2370°F. Once inside, it will vaporize and interact with the red-hot surfaces of the work leaving beautiful flashes of color and glaze.

Benefits: Each firing is a beautiful surprise letting the soda and kiln work in complicated conjunction.

Setbacks: Unpredictable results, warping and cracking of flatware.

### **RAKU FIRING (CONE 06 REDUCTION)**

What is a raku firing?

Raku is a firing technique where a pot is heated until glowing, then pulled with tongs from the kiln and placed into a reduced atmosphere, such as a metal can full of pine needles, newspaper or leaves. After cooling somewhat, the piece is often plunged into cold water, creating crackle effects. In Raku, unglazed areas of clay become black due to the carbon from the burning fuel. When the carbon is scrubbed off the glazed areas they are often bright metallics such as copper and bronze.

Benefits: Unique firing process and results

Setbacks: Work is not food safe, work is very vulnerable to breaking during firing

### **LUSTER FIRING (CONE 018)**

What is a luster firing?

Lusters are metallic particles suspended in gum solution that can be painted onto glaze-fired ware, then fired again at a very low temperature to solidify the metals for a dramatic effect against the glaze. Used for an added layer of detailed surface design work. Lusters put off fumes, so when working with lusters students must be outside and wearing respiratory protection.

Benefits: Unique, beautiful, highly controllable results

Setbacks: Supplies are pricey, the learning curve is steep, ware is no longer microwave-safe due to metals, application process and firing need extra care due to heavy fumes.

## HOW TO GLAZE:

1. Make a plan!
  - Look at our test tiles and decide what works best for your piece
2. Write it down in your sketchbook in detail
3. Draw a line  $\frac{1}{4}$ " up from the bottom of your work with a pencil
  - Draw the line up to  $\frac{1}{2}$ " from the bottom if the glaze is marked runny!
4. Wax the bottom of your work using a black sponge brush and up to the line you drew
  - Check out our "using wax" poster in the mezzanine for more instruction
5. Mix up your glaze!
  - A good rule of thumb is to mix it 2x longer than you think you need to
  - How thick is it? The glaze should be a buttermilk consistency
6. Apply your glaze: brush, dip, or pour?
  - If you are unsure of how to apply your glaze, consult your instructor.
  - Layering glazes or want a different glaze on the outside and inside? Consider doing your first layer and waiting at least 8 hours for your second layer, this gives the water time to evaporate for a consistent coating
7. Wipe your glaze drips from the bottom of your work with a sponge
8. Put your pot on the appropriate glazeware shelf
  - Check to make sure it is for the correct firing temperature!

**Tech Team Tip:** Mastering glazing takes time, consistency, and patience. Take lots of notes during your glazing process and glaze throughout the quarter so you can continue to see and review your results with your instructor.

## CLEANING UP:

1. Close and wipe down your glaze bucket and put it back in the appropriate spot.
2. Clean off all of your tools and/or mixers in our rinse buckets.
3. Using a sponge clean off your work table
4. Mop the area around where you worked to prevent glaze dust. Please do not use a sponge on the floor as it often just spreads material around.

**Rinse Bucket System:** Using these buckets prevents glaze materials from going down the drain and into the environment. Please wash anything with glaze, underglaze or slips in these buckets only. This includes sponges with these materials on them.

Bucket # 1: Wash    Bucket # 2: Rinse

## GENERAL RULES:

1. The bottom of all work must be clean and clear of any glaze.
2. All work must be bisque-fired before glazing or staining.
3. No work with glaze or stain on it may go into a bisque firing.
4. All work must go in the appropriate firing for the clay and glaze used (ex. low-fire clay must go in a low-fire glaze firing, it cannot go in cone 6 glaze firing, cone 10 glaze must go in a cone 10 firing).

## **FREQUENTLY ASKED QUESTIONS:**

### **Is my work food safe?**

Your work should be food-safe as long as the test tile is not labeled with the not food-safe tag and it does not have any glaze defects (check our glaze vocabulary list).



### **How do I know if my work is fully vitrified?**

To ensure your work is fully vitrified, fire your work to the correct cone for the clay you are using and then test it. How to test it- After your work is glaze-fired, fill it with water and place it on a piece of paper for 24 hours. If there is any sign of water on your paper afterward, you know your work is not fully vitrified.

### **Can I put a low-fire clay into a cone 10 firing?**

NO! Absolutely no work is permitted to ever go in a firing that is above its rated temperature (cone). This includes low-fire clay fired to cone 6 and cone 6 clay fired to cone 10. This will cause the work to slump, stick to shelves, and in extreme cases melt into a puddle. It can ruin our equipment and others' work. If you are unsure about what cone your clay is, please consult a member of the Ceramics Team before firing.

### **What do I do if a tile is labeled runny?**

If a glaze or glaze combination you'd like to use is labeled runny, be very careful when choosing it. Look at the glaze(s) you chose, are any of them runny on their own? If so, find the culprit and only put the runny glaze on the top 1/3rd of your pot. If you are unable to identify which glaze makes it runny, consult a member of the KAC Ceramics Team. In any case, please leave at least 1/2in of unglazed surface from the bottom of your work for some wiggle room. It is also suggested to put a "cookie" or piece of kiln shelf under your work. Please remember you are responsible for replacing any kiln shelves that are damaged by glazes running off your work.

### **My glaze is peeling or cracking after application, what do I do?**

This means your glaze application is too thick. Scrape or sponge off your work to clean off the glaze. Wait until your work is fully dry before glazing again. Ensure the glaze is mixed properly and consult your instructor if you believe the glaze in the bucket is too thick. OR - your glaze was applied over another glaze or on bisqueware that still had too much water in it.

### **There are bubbles on the surface of the glaze after application, what do I do?**

This is common and nothing to worry about, they can be rubbed down once the glaze has dried. If they are large, it may be because the work was not dry enough, consult your instructor if this happens.

### **There is a strange yellow color on my work after my glaze dried, what is this?**

This is normal for glazes that have water-soluble materials in them such as sodium, nothing to worry about.

### **I'm unhappy with my results, can I refire my work?**

Re-firing is not permitted without permission from your instructor or a member of the KAC Ceramics Staff. Most of the time, your results will not differ from a re-fire unless the work was underfired.

**DISCLAIMER:** Although instructors are urged to orient all students to safety, storage, disposal, and technical issues, mistakes can and do happen at a learning facility. As a result, KAC cannot guarantee the success or results of work produced in the classroom or during firing. KAC is not liable for unsuccessful work, or work that is broken, missing, or disposed of before or after posted clear-out dates.

If a student makes a work that damages the kiln or shelves, they are responsible for the cost to replace or repair the part (ex. a high-fire kiln shelf is \$80 to replace). If you are unsure of a clay or glaze, please consult the KAC Ceramics Team before firing. Any work the ceramics team has deemed unable to fire will be placed on the designated “whoops” shelf. If you find your work on these shelves, please consult your instructor to find out why.

Firing frequency varies and firings are typically made when there is enough work to fill the kilns. Pieces that are large or require special consideration will take longer to fire. Students should direct all questions concerning firing schedules, clean-up procedures, and storage to their instructor. Students are not allowed to load and unload kilns without proper training and approval by the Ceramics Team.

Ceramics are fragile in all stages. Please be careful and respectful when looking through the ware shelves to find your work. Do not handle or move others' work for any reason.

### **Want to learn more?**

KAC frequently offers workshops and classes that are glazing-specific and range from surface design to glaze formulation. Check out our website to find more information on our current offerings and register today!

#### **Suggested Reading:**

*Clay and Glazes for the Potter*, Daniel Rhodes

*The Ceramic Spectrum*, Robin Hopper

*The Craft and Art of Clay: A Complete Potter's Handbook*, Susan & Jan Peterson

## **GLAZE VOCABULARY:**

- Glaze:** A melted glassy coating fired onto ceramic objects for visual or functional purposes. Glassformer + viscosity agent + flux. May have a glossy, satin, or matte surface.
- Slip:** A mixture of clay and water, which can be colored with oxides or stains and used for decoration. Some people use engobe as a synonymous term. Slip application methods- Brush, dip, marble, feather, Mishima, sgraffito, stencil, comb.
- Underglaze:** A commercial product that is like a finely ground slip of colored clay that usually requires a glaze on top. Traditional underglaze calls for 3 coats. These products work best at low-mid range firings. During high-fire firings, you may have bubbling, cratering or burning out of some colors. Testing is strongly recommended. Not recommended to use on the bottom of work.
- Slop Glaze:** Slop glazes are made from materials that settle to the bottom of our studio rinse buckets and are repurposed into glazes, rather than going into the landfill. These glazes are unable to be replicated, use them while they last as each bucket is different!
- Oxidation:** Condition in firing where sufficient oxygen exists to allow clean burning of any combustible materials in the firing. Electric kiln firing is an oxidation atmosphere.
- Reduction:** A condition, usually in a fuel-burning kiln, where there is insufficient oxygen for the complete combustion of the fuel in the kiln. This forms carbon monoxide, which takes loosely bonded oxygen from iron and copper materials, changing their molecular form and color.
- Vitrification:** A fired state where clay is hard, dense, non-porous, and will hold water w/o glaze.
- Cookie:** A cookie is a slab of clay (bisqued or fully fired, with no glaze) that is made to go under a piece of work in a glaze firing on a piece that has a risk of running. It is made for the sole purpose of preventing your work from sticking to the kiln shelf and damaging shelves when using a runny glaze.
- Blistering:** Blisters are evident on the fired glaze surface as a 'moonscape' of craters, some with sharp edges and others rounded. These craters are the remnants of bubbles that have burst during the final approach to temperature or early stages of cooling. In some cases, there will be some unburst bubbles with a fragile 'dome' that can be broken.
- Bloating:** Bubbling or blistering inside of a clay body caused by trapped gasses.
- Crawling:** Condition where the glaze rolls back during firing and leaves bare patches on the body. May be caused by overly thick glaze, or dust, wax, or oil on the surface of the bisque ware or not waiting enough time between layering glazes. Crawling attracts bacteria and bare patches are vulnerable to breaking down when exposed to strong bases such as acids and detergents.
- Crazing:** When a glaze shrinks more than the clay body it is on, causing cracks in the glaze. This is sometimes called crackle when done deliberately for decorative effect. Crazed glazes on a porous body (low-fire) will seep liquids and won't be food-safe.
- Dunting:** Cracking through the body and glaze during cooling due to the stresses between the body and the glaze and/or thermal shock cooling. Dunted pieces will have very sharp edges at the break.
- Shivering:** Shivering is a ceramic glaze defect that results in tiny flakes of glaze peeling off the edges of ceramic ware. It happens because the thermal expansion of the body is too much higher than the glaze.
- Leaching:** the release of materials (some toxic) from a glazed surface after firing.
- Pinholing:** A glaze defect where tiny holes are present in the fired glaze surface. These holes normally go down to the body surface below.
- Warping:** The distortion of clay ware that occurs in drying or firing. This can be due to gravitational stress, uneven drying, clay body formulation issues, or over-firing.