FUSEWORKS™

CRAFT KILN

MATERIALS AND PROCEDURES GUIDE

THIS IS NOT A TOY!

CHILDREN UNDER THE AGE OF 16 SHOULD NOT USE THIS KILN AND ITS CONTENTS WITHOUT STRICT ADULT SUPERVISION.

Carefully read all instructions before using the FUSEWORKS™ Craft Kiln.

IMPORTANT SAFETY WARNINGS

- The interior of the FUSEWORKS™ Craft Kiln and its contents can reach temperatures exceeding 1400ºF. Temperatures this high can cause serious bodily harm and property damage, if not handled properly.
- Always use heat resistant gloves/mitts when handling the hot kiln.
- Keep your area clear from any clutter.
- KEEP OUT OF REACH OF CHILDREN AND PETS.
- Keep away from flammable objects.
- Always unplug your FUSEWORKS™ Craft Kiln when not in use.
- Do not move your kiln until it has cooled completely.
- Use at your own risk and follow all recommendations and common-sense safety precautions.

5600 AIRPORT BOULEVARD, SUITE C; TAMPA, FL 33634
(813) 806-2923
EMAIL: INFO@DTICRAFTS.COM
FAX (813) 806-1988

TABLE OF CONTENTS

WELCOME TO FUSING

What is glass fusing? Glass fusing is the process of heating glass to extreme temperatures until it melts (fuses) together. Are you ready to become a fused glass artist? All you need is this kiln, creative drive, compatible glass, and a few tools. In this instruction manual, you will learn the basic techniques, and what tools to use to get started.

Coasters

Jewelry

Ornaments

Cast Glass

Sun Catchers

Fused Art

Metal Enameling

Glaze Ceramics

Hot Mosaics

SETTING UP

- Unpack your kiln and inspect before use. The fiber body should be free of cracks and the heating coils should be seated in the grooves on the interior of the lid.
- Vacuum your kiln to get rid of any debris from packaging and transportation.
- Place the kiln in the provided stand on a solid, level surface. Operating your kiln without the stand poses a serious fire hazard.
- The kiln must be operated in a clutter free area, and away from flammable objects. Do not use the kiln below upper cabinets or overhanging fixtures.
- Never use the kiln with an extension cord.
- To avoid overloading circuits (tripping your breakers), do not operate multiple appliances on the same outlet while firing your kiln.
- DO NOT fire your kiln over 15 minutes at a time. Additional time can be added as needed.

Now you're ready to pre-fire your empty kiln. Plug your kiln in, close the lid, then turn the dial clockwise to 15 minutes. Do not leave the kiln unattended at this time. After time is up, unplug your kiln and let it cool down for 2 hours.

HOT TIP! Do not touch hot kiln without heat resistant gloves/ mitts.

The Fuseworks™ Craft Kiln must be pre-fired before the first use.

TOOLS & SUPPLIES

SAFETY GLASSES - Protect your vision with appropriate eye wear. Side-wrap glasses are recommended.

DUST MASK - Avoid inhalation of small particles of fiber paper or glass by wearing a dust mask when handling powders and fired kiln paper.

NIPPERS - Specialty pliers feature two cutting wheels that apply pressure to both sides of glass, creating a quick and easy break with an organic curve.

GLASS CUTTER - For precision cutting, the tiny wheel on the glass cutter creates a "score" as it is guided across the glass surface.

RUNNING PLIERS - These pliers apply upward pressure on the underside of the score, and downward on either side of the score line, encouraging a "run" (crack) along the line of the score.

BREAKING PLIERS/BREAKER GROZER PLIERS - Both pliers are used to grasp and break away narrow bits of glass following a score line. Breaker Grozer Pliers have the additional function of allowing you to use the curved jaw of the plier as a rough file.

FUSIBLE GLASS - Glass that has been tested to rate the COE (Coefficient of Expansion), glass of the same COE will expand and contract at a similar rate as it is heated and cooled in the kiln. This measurement is simplified and denoted with a numeric value – 90 COE and 96 COE are most commonly seen. Do not mix varying COEs of glass in a single project, as different rates of expansion and contraction will introduce stress that will cause your art to eventually break.

FUSING ADHESIVE - Non-toxic fusing adhesive can be used sparingly to help secure small glass accents. *SAFETY WARNING: DO NOT use super glue, silicone or other adhesives that are not labeled as "non-toxic" and designed for kiln use.*

KILN PAPER - This specialty fiber paper provides a layer of protection between the glass and the kiln base, preventing glass from sticking to the bottom of your kiln.

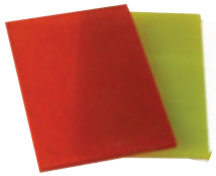
KILN MOLDS - Ceramic fusing molds are used to create 3-dimensional art. Slumping molds allow you to shape the glass by bending (slumping or draping) over the form. Casting molds allow you to create solid glass forms from small glass bits.

KILN WASH - Used to prevent glass from bonding to kiln molds during firing. Available in aerosol spray & brush-on formulas. Kiln wash must be completely dry prior to positioning glass & firing.

VACUUM WITH FILTER - Make clean-up of your kiln and work area quick and easy. A vacuum with hand-held wand can be used to pick up tiny glass slivers and fired kiln paper.

BENCH BRUSH - Keeps your work surface clear of glass chips to help avoid incidental cuts.

GLASS TYPES



SHEET GLASS

Flat pieces of glass, available in assorted transparent and opalescent (opaque) colors with a variety of specialty finishes. Simple hand tools are used to cut glass into shapes before being fused together.

DICHROIC GLASS

Space age coatings of metal oxides are applied to glass to create a shimmering, color-shifting surface. Dress up your projects with this exciting accent that can be cut like other sheet glass.

FRIT

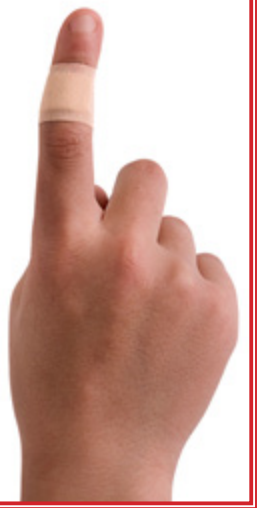
Ground glass, in various particle sizes and colors. Decorate your fused art or create castings in a mold.

STRINGERS

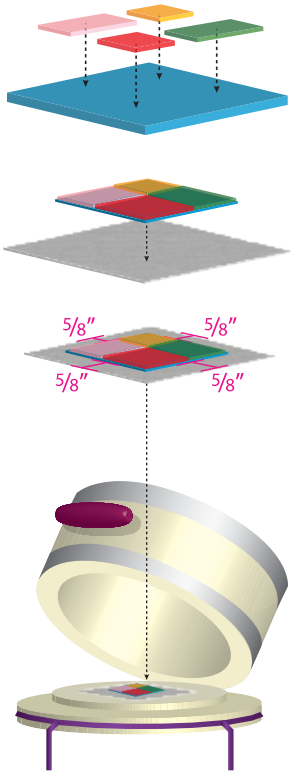
Assorted colors of thin strands of glass (think uncooked spaghetti noodles). Break with fingers or nippers to add detail to your designs.

IMPORTANT SAFETY NOTES

- You will eventually cut yourself with glass. It is going to be inevitable, it's like an initiation process. Use common sense, keep a supply of band aids, and take minor cuts in stride. Keep a first aid kit handy.
- For your protection, ALWAYS WEAR SAFETY GLASSES AND GLOVES WHEN WORKING WITH GLASS AND KILN.
- Be cautious about touching glass in the kiln, even when you believe it is room temperature. The glass itself may be much hotter.
- Never brush glass off your work area with your hands. Keep bench brush handy, or use a hand-held vacuum.



LET'S CREATE



PLAN YOUR PROJECT

• Most sheet glass is available in thicknesses of approximately 1/8" (3mm) or 1/16" (2mm).
• When heated to fusing temperatures, glass melts & will respond like a thick, viscous liquid that will pool to a consistent thickness Glass likes to be 1/4" thick.
This means:
- Projects less than 1/4" thick will pull-in to try to reach that thickness, and will become distorted in shape accordingly.
- Projects made of layers of glass equivalent to 1/4" thick should retain a similar size and shape during firing. With extended full fuse schedules square shapes may become round.
- Projects stacked to more than 1/4" thick will spread out until an even thickness of about 1/4" is reached.
• To reduce the risk of thermal shock (uneven heating of glass that can result in breaks when heating), projects should be made so all areas are an even thickness.
• The interior of the kiln is 8" diameter, your project needs to fit, centered on the shelf, with at least 5/8" allowance on all sides. Projects should not exceed 6" diameter for best results.
NOTE: When making square projects the diagonal measurement should not exceed 6".

CUT YOUR GLASS

***IMPORTANT SAFETY REMINDER**: Always wear appropriate eye protection when cutting, nipping and breaking glass.* Instead of cutting glass (as with shears for fabric) a glass cutter is used to score the glass from edge to edge. Pressure is then used to run the score & cause the glass to break.

SCORE - Place glass on a clean, level surface. Beginning at one edge of the glass, apply consistent, gentle pressure to the cutter as you move continually across the surface of the glass to the other edge. A small scratch about the size of a strand of hair should be visible on the surface. A heavier score (looks like a trail of salt) is too deep and may not break cleanly. Scores can be a straight line or a curve, but cannot achieve a sharp corner.

RUN - Align the running pliers and squeeze gently to apply pressure to your score, causing the score line to crack, creating a controlled break.

BREAK - Position breaker pliers (or breaker grozer pliers with the flat jaw on top) perpendicular to your score, approximately 1/16" away from the score line. Grasp firmly and pull outward (away from the glass) to break away small bits.

NIP - Position glass nippers such that the wheels are parallel to your desired break. Hold glass inside a box (to catch broken bits), and squeeze handles.

HEAT YOUR GLASS

- Place an 8" diameter round kiln paper on the base of your kiln.
- Wash your glass with dish soap, denatured alcohol or white vinegar to clean oils and marks off the surface, but be sure to rinse thoroughly with clean water. Dry with a lint-free towel.
- Stack and assemble glass pieces to create your project. A bit of fusing adhesive can be applied with a toothpick to hold accents. Use adhesive sparingly to avoid unattractive residue in your fused art. Allow to dry completely before firing.
- Position your project in the center of your kiln on top of the kiln paper.

HOT TIP! *Projects exceeding 2" in size should be placed in the center of the kiln to help ensure even heating and prevent breaks. Smaller (jewelry size) pieces can be positioned around larger projects.*

TACK FUSE
Glass pieces are fused together with little change beyond softening or rounding of edge.

CONTOUR FUSE
The glass edges are soft and rounded, yet the project surface retains a degree of dimension.

FULL FUSE
Glass has combined completely with a smooth surface. Extended fuse times may cause rounding of project shape.

FUSE TYPE	LAYERS/THICKNESS	MINUTES
Tack Fuse	2 Layers	10 min
Contour Fuse	2 Layers	12 min
Full Fuse	2 Layers	15 min

NOTE: Firing times are approximate and will vary. Different glass can impact firing times.
HOT TIP! *Take good notes! Use the Firing Log at the end of this manual to keep important information about fusing projects.*

WARNING: NEVER LEAVE KILN UNATTENDED DURING THE FIRING PROCESS!

• When the timer indicates the end of your firing, put on your hot gloves and safety glasses before peeking the lid open to inspect your project. If the desired fuse has not been achieved, close the lid and continue firing in 1-2 minute increments, checking after each, until the desired result is achieved.
• Unplug your kiln and leave closed. Allow your kiln to cool to room temperature undisturbed – this typically takes about 3 hours.

HOT TIP! *Glass is sensitive to temperature changes. Opening your kiln prematurely can cause the glass to cool rapidly and unevenly, increasing the risk of a break.*

AFTER FIRING *Wait until your kiln is completely cooled down before firing your next project. NOTE: Your glass art may be warmer than the kiln temperature. Use caution when removing glass art from your kiln.*

- Wear a dust mask when removing projects from your kiln. Kiln paper is good for a single firing, and may present as powder which should not be inhaled.
- Glass art can be rinsed clean to remove any kiln paper residue.
- Vacuum your kiln to remove all additional kiln paper.
- If any glass is stuck to the kiln interior, use a utility knife to carefully cut and remove glass from the kiln.

WHAT'S NEXT

Beyond fusing, you can keep creating in your kiln!

GLASS CASTING

Create jewelry with substance. Ceramic casting molds come in a variety of fun designs. Simply coat, fill with frit and small glass bits, then fire for perfectly formed shapes every time.

GLASS SLUMPING

Add dimension to your fusing. Ceramic slumping molds allow you to shape the glass by bending (slumping or draping) over a form to make unique art, dishes and more.

METAL ENAMELING

Add incredible color to copper shapes. This fast and fun ancient art-form uses powdered enamels applied to a metal base to make glossy, gorgeous jewelry and dishes.

GLAZED CERAMICS

Paint your way to pretty dishes, tiles and more. You can fire low-fire glazes in your Craft Kiln to make truly unique home décor.

ENAMEL & CERAMIC BASICS

Copper Enameling

1. Clean - Use copper cleaner following package instructions to remove all oils, oxidation and residue from the surface of your copper shapes. Rinse thoroughly with clean water and dry with a lint-free cloth. Note: Be sure not to touch the clean surfaces with your fingers for best results.
2. Decorate - Use a sifter to decorate your copper piece with powdered enamel.
   IMPORTANT SAFETY REMINDER: Wear a respirator to prevent inhalation of powdered enamels.
3. Prepare to Fire - Transfer your copper piece to a trivet or steel mesh firing rack. Position in the center of your room-temperature kiln on kiln paper.
4. Heat Up - Turn the kiln dial to set the estimated time to fire your project. Your project will progress through several visually identifiable stages as it fires. From powder to "wet sugar", then "orange peel", then finally to "full gloss".

ENAMEL FIRING	RECOMMENDED MATURATION TEMPERATURE	MINUTES
Low-Fire Enamels	1450°F - 1500°F	7 min
High-Fire Enamels	1500°F - 1560°F	9 min

WARNING: NEVER LEAVE KILN UNATTENDED DURING THE FIRING PROCESS!

When the timer indicates the end of your firing, put on your hot gloves and safety glasses before peeking the lid open to inspect your project. If the desired finish has not been achieved, close the lid and continue firing in 1-2 minute increments, checking after each, until the desired result is achieved.

5. Cool Down - Unplug your kiln. Put on your hot gloves and safety glasses, then use your steel fork or spatula to carefully lift the firing rack or trivet from the kiln and place it on a heat resistant surface to cool.
   IMPORTANT SAFETY REMINDER: Your project and trivet will be extremely hot. Use caution when removing from the kiln. DO NOT touch until completely cooled.

Glazed Ceramics

1. Clean - use a dry, soft cloth or brush to dust off any debris from the ceramic bisque ware. NOTE: Bisque ware has been pre-fired and is ready to glaze. These instructions are not meant to represent firing ceramic greenware.
2. Decorate - paint your bisque ware using underglazes, glazes and overglazes of the same firing temperature (all cone 05 or all cone 06). If you are applying multiple coats be sure to allow each application to dry completely before applying the next. Avoid applying glazes to the bottom surface of your bisque ware.
   NOTE: Glaze colors may look very different pre-firing than the mature color. Use manufacturer color swatches to identify appropriate color.
3. Prepare to Fire - once your glazes are completely dry place your bisque ware on a firing trivet or kiln stilts on top of kiln paper in the center of your kiln.
4. Heat Up - Turn the kiln dial to set the estimated time to fire your project.

CERAMIC GLAZE FIRING	MINUTES
Cone 06	15 min + 10 min
Cone 05	15 min + 12 min

WARNING: NEVER LEAVE KILN UNATTENDED DURING THE FIRING PROCESS!

When the timer indicates the end of your firing, put on your hot gloves and safety glasses before peeking the lid open to inspect your project. If the desired finish has not been achieved, close the lid and continue firing in 1-2 minute increments, checking after each, until the desired result is achieved.

5. Cool Down - Unplug your kiln and leave closed. Allow your kiln to cool to room temperature undisturbed – this typically takes about 3 hours.

TIPS TO EXPAND YOUR SKILLS

Striker Glass Colors: Some glass available for fusing is considered "striker" glass, and will change color during firing. Using a traditional kiln and fusing schedule usually creates relatively consistent results. Due to the faster firing schedule and shorter exposure to key maturation temperatures, not all striker colors will develop as expected in the Craft Kiln.
TIP: Always fire a test swatch of any "striker", "reactive" or "shift" colors for the time you expect your project to be fired to get an approximation of the results you can expect.

Examples using Bullseye Tested Compatible (90 COE) Glass:

Bullseye color	Pre-fired color	Craft Kiln fired samples	
			Pink Transparent (12153) didn't strike at all, even at 15 minutes firing time.
			Orange Transparent (10253) developed to a beautiful orange opaque at 15 minutes.
			Opaline (04033) developed to a bright opaque white at 15 minutes, but developed to the white translucent it's known for when fired for only 13 minutes.
			Gold Purple Opal (03343) developed approximately true at 15 minutes.
			Plum Opal (03323) developed approximately true at 15 minutes.

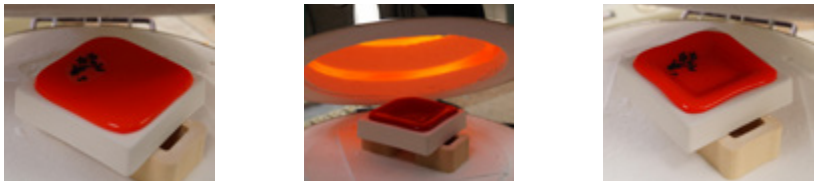
Decals: Not all decals respond the same, however we found that "low fire" decals tended to lose all detail during firing, whereas "high fire" decals typically fused nicely. Gold high fire decals matured to a brilliant metallic finish. As always, be sure to allow the decal to dry completely before firing.
TIP: Fire decals for the shortest amount of time required to achieve the fuse desired for your project.

FUSEWORKS™ decals and high-fire decals provided a quick and easy way to add details.

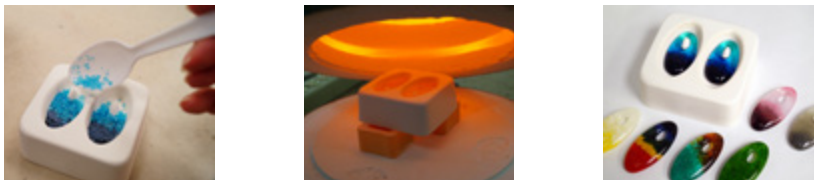
Metal Inclusions: Fine silver wire, copper wire, copper sheets and hi-temp wire offer the opportunity to create some unique accents in your art or add built-in hanging rings to sun catchers and ornaments. During firing the metal inclusions can oxidize, changing the color finish of the metal, and may even react with the make-up of the glass, causing unique color changes.
TIP: Test fire the metal with any glass it may contact during firing to check for color reactions.

Cut and emboss copper sheets for gorgeous designs, or create custom hangers with hi-temp wire.

Creating With Molds: We've had excellent success creating with ceramic molds to make small slumped projects and jewelry castings. Molds should not exceed the maximum recommended project size of 6" diameter, and should be limited to relatively shallow designs that will fit well in the firing chamber. Prepare the mold with an appropriate mold release and allow to dry completely before use. Be sure any vent holes in molds are clear to allow air to escape, and place the mold on kiln posts to encourage even heating and heat retention; this will extend the life of your molds.
TIP: Position the mold on kiln posts in the center of the kiln to fire.



Make fused mini-dishes and more with slumping molds.



Create cast glass jewelry. Molds can be used for multiple firings.

Fiber Paper: Using different thicknesses of fiber paper is a fast, fun and easy way to make exciting relief designs and textures. Fiber paper can be cut and stacked in layers to form a design, then glass positioned over the fiber paper in the kiln and fired to imprint the design. Be aware that during firing the organic binder will burn off from the fiber paper and may produce some smoke. Be sure to work in a well-ventilated space.
TIP: Use 2 layers of transparent glass to imprint a design deeply and produce smooth rounded edges during firing.

Cut and layer fiber to build a design. Position glass over fiber in kiln and fire. Remove fiber after project is cooled and rinse.

Enamel Pens: Enamel pens are a fantastic way to add details to your projects. Enamels develop nicely when fired using a fusing schedule. Always be sure to let enamels dry completely before firing. Thick applications of enamel may spread out as the glass reaches a full fuse, and may not achieve the same smooth, glossy surface as the rest of the glass. Metal pen tips are available to fit the popular Delphi Milton Bridge Enamel Pens or Glassline Pens to provide better control over how much is applied and the intricacy of the design you can create.
TIP: Apply the minimum amount of enamel possible to achieve the detail desired.

Specialty tips are available for finer lines. Always make sure enamels are dry before firing

COMING SOON! MORE SUPPLIES AND EXTENSION KITS FROM FUSEWORKS™

Fusible
Glass Packs

Pre-Cut Craft
Kiln Liners

Slumping & Casting
Mold Kits

Ceramic Kits

Copper Enameling Kits

Join our email list at
www.diamondtechcrafts.com
to stay informed about new supplies, kits, and accessories

To find a dealer near you, visit:
www.diamondtechcrafts.com/dealers

For fun how-to guides and projects, visit:
www.diamondtechcrafts.com/creative_corner

TROUBLESHOOTING

Q: My fused project has bubbles in it. What caused them and how can I prevent them?
A: Air has become trapped between glass layers. Avoid positioning a top layer over any void spaces in your design.

Q: Sometimes my glass pieces look like a porcupine with spiky edges. What caused it?
A: The spiked edges are caused by the glass being over-fired. Use a diamond-coated file or scythe stone to smooth down rough edges. File under running water to avoid inhaling glass dust. To prevent this in future firings, reduce fusing time.

Q: What causes two pieces of dichroic or iridized glass to not fuse together?
A: Dichroic and iridized coatings are made up of metal oxides that will act as a barrier, preventing glass from fusing together if 2 coated surfaces are touching. To avoid this, position glass with coated surfaces separated by glass.

Q: My fused glass has a hazy film on the surface. How do I avoid this?
A: There are several possible culprits.

Dirt, oils and adhesives left on the surface of glass can leave residue; clean all glass carefully before fusing.

Glass that is not tested compatible for fusing may develop devitrification (a hazy, scummy or rough looking surface); only use tested compatible fusible glass to help avoid this.

Firing glass too long or too hot can cause devitrification. Avoid this in later firings by starting with a shorter firing schedule and only adding time as needed to reach the desired fuse.

Q. My glass cracked! What happened?
A: Glass can crack due to thermal shock or compatibility issues.

Thermal shock happens when glass is heated or cooled too quickly or unevenly. During firing, you may hear an audible crack as the glass is heated and shocks/breaks apart. If you hear this, turn the kiln off and unplug, then allow to cool completely before inspecting. This will help prevent possible damage to your kiln. Help prevent this by stacking glass to create even layers, position glass in the center of the kiln to fire, and once firing is complete, do not disturb the kiln until it has cooled to room temperature (typically 3 hours).

Compatibility issues are caused when you have mixed glass of different COEs or glass that is not tested for fusing. The glass expands and contracts at different rates, and may pull itself apart where glass of different COEs adjoin. Sometimes the stress from incompatibility will not be immediately evident, but your art could break at any time. Be sure to always use tested compatible glass of a single COE in each project.

Q: My kiln interior has developed cracks, and/or the heating coils (kiln elements) are coming loose. Is my kiln still safe to operate?
A: Small surface cracks in the interior of the fiber body should not impact operation. Coils that sag slightly will not interfere with proper firing. If you are concerned about the heating coils please contact ***diamondtechcrafts.com***

DIAMOND TECH CRAFTS
5600 AIRPORT BOULEVARD,
SUITE C; TAMPA, FL 33634

DIAMONDTECHCRAFTS.COM
EMAIL:
INFO@DTICRAFTS.COM

PHONE
(813) 806-2923

FAX
(813) 806-1988

FUSEWORKS™ FIRING LOG

Make copies for future use

PROJECT TITLE	DESCRIPTION	TIME	RESULTS
Patchwork Coaster	4", 2 layers, 90 COE	15min	Ideal Full Fuse Use Next Time!