

KILN MANUAL



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UNPACKING YOUR KILN

Tools needed: Hammer & pry-bar

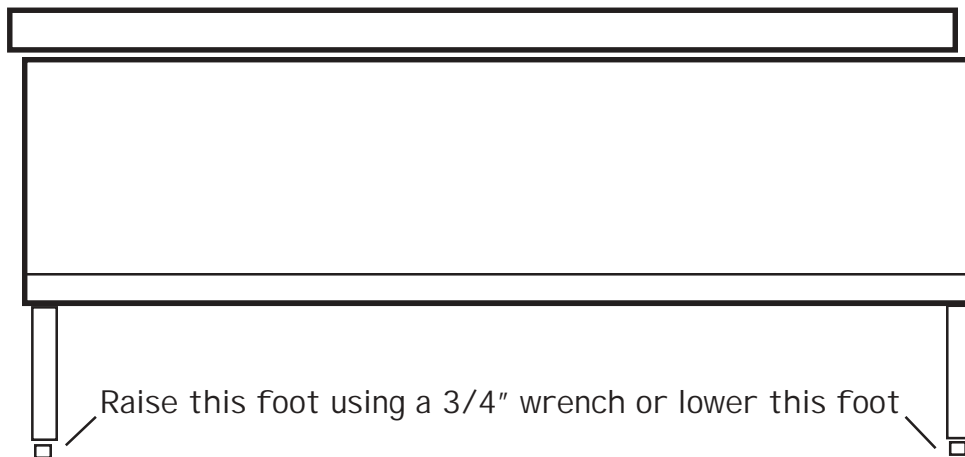
Your kiln arrived safely and now you have the task of unpacking. First cut the shrink wrap and take that off. Use your hammer and pry-bar to remove the top of the crate. On larger crates, it is a good idea to illicit the help of a friend. You wouldn't want it to get away from you and scratch your new kiln. Proceed by taking the sides off the same way. Now it should be sitting on just the base of the crate. Lift the kiln off on to the floor and put it where it is going to live in your studio. Get some help with the larger kilns. If you purchased casters for your kiln, now is a good time to install them. Work your way around one corner at a time, lift each corner of the kiln and thread them in. Roll your kiln in place.

Remove the plastic straps that are holding the lid closed. Open the lid and look at the rack system that holds the elements. See the packing that is between the element rack and ceiling? Remove this stuff. Now, carefully take the boxes out (the one on the same side as the control box is where your thermocouple is located). Remove the cardboard piece from the floor of the kiln.

If you ordered a fiberboard kiln shelf, this is the white board on the floor. You will need to burn out the binders. We cannot do this for you because it softens afterward and would most likely break in shipping. (see instructions included)

With the kiln in place, now is the time to level it. Your kiln came with leveling feet. If the lid is sitting askew to one side or the other, the diagram below will help explain how to realign everything.

If your kiln's lid looks like this



If you have casters, they are threaded so just screw them in or out as needed to adjust the lid and level the kiln.

TOP LOADING KILNS

Check the counterbalanced lid opening system by lifting the lid. Hold on to the handles on the lid, as you open the lid you will feel it take over and hold in the open position. Don't let go in case it needs adjustment. You know when it is maladjusted. It will not catch and stay in the open position. You may have to do some adjustment with the springs to keep the lid open. Sometimes they loosen up during travel. If you open the lid and it will not stay open by itself it needs adjustment.

Adjusting the Springs on your lid is simple procedure that requires the help of a friend or two depending on the size of your kiln. Have your friend open the lid to a full open position to where the tension is off the springs. Turn the bolt on the bottom of the eyebolt about a quarter turn at a time until you can feel it catch and it will stay open by itself. Be careful not to over tighten the lid. This will keep it from closing properly and may cause it to fly open on its own which will damage your kiln.

**Moving your kiln through a narrow doorway.
Carrying a kiln up or down stairs.**

You will need enough strong people to help. Your kiln weighs a great deal and is awkward to carry. First we get the kiln out of the frame. It is screwed onto the frame from the bottom with sheet metal screws (larger kilns only). You will need a 5/16" nut driver. Next, you will need to release the tension on the springs. With one person on each side, lift the lid open far enough to unhook the springs from the eyebolts. Be careful while closing the lid back down, it can be quite heavy.

Have some sawhorses or something ready to set the kiln box on after it is lifted out of the frame. You may or may not need to remove the lid. On larger kilns, we recommend that you do as this will help make the kiln lighter for carrying. Open the side of the control panel and gently pull the thermocouple out of the kiln (it is the brown wire). Remove the hinge screws from either the lid or the kiln body, it doesn't matter which. Remove the four screws that hold the control box on. Lift the lid straight up **(do not slide it, you will break the elements)**.

Set the lid upside down on a blanket someplace out of the way. Leave the control panel attached to it. Unpack the inside of the kiln down to where the cardboard that has been tucked under the fiber walls to help hold the brick in place on its journey. Leave this in the kiln.

Next, carry the stand/frame in and place it in or near the spot where it is going to go. Leave plenty of room for carrying the kiln in. Note the location of the spring brackets and eyebolts should be pointing in the direction that you want the back of the kiln.

While carrying the kiln box, do not tip it past 90 degrees. The bricks are loose and can fall out. Place the kiln in the frame with the hinge to the back. Bring the lid in and set it straight down into place. Put all the screws back in along the hinge, and reattach the control box.

With a person on each side lift the lid and reattach the springs. Carefully lower the lid to a closed position. Come around to the front. Grab hold of the handles and open the lid. Without letting go, will it stay put in the open position? If yes all is well. If not, see the section on adjusting the counterbalanced lid. Remove the cardboard covering the floor. Reinsert the thermocouple. Look inside to make certain that there isn't any fiber stuck to the end of it.

Electrical connection

Your kiln has a 4 wire system; 2 hot legs (red & black), one ground (green) and a common return (white). Look on your sales receipt, it will tell you the amperage and voltage. Your electrician will need to know this. Your electrician will either install the appropriate NEMA configuration plug and outlet or hardwire it in depending on your cities code requirements.

Denver Glass Machinery recommends you have a qualified electrician do the install.

CLAM SHELL STYLE KILNS

Moving a Clam Shell kiln through a door

1. Remove the element cover and disconnect all the wires going to the element tails (red & black).
2. Remove the thermocouple.
3. Un-mount the control box from the frame
4. Open lid all the way and remove the retaining clips from the ball studs (top and bottom) on the gas springs. They snap away from around the neck of the ball stud and pull out. Have someone hold the lid open while you remove the gas springs. They pull off. Carefully lower the lid shut.
CAUTION! Do not remove the gas springs with the lid closed. They are under pressure and will spring open instantly if released.
5. Remove the 2 hinge bolts on the back of the frame.
6. The lid can now be lifted off the frame and tipped through the doorway.
7. If necessary, the floor section can be removed from the frame by taking all the little screws out of the bottom (on larger kilns). Take care not to tip the bottom section too far. The bricks are loose in the floor and can fall out. Also, take care not to twist and /or torque it too much.
8. Once you have everything inside, start the re-assembly process in reverse order. Be sure to screw the floor section back into the frame. This prevents the floor from warping and or buckling under high heat.
9. When re-connecting the thermocouple, be certain that the red wire is connected to red and no solder is used. Wire nuts only.
10. Be sure to put the retaining clips back on the gas springs.

Call with any questions
303.781.0980

Remove the plastic straps that are holding the lid closed. Open the lid and look at the rack system that holds the elements. See the packing that is between the element rack and ceiling? Remove this stuff. Now, carefully take the boxes out (the one on the same side as the control box is where your thermocouple is located). Remove the cardboard piece from the floor of the kiln.

If you ordered a fiberboard kiln shelf, this is the white board on the floor. You will need to burn out the binders. We cannot do this for you because it softens afterward and would most likely break in shipping. (see instructions included)

With the kiln in place, now is the time to level it. Your kiln came with leveling feet. If the lid is sitting askew to one side or the other, the diagram on page 2 will help explain how to realign everything.

If you have casters, they are threaded so just screw them in or out as needed to adjust the lid and level the kiln.

Electrical connection

Your kiln has a 4 wire system; 2 hot legs (red & black), one ground (green) and a common return (white). Look on your sales receipt or the spec plate on the side of your control box, it will tell you the amperage and voltage. Your electrician will need to know this. Your electrician will either install the appropriate NEMA configuration plug and outlet or hardwire it in depending on your cities code requirements.

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ALL KILN STYLES

General Maintenance

The brick floor is not mortared in. This was done for a reason, if you wreck one you can lift it out and replace it. Vacuum the floor of your kiln to get the dirt, dust and debris out.

Occasionally you need to paddle the blanket to give it its rigidity again and maintain a good seal against the walls. Do this by using a piece of board (plywood, OSB, or anything will do) and a rubber mallet. Hold the piece of board up against the blanket wall and smack it with the mallet. Work your way around the walls. I just smack the blanket with my hands but this can make some people itchy.

There isn't much of anything you need to do to maintain the board in the lid (hot face). After many years, you may need to replace the hot face if and when it develops cracks.

Kiln Element Replacement

The replacement of the elements in all Denver Glass Machinery kilns is done in the same manner. It is easiest, especially on the larger units, if you have two people. Some preparations will help in making the job easier.

Here are some things that you should have ready:

- An area large enough to lay the element rack once it has been removed from the kiln.
- A straight blade screwdriver
- A pair of pliers
- A 5/16" nutdriver or wrench
- A 7/16" nutdriver or wrench
- A pair of wire nippers
- Some patience...(always a virtue)

Then:

- Disconnect all the power to your kiln
- With the 5/16" wrench, remove the screws from the electrical cover on the lid and lay the cover to the side to expose the electrical connections to the wires.
- Label the wires so they go back where they were.
- Disconnect the wires from the elements using the screwdriver and the pliers. On some of the older models there was a crimping system used. These crimps should be replaced with copper clamp type lugs.
- Now you can lay the electrical cover completely out of the way.
- Open the kiln lid and from the top, start removing the 7/16" nuts that hold the element rack in place. Be very careful not to let it fall into the kiln. (It probably won't, but you should be aware of it.)
- Gently lower the rack from the lid being careful not to twist, torque or let it spread apart such that the mullite tubes would fall. Lay it down in the area that you made to work on it.
- Remove (from the top of the lid) the ceramic insulators.
- Slide the steel rack off of the end where the element tails go through the lid and remove the failed coil(s).
- Reinstall the new coil(s). You may need to adjust the stretch of the element a little bit.
- Slide the steel rack back into place making sure that element tails are all to the top side of the rack (pointing up in the air).
- Gently carry the rack back to the kiln and start the element tails and rack legs back up through their holes (this is the hardest part).
- Secure one leg on each end of the rack with the 7/16" nut to hold it in place while you replace the ceramic insulators. Pack some ceramic fiber blanket down into the tubes around the rack legs to prevent any chimney effect of heat coming up through the lid.
- Replace all securing nuts and washers. Redo all electrical connections and replace the electrical cover.
- Reconnect electricity and test for proper connections.

Learning to use your digital controller.

Your kiln is equipped with a programmable digital controller. Read the instruction sheet that came with your kiln. We use different controllers, therefore it is a separate manual. It is a good idea to enter the sample program and run it with nothing in the kiln. Next build your own program and run it. Watch it closely to see if all was understood. Call our Technical assistance department with any questions.

Fiber Board Kiln Shelves Burn-out & use

Your fiberboard shelf is a ceramic insulation product. This material is most effective for use in production studios because it does not store heat the way a ceramic shelf will. This allows, in many applications, the possibility of multiple firings per day.

This type of product does need to be "burned out". Ceramic fiber products have binders in them. The organic binder burns out at approximately 600 degrees F (316 degrees C) and the inorganic binder burns out around 1200 degrees F (649 degrees C). This "burn-out" process needs to be done very slowly so the board does not warp.

Burn-out procedure:

Lay the board flat on the floor of your kiln. Do not set it up on posts. Ceramic Fiber products are impervious to thermal shock unlike clay type products. Prop the lid open approx. 1" or so to allow the fumes to rise out of the kiln. If you have a vent system installed, you should enable it through-out this procedure. Otherwise, make sure the area is well ventilated. The fumes are intense.

Set the program for 10 degrees per minute or 600 degrees F (316 degrees C) per hour. Hold at 600 degrees for one hour. For the next segment, set the controller to climb at 10 degrees per minute or 600 degrees F (316 degrees C) per hour. Make the set point 1200 degrees F (649 degrees C). Hold there for one hour and shut off.

Start your program and it is suggested that you leave the area for an hour or so.

After the kiln has reached the 600 degrees F (316 degrees C) the worst of the smoke and smell will be over. It is natural for the board to turn brown-black and for some discoloration inside the kiln to occur. The final segment of 1200 degrees F (649 degrees C) will finish the burn-out and it will turn white again. In some cases you may have to turn it over and fire again. After the shelf has finished burning out it will be softer than it was and is subject to breakage. Be very careful if you need to flip it over and fire again.

Depending on your type of work you may want to just kiln wash them as they are or use fiber paper as a separator. We recommend you use a non-clay based primer (Hotline's Primo Primer) with fiber type products. Its expansion rate is closer to the expansion rate of the board since it is an alumina based product. Clay based primers can be used but be sure you apply a generous coat to ensure that no little pin holes open up and grab hold of your glass.

If you are laying heavy molds or projects on your fiber board you will want to rigidize it. There are two types of rigidizer (mold hardener) on the market, colloidal silica and colloidal alumina. We have found that there are differences in the colloidal silica product. Some hold up well while others just seem to burn right out. The colloidal silica type rigidizer is rated to

2300 degrees F (1260 degrees C). The Alumina type holds up to 3000 degrees F (1649 degrees C). We have not had problems with the alumina type holding up to temperature.

Rigidizing your fiberboard kiln shelf:

You will need plastic sheeting, a high capacity foam roller, paint tray and some rigidizer. It takes approx. 16 oz. per sq. ft. (.5L per 930 sq cm) mixed 1:1 with water. Carefully lift the burned out board and lay a piece of plastic underneath (like a trash bag or two). Allow it to stick out enough so you can slip it back out once you have completed the soaking procedure. Mix the rigidizer and pour into the paint tray. Use the high capacity foam paint roller to apply the mixture. The plastic keeps the mixture from going through the board and down into the brick floor. It also ensures that it will soak through the board and into the back side. Once you have it evenly coated, Prop the lid open and fire the shelf at 250 - 300 degrees F (121 - 149 degrees C). Cook it until all the thermal steam has escaped and the shelf is dry. This may take 3-4 hours depending on the relative humidity in your area. When the shelf has cooled, you apply the kiln wash.

Coating your shelf with QF180 refractory cement:

If you want a smoother surface, you first apply coats of QF180 which is high temperature coating cement. This coating has a continuous service rating of 2300 degrees F (1260 degrees C) it is thermally reflective and adds dielectric strength. Use a paint brush to apply. Stir the QF180 with a paint stick. Apply the first coat at full strength. With the kiln vented, fire it at 250 -300 degrees F (121 - 149 degrees C). Remove the shelf from your kiln and place it on a level work surface. Sand smooth with 100 grit sandpaper wrapped around a piece of 2x4 or a sanding block to help keep the process level. Vacuum the dust off using a vacuum with a HEPA filter. Wipe the surface with a damp sponge. Mix the QF180 1:1 with water for the second coat. Apply with a brush like you did with the first coat and fire again to dry. You can repeat this process until you are happy with the surface. Then apply kiln wash (separator). Again, we have found that the alumina based primer works best with the alumina board, alumina rigidizer and QF180 refractory cement.

Limited Warranty

Denver Glass Machinery warrants this product from manufacturing defects for a period of 1 year from the date of purchase. Our obligation assumed under this warranty is limited to the repair and/or replacement of parts without charge.

This warranty does not apply to elements.

Denver Glass Machinery will not assume responsibility for kilns that are left unattended.