

TROUBLESHOOTING AND FIXING BRICK PROBLEMS

GENERAL NOTE

Firebrick is a very fragile material and subject to breakage, spalling and heat shock. The good news is that it is very easy to repair and maintain with the proper materials and techniques. Enclosed in this brick repair kit are all the materials you will need to do a first class job. This brick repair kit is ONLY meant to be used on L&L kilns. If you use it on anything else you do so at your own risk. It will not work on other types of refractories such as are used in woodstoves, etc.

BRICK REPAIR KIT

L&L sells an excellent Brick Repair Kit that you can use to maintain your kiln in good operating condition.

Included with Brick Repair Kit

- ½ pint Primer Mix
- ½ pint Brick Dust
- ½ pint Brick Facing
- ½ pint Brick Cement
- 1 brick
- Small Plastic Spatula
- Small brush
- 1 rubber glove
- 1 small sponge



CAUTION ABOUT CEMENT

This special cement that is used by itself and with the grout is a phosphorous based cement. It has unusually strong adhesive properties which makes it ideal for repair work. It is different from the cement we normally use for cementing our firebrick. The phosphorus makes phosphoric acid. It is best to use rubber gloves. If you don't be sure to wash your hands with soap and water immediately following your use. Protect your eyes with glasses.

Brick Primer & Hardener

TECHNIQUE AND USE

- Using the small brush, paint or dab any spot on the brick you will be patching.
- You can not go overboard with this, even if you don't end up patching every hole. It won't hurt anything. Also, in some cases, using just this primer is enough to strengthen the brick, bind dust, and prevent further damage. Sometimes, less is more in repairing brick.
- Be sure to put extra on large holes or edges requiring a larger patch.

Brick Patch

TECHNIQUE FOR APPLYING BRICK PATCH

- Use a plastic spatula to push the Patch into the holes.
- Use either a twisting motion of the wrist or push it in from several sides to ensure the patch sticks to all sides of the hole.

In case you want to make more Brick Patch from your other materials:

FORMULA

- Start with 3 parts brick dust and 2 parts Primer mix
- You might need to add in a very little brick dust
- Mix with a tongue depressor or plastic spatula
- It should be on the edge between a liquid and a solid - and look like Silly Puddy
- If it starts to get a little dry, use your primer brush to dab a little Primer Mix into it - a very small amount and then remix

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Brick Facing

TECHNIQUE

- Wear a rubber glove(s)
- Mix completely before using with stick and/or by shaking
- Use a sponge and your gloved hand to smooth it on the brick.

BRICK PROBLEMS

EXCESSIVE BRICK WEAR

- Excessive brick wear can be the result of various conditions. Most common is improper curing of the brick when first fired. FOLLOW THE INSTRUCTIONS IN THE INSTALLATION SECTION FOR THE FIRST FIRING AND CURING CYCLE!
- All insulating firebrick expands and contracts when heated and cooled. Over time this will lead to cracking and spalling. Spalling is the continued cracking of the brick, which eventually results in large pieces of the brick falling out from the brick section. This is a normal condition as long as the emphasis is on eventually. Factors such as how close the kiln is operated at or near maximum temperature, how often and how fast the kiln is cycled up to heat and then cooled, how heavy the loads are, all figure into the brick wear equation. There is no set rule as to how long a brick lining will last. There are some L&L kilns, which are 25 to 30 years old with the original lining still in place. Note that the type of brick we use is the same that we have always used and is the same brick generally used in the hobby kiln industry.
- Frequent door openings when the kiln is at high temperatures can cause thermal shock, leading to excessive cracking and spalling.
- For light to moderate spalling, re-coat the brick with the Brick Facing or the Brick Primer/ Hardener

GENERAL BOTTOM MAINTENANCE

- Cover the bottom with kiln wash to prevent glaze from sticking to the bottom.
- If glaze does get onto the bottom be sure to scrape it off. Apply kiln wash over area that you have scraped clean.

REMOVING GLAZE SPOTS

- Be sure to remove any spots of glaze that get onto the firebrick sides or on the element holders. When the kiln is heated up the glaze will remelt and potentially cause problems with the elements.
- Repair hole as per instruction below.

BOTTOM OR TOP IS CRACKING OR FAILING

- Do not be concerned with small hairline cracks in the firebrick. These are normal and will close up as the brick expands when firing.
- Be careful not to overload the bottom.
- Try putting a full ceramic shelf directly on the bottom.
- Mechanical shock can crack the fragile top if you let it down too quickly.
- Do not open kiln when hot (above around 500 Deg F). Heat shock will destroy the brick (just as it will your ceramic pieces.)
- In many L&L Kilns the bottom can be reversed once the initial inside surface has become deteriorated over time.
- It is OK to double up the bottom. Buy another bottom and put this underneath your cracked or spalled bottom. This will also improve the insulating characteristics of the kiln and will improve heat up time.

REPAIRING SMALL HOLES OR CHIPS IN BRICK

- Remove all dust and loose brick with a brush, vacuum or small sparp knife or screwdriver.
- Brush with Brick Primer/Hardener
- Squeeze Brick Patch into hole or crack with plastic Spatula.
- You can brush on hardener or facing afterward if you desire.
- Let dry for 24 hours.
- Do a Fast Glaze to Cone 05

REPAIRING VERY LARGE HOLES IN BRICK

- Many large holes can be repaired with the Brick Patch.
- To do this follow the instructions above.

Another technique:

- Cut out an area around the brick chip with a small knife, saw or router.
- Cut a piece of firebrick to fit into this cut out hole. The piece should be slightly smaller than the hole (by about 1/16" to 1/8".)

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- Both the hole and the brick piece should be brushed clean.
- Wet the firebrick with a water spray bottle (or brush with water).
- Using kiln cement - cement the brick piece into the hole. Use only about 1/16" of an inch of cement.
- Let dry for 24 hours at a minimum.
- Cut off and/or sand off excess brick and cement.
- Brush or Sponge with Brick Facing and allow to dry for another 24 hours.
- Turn kiln onto low for 3 hours to dry totally,
- Do a Fast Galze to Cone 05

VIDEOS

See various videos for help in hotkilns.com/videos and filter for the "Repair & Diagnose Brick" category.

CRACKS IN THE LID & BOTTOM

See these videos for bad cracks:

hotkilns.com/fix-cracks-front-load
and hotkilns.com/repair-cracked-top

See this video for hairline cracks:

hotkilns.com/repair-hairline-cracks

- It is quite normal to get hairline cracks in both the lid and the bottom firebricks.
- They are caused by the expansion and contraction of the firebrick as it heats and cools.
- As long as the bottom is fully supported by the stand the cracks in the bottom will not adversely affect the operation of the kiln.
- The stainless steel clips we use in our lids also help keep these natural cracks from normally becoming a problem in the lids.
- Note that it is possible to put another bottom under the original bottom as a second layer (this can also improve performance and heat up rate of the kiln).
- You can tighten the stainless steel band.

This crack is OK:



TIGHTENING STAINLESS BANDS

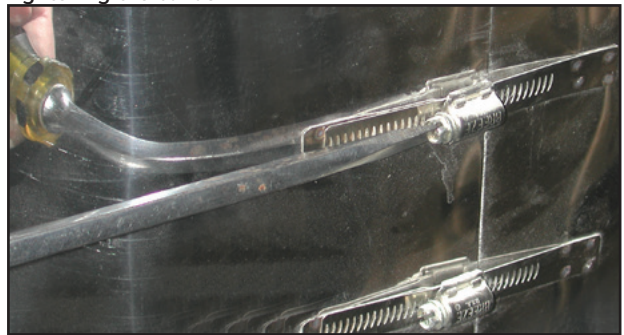
See these videos:

hotkilns.com/replace-side-brick-kiln

hotkilns.com/replace-side-brick-davinci

- The brick will shrink slightly over time. This is more pronounced when using the kiln at higher temperatures like cone 10. If you only use the kiln for low fire bisque you may never notice this condition.
- If the bricks shrink too much they will become loose.
- Tighten the case by turning the screws of the case clamps. Do this 1/4 of a turn at a time on each of the clamps. Keep a balanced tightening (i.e don't tighten one clamp too much at one time). Slow is good.

Tightening the bands:



- You can do this on the bands around the top and bottom also. This will help maintain the integrity of those slabs even if there is a crack.

TROUBLESHOOTING AND FIXING BRICK PROBLEMS

REPLACING FIREBRICK IN SIDES

See these videos:

hotkilns.com/replace-side-brick-kiln

hotkilns.com/replace-side-brick-davinci

- If you need to replace a firebrick piece in one of the sections do the following. While it does not require a great deal of experience to accomplish it does take time and patience.
- Order the firebrick precut and prerouted from L&L Kiln. You can order this with the proper element holders already in place or you can reuse the holders from your old brick. Be sure to order it for your specific model kiln. Also, be sure to say whether it is a brick where the element connections come through (because this has different element holders).
- There are no holes drilled in the brick for either peepholes or element connections. This has to be done in the field.
- Take the section off the kiln and put it on a flat surface like a flat floor or table. Elements will have to be removed and probably replaced. If the elements are old they will be brittle. They may break so be prepared to get new elements.
- Loosen up the adjustable clamps that hold the stainless steel wrapping. Loosen them just enough to allow the brick to slide out with slight hand pressure (so that the other bricks stay in place). NOTE: If you don't have the section on a flat surface then the bricks will all come out of proper alignment at this point.
- Slide the bad brick(s) up and out and put in new brick(s). Be sure the element holders line up with the other holders on either side. Note there is a top and a bottom in the element holder so be sure to get the orientation correct.
- Retighten the clamps on the wrap. Alternately tighten the two or three clamps (about a 1/4 or 1/2 turn at a time) so that you don't cock the stainless casing.
- Sand off the top surface of the firebrick to match the surface of the other firebricks. Sandpaper will work fine. Reface with Brick Facing.
- You can see this action in this video:
hotkilns.com/replace-side-brick-kiln

DRILLING HOLES FOR PEEPHOLES

- Some of the bricks that you may need to replace will need to have holes drilled in them in the field. These holes can not be drilled in the factory because the alignment would not be perfect.
- To drill out for peepholes use a 1" diameter drill bit or hole saw. You can also drill with a smaller drill and then file out with a round hasp type file. Drill slowly through the firebrick using the prepunched hole in the stainless steel. You may have to remove the bit several times and clean it out as you drill deeper. **It is a good idea to have someone help you by watching from the side to make sure you are drilling straight. It is hard to see this when you are doing the drilling.**
- For sections that have two element rows: the hole is drilled perpendicular to the stainless case.
- For sections that have three element rows: the hole is not drilled at a perfect 90° perpendicular angle to the kiln case. It will be drilled at a slightly down angle (about 5° to 7°). This is to miss the element holders.
- Before drilling, as a precaution, you can measure down from the top of the brick to the top of the existing hole in the stainless steel case. This measurement on the inside will show you where the top of the drill bit will protrude. Adjust your angle of drilling accordingly.

Drilling the peephole:



DRILLING ELEMENT CONNECTIONS

- Use a 1/8" to 3/16" diameter drill bit and drill out from the center of the hole in the stainless steel case. Do this slowly with a speed control.
- Do this perpendicular to the case.

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REPLACING BOTTOMS

- Remove the kiln sections.
- Take the old bottom off the stand.
- Put the new bottom on the stand.
- Relevel the kiln. (This is important).
- Replace the kiln sections.
- NOTE: You may want to experiment with using the old bottom as a secondary back up bottom if it is not too badly damaged. Just make sure it is totally flat so that it doesn't crack the new bottom. Some people find that having this extra insulation thickness helps firing times and bottom uniformity.

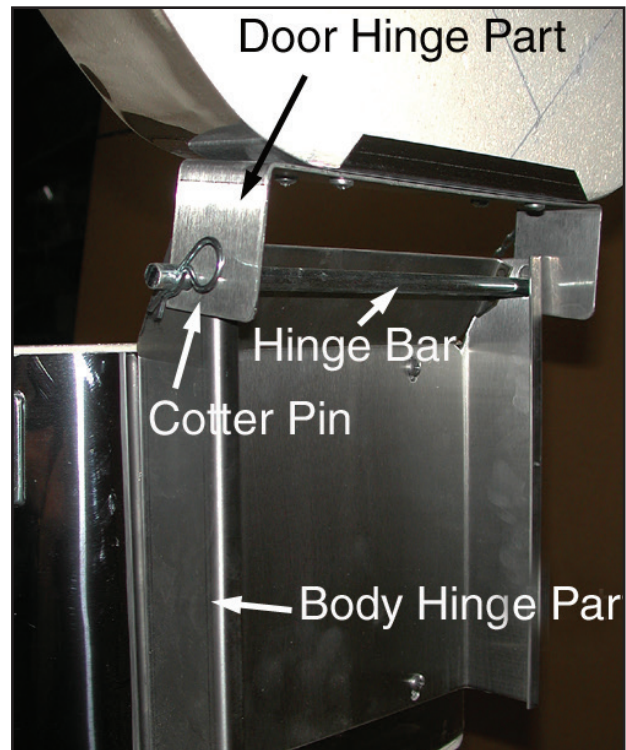
REPLACING EASY-LIFT LIDS

- Remove the Hinge Pin and take the old top off the kiln. See the Assembly Instructions for guidance if you have questions about how to do this. Use the Hinge Tool to take the tension off the spring. BE SURE TO USE SAFETY GLASSES - THERE IS A LOT OF TENSION ON THE SPRING AND INJURY COULD RESULT.
- Remove the Top Hinge Part from the old lid. Note that there are three parts to this. There is the main Top Hinge Part. Then there is the Front Hinge Part (the little 3" x 4" aluminized steel plate with a small hole that gets attached to the front of the top with the screws for the Handle). Then there is the Handle. Note that the hole in the Front Hinge Part should be centered around the little stud that protrudes from the Top Hinge Part.
- Using the old top as a guide, install the Top Hinge Part onto the new lid.
- Reinstall the top and reset the spring. See the Assembly Instructions if you have questions about how to do this.
- See this video: hotkilns.com/replace-easy-fire-lid

REPLACING SMALL NON-SPRING HINGE LIDS

- Remove one of the Cotter pins from the Hinge Bar.
- Pull out the Hinge Bar.
- Unscrew the chains from the stainless steel case of the lid.
- Remove the Top Hinge Part from the old lid.

A simple hinge with parts marked



- Using the old top as a guide, install the Top Hinge Part onto the new lid.
- Reinstall the top.

REPLACING DAVINCI LIDS

See this video: hotkilns.com/replace-davinci-lid