Liquid Stringer Medium

From
Fusion Headquarters, Inc.
Newberg, OR 97132

Liquid Stringer Medium is a specially designed vehicle that can be mixed with any brand or form of crushed glass, frits, powders or enamels to make a formable pate-de-verre or paste of glass. At room temperature, this glass paste can be molded or formed in a variety of ways. It can be sculpted into 3-dimensional forms, squeezed from a cake decorator, painted into a pate-de-verre mold, or formed into decorative pattern bars. When fired in a kiln, the glass particles bond together forming a solid. Depending upon the time spent and the temperature the glass is heated to, a variety of looks can be achieved from the same frit form ranging from granular, barely bonded, to solid dimensional relief images to fully fused flat plates, jewelry and tiles.

Getting started is easy. Here are some of the supplies you'll want to have on hand in advance. A set of measuring spoons, some small plastic bags, squeeze bottle or cake decorator, some glass frits, powders or even enamels, eyedropper, a 45° angle ramp, and of course of Liquid Stringer Medium.

Its uses are endless and its value as an artistic tool are just now beginning to be realized. Although the ancient glass workers were very aware of the values of a frit paste it is still a relatively new direction for contemporary glass arts to pursue.

Liquid Stringer Medium

Liquid Stringer Medium is a clean burning, water soluble binder that offers several distinct advantages over commonly used binders such as CMC, gum arabic, hair spray and glue. Its primary benefit is that it will withstand elevated temperatures thus holding the glass particles in place until they are sticky enough to bond together on their own. This can be a problem with many other binders that burn out at lower temperatures allowing the glass form to fall apart. Liquid Stringer Medium has the high- temp bond that is essential for this type of work.

Most of the other advantages of the Liquid Stringer Medium fall under the "user friendly" category because they pertain to its pre-fired working qualities. Most other binders have a short working time and tend to dry hard; this is not the case with LSM. It is designed to stay workable for extended periods of time and it dries soft yet firm. If you have ever used CMC you are well aware of how quickly it dries out. Once it is dry, it is difficult to sculpt or shape. If you add water to make it workable again you will find a lot of hard lumps that don't want to dissolve. Even cleaning up your tools can be a real chore once it is dry.

LSM has an extended working time and once it is mixed with frit and kept in an air tight container, your mixture will remain workable for many months. I have a squeeze bottle with LSM and frit that is still workable after 10 months in storage.

If drying does occur, you can reconstitute the mixture by adding a few drops of water. Within minutes, your new mix will be as smooth and workable as the original. This not only saves you money, because you don't have to throw away unused portions of a mix, it also means you can make repairs to objects in the green or unfired state.

When cracking occurs with other binders, you might as well start over again, because chances are that the frit forms will separate along the crack line during firing. I have had unfired forms break during transit that I repaired with a few drops of water and they fired perfect.

Another benefit of the LSM is its workability in the green state. If a line comes out a little thick or uneven, just let everything dry over night and then you can come back with a sharp object like a dental tool or x-acto knife and clean it up. The LSM mixture is soft enough to carve smoothly with yet firm enough to withstand light brushing. These are qualities not found in other binders. They tend to be either too brittle or to soft making touch up extremely difficult. They either chip unevenly or they are so soft that sweeping away the excess frit particles also removes the parts you want to keep.

Liquid Stringer Medium

Mixing LSM
There are a few tricks that will help maximize your results when using LSM. It is important that you mix the components completely. An uneven mix will give you uneven results. One easy way to mix is to put the ingredients into a sealable plastic bag. Seal the top and massage the bag with your fingers. This is also handy if you are going to transfer the mixture to an application devise like a cake decorator or a squeeze bottle. Just cut off a corner of the bag and squeeze the mix unto the applicator. You can also stir the components together with a pallet knife on top of a clean piece of glass.

It is important to pay close attention to the ratio of the frits and powders to the Liquid Stringer Medium. I have found that as long as the glass particles are fine or smaller, the exact partial size does not significantly vary the results. Regardless of whether you are using Fine Frit, Powders or Enamels, the following relationships will be the same.

It is best to start your mix by combining equal parts by volume - LSM and ground glass. I like to use measuring spoons. Because just adding a couple drops of water or a little bit of frit can greatly change the workability of the paste, I suggest that you now see how thick your mixture is by running a quick viscosity test. An easy way to do this is to let a little dab of the mix run down a 45° ramp.

The ramp is easy to make. I just cut a piece of 1 inch thick or is thicker Styrofoam at a 45° angle and tape a smooth surface, such as a plastic ruler or a piece of glass onto the angle slide of the ramp. A ruler is handy, because it gives you accurate measurement on how much your tests sample moves over a given period of time. If you take the time to make a simple ramp and test the consistency of your paste, you will have a much higher success rate.

There are optimum mix consistencies that work best for any given application. The four most common consistencies I use are: slightly runny, slow moving, firm and extra dry.

Liquid Stringer Medium

Slightly Runny – This mixture moves quickly down the 45 degree ramp, traveling an inch in 15 seconds or less. This mixture will flatten out when applied to a smooth horizontal surface like a sheet of glass. This is a good mixture to use when you want to fill an area with frit, apply a wash of enamels or create wide fluid lines.

Slow Moving – This is the key mixture that gives Liquid Stringer Medium its name because it is thick enough to hold a stringer type of line yet it is fluid enough to be squeezed out of a cake decorator with a #4 or larger tip. This mix should ideally travel one inch down the 45 degree ramp over a 15 – 20 minute period. If your mixture is moving to quickly down the ramp, add just a little bit more frit and mix thoroughly. If the mix is too thick, adding a few drops of water should do the trick. Not only is this mix ideal for the squeeze line technique, it is also perfect for applying controlled frit areas into a pate-de-verre mold.

Firm – This mixture is just slightly thicker than Slow Moving. It is really too thick to move down the ramp regardless of how long you wait. If you're using your paste mixture for three-dimensional sculpting you will love this consistency. The frit mix is firm enough to hold a shape yet it is very moldable. This allows you to fire your objects surface side up so that they have a smooth, shiny surface, unlike the matt surface achieved in mold formed pate-de-verre.

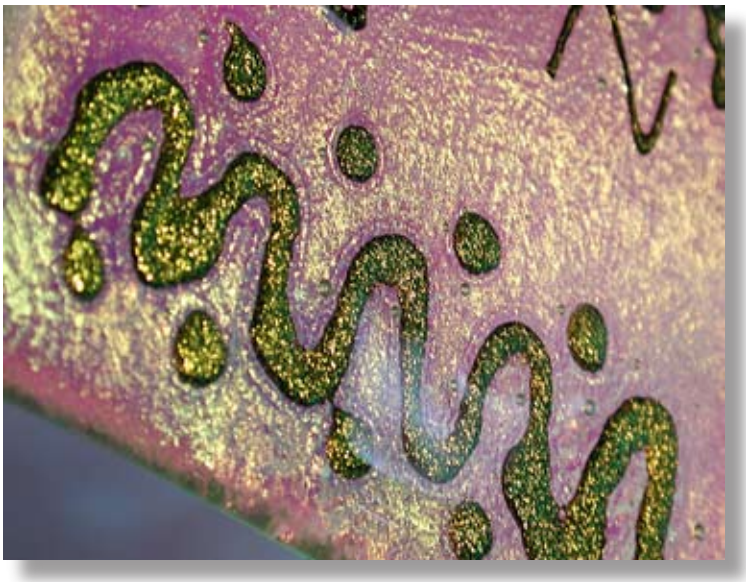
Extra Dry - To achieve the extra dry state you will want to keep adding frit to the 50/50 mix until the mixture borders on crumbling apart. It is kind of like a pie dough in that you think there is no way you can work more frit into the mix, yet you can with a little effort. I like to wear rubber gloves (this is still glass we are playing with here) and mix by hand. This is the ideal consistence to use like clay. You can use the same tools that are common with fimo clay to make pattern bars and milliefiori.

If you are having problem getting the LSM and frit paste to flow easily out of your squeeze bottle, you may have to cut the tip to slightly enlarge the opening. A #4 or larger cake decorators tip seems to work well. A #4 hole should just accommodate the tip of your average ball point pen. (1.8 mill)

Liquid Stringer Medium

Firing

How quickly you fire a piece will depend upon how quickly any molds or the largest piece of glass in the kiln can safely be heated without breaking. If your mix is all frit, that shouldn't be much of an issue so a rate of 500 F degrees per hour is a good modest rate. LSM does emit a slight odor during the first 900 F degrees of the heating phase. Although I have not experienced any problems when firing in an unvented kiln, it is always a good idea to vent you kiln and work space during heat up.



How hot you go will depend upon your desired results. Because every kiln holds and loses heat differently it is best to test some small sample firings if you are after very specific results. A low end starting point would be 1335 for 10 minutes. Depending upon the softening point of your specific glass, this should yield a complete bonding of the glass particles without allowing them to flow or distort. As you add more heat or increase the hold time, you will notice that the particles look less granular and the entire mix is starting to flow and puddle. It is useful to have test samples from different types and brands of glass fired to various temperatures.

Anneal for the thickest area of your new piece of glass art just as you would ordinarily.

The use of frit paste is not only a link to our ancient glass history; it is very possibly the one of the keys to our artist glass future. Just like the way that the development of compatible sheet glass changed the direction of contemporary glass art, the evolution of frit formed art has the potential to cultivate glass working techniques that we have yet to even imagine. LSM is a wonderful binder that significantly improves on the existing options. It may or may not prove to be the best possible choice for many glass artists, but it does open new doors that are definitely worth exploring.

I made this piece called “Balancing Act” to demonstrate some of the ways one can use Liquid Stringer Medium and frit.

1 – On my original pencil sketch, I darkened my lines with a felt tipped marker so they would look as thick as the LSM lines (about 2 mill and up)

2 – My design was transferred to my pre-fused base glass with a clean burning marker.

3 - I drew the image onto my pre-fused base glass with the LSM and frit paste.

4 - When the paste didn’t flow evenly, I cleaned the tip with a piece of wire.

5 - After the paste had dried overnight, I came back with a dental tool and cleaned up my lines by carving away any excess frit.

6 - I used a soft fan brush to sweep away any loose particle of frit.

7 - After the piece was fired to 1335 for 10 minutes, the System 96 black frit turned dark and glossy and it texture fused to the surface of the base glass.

8 - I added some color by firing on Fuse Master Enamels mixed with the LSM and water.

“Balancing Act” by Gil Reynolds, 14” x 10” - 2005, Fused Glass - System 96 glass and frit, Fuse Master Enamels.