

Basic GLASS FUSING

All the Skills and Tools You Need to Get Started



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Lynn Haunstein

*Photographs by
Alan Wycheck*

STACKPOLE
BOOKS



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Introduction

Fusing glass in a kiln is a very exciting process. Flat sheets of glass can become beautiful and functional pieces of art when heated to temperatures that bond the glass together or change its shape.

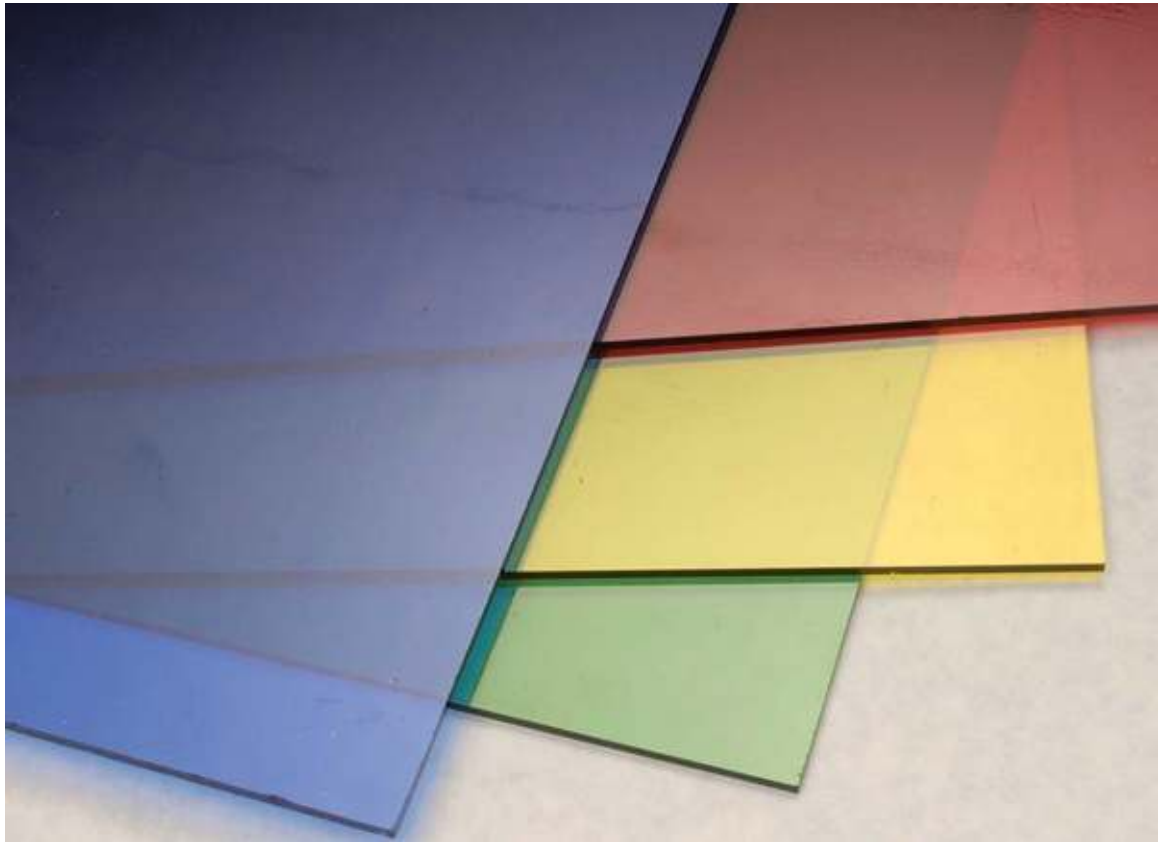
My first class in fused glass was really intriguing. And really confusing. Firing schedules, special glass for fusing, manually operated kilns—there was so much to learn. Over the years, as that first class was followed by more classes, workshops, and lots of practice, the fusing process became clearer. Automatic kilns took the guesswork out of firing schedules. Manufacturers began offering more fusing glass, and I learned new techniques from experienced fusers. The projects I made became more functional and creative.

The goal of this book is to take the confusion out of fusing and slumping glass. You'll find all the information you need about the specific glass developed for fusing as well as the decorative components you can use to enhance your projects. Kilns and firing schedules are discussed in detail. For those with little or no experience in basic stained glass cutting, I have included a chapter to hone those skills. You will find easy-to-follow directions for numerous fused glass projects that will begin at the most basic level and increase in difficulty.

Once you have mastered the basic skills for fusing and slumping glass, you can use your creative spirit to explore unlimited possibilities in this art form.

I hope this book will simplify the kiln process for you as you learn new techniques in working with glass.

Glass for Fusing



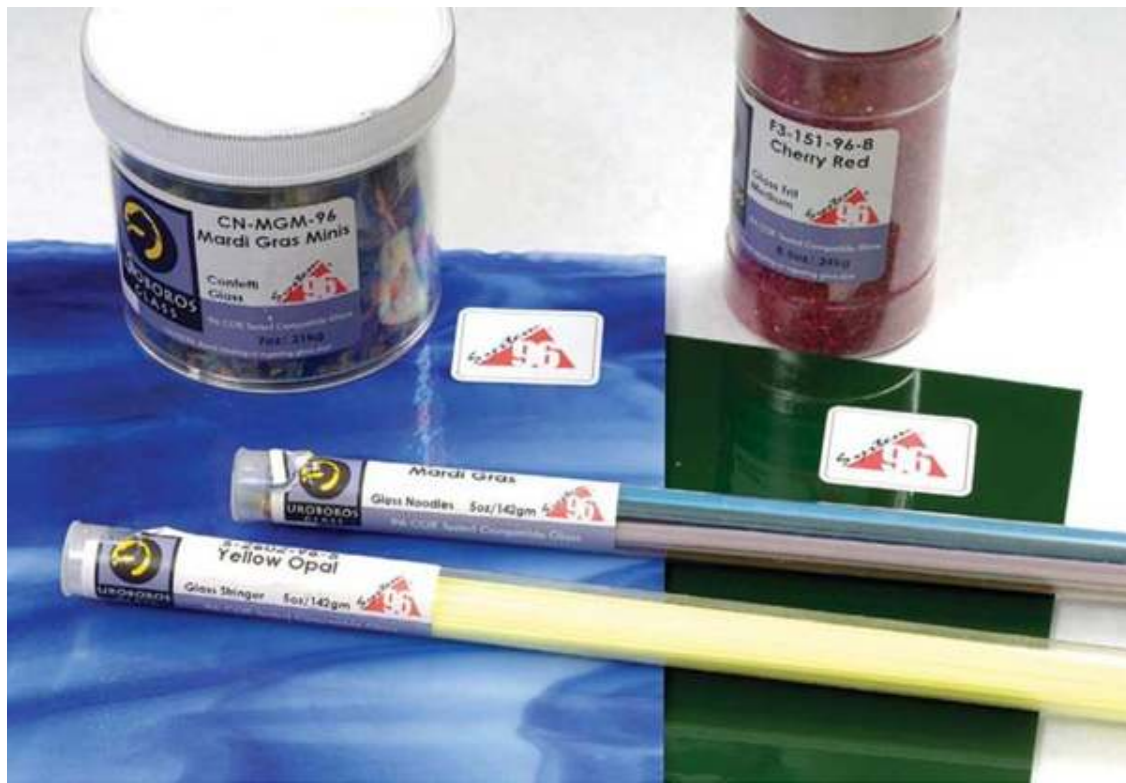
Nearly any glass can be fired in the kiln by itself. However, when two or more pieces of glass are fired together, we must respect their rates of expansion when heated, and contraction when cooled. Glass manufacturers test their glass and assign the appropriate number for that expansion and contraction rate. This number is called the Coefficient of Expansion, or COE.

Glass and accent pieces with the same COE number are considered compatible. When fusing a project, you will want to use only compatible glass and components. A fusing project made with glass or components that are not compatible may contain stress. During the firing process, or any time thereafter, a project containing stress may develop cracks and eventually break.

COMPATIBILITY

Manufacturers offer fusing glass in a variety of COE numbers; 104, 96, 90, and 84 are the most common COE glasses available for fusing. In general, the lower the COE number, the more time and temperature it will take for the glass to reach the desired state. For example, a glass with a COE of 84 will take more time and a higher temperature to fully fuse than a glass with a COE of 96.

The projects in this book are primarily made from glass with a COE of 96. This glass is easy to cut, available in a wide range of colors and color blends, and fires beautifully in the kiln. A number of glass companies have made 96 COE glass and other fusing components readily available.



Note: If you have other stained glass in your workshop, you will want to set aside a separate area for your fusing glass, leftover scraps, and other fusing supplies. You can always use fusing glass in a regular stained glass project, but you do not want to use regular stained glass in your fusing projects. If you also choose to try fusing glass with other COE numbers, you will need to keep that glass separated from the 96 COE glass.

Just for Fun

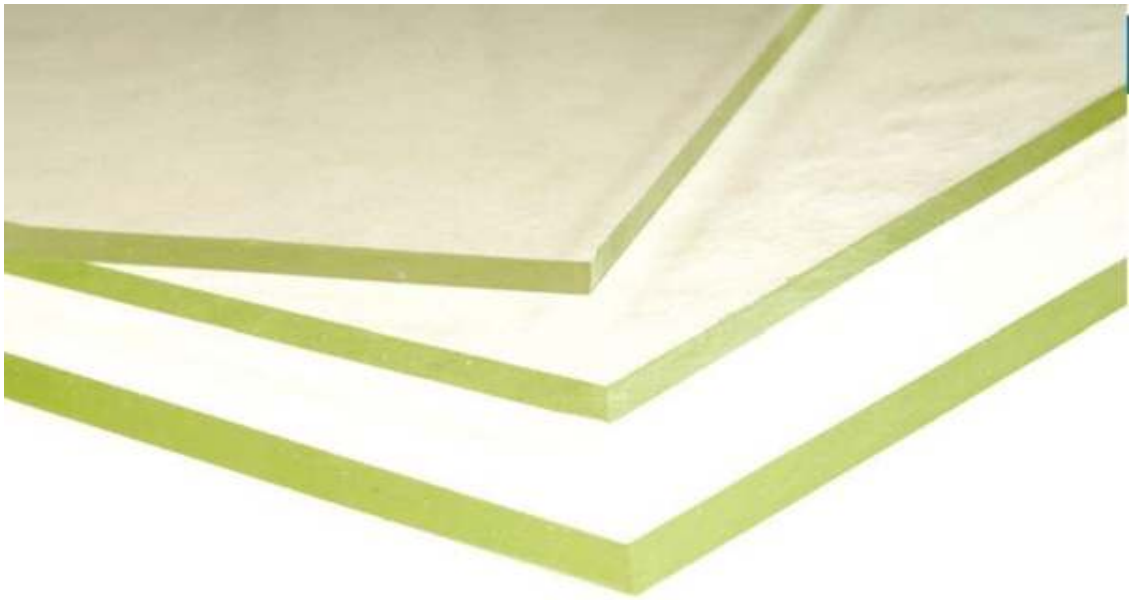
Checking glass for compatibility can easily be done with two sheets of polarizing laminated film. Full fuse (1480°F) small squares of the glass you wish to test onto a double layer of clear 96 COE glass.

Place one sheet of the polarizing film on a light source. Lay the test strip across the film and cover with a second sheet of polarizing film. Rotate the top film until the least amount of light is transmitted through the film.

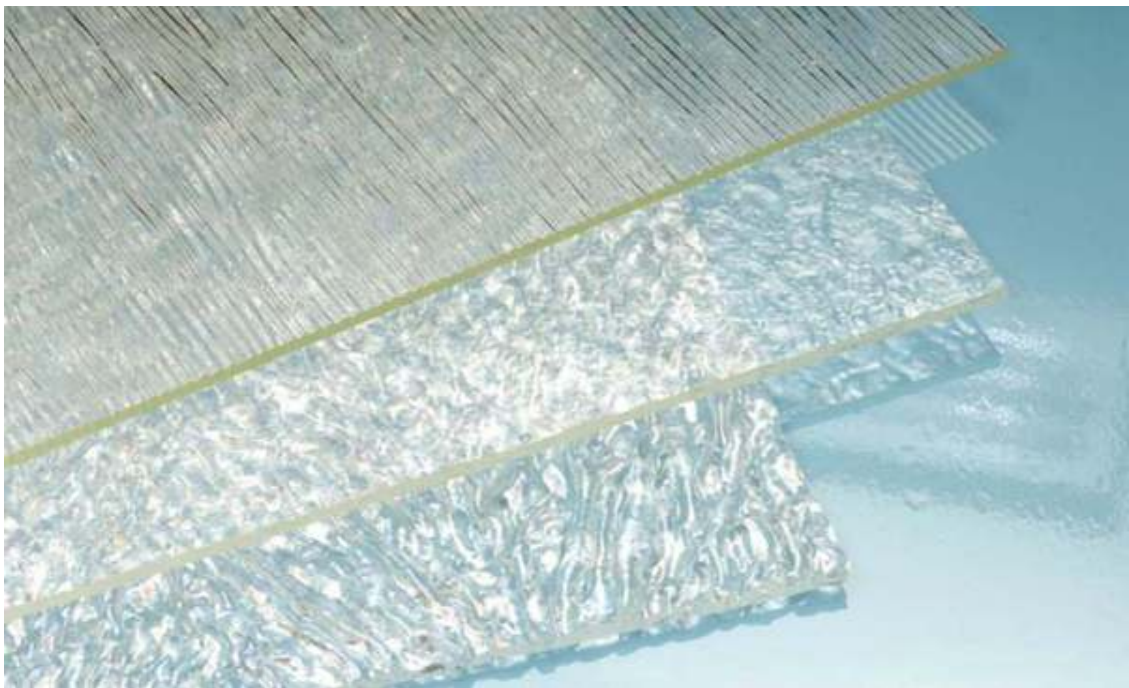
Notice the halos around the glass squares in the top test strip. This indicates that the glass squares were not compatible with the clear 96 COE glass base. In the lower test strip, there are no visible halos around the glass squares. These squares are all 96 COE glass, fully compatible with the clear glass base.



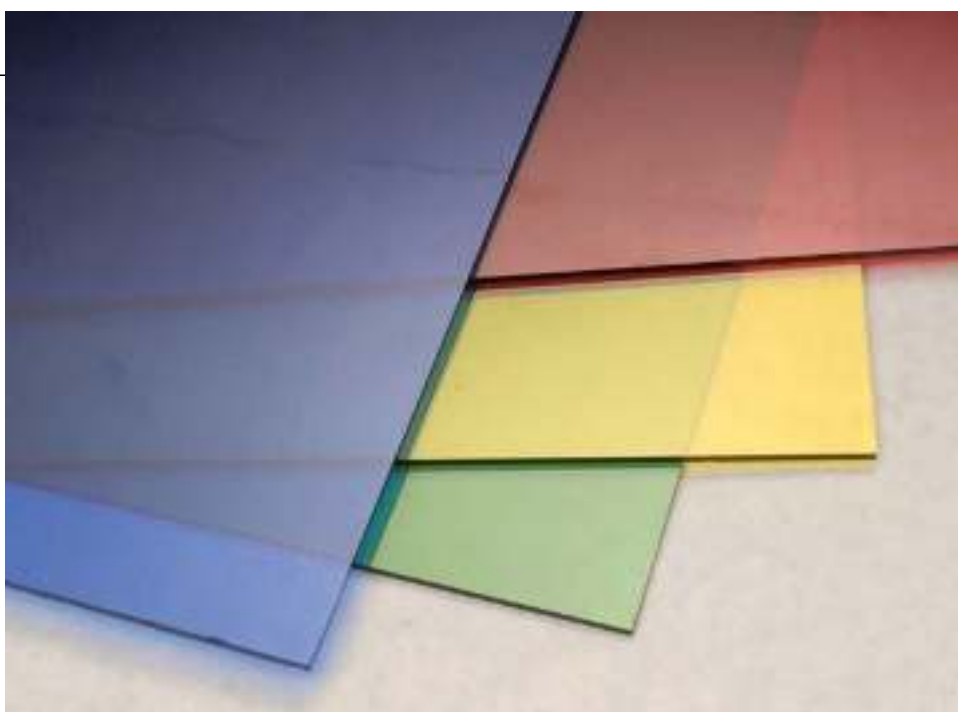
Types of Glass



Clear glass is used in many fusing projects. Thin clear glass is often used in jewelry projects to keep pieces lightweight. Regular 1/8-inch clear glass is useful as a base under a project or a cap over a project. Clear 1/4-inch glass is perfect for a base under projects such as large bowls or platters.



Clear and black glasses also come in interesting textures. You will want to lower your firing temperature when using these kinds of glass to retain as much of the texture as possible.



Transparent colored glass, also called cathedral glass, will brighten any project. You will find a wide variety of shades available, from pastels to vivid hues.



Neutral shades of glass are good background colors and add balance to your work.



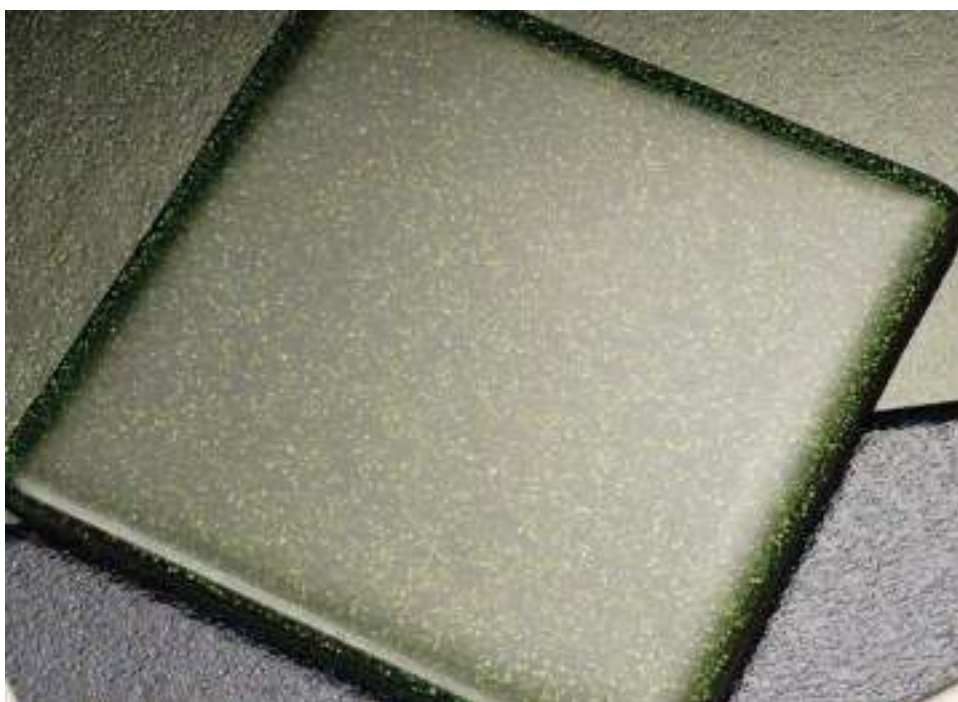
Opal, or opaque glass, can make a bold statement in any project.



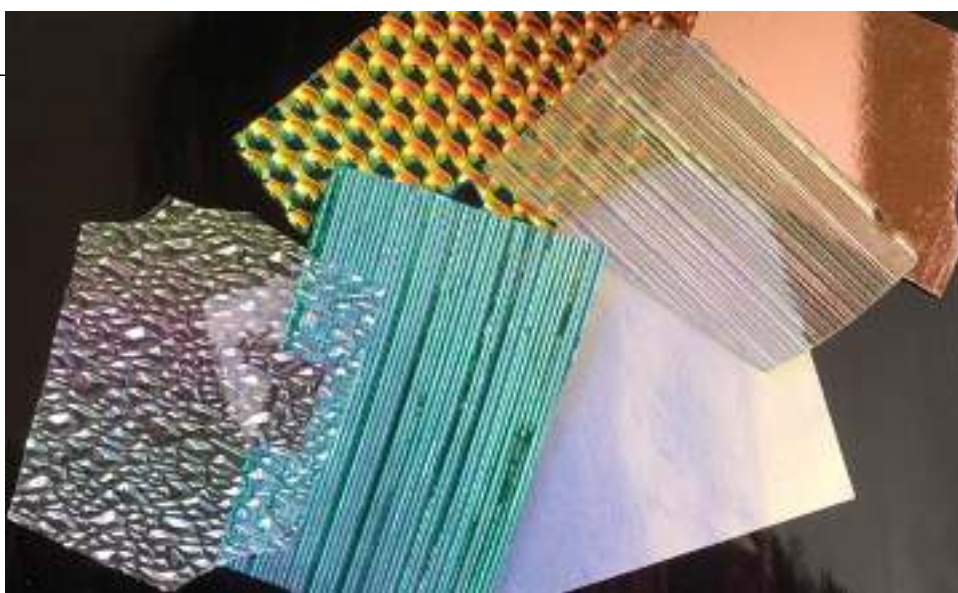
Spirit glass comes in fabulous color combinations on both clear and opal bases.



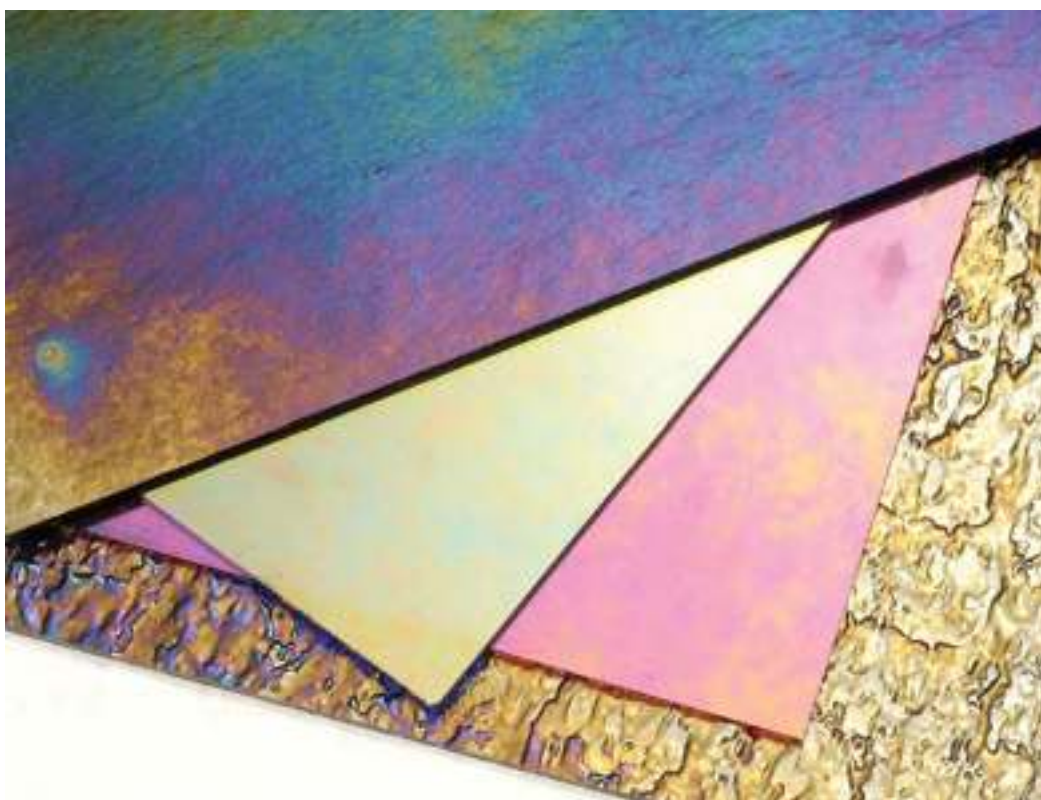
Opal Art glass has wonderful swirls of deep color over a lighter background.



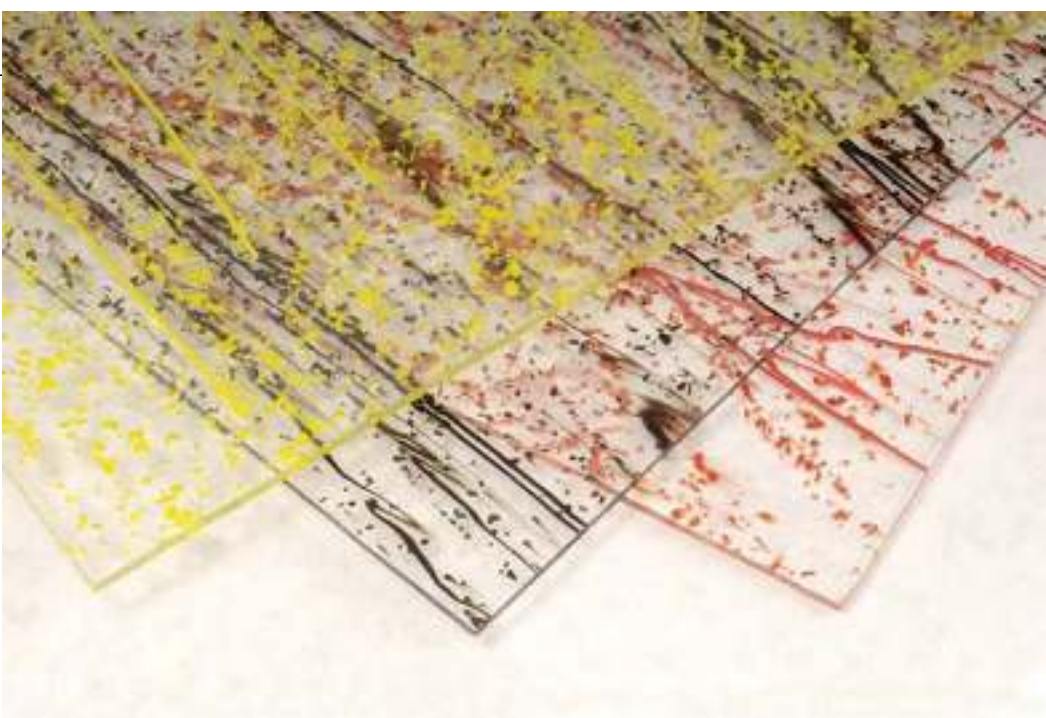
Aventurine glass is available in green, blue, and black. This glass is full of sparkle.



Dichroic glass has a coating that gives the glass a metallic shimmer. Light plays off the reflective coating in a brilliant display of color, making it perfect for jewelry or other small projects. The dichroic surface is available on clear or black background glass, and now is available with interesting patterns and textures.



Iridized glass has a coating on one side that gives the glass a shimmering rainbow effect. To determine which side of the glass has been coated, scratch it with a fingernail. A scratching sound will indicate the iridized side.



Mardi Gras glass combines the look of streamers and frit (tiny grains of glass) on a clear base.



Streaky glass comes in beautiful color combinations that will enhance many projects.

Enhancing Your Projects

There are many products that can be used to accent your projects. Always remember to match the COE number of the accent pieces to the COE of the glass.



Frit. Small pieces of glass that come in various grades or sizes are called frit. In the photo at right the dark green frit is mosaic size, the red frit is coarse, the dark amber frit is medium, the yellow is fine, and the blue is a powder.



Powdered glass is best applied to a project by using a sifter to drift the fine material onto the glass.

Enamel is even finer than the glass powders. It needs to be mixed with a medium and painted or stamped onto the glass.





Confetti. This is thin slivers of glass that can be added to the background of a project. Larger pieces can be broken easily with your fingers.



Stringers. Stringers are long, thin canes of glass about the same diameter as thin spaghetti. They can be broken with your fingers into any length.

Noodles. These narrow strips of glass resemble linguine in size and shape. I find it easiest to score them lightly with the glass cutter, and then break them with my fingers.

Bead Rods These are the glass rods used by bead makers. Because they come in compatible COE numbers, they can also be used as accent pieces in fusing. The best way to cut a bead rod is to use mosaic cutters.

Stringers, noodles, and bead rods are available in a wide range of transparent and opal colors.

FUNDAMENTALS OF GLASS CUTTING

Some fusers began as traditional stained glass crafters and have developed good glass-cutting skills. However, many are new to glass cutting or need a refresher course; this section is for them.

MATERIALS

- Glass cutter
- Cutter oil
- Grozing pliers
- Running pliers
- Eight squares of glass, 3 by 3 inches
- Glass marker
- Safety glasses



GLASS CUTTERS

There are several styles of glass cutters available, and you will want to invest in one of good quality to ensure your glass-cutting success. Each type of cutter will be held differently.

This upright steel cutter with a ball on top should be held between the first two fingers of your dominant hand.



Place your thumb on the indentation at the back of the cutter and your index finger on the front indentation.



Place the thumb of your opposite hand on the ball at the top of the cutter, while that index finger extends along the cutter head.



Hold this cutter upright to score the glass. As this cutter has no oil reservoir, you will need to lubricate the cutting wheel. Dip the cutter into a container holding a sponge saturated with cutting oil every few scores.



If you have an upright pencil-shaped cutter designed like this one, hold it in your dominant hand like a pencil.



Place your opposite hand on the other side of the cutter with the index finger extended along the cutter head. This cutter is held at a bit of a slant, much like a pencil. The oil reservoir in this cutter contains cutting oil that lubricates the cutting wheel.



I prefer using a pistol-grip cutter like the one pictured here. It has an oil reservoir to lubricate the cutting wheel, and the design of this cutter helps prevent hand fatigue.



If you are using this oil-fed glass cutter, you will need to put about a teaspoonful of cutting oil in the chamber of the cutter.



Close the cutter cap gently, as over-tightening can crack the body of the cutter.



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