

# Basic GLASS FUSING

All the Skills and Tools You Need to Get Started



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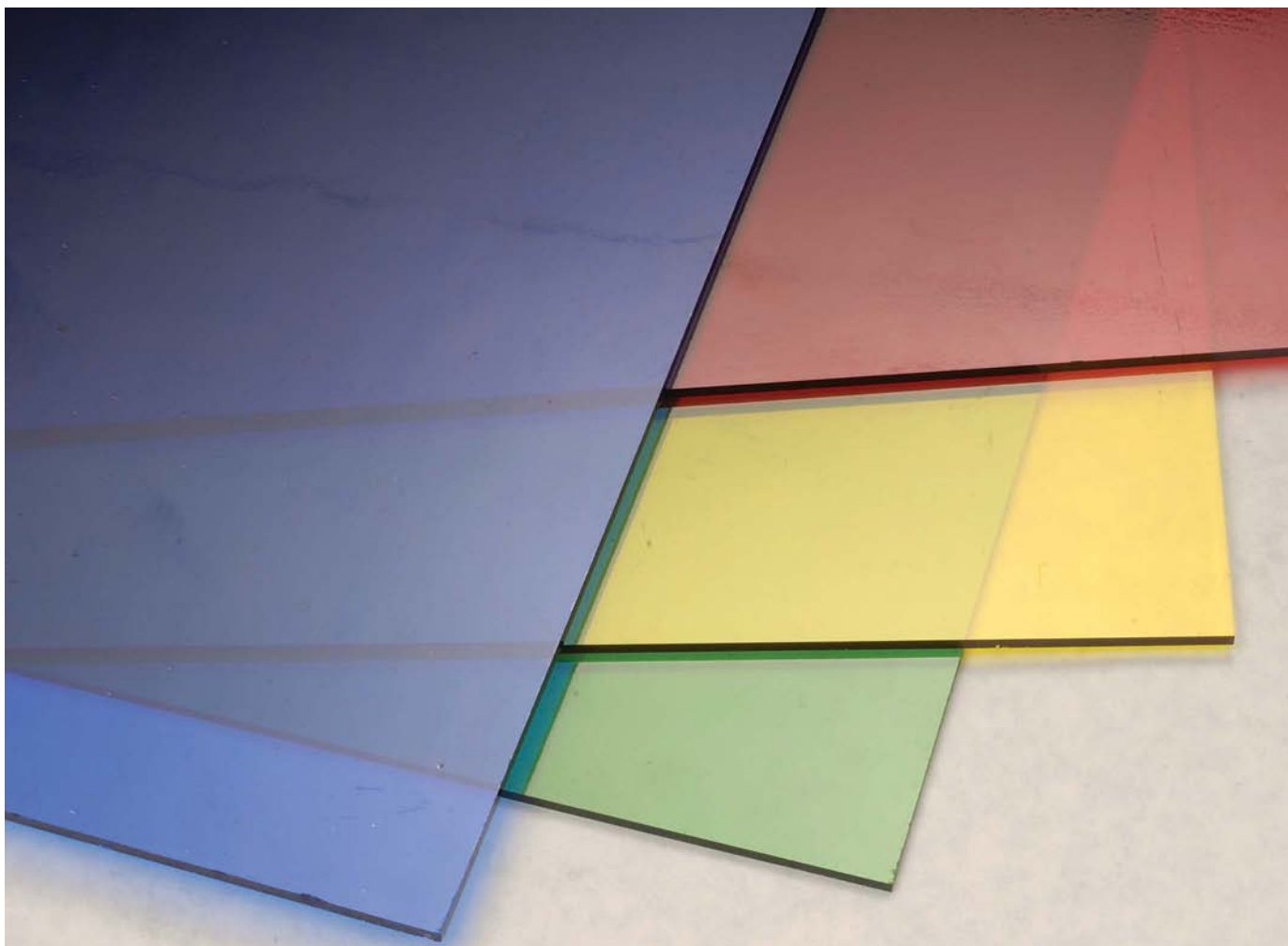
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# 1

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## Glass for Fusing



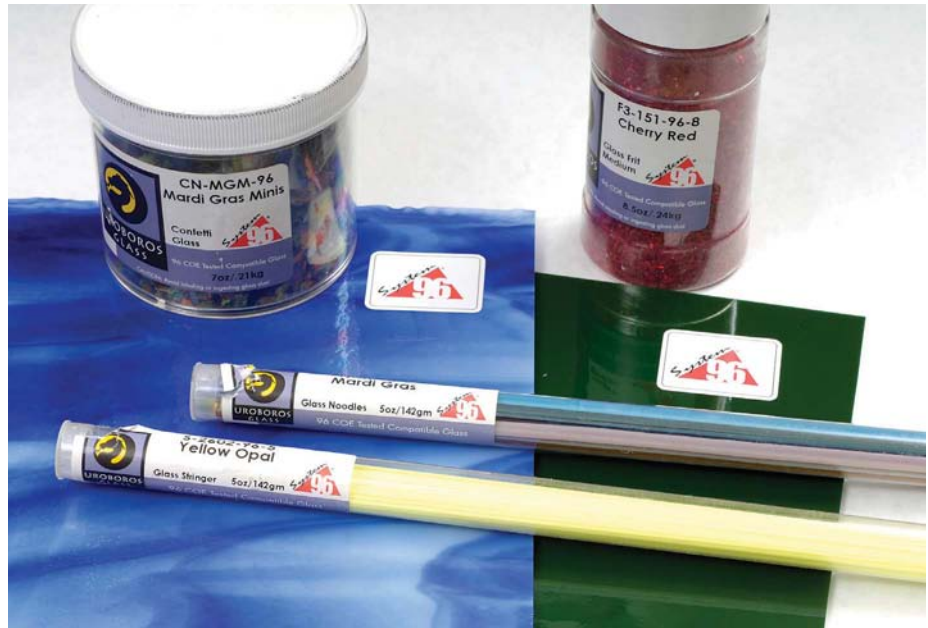
Nearly any glass can be fired in the kiln by itself. However, when two or more pieces of glass are fired together, we must respect their rates of expansion when heated, and contraction when cooled. Glass manufacturers test their glass and assign the appropriate number for that expansion and contraction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



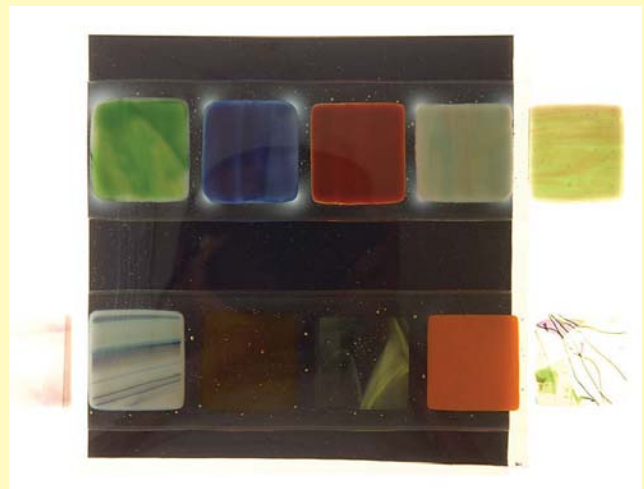
**Note:** If you have other stained glass in your workshop, you will want to set aside a separate area for your fusing glass, leftover scraps, and other fusing supplies. You can always use fusing glass in a regular stained glass project, but you do not want to use regular stained glass in your fusing 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

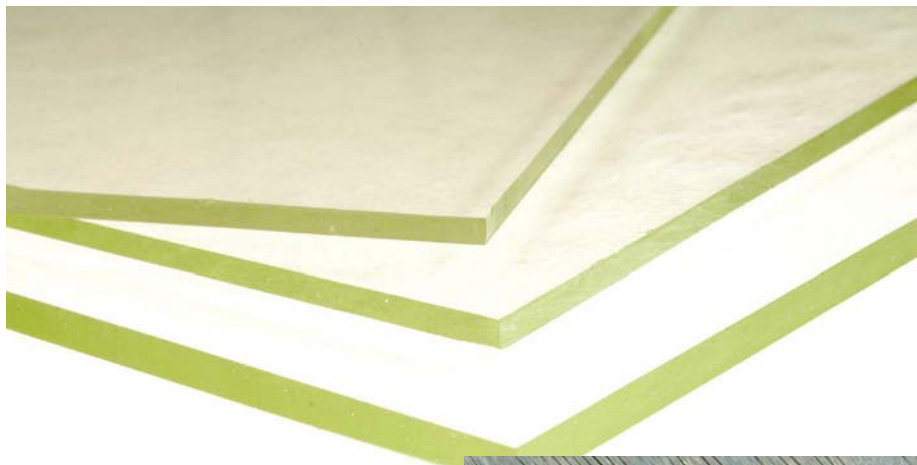
Checking glass for compatibility can easily be done with two sheets of polarizing laminated film. Full fuse (1480°F) small squares of the glass you wish to test onto a double layer of clear 96 COE glass.

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.

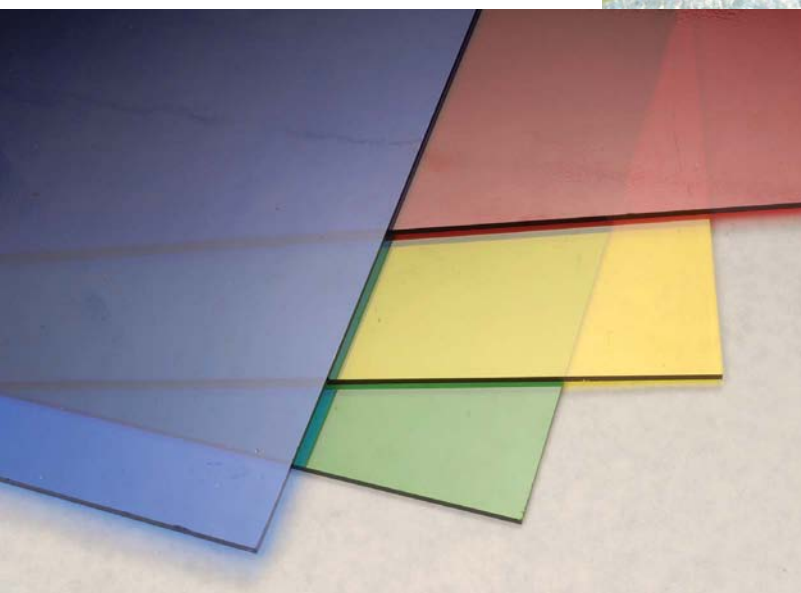


## Types of Glass

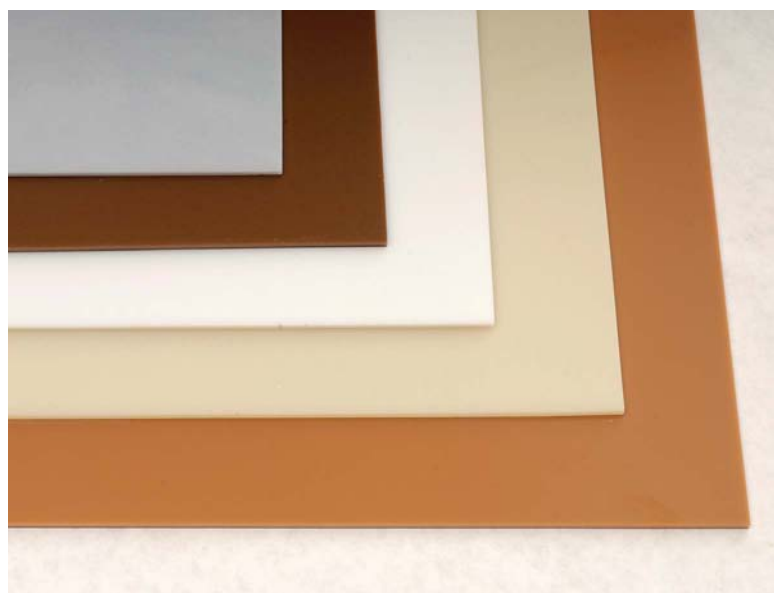


Clear glass is used in many fusing projects. Thin clear glass is often used in jewelry projects to keep pieces lightweight. Regular 1/8-inch clear glass is useful as a base under a project or a cap over a project. Clear 1/4-inch glass is perfect for a base under projects such as large bowls or platters.

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.

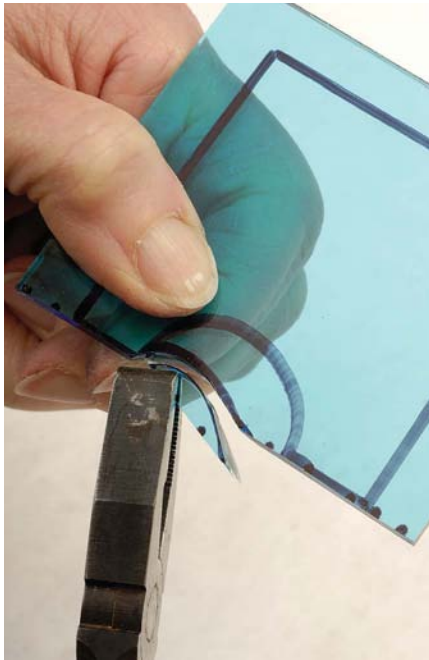


Transparent colored glass, also called cathedral glass, will brighten any project. You will find a wide variety of shades available, from pastels to vivid hues.

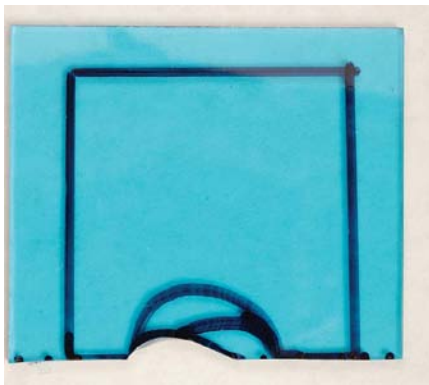


Neutral shades of glass are good background colors and add balance to your work.

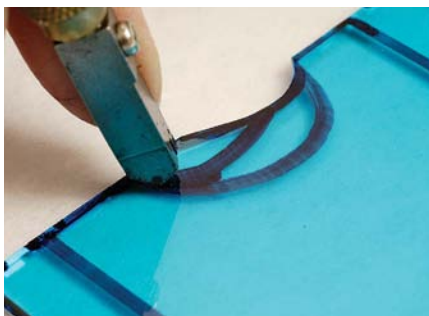
Break out this small piece of glass. Your grozing pliers are the best tool for this break.



From the opposite side of the inner curve, draw another smaller arch.



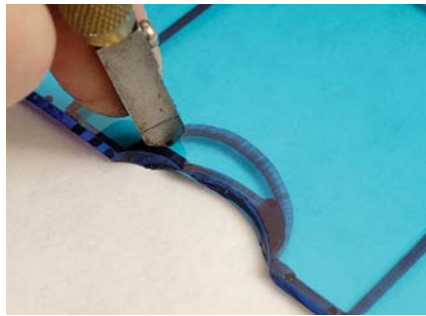
Score along the smaller arch.



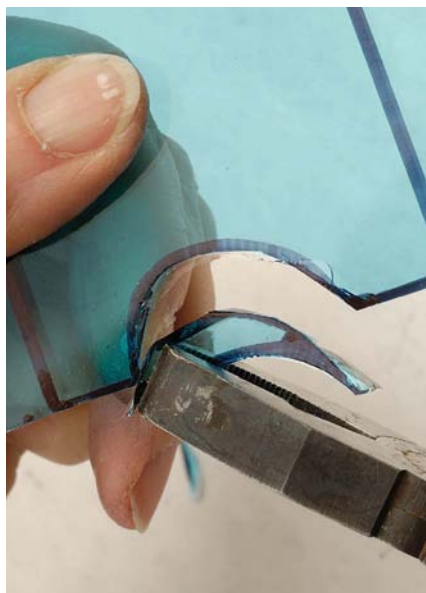
Break out the small piece of glass.



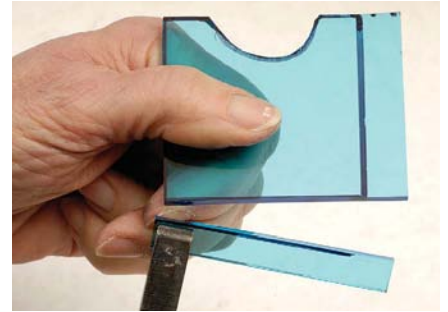
Now score along the top of the original inner curve.



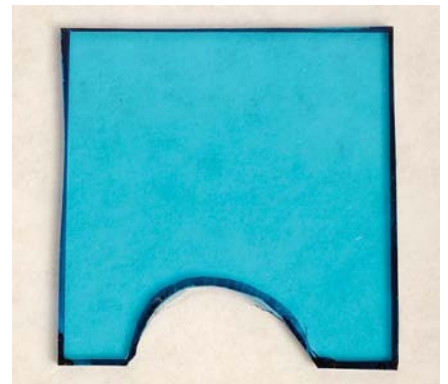
Break the final piece of glass from the arch.



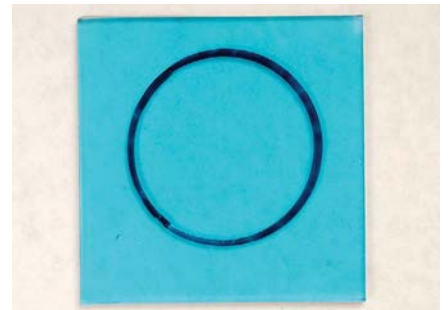
With the more difficult part of the design cut, you can easily score and break the straight sides of your design.



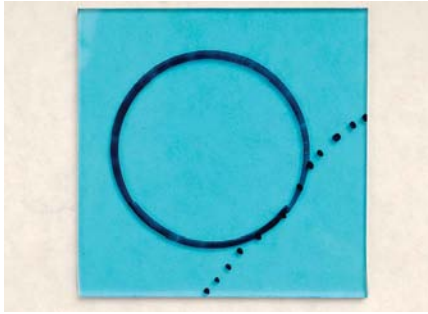
Your finished shape should look like this.



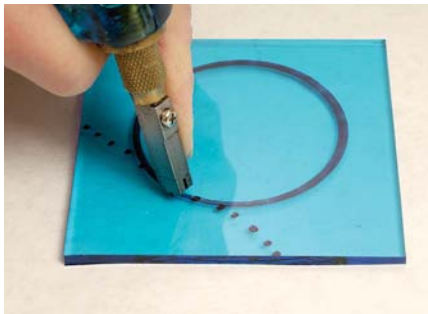
The final practice shape to cut will be a circle. Draw or trace a circle on your glass square.



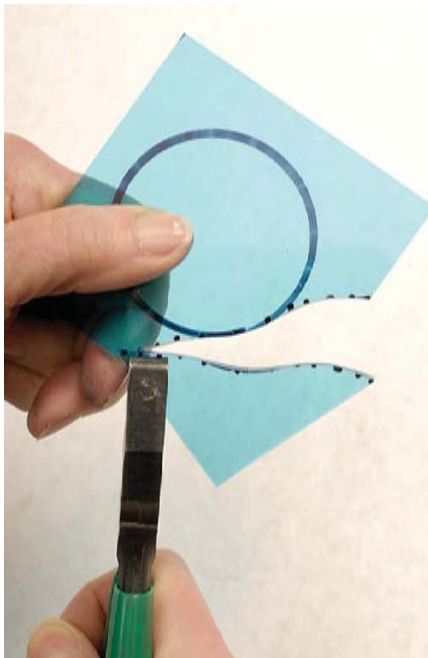
Use the glass marker to draw a dotted line that starts at the edge of the glass closest to you, goes around a portion of the circle, and continues to the edge of the glass.



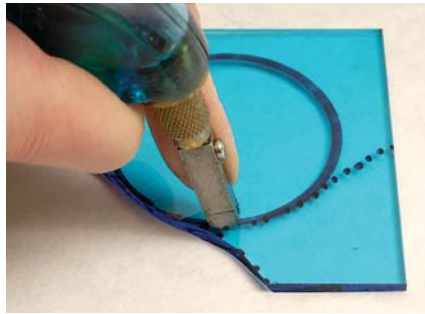
Score the glass, following your drawn line.



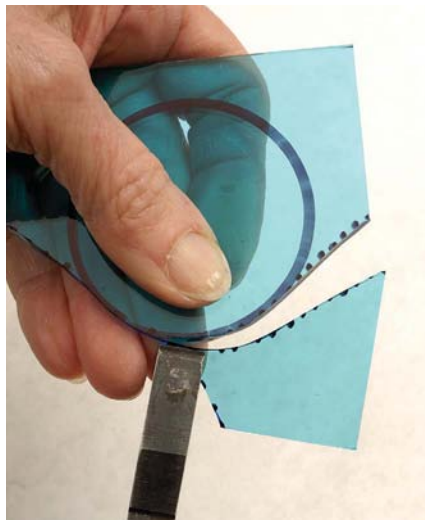
Break off this section of glass.



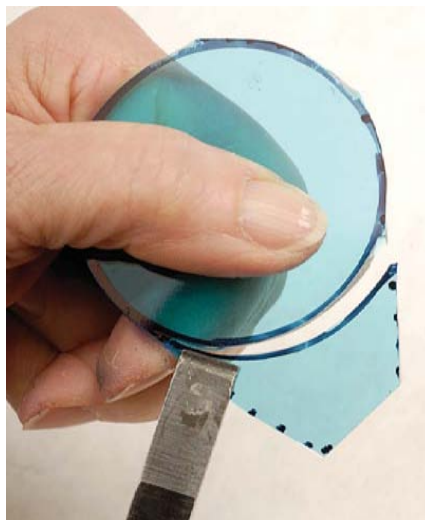
Draw another line that catches the next arc of the circle, and continues to the side of the glass. Score along this line.



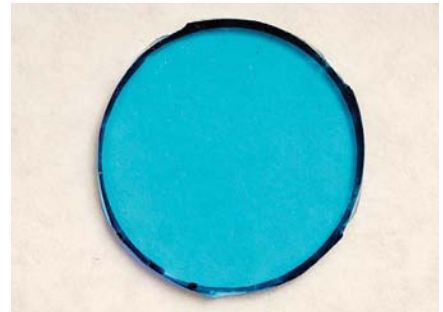
Break off the glass piece.



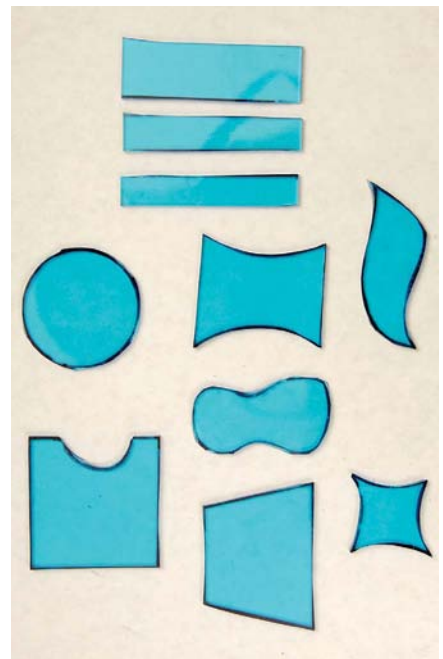
Continue this technique around the remaining portion of the circle. It should take five or six scores and breaks to cut out the entire circle.



Your finished circle will look similar to this one. Notice that you have some rough edges where each break was. We will address those rough spots in the next section when we discuss grinding the glass. You can also practice the technique where you grasp the nub of glass with your grozing pliers and bend it off.



Let's look at your practice pieces. Are you getting more comfortable with cutting and breaking the glass?



## POCKET VASE

This pocket vase is a sweet way to hang a few flowers on your wall. We've made a small version, but the concept can be used on any scale. If you choose to make a larger pocket vase, you will want to use several layers of the fiber paper to create a larger space for flower stems.

The pattern can be found on page 145.

- Using Glass Nuggets
- Using Fiber Paper
- Drilling Holes in Glass





## MATERIALS

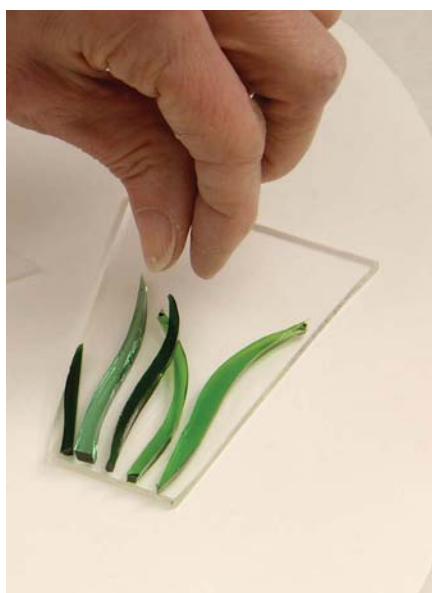
- Clear fusible glass
- Leaves cut from a variety of green glass shades
- Tiny nuggets
- Bent green stringers
- Pattern
- Glass-cutting tools
- 1/8-inch fiber paper
- Prepared kiln shelf
- Thin kiln paper



**1.** Cut the clear fusing glass according to the pattern. Wash, rinse, and dry the glass pieces.



**2.** The shorter piece of glass will be the top of your pocket vase. Place a few leaves in various shades of green on this piece of glass.



**3.** Create flowers using small fused nuggets made from scrap glass. Use different colored nuggets for the flower centers. See Chapter 2, Preparing Accent Components, for instructions for making your own nuggets and bent stringers.



**4.** Add a couple of gently bent stringers for flower stems.



**5.** Fire the pocket vase top glass on your prepared kiln shelf covered with a sheet of thin kiln paper. This project is sharing the kiln space with another project that will be fired to the same temperature.



Use firing schedule A from page 34 or the firing guidelines below.

### Firing Guidelines

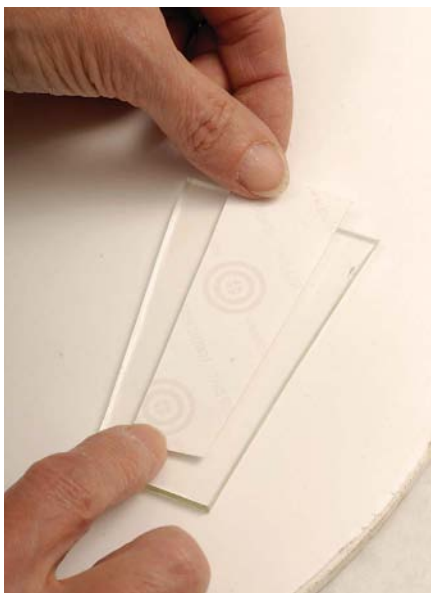
Speed: Medium  
Process: Tack Fuse  
Top Temp: 1375°F  
Hold Time: 12 Minutes

**6.** When the kiln has cooled to 100°F or less, you can remove your glass and wash away any kiln paper residue.

The components are now ready to assemble into the pocket vase.



**7.** Place the pocket vase base on a prepared kiln shelf covered with a sheet of thin kiln paper. Cut two pieces of thin kiln paper and a 1/8-inch piece of fiber paper as indicated on the pattern sheet. Position one of the pieces of kiln paper, smooth side down, on the base glass.



**8.** Lay the fiber paper directly on the kiln paper and place the second kiln paper piece over that, with the smooth side up.



**9.** Center the fired top piece of glass over the top of the whole thing, and you are ready for your second firing.



**10.** Use firing schedule A from page 34 or the firing guidelines below. This is the same tack fuse program that was used to fuse the design pieces to the top glass.

### Firing Guidelines

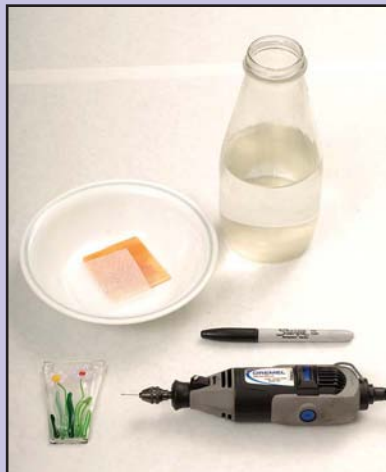
Speed: Medium  
Process: Tack fuse  
Top Temp: 1375°F  
Hold Time: 12 Minutes

**11.** After firing, remove the pocket vase from the kiln when it has cooled to 100°F or less. Carefully remove the fiber paper and kiln paper from the pocket they have formed. Remember to handle these products with care, and wear your dust mask.



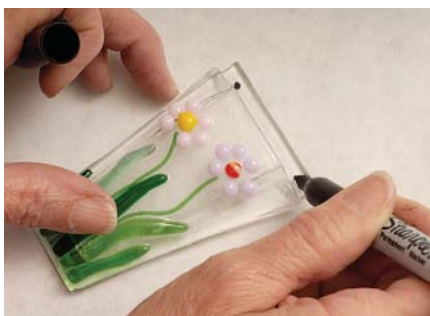
## FINISHING MATERIALS

- Bowl
- Glass scrap
- Thin packing foam
- Water
- Glass marker
- Petroleum jelly
- High-speed drill with 1 mm diamond bit
- Twisted colored wire



The best way to display your pocket vase is to add a decorative wire loop for hanging it. To attach this wire, you will need to drill two small holes in the base glass layer. Drilling holes in glass requires a special technique so that the heat generated by the drill bit does not crack the glass.

**1.** Use the glass marker to make a tiny dot in each top corner of the base glass of the pocket vase.



**2.** A smudge of petroleum jelly will keep the marker from washing away in the water.



**3.** Place the glass scrap in the bowl, then the thin packing foam, and place your pocket vase on top.



**4.** Add water until it barely covers the marker dots.



**5.** Turn the drill to its highest speed and place it against one of the marker dots. Allow the drill bit to grind easily through the glass rather than applying forceful pressure. Drill another hole at the other marker dot.

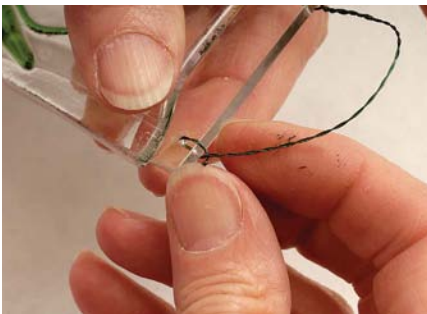


**6.** After both holes have been drilled, wipe away the petroleum jelly residue with a paper towel.

**7.** Thread one end of the twisted wire up through one of the drilled holes and wrap it around itself to hold it in place.



**8.** Thread the opposite end of the twisted wire up through the remaining hole. Trim the wire to an appropriate length and twist the end to the main wire to form a loop.



Your pocket vase is ready to hang and fill with flowers!



## DICHROIC GLASS PIECES



Working with dichroic glass is a lot of fun. The extra shimmer found in this glass makes it perfect for small projects like jewelry, wine bottle stoppers, and drawer pulls. These projects will use the same firing schedule, allowing you to maximize the use of your kiln space. Make as many projects as will fit comfortably on the kiln shelf and fire them together.

The patterns for the projects made here can be found on page 146.

- Using Dichroic Glass
- Using Dichro Slide Paper
- Attching Glass to Metal Findings



## MATERIALS

- Thin clear fusible glass
- Thin black fusible glass
- Variety of dichroic glass pieces
- Dichro Slide paper
- Decorative paper punches
- Earring bails
- Pendant bails
- Wine bottle stopper
- Drawer pull
- Black glass marker
- Silver glass marker
- Shallow plate
- Distilled water
- Paper towels
- Glass-cutting tools
- Artist's brayer
- E6000 adhesive
- Thin kiln paper
- Prepared kiln shelf



**Note:** Wash, rinse, and dry all glass before you assemble the projects.

### SIMPLE PENDANT

**1.** The first piece is a pendant featuring Dichro Slide paper. This material is made like a decal, with a dichroic coating and a protective paper backing. Use a decorative paper punch to cut a design from the Dichro Slide paper.



**2.** Pour a small amount of distilled water into the shallow plate.



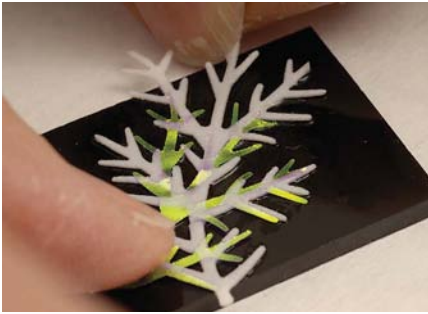
**3.** Soak the cut design in the water for a minute or so, just until the paper backing begins to slip free from the decal.



**4.** Position the cut decal onto a 1 by 1½-inch thin black glass rectangle.



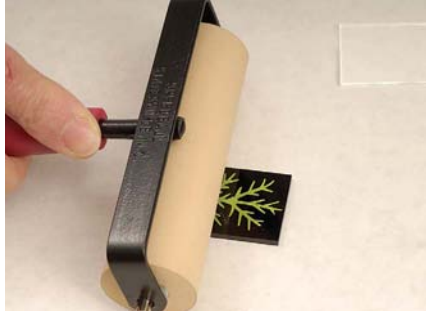
**5.** Gently slide the protective paper from beneath the decal layer.



**6.** Blot away the excess water with a paper towel.



**7.** Burnish the dichroic decal to the black glass with a clean brayer.



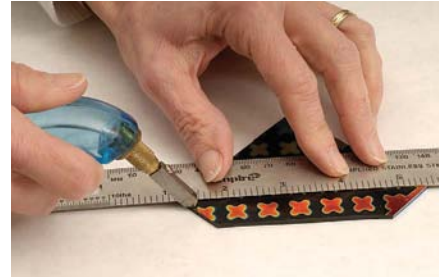
**Pro Tip:** Covering dichroic glass with a clear cap will magnify the dichroic shimmer. Just a little bit of dichroic glass can wow you with its effect!

**8.** Allow the piece to air-dry, then cap with a rectangle of thin clear glass 1<sup>1</sup>/<sub>16</sub> by 1<sup>9</sup>/<sub>16</sub> inches.

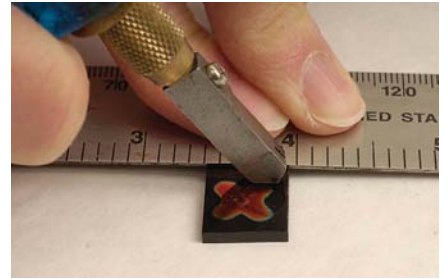


## EARRINGS

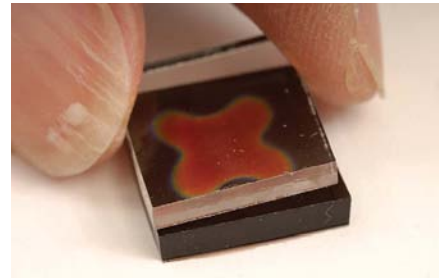
**1.** Patterned dichroic glass can be used to make a small pair of earrings. Cut ½-inch strips from the patterned glass.



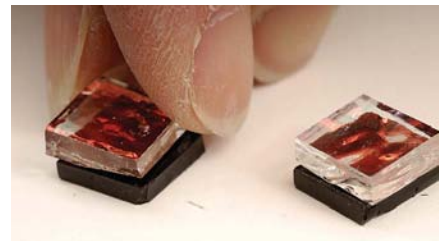
**2.** Score each strip into ½-inch sections and separate the pieces.



**3.** Cover each design square with a 9/16-inch cap of thin clear glass.



Some smaller earring pieces will also be included in this firing. These are ¼-inch squares of dichroic glass which have been capped with 5/16-inch squares of thin clear glass.



- An illustrated guide to a fun, growing trend in glass crafts
- Choosing glass, cutting glass, working with a kiln, making your own molds
- Includes instructions and full-size patterns for 18 projects

**Straightforward, expert instruction on glass fusing fundamentals**



### Contributors

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