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# Volume Control... Successfully Fuse Dichroic Cabochons

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by: [lytray](#) ( [4179](#) ★ ) [Top 5,000](#) Reviewer

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## Volume Control... Successfully Transform Sandblasted & Etched Dichroic Glass Tiles into Perfect Cabochons.

Have you been frustrated with your cabochons not always keeping their shape when fused in your kiln?

This guide will help you understand why that is happening and will show you how to prevent it from happening again.

How to control glass volume as glass expands and contracts during the fusing cycle in your kiln.

When heating glass to a full fuse, (1400F or higher), single stacks of glass with one or more layers will try to melt into a single layer about 6mm or 1/4" thick. This can mean that a piece won't necessarily be the same size, shape or thickness coming out of the kiln as when it went in. If you know how to control the glass volume this won't be a problem.

When glass is heated to high fusing temperatures it is affected by the dynamics of surface tension and gravity. Without surface tension, molten glass will spread out into a thin sheet of glass. Without gravity, glass will pull in and try to become a ball of glass.

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Volume control is the method used to maintain a uniform thickness of glass while it is being influenced by the opposing effects of gravity and surface tension while in a molten state.

A single square layer of standard 3mm glass when fired to temperatures above 1400F will pull in and thicken to 6mm (1/4") and the corners will pull in even more than the sides creating a domed rounded cabochon.

Two stacked 3mm layers starting at a combined thickness of 6mm or 1/4" will fuse into one layer and will maintain the original thickness and shape when fired to 1400F.

Three layers (9mm total height), fused into one layer will expand in area as the glass melts and reduce in thickness to about 6mm thick, becoming rounded at the corners and bulging on the edges. (See image below).



The best way to observe the affects of volume control is to watch how different stacks of glass appear after a full fuse. To be successful, you will need to test your kiln and determine your full fuse temperature. Depending on which of my kilns I use, my full fuse temperatures range between 1400F and 1450F.

You will need to determine how quickly you can heat up your kiln and at what temperatures your glass changes from a solid to a plastic, and finally to a molten state.

By observing changes in the glass, you can quickly learn and recognize the effects of volume control by measuring time and temperature and you will be able to anticipate the subtle changes in glass by how red or white hot the kiln becomes as you peer at the glass through a peep hole.

#### Volume Test...

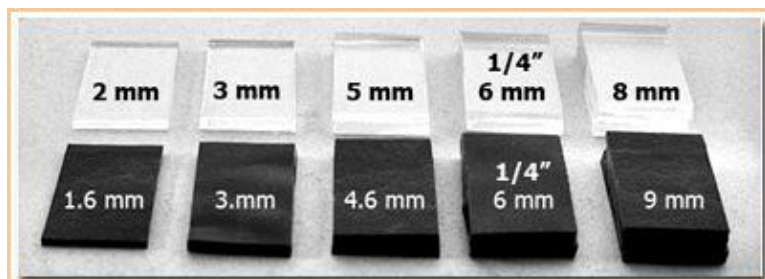


Fig 1

In the above photo, thin (2mm) and standard (3mm) layers of glass are stacked in piles ranging in thickness from 1/8" to 3/8" ready to be fired to a full fuse of (1450°F). The goal is to see the effects of gravity and surface tension on glass as it fuses into a single layer.

#### Volume Test Results...



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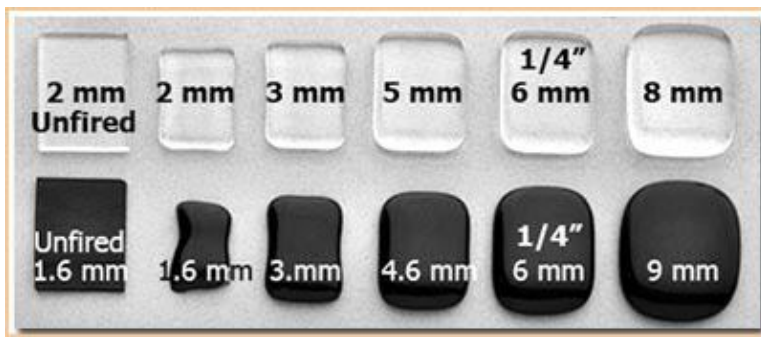


Fig 2

Fig 2 shows the tiles after firing. The 2 left hand tiles (clear and black glass) are unfired - the 10 glass tiles to the right were fused to 1450°F and soaked for 5 minutes. Notice that stacks of glass about 1/4" thick (5-6mm) maintained their original size. Stacks 4mm or less reacted to surface tension and pulled in trying to become 1/4" high and thicker stacks spread out as they reacted to gravity and spread.

The examples above show clearly how different thicknesses of glass react to gravity and surface tension at a full fuse of 1450F and is useful in determining what thickness to start with to achieve a specific goal.

For example, if you were making a pair of earrings with a sandblasted design on Dichroic glass and you wanted to use a single layer of 1.6mm thick glass to keep the earrings light in weight and also to prevent any distortion to the design due to glass shrinkage, 1450F would be too hot.

The following photo shows examples of single 1.6mm glass made into earrings fired at a lower temperature.

#### Thin Glass Volume Control...



Fig 3

These thin (1.6mm) earring tiles were made from my sandblasted designs and were fired to 1380°F and then soaked for a couple of minutes until the edges became round and the glass became glossy. Start watching the glass at 1350° F.

It is especially important to control volume in thin glass which has sandblasted designs in order to prevent distortion to the designs caused by any glass shrinkage. Control glass volume by firing at lower temperatures and watch closely while you soak for your desired effect.

These sandblasted designs plus matching black base and clear cover/overlay glass can be found in my Ebay store... LytRayDichroic.

#### Volume Control without using a clear cover glass...

Dichroic glass fired without a clear glass cap produces a nice durable satin finish piece.

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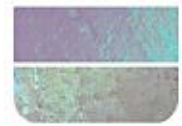


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Fig 4

In fig 4 the left photo shows a group varying thicknesses and sizes of stacked dichroic glass prior to firing. These unfired glass stacks range in thickness from 1.6 mm to 9 mm.

The middle group was fired to 1400F and the right hand group was fired to 1450F without a clear glass overlay...

Notice that the middle group fired to 1400°F and soaked for 5 minutes, remains square and shows no distortion.

The right hand group fired to 1450°F and soaked for 5 minutes, have spread and have become progressively more oval and wider than the original square unfired shapes and the top three 1.6mm tiles are over fired and distorted.

Dichroic glass fired without clear overlay glass has a very nice satiny metallic appearance and is very durable. Uncapped Dichroic works very well for reducing the weight of earrings.

#### Volume Control with a clear cover glass...



Fig 5

When stacking layers of glass you can either make the top clear layer the same size or slightly larger than the lower layer or layers in the stack. If you are going to fuse to 1400°F and then grind the edges as shown in the center group of cabochons, you might want to use the same size overlay glass as the lower layers in order to cut down on the grinding time. After firing to 1400F and soaking for a few minutes, these cabochons were ground to create square vertical edges, and then fired a second time to 1400F and fire polished. (Depending on the glass and it's surface texture, fire polishing can be done between 1350F to 1400F).

To prevent layers of glass from sliding around as you stack them, use a small dab of "Elmer's Blue School Glue Gel" on the edges of the glass. Blue School Glue Gel is safe and burns off leaving no residue

#### Volume control for wire wrapping...

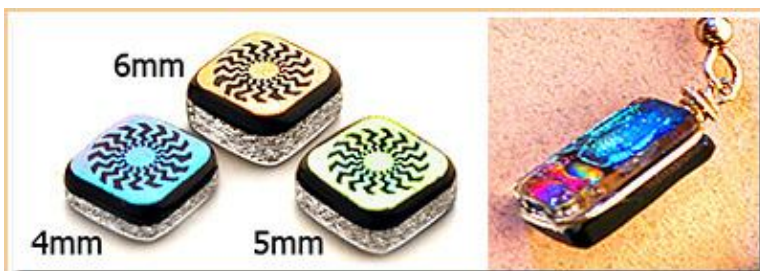


Fig 6

The cabs on the left have dichroic glass on top and clear glass on the bottom. They were fired to 1400°F to tack fuse all the layers together and to maintain their square shape. After the glass was cooled to the touch, they were removed from kiln and the edges ground flat and the corners were ground round. At this time you can also grind a groove around the edge of the glass for wire wrapping earrings and pendants (right photo).

After grinding, thoroughly clean the glass tiles. Re-fire to 1400°F and soak a few minutes until the ground surfaces are fire polished and become smooth and shiny.

Lower firing temperatures with longer soaks will give you more control...  
Thanks for visiting, Cheers.

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Guide created: 08/02/07 (updated 11/15/08)

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### Create a fused glass dichroic pendant.



### Materials needed:

#### All glass must be fusible 90 coe glass.

Black 3 mm glass

Dichroic 3 mm glass (preferably Ripple or Herringbone [clear or black])

Clear 3mm, (Bullseye Mardi Gras or Streamers optional)

#### Step 1)

Cut 1 piece of each of the 3 pieces of glass ½ inch by 1 inch.

Please note that the dichroic Ripple or Herringbone should be cut for best effect with the raised lines going horizontal to the length of the piece. (Sideways on the short length) the valleys in the texture will allow the black base glass to show through.

#### Step2)

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Stack the 3 pieces on top of each other in this order:

Base piece black 3mm

Then the Dichroic on the base

Then the cover piece (Clear 3mm, Mardi Gras or Streamers.)

If you want to add stringers or frit you can place those in the valleys of the dichroic piece & then cover with your top piece.

### Optional Step)

If you wish to make a hole for a chain or leather cord you can lay a 1/8th inch strip of fiber paper (cut it significantly wider than the width of the glass) underneath the top layer of glass approx. 1/8th to 1/4 inch from the top. If doing this it is best to cut off 1/4 inch of the dichroic glass, and the cut 1/8th inch off of that little piece. This will make a channel into which you can place your fiber paper. It will also give a flatter more professional look to you finished piece.

You can also use Nichrome or Sterling wire approx. 1 inch. If using wire place the wire under the dichroic & do not cut down the dichroic as described above. Be sure to fold the wire in a U shape. Then cover about 1/2 of the extended wire with fiber paper to prevent the spreading glass completely covering the loop you made when firing.

### Step 3)

Place the pieces into your kiln making sure they the edges line up evenly. Fire to 1515° to 1525° until your piece is fully fused and rounded out. The longer you hold it at the higher temperature the large it will spread and round out. The spreading will break up the textured dichroic and produce very nice effects. When the piece is at the shape you like flash vent the kiln down to 1000°. Be sure to anneal the pendant/cabochon at 960° for at least 15 minutes, longer is better. Then cool down the kiln.

### Cabochon:)

You can glue a finding (loop with a pad) onto the back of the cabochon. I recommend DEVCON 5 MINUTE EPOXY available at Lowe's Hardware store. Mix according to directions place a good size drop on your finding pad & hold it in place with a clothes line pin. After 5 minutes remove the clothes line pin & clean up any excess with a razor blade being careful not to scratch the pad on you finding.

### Further Notes:

For the base glass you can use any color of 3 mm glass you like. But be sure to use clear dichroic over that piece so that the base color shows through. Also when using Mardi Gras or Streamers make sure that the streamer & frit side are next to the dichroic with the clear side up. (This will prevent any of the colors used in this type of glass from devitrifying.)

Now go and have some fun!

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Guide created: 04/06/06 (updated 08/22/08)

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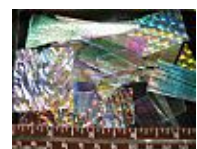
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