GLASS BIRD

Glass Fusing Art Products

Modeling Glass™ Starter Kit Instructions for Use

It is recommended that you have had at least one fused glass class and understand the basics of fusing glass before attempting to work with Modeling Glass.

DIRECTIONS FOR MIXING MODELING GLASS

(4 ounce batch)*

½ cup plus 2 level teaspoons frit powder (113 g or 4 oz.)
2 ½ level teaspoons powdered binder (6 g)
¼ cup plus 2 teaspoons water (60 g)
1 teaspoon liquid medium (5 g)

IMPORTANT: You must combine the ingredients in the order described below, or the Modeling Glass will not mix correctly!

In a small bowl, blend the glass powder and binder very thoroughly, then add the water, mixing to moisten all the ingredients. Once the water has all been absorbed, you will have a ball of material with a few loose crumbles.

Next, add the liquid medium and mix, then knead the ball by hand to completely work in the medium. At this point you will have a firm, non-sticky ball of Modeling Glass that is ready for use. It's not unusual for some to be on your hands at this point because the binders haven't completely bound all the water. If the ball feels a little dry and stiff, sprinkle a few drops of water onto it and knead it in until it is completely soft when you squeeze it. If your batch is slightly too wet, let it sit out for a few minutes, then knead it again, doing this until the binder grabs up all the water. Usually this is all it takes to correct a damp batch.

The consistency of Modeling Glass can be adjusted. If your project calls for a softer consistency of Modeling Glass, use slightly less powdered binder, and/or slightly more water. Experiment to get exactly what you want. It can be applied with a palette knife, with fingers, or even thinned to use with a brush.

To Make a Smaller or Larger Batch

This recipe scales up proportionately to one pound or more. A countertop standing mixer with a paddle attachment is ideal to mix larger amounts. The recipe may be cut in half to make a 2-ounce batch, but controlling the result is more difficult when working with such a small amount of powder. Measure carefully. I recommend making larger batches because if wrapped carefully in plastic and then in an airtight container, Modeling Glass will keep for months! If it gets a little dry just sprinkle a few drops of water onto it and knead until it rehydrates.

Half batch recipe (2 oz.):
1/4 cup plus 1 level teaspoon glass powder
1 1/4 level teaspoons Powdered Binder
2 tablespoons plus 1 tespoon water
1/2 teaspoon Liquid Medium

To make just one tablespoon of a single color:
1 tablespoon glass powder
1/4 teaspoon Powdered Binder
1 1/2 teaspoons water
1/8 teaspoon Liquid Medium

MIXING NON-BULLSEYE POWDERS

The mixing instructions for Modeling Glass were developed for use with Bullseye Glass powders. The ratio for mixing Modeling Glass with Spectrum/Oceanside/Uroboros or other powders is slightly different. INCREASE BINDER from 2 1/2 level teaspoons (6g) to 1 level tablespoon (7g). INCREASE WATER from 1/4 cup plus 2 teaspoons (60g) to 1/4 cup plus 2 1/4 teaspoons (70g).

Suggested Tool List:

Rigid spatula or spoon for mixing
Small glass or plastic bowl for mixing (recommend 2-cup)
Measuring cups/spoons
Silicone baking mat (recommend 11" x 16")
Rolling pin
Heavy duty plastic wrap
Cookie sheet or other heat-safe tray
Palette knife
Clean-up tool with pointed spade end (for ceramics)
Wet/dry sandpaper 150 grit
Zip lock sandwich baggies to store mixed Modeling Glass

About the Liquid Medium

Glass Bird Liquid Medium is a hygroscopic liquid. That means that it attracts and binds to water. It gives Modeling Glass its smooth, non-sticky texture. The Liquid Medium is nontoxic and extremely stable. It's important to keep the container tightly sealed and avoid letting it come into contact with water, except when mixing Modeling Glass.

About the Powdered Binder

Glass Bird Powdered Binder is nontoxic, and is effective because of its purity. It's important to keep the Powdered Binder dry and its container sealed tightly when not in use. Always wear a mask or respirator when mixing the binder with powdered glass. Due to the limitations of commercially-available jars, the binder and liquid medium will not run out at exactly the same time. There is slightly more powdered binder in the starter kit, but there is enough of both products to make at least 3 pounds of Modeling Glass.

Storing Modeling Glass

You may store Modeling Glass in a zip-lock baggie for up to 3 weeks. For longer storage, it will keep almost indefinitely in an airtight container if wrapped in plastic wrap within the container. If the Modeling Glass begins to feel dry or stiff, just spritz it with a mist of water and knead to blend the water back in.

Handling Modeling Glass

The ingredients in the Modeling Glass kit are food safe and nontoxic. If you have sensitive skin, you may find that Modeling Glass has a slight drying effect on your hands. Use gloves if desired.

Modeling Glass may be rolled into a flat sheet and cut into shapes, it may be rolled out in a coil, and basically handled like any other type of clay. Beautiful effects can be created by using a palette knife, thinning the material with water and spreading it in thin layers. Different colored powders can be combined and then turned into Modeling Glass, or already-mixed Modeling Glass can be blended together to make new colors. Modeling Glass can be made from powder, fine frit, or a combination of the two. If your Modeling Glass begins to dry out while you are still working with it, simply use a small paintbrush to spread a little water onto the surface, or mist lightly with a spray bottle.

Before firing, the Modeling Glass should be completely dry. Leave the piece on a baking mat while it is damp. Air-dry the piece, or for a quicker result, dry it in a kiln at 200 degrees F. for 1-2 hours or as needed (depending on the thickness). Pieces will dry more quickly if they are flipped over partway through the drying process. As the piece dries, it will lift away easily from the underlying baking mat. The mat can be placed directly on a kiln shelf. Since you are only going up to 200 degrees F, there is no danger of melting the baking mat. However, be sure to remove the baking mat before going above 500 degrees F.

Once Modeling Glass has dried completely, it can be sanded, trimmed, and carved. It's surprisingly strong, but will break if handled too roughly, or if it has been rolled extremely thin.

If creating Modeling Glass shapes that will NOT rest on top of sheet glass, try to keep the unfired thickness of shapes at least 3 mm thick. Shapes that will be fused onto sheet glass can be much thinner. If you are trying to make a shape that is dimensional (not flat) it should be supported during firing so it doesn't sag. You can do this with fiber paper or other types of support material. Modeling Glass is still glass, and will not behave like you would expect ceramic clay to.

Clean Up
Clean tools and hands with water. Dry Modeling Glass comes off easily with a bit of rubbing. Do not allow large amounts of Modeling Glass to go down the drain, as clogging may occur.

Firing Modeling Glass
Modeling Glass is extremely versatile, and depending on the effect desired, it may be either tack-fused, contour fused, or full fused. Modeling Glass at full fuse maintains complete color accuracy, and does not affect the frit's COE. At tack-fuse temperatures, some colors will be less vibrant because they do not completely mature at low temperatures. Because Modeling Glass holds a lot of air bubbles, it will not fire to a true transparent color, and will hold tiny air bubbles even at full fuse temperatures.

At approximately 700-900 degrees F, the binder and medium will burn off, creating a slight odor that smells like hot cardboard. The kiln area should be well ventilated to prevent fumes from building up. It is not necessary to vent the kiln during burn-off, unless you are firing a large number of pieces or a large volume of Modeling Glass (more than a pound). Then crack the kiln until it goes above the burn-off temperature. Any residual odor will dissipate after firing. Depending on how well-ventilated the space is, wearing a respirator when entering the firing room during burn-off is recommended, especially if you are firing more than a couple of ounces of Modeling Glass.

Color Maturation
Some colors will not be completely true at the lowest temperatures (1275F), but will improve with additional heatwork. White will be slightly grayish until you are firing at 1325F and up. Clear glass will never be clear, but instead ends up gray, mostly due to trapped air in the glass body, until you get to full fuse temps. Blues work great, as do browns and greens. Reds may be slightly more orange than expected until they sinter thoroughly (this happens at either a higher temperature, or through the cumulative heatwork of multiple firings). All colors fire to their true shade at full fuse. Strikers will not strike until you are firing at full fuse temperatures. Reactions between sulfur and copper colors do not occur at tack fuse temperatures, so blending blue and yellow, for instance, is not a problem. However, the expected reactions will occur at full fuse. **TIP: extend the hold time at 1325F or above to 30 minutes if you want whiter whites and more mature colors!**

A Note About Shrinkage
Expect at least 15% shrinkage, depending on the thickness of your piece, the color, and the temperature to which you are firing. This is based on a peak temperature of 1275 degrees F held for 10 minutes. If firing hotter, expect more shrinkage. It can be useful to pre-form shapes that you intend to place on top of backing glass, drying them, and then tack-fusing the shapes in a separate firing on shelf paper or on a primed kiln shelf, with no glass under them. The "pre-shrunk" pieces can then be placed onto sheet glass and fused again, either at a low temperature to preserve the relief, or at a full fuse, to create a smooth surface. Bas-relief shapes also can be built directly onto a sheet of glass, but it's important to allow for shrinkage in the design. Large-capacity kilns tend to hold their peak temp longer than a small kiln due to their thermal mass, so your results will vary...test a few pieces to see what you prefer.

The thicker the shape, the less obvious the shrinkage will be. In addition, shapes shrink toward the center mass, which means a shape will shrink from all edges toward the center. It will take some practice to get a sense of how shapes shrink; if you have formed a tree branch, for instance, small twigs may pull away from the main branch shape during firing if they are not solidly connected to the branch during construction. As with all glass, a shape made with Modeling Glass "wants" to be 6 mm thick, and the hotter it's fired, the more it will shrink to attain this thickness if it is not layered with other glass.

Firing on Shelf Paper or Kiln-washed Shelf
Modeling Glass fires extremely well on shelf paper. It can also be fired directly on a thoroughly kiln-washed shelf. If using shelf paper, be sure to gently wash/brush off any residual powder from the back of tack-fused shapes before fusing onto sheet glass.

Basic Firing Schedule (all temperatures are Farenheit)
Many wonderful effects can be gained by firing at fairly low temperatures (around 1275 degrees F). Because Modeling Glass contains glass powder, it melts more quickly than solid sheet glass. When the material melts or "sinters" together, decreased volume results in the shrinkage. Depending on the hold length, the surface will have varying degrees of shine—a longer hold time results in a more sintered piece with a shinier surface. It's important to remember that black and other dark colors absorb more heat in the kiln, and will soften much more quickly than white or other light powders. Experiment with temperatures to get the effect you need. Extend the anneal time for extra-thick pieces as you would with thick sheet glass that's more than 6mm thick. Fortunately, uneven thicknesses in Modeling Glass shapes do not seem to create as much stress during firing as uneven thicknesses of solid glass, and are less prone to breakage during firing. When in doubt, use a conservative schedule until you get the hang of firing Modeling Glass.

It's always a tradeoff: if you fire hotter to get a glossy surface and more vibrant color, you will lose a little texture. If you fire cooler to preserve the maximum amount of texture, colors will be more muted and the finish will be satin. Both are nice effects, it depends on the artist's goals.

Schedules:
Modeling Glass can be full fused or fused at lower temperatures for texture. This is a great schedule to make basic shapes, to tack fuse layers of Modeling Glass to one another, and to pre-fire elements that will be placed on sheet glass later, to get the shrinkage out of the way. This schedule is for maximum texture and a satin finish with more muted colors:

300 degrees per hour to 1275, hold for 10 minutes
AFAP to 900 degrees, hold for 1 hour
150 degrees per hour to 700, hold for one minute
AFAP to 70 degrees, no hold

Contour fuse firing for richer colors, whiter whites, and glossy surface:

300 degrees per hour to 1000, hold for 10 minutes
600 degrees per hour to 1325, hold for 30 minutes
AFAP to 900 degrees, hold for 1 hour
150 degrees per hour to 700, hold for one minute
AFAP to 70 degrees, no hold

NOTE: The schedules above are set for COE 90 glass. If you are using COE 96 glass, adjust the schedule to fit your COE.

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