

Fused Glass Pendant for Beginners

By Kat Kramer

This sterling silver setting for a fused glass pendant incorporates a simple bezel setting and very basic metalworking skills. It's a great first project for a glass artist wanting to create more elaborate jewelry and graduate from store-bought glue-on bails.

This particular pendant was a commissioned piece that started out with emailed photos of glass pieces for the customer to choose from.

He selected an odd-shaped piece of layered transparent blue glass with a bit of dichroic sparkle, in a technique that I learned from a fabulous glass studio—Helios Kiln Glass Studio in Austin, Texas. Paul and Karen Tarlow offer a variety of glass classes in different techniques well-suited for wire wrapping or bezel setting.

For added fun, I uploaded the process photos in Facebook messages to the customer so he could experience the design and manufacture of his custom gift real-time, which he then shared with his fiancée after presenting her with the gift.

A note about glass...when you fuse glass in a “full” fuse, surface tension takes over, rounds the edges nicely, and the glass ends up about ¼” thick. So this requires a taller bezel. Sharp corners are a little harder for new students, but almost any piece of glass fired to a full-fuse temperature will round corners and make it easier to bezel set. I've included my Bullseye 90 COE and Spectrum 96 COE firing schedules at the end of this tutorial.

Materials List

- Glass cabochon, full-fused with rounded corners
- ¼” fine silver bezel wire
- 20 gauge sterling silver sheet
- 24 gauge sterling sheet scrap for circle
- Hard and easy solder (sheet, or wire rolled thin in rolling mill or hammered flat)

Tool List – Don't forget Safety Glasses!

- | | | |
|---------------------------------|---|---|
| • Tracing paper | • Emery stick | • Copper tongs |
| • Fine & regular Sharpie marker | • 3M radial bristles, fine | • Rawhide hammer |
| • Glue stick | • Torch (Crème Brulee or other setup) | • Brass mallet |
| • Jeweler's saw & beeswax | • Firebrick, Solderite pad, or charcoal block | • Fretz sharp texture hammer (optional) |
| • .925 stamp, letter stamps | • Paste flux and brush | • Steel punch or nail |
| • Disc cutter (optional) | • Freedom Flex Shaft, Dremel, or hand drill | • Toothbrush handle |
| • #0 half-round hand file | • Pickle pot (tiny Crockpot, Sparex, or pH Down from pool supply or home improvement spa section) | • Liver of sulfur |
| • #2 half-round hand file | | • Brass brush |
| • Needle files | | • Dawn dishwashing soap |
| • Steel bench block | | |
| • Sandpaper, 320/220 grit | | |
| • 3M sanding pads | | |



Creating the Design

Step 1: I started on this piece thinking I would create a nice sterling glue-on bail...but I really liked the shape of this bail, and thought I would go ahead and dress up the piece for the customer. I started out trying to save him a little money on his gift...but I was able to go “all out,” and still stay within budget.



Step 2: In the second design, I used a piece of tracing paper to trace the stone, then folded the paper over to draw the design. This way I can try different effects. I drew the small circle using a template that corresponded with the sizes of my Swanstrom disc cutter. A disc cutter cuts a really nice circle, and rounds over the edges at the same time.

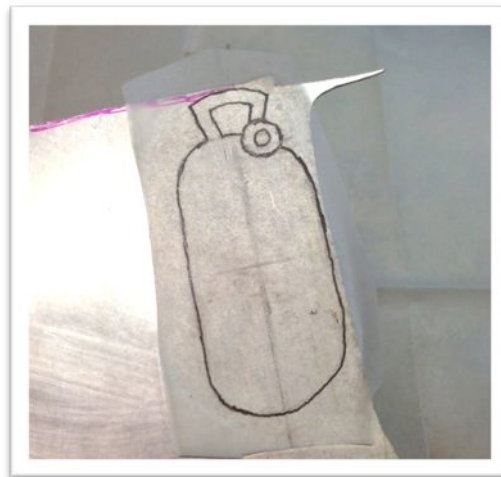


Making the Backplate

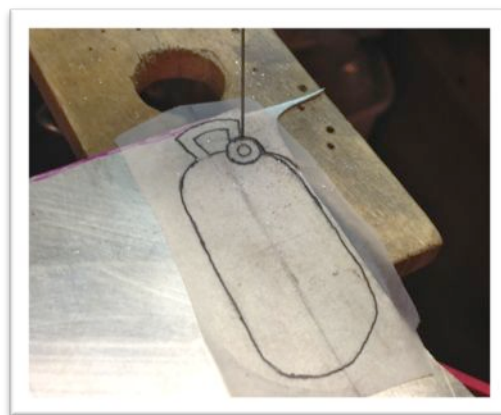
Step 3: Using a glue stick, attach the outline to the 20 gauge sheet silver. Thinner metal can be used, but for the backplate, I prefer the thicker metal...it lends a quality feel to the piece, and I like to lightly texture the edges. 22 gauge would also work.



Step 4: Position the glued template on the sheet silver.



Step 5: Use the jeweler's saw to cut out the design. I cut the top bail later in the process, so I wouldn't accidentally melt it while soldering the bezel.



TIP: Annealing the silver before using a disc cutter makes the metal easier to cut and prevents damage to the disc cutter. Scribble on the surface of the sterling sheet with a Sharpie; heat on your firebrick until the Sharpie mark disappears. Alternatively, coat the silver with paste flux; heat until the flux turns "glassy." Quench in water, then place in pickle for about 5 minutes. Remove with copper tongs, rinse with clean water.

By the way, copper tongs will not contaminate the pickle...contaminated pickle will copper plate your silver. ***Never put anything steel in your pickle pot!***

Step 6: Cut the disc with a jeweler's saw or disc cutter.

Check the placement of the circle. At this point I also put a small divot in the center of the circle for the placement of the ball.

Remove the tracing paper, wash with soap and water to remove the glue.

File the edges, first with a coarser file, like a "0." Finish up with a "2," then use fine sandpaper or emery stick to make sure the edge is perfectly smooth.



Making the Bezel & Surface Embellishment

Step 7: Using the ¼” bezel wire, fit the bezel around the glass. Mark where the wire overlaps with a fine Sharpie, and cut a little larger, using metal shears. File the ends flat, and make sure the ends don’t have a gap.

A slightly larger bezel is better than one that’s too small.

Many new jewelers file back and forth with a file, which can round the edges. Use a larger file, not a needle file, and file AWAY from you with your bezel held firmly on the bench pin. You’ll have more control.



TIP: To make a small silver ball, cut a piece of the fine silver bezel wire about ¼” long, and place it on a firebrick or charcoal block. Heat until it “balls” up. Pick up with tweezers when it’s not glowing red anymore, and quench in water. Since you’re using fine silver, it won’t turn black from firescale.

Step 8: Pickle the metal first to clean it, and rinse in clean water. Using a soft brush, apply paste flux all over the bezel. Place a small “pallion” of **hard** solder on the brick, under the joint as shown.

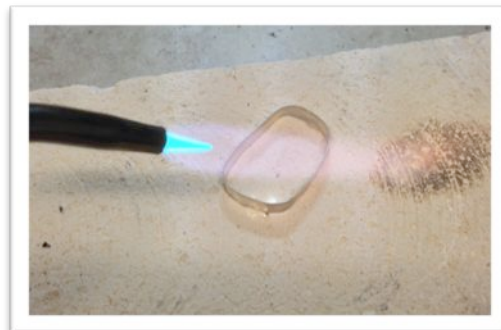
And before you heat, remember Lexi Erickson’s soldering mantra...fit, clean, flux, placement, and heat. Remember those tips, and you’ll become a soldering pro!



YES, ANOTHER TIP! Using hard solder for the bezel helps ensure that the bezel doesn’t come apart in later soldering operations. For beginners, using hard solder on the bezel, medium to solder it to the backplate, and easy for things like bails and other decorations is pretty standard. In this project I used hard solder on the bezel, and easy solder for everything else.

Step 9: Heat the opposite side of the bezel first, and keep your flame **constantly** moving. Occasionally “focus” the flame quickly on the joint, then move it around the bezel, until the solder flows.

I call this the “racetrack” technique...go round and round, focus on the joint, then round and round, focus on the joint. The solder will “jump” up onto the bezel when it flows. Remove the heat immediately.



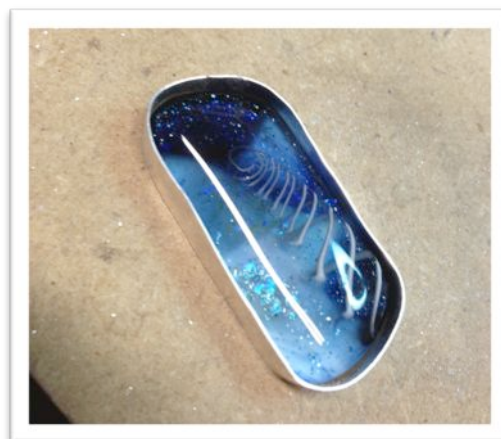
Pick up the piece with copper tongs, quench in water, and place in the pickle. After a few minutes, remove it with copper tongs, rinse in clean water, and dry.

Step 10: Pickle the small circle, apply flux, then place a small pallion of **easy** solder on the back (the front will have rounded edges if you used a disc cutter). Heat until the solder flows. This piece will be invisibly “sweat soldered” to the backplate.

Quench in water, pickle for a few minutes, and rinse.



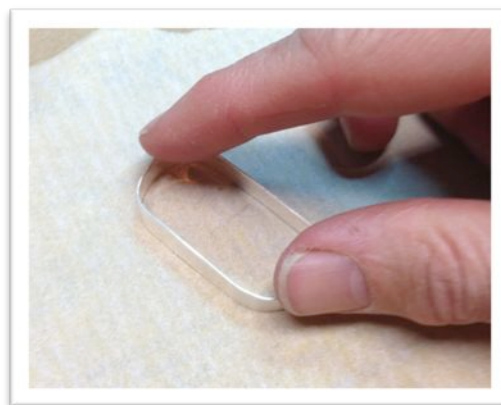
Step 11: Test the fit of the bezel. You should be able to push it easily over the glass, and remove it easily. If it's really loose, use your metal shears to cut it, re-file it, and re-solder. If the bezel's too tight, I usually just remake it. In some cases, you can roll the bezel with a ring mandrel and *slightly* stretch it.



Step 12: Sand the back side of the bezel on a piece of 320-grit sandpaper until it is perfectly flat. You'll be able to tell where you've sanded if you look carefully.

Don't cheat on this step! Anywhere that's not sanded may end up as a gap or a melted hole in the bottom of your bezel!

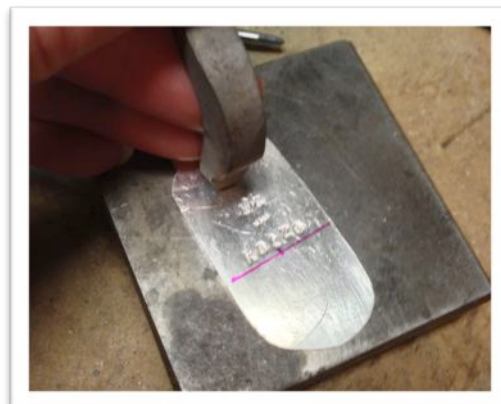
I usually flip the bezel and also sand the top side at the same time.



Mark Your Piece

Step 13: Using the .925 stamp or “sterling” stamp, mark your piece on the back using a brass hammer. I also stamp my logo, and use letter stamps to mark my piece. Drawing a line helps keep the letters lined up.

If your backplate warps during stamping, use a rawhide hammer on a steel bench block to flatten it. Rawhide will not mar the metal.



Soldering the Bezel to the Backplate

Step 14: Apply flux the backplate and the bezel.

Place small pallions of **easy** solder around the inside of the bezel, one about every 3/8" or so. Place the circle on the backplate, with a VERY small **easy** solder pallion in the divot, and the ball on top of the solder. Easy solder melts at a lower temperature, so it will help you avoid melting your bezel.

Step 15: Start heating the bail first, making sure that you keep your flame constantly moving, then start working your way around the bail...not too close...and you want a "bushy" flame. Go round and round the bezel, then heat the center, while constantly moving. Then around the bezel, then back in the middle, then back around the bezel. You'll see the solder "flash" when it flows, and the solder will flow around the base of the bezel. While moving your torch, you can "encourage" the solder around the bezel...solder will follow the heat.

Let the piece sit for a minute on the soldering block, then pick up with the copper tongs, quench, and place in the pickle. Remove after about 5 minutes and rinse. Use a brass brush to clean the piece with Dawn.



Step 16: Hold the piece up to the light and look for light coming through under the bezel. Try to pry the ball and circle off the piece. If everything looks good, move onto the next step.

If you see light, or if something isn't soldered completely, re-flux the piece, add pieces of solder where needed, and re-solder.

Use the punch to make a divot in the middle of the bail. Also make a divot in the middle of the piece. These will help you drill holes more easily.



TIP: The hole inside the bezel can be used to push the glass piece out before the bezel is pushed over. If you choose to drill a hole, make sure that it's not visible through a transparent piece of glass.

You can also use flat dental floss/dental tape placed over the bezel before inserting the glass. Pull the ends to remove the glass.

Step 17: Drill the holes. The divot keeps the drill from “dancing” around on your metal.

(I only learned this tip recently...this will make your life so much easier, and eliminate your “need” for a drill press! Seriously, that’s more money in your pocket for your newfound Fretz hammer addiction or more jars of frit!)



Step 18: Use a fine Sharpie marker to draw the outline of the inside of the bail as shown.

Release one end of the saw blade on your saw frame and thread it through the hole. Tighten the blade, and run it through beeswax or other blade lubricant. Carefully cut out the bail.

Release the blade and remove.



Step 19: Use a small half-round needle file to clean up the hole in the bail. Use a file to clean up the outer backplate, then sand to make the edges perfectly smooth.

Use radial bristles on the Foredom flex shaft or Dremel to clean up the inside of the bezel if your glass is transparent.

At this point I texture the edge of the backplate with a Fretz Sharp texture hammer...stand the piece on its edge on a block of wood or rubber block...it’s a subtle detail that sets the piece apart from the crowd.



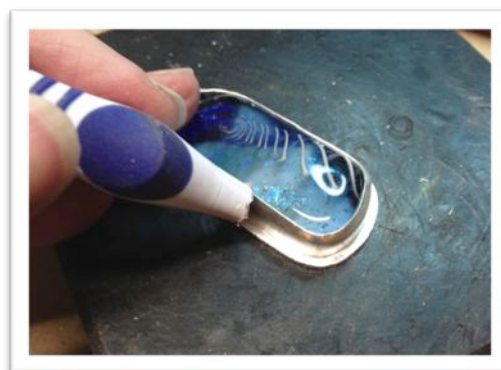
Step 20: Place the glass piece in the bezel. If it fits fine, remove the glass, put a small bit of E6000 or epoxy glue in an inconspicuous place, and put the glass back in the bezel. This will keep the glass from rattling in the setting.



Step 21: Use a cut toothbrush handle to push the bezel in. Start at opposite corners first, then gently move around.

Some artists will use a regular bezel pusher, but it can scratch and damage the glass piece, especially if there is a dichroic coating on the surface. I highly recommend the toothbrush option.

Plus...it's probably time to replace your toothbrush anyway!



Applying the Patina

Step 22: Heat the piece under warm water (remember glass can thermoshock if it's too hot, although I usually run pretty hot water when I'm doing this). Either dip the piece in prepared liver of sulfur, or brush liver of sulfur gel onto the piece. Rinse and repeat until the desired patina is obtained.

For this piece I painted the liver of sulfur gel onto the piece, because I didn't want it to get inside the bezel. (remember the hole?) The piece has very pale transparent blue glass at the bottom, and liver of sulfur inside the bezel would have shown.



Kat's Hindsight Tip: Doing this piece again, I would probably skip the hole in the middle of the bezel and use the dental floss technique for being able to remove the glass. It was pure luck that the hole didn't show through the transparent glass. And you wouldn't have to worry about the patina coming through the hole and darkening inside the bezel after the stone was set.

Step 23: Alternatively, you can apply the liver of sulfur before setting the glass, making sure not to get it inside the bezel.

This shows a wild color I got from the liver of sulfur. I had cleaned the piece with ammonia & Dawn detergent, and the ammonia reacts to create wild colors.

It will eventually oxidize and turn brownish, so don't fall in love with this color!



Step 24: For the finishing touch, use 3M fine or ultra-fine sanding pads to give the piece a satin finish. On the back, sand in one direction only for a professional look.

I added an adjustable leather cord for the finishing touch. See my other tutorial on the Sliding Leather Knot Necklace in the Beading & Stringing section for instructions.

Voila! Glass masterpiece.



Let's Talk About Fusing

Shape, Annealing, & Strength

As we discussed earlier, putting your glass cabochons through a full fuse cycle in your kiln will round the edges nicely and make it much easier to set in a bezel setting. I sometimes re-fire pieces to make them more round, and easier to set in a bezel setting.

In my earlier experience, I would cut the glass pieces, then run them through a final "fire polish" at about 1350°, holding for 1-3 minutes, which would result in nice squared edges that I loved...they were different than everyone else's glass. However, I learned that the more "cubic" style had corners that would break if dropped. The beauty of your properly-fired fused glass is that if it's dropped on a tile or concrete floor, it will probably NOT break! Rounded glass will most likely never break if annealed properly.



Grinding, Cutting, & Cleaning

A problem that many glass artists have (that they sometimes don't even know they have) is that the edges of their glass pieces have a gray haze, usually caused by grinding. Cutting with a traditional "wheeled" glass cutter will provide clean fired edges with no haze. I tend to cut

most of my glass with a 7" tile saw and a diamond blade specifically made for cutting glass tile (Home Depot, QEP brand, SKU 593-447). There is no chipping on the edges of the glass, and absolutely no grinding. A disadvantage is that the "kerf" (width of the blade/cut) is a little wide. If budget is no object, spring for a small diamond trim saw...the kind used in lapidary work. The blade is very thin.



After any cutting or grinding, always clean the edges of each piece with a toothbrush and dishwashing detergent. Rinse with running water. You'll get clean edges to your pieces with no gray haze around the sides. I have also used a "glass brush," the kind used in enameling, but they are very expensive. I found that the toothbrush and detergent method gave equally good results.

Firing the Pieces

Next, place the pieces into the kiln on a kilnwashed shelf, and fire.

Alternatively you can use Thin-fire paper, but I find that this contributes to the gray haze around the edges. Kilnwashed shelves produce a cleaner jewelry piece. You can scrape off the kilnwash with a paint scraper once it starts to crack, then reapply kilnwash with a soft hake brush (the kind with bamboo handles). I usually get about 3-5 firing from one kilnwash. Be sure to wear a dust mask when scraping.



Also, my schedules are derived from those of Paul Tarlow of Fusedglass.org, who runs an extremely conservative firing schedule. He not only looks for great glass results, but also runs schedules that will protect your kiln and not crack your expensive kiln shelves. I cracked a \$130 kiln shelf in half as a newbie glass artist because I chose to ramp up the temperature too fast. I still haven't replaced the shelf, and can't make large platters because of the mistake.

For glass, I only a kiln with computer controller. Glass is very susceptible to thermal shock, so being able to control the ramp (increase in temperature) and cooling is essential to creating durable glass pieces. I can't tell you how many people have approached me and said "my grandma has a ceramics kiln and I want to learn how to fuse." Don't do it. Invest a little in the right equipment, and you will grow as glass artist. If you're continually fighting your equipment, it's not fun and you won't realize your full potential as a glass artist. For what it will cost you to wire your garage with a 240v outlet for grandma's bug-ridden cobweb-infested 1960s kiln, you can purchase a shiny new 9" computer-controlled kiln that you can plug into a regular outlet!†

So I'm including my kiln schedule in this tutorial. Sure, you can fire faster and hotter, but this schedule is years in the making. I've seen dichroic cabs where the dichro is completely "fried," and not sparkly anymore...because it was fired too hot. I've fired cabs in my small kiln within a couple of hours. But this schedule takes your kiln into consideration, and the quality and longevity of your pieces. It's pretty foolproof.

† Small kilns usually draw 12-14 amps of power, so you want to make sure it's plugged into a regular outlet that can handle that "draw" (amps are "current," and can be compared the flow of water from a faucet). If you are unsure, consult a licensed electrician just to be safe.

Also, remember that kilns vary, so use this chart as a guideline. Make adjustments as necessary.

SAFETY NOTE: Manufacturers recommend never firing a kiln unattended. I use a remote wireless Foscam camera and my smartphone to monitor my kiln. A baby monitor also works well.

Kiln Schedule for Bullseye 90 COE Glass Cabochons—Full Fuse

Step	Ramp (°F/hr)	Temp	Hold	Notes
1	300°	900°	8 min	Slower ramp to protect the kiln and shelves, and not thermoshocking the glass pieces.
2	500°	1250°	5 min	Usually a “bubble squeeze” at this temp, but here we’re just equalizing the temp.
3	AFAP/9999*	1475°	3 min	Full fuse temperature. If the pieces aren’t rounded enough, extend this time.
4	AFAP/9999*	960°	30 min	This is an important step...annealing. Annealing your glass makes it STRONGER and more durable (a little different than with metal)
5	200°	700°	0	Controlled annealing cooling.
6	0	0	0	Shuts off kiln. DO NOT open kiln until temperature reaches 250°

*AFAP/9999 = “As Fast As Possible”, which on most computer controllers is entered as 9999.

Many beginning fusing books instruct you to open the lid of the kiln and “flash cool” when you reach the “process temperature” (Step 3 here). It’s not necessary, and some kiln manufacturers advise against it...it’s on your kiln. Speaking from experience, there is absolutely no need to open your kiln during the firing process.

Kiln Schedule for Spectrum 96 COE Glass Cabochons—Full Fuse

Step	Ramp (°F/hr)	Temp	Hold	Notes
1	300°	1050°	8 min	Slower ramp to protect the kiln and shelves, and not thermoshocking the glass pieces.
2	250°	1250°	5 min	Usually a “bubble squeeze” at this temp, but here we’re just equalizing the temp.
3	300°	1465°	3 min	Full fuse temperature. If the pieces aren’t rounded enough, extend this time.
4	AFAP/9999*	950°	60 min	This is an important step...annealing. Annealing your glass makes it STRONGER and more durable (a little different than with metal)
5	200°	800°	10	Controlled annealing cooling.
6	0	0	0	Shuts off kiln. DO NOT open kiln until temperature reaches 250°

*AFAP/9999 = “As Fast As Possible”, which on most computer controllers is entered as 9999.

Simplified Tool List

- Tracing paper
- Fine & regular Sharpie marker
- Glue stick
- Jeweler's saw & beeswax
- File, needle files
- Steel bench block
- Sandpaper, 320 grit
- 3M sanding pads
- Crème Brulee torch
- Firebrick (\$5 at pottery supply)
- Paste flux and brush
- Hand drill or dremel
- Pickle pot (tiny Crockpot, pH Down from pool supply or home improvement spa section)
- Large nail
- Toothbrush handle
- Liver of sulfur
- Soft brass brush
- Dawn dishwashing soap
- Copper tongs
- Rawhide hammer
- Electric engraver for marking your name (optional)

Review Questions

- 1) When soldering the bezel with hard solder, where is the piece of solder placed?
 - a) Balance the solder on top of the joint
 - b) Under the joint, between the bezel and solder block
 - c) Neither of these
- 2) What does the “.925” stamp on the back of a piece of jewelry signify?
 - a) That the piece is fine silver
 - b) That the piece is sterling silver
 - c) The weight of the grams of silver in the piece
- 3) What kind of mallet is used for stamping metal with steel stamps?
 - a) Ball peen hammer
 - b) Riveting hammer
 - c) Brass hammer
- 4) What type of hammer is used to flatten the backplate after texturing has warped it?
 - a) Riveting hammer
 - b) Rawhide mallet
 - c) Chasing hammer
- 5) True/False. Use a toothbrush handle as a bezel pusher because it will not scratch and damage the glass.
 - a) True
 - b) False