

## **GLAZE PROBLEMS**

### **Pinholes**

Perhaps the most common of all glaze defects, pinholes are tiny holes in the glaze surface which penetrate all the way through to the body. They are caused by gases escaping from the clay body during the firing cycle, after originating from tiny pieces of organic matter, such as charcoal, which is present in the clay. The most common remedy in low fire ceramics is to ensure that the piece is bisque fired 2 cones hotter than it is glaze fired (ie when glaze firing to cone 05, bisque fire to cone 03.) Other possible remedies include: a longer firing cycle with 15 minute soak at the peak temperature, changing the peak temperature, a slower cooling cycle, a thinner glaze coating, using a glaze with more flux, and decreasing the amount of zinc or rutile in the glaze if it is present.

### **Crazing**

Glazes that have crazed show a fine pattern of cracks in the surface of the glaze. Sometimes they are easier to detect by breathing on the piece and fogging the glaze surface. Crazing is the result of a mismatch between the coefficient of expansion of the glaze and the clay body. When the glaze has too high a coefficient of expansion relative to the clay body, crazing will occur. The solution is to reduce this difference in expansion. This can be done by changing to a lower expansion glaze or adding a relatively low expansion material such as silica to the existing glaze. Alternatively, you can switch to a higher expansion clay body.

### **Shivering**

When a glaze shivers it cracks and pieces of glaze peel right off the piece, often at the edges of a piece. This is another mismatch in expansion coefficients, but this is the opposite of crazing. In this case the glaze expansion is too low relative to the clay body. One solution is to increase the expansion of the glaze by adding a material such as a high expansion frit.

### **Crawling/Creeping**

When a glaze crawls or creeps it will tend to mound up and expose an area of bare bisque. This often happens in corners where glaze has built up too heavily or has not flowed all the way into the corners. Glaze can crawl on firing due to the presence of dust, grease or other dirt on the bisque. Sometimes crawling is a defect of the glaze itself due to the use of materials that have been too finely milled. It can also be caused by shrinkage and the consequent cracking of the glaze as it dries before being fired. Also when underglaze is applied too heavily it may lead to crawling of the covering layer of clear glaze. One general solution to crawling is to thin the glaze with by adding water or by applying less glaze.

## **Blisters**

Glaze blisters look like little craters (appr 1/8 inch diameter.) Possible causes of blistering are: too thick a layer of glaze, insufficient drying of the glazed piece prior to firing, or too dense a clay body which traps air in the piece.

## **Settling-Out**

This is the most common problem for glazes prior to firing, which may also result in firing problems. When a glaze settles out some of the heavier components of the glaze settle to the bottom of the container. If you try to use this glaze without thoroughly remixing you will be applying a glaze with key ingredients missing. A glaze stays in suspension due to the presence of various types of clays, such as bentonite, and/or gums, such as CMC. One common cause of settling out is the addition of too much water to the glaze, which dilutes the effect of the suspending agents and allows some of the glaze ingredients to settle out.

Another possibility is the growth of bacteria which will consume an organic gum, such as CMC, and will lead to loss of suspension. To prevent bacteria growth do not return used glaze, which has been poured out of the original container, back into the original container. Also do not introduce possibly contaminated objects, such as brushes, into the original container. Storing glaze in a hot or sunny environment may also encourage bacteria growth. Freezing can also destroy the action of CMC, so brushing type glazes in particular should not be shipped by unheated freight in winter when the possibility of freezing exists. If a glaze has settled out, but has not gone rock hard in the bottom of the container, it can be re-suspended by the careful addition of Epsom salts. Epsom salts can be readily purchased in most drug stores. First you need to create a saturated solution of epsom salts by dissolving them in a cup of warm water until no more will dissolve. Then add this solution slowly and carefully to the glaze while continuously stirring the glaze. It should require less than approximately one teaspoon of epsom salt solution per gallon of glaze. The quantity will depend on the severity of the problem.