

Revised July 8, 1998

Heat-Kit System

Modular Contraflow Masonry Heater Core

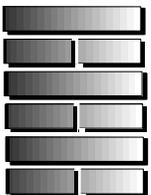
Assembly Manual

HK-22fo-st

22" See-Through Firebox with Front Bake Oven

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Material List

(in addition to core components)

200	Standard Firebricks 4.5"x9"x2.5" (2.5" dimension may vary. Important: The 4.5" and 9" dimensions are important)
20	Firebrick "Splits" 4.5"x9"x1.25"
40	Common clay bricks (8"x4" nominal)
3 bags	"Mortar Mix" (ie., premixed with sand, as opposed to "Masonry Cement", which requires mason's sand)

Setting Firebricks

Firebricks are laid up with clay air setting refractory mortar ("Sairset", or fire cement) with thin joints. Only enough clay needs to be used to completely fill the joint. No joint thickness needs to be built up - you are only filling in gaps and irregularities between the bricks. Although masons are used to trowelling firebricks, the best joints are obtained by dipping the bricks into mortar that has been thinned to the right consistency. It looks messy, but the cleanup is easy later with a sponge.

The Sairset that comes with the heater core kit has been pre-thinned to dipping consistency. You may need to add a some water, since it tends to thicken a little with time. You can tell if the Sairset has the right consistency by setting a brick down in a bucket of mortar. It will sink about half way. We like to dip the bricks and also keep a margin trowel (small rectangular trowel) handy for the odd bit of trowelling.

Assembling the Bottom End

The bottom end of a contraflow heater is the most complicated part of the whole job. The two downdraft channels connect here, underneath the firebox. As well, the chimney connection and the cleanout openings for the particular installation need to be determined and located here.

We've removed as much of this complication as possible with the Heat-Kit system. The insulated base slab allows you to do a dry layout first and make sure that everything is located properly in relation to the chimney and the slab. As well, our thinwall refractory castings simplify the job of making the necessary cutouts with a portable masonry saw or a skilsaw. If you take a little extra time at this stage, particularly with the layout, you'll avoid problems later on.

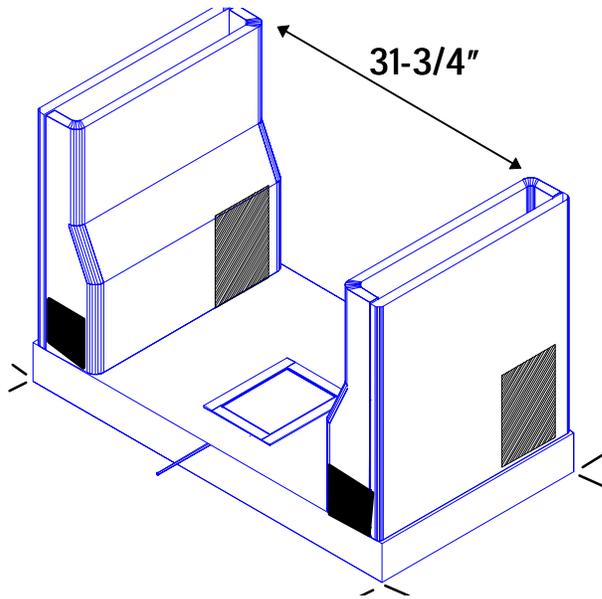


Figure 1.
2 Base channels sit dry on insulating base

Position insulating base slab dry to determine layout for heater and chimney.

Mark final position at corners with a pencil.

Install insulating base slab level onto a mortar bed.

Before setting base channels, cut appropriate holes for chimney connection and for clean outs. In this example, a right side chimney and front channel cleanouts are shown.

Set base channels dry as shown. Bottom seam will be sealed later by mortar slush between channels and facing.

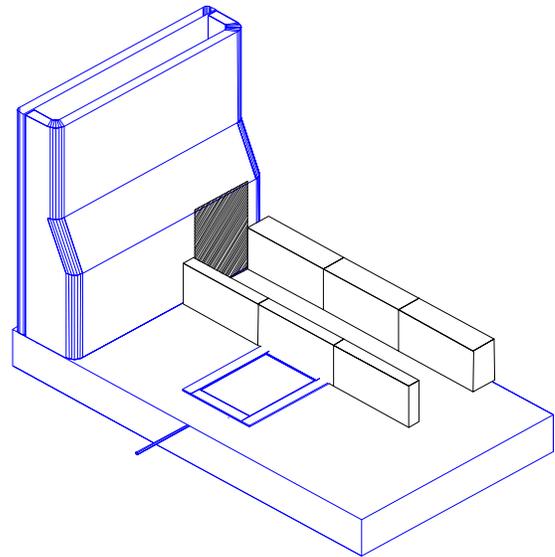


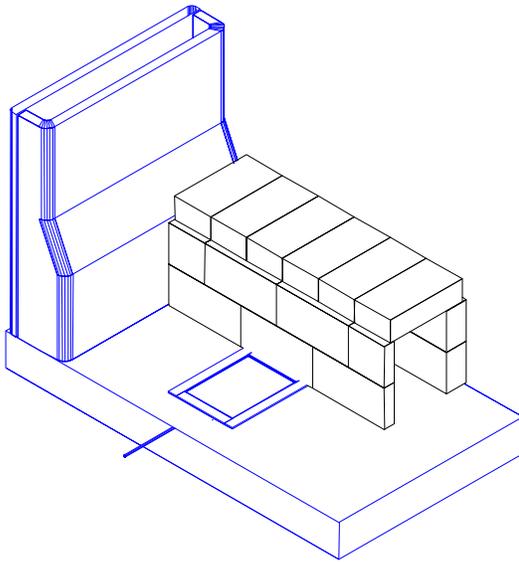
Figure 2.
Connecting channel is started
Right base channel not shown (for clarity)

Build connecting channel, using refractory mortar.

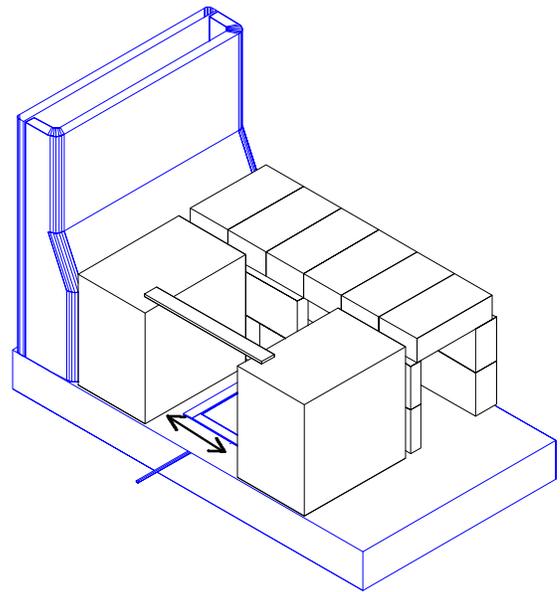
(If there is a rear chimney, leave opening and span with flat bar supplied (notch bricks to accept flat bars, thus allowing you to maintain thin joints)).

Firebrick shiner is flush with outside of slab. Firebrick split shiner is set to form a 6-1/2" channel.

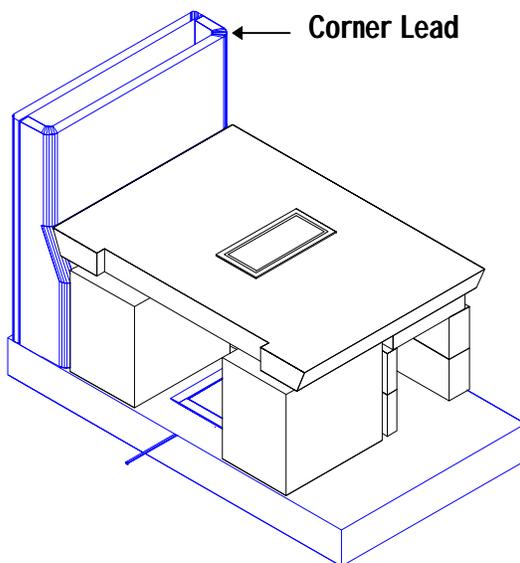
(Note: "shiner" = brick set on edge)

**Figure 3**

Form connecting channel ceiling as shown.
Sponge inside of channel to remove hanging drips.
Fill any large gaps between bricks and lower channel with regular mortar.

**Figure 4**

To form support for firebox floor, build up fill as shown to same height as firebrick. Arrow indicates approx. 8" channel for ashes.
Install 14" flatbar as shown to provide extra support for firebox floor. Use mortar joint to gain height

**Figure 5**

Install firebox floor onto generous mortar bed and level accurately.
Back corners of floor line up with leads that are precast into lower channels.
Ensure full mortar bed between flat bar and floor.
You are now ready to build the firebox.

Assembling the Firebox

The firebox is laid up from standard firebricks. Standard firebricks are 4 ½” wide by 9” long by 2 ¼” thick. The thickness will vary between 2 ¼” and 2 ½” depending on the supplier. Since the Heat-Kit is designed around the standard firebrick module, it is important to check the width and length of your bricks beforehand, to avoid having to make modifications to the assembly procedure.

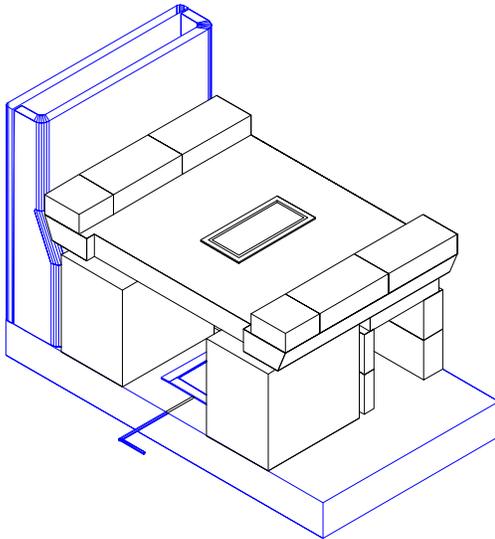


Figure 6

Lay up firebox as indicated, using air setting refractory mortar. Line up back corners with the leads that are precast into the lower channels (right channel deleted from drawings for clarity).

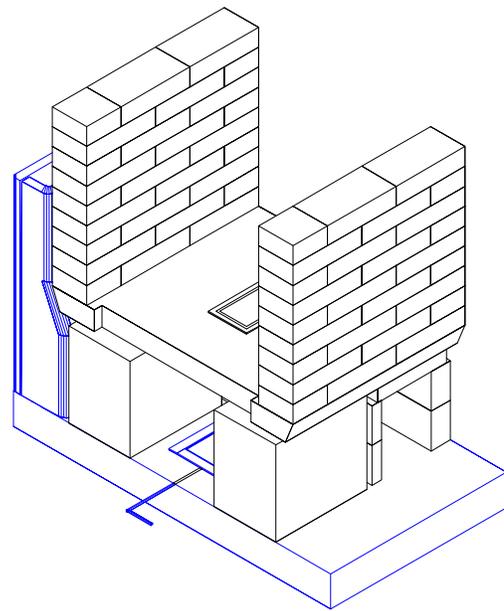
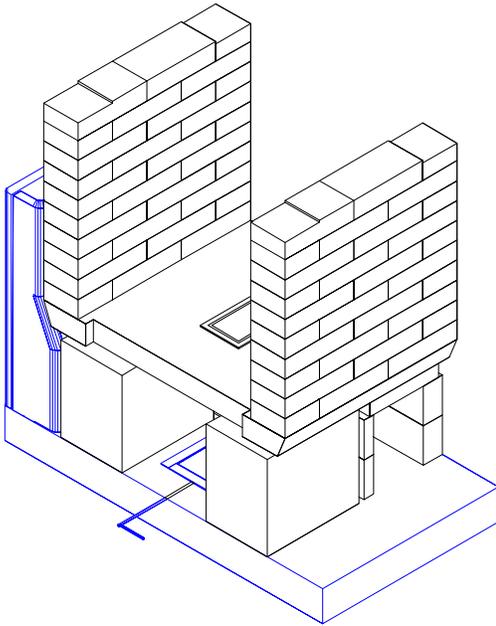
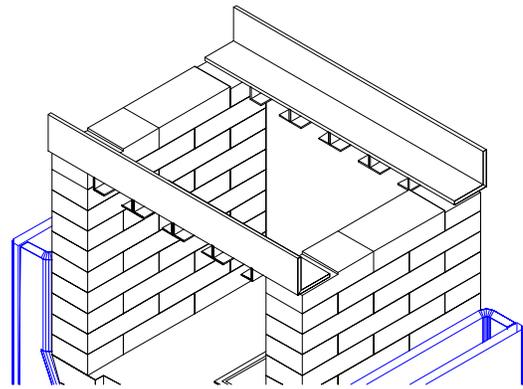


Figure 7

Set the cut edges of the half bricks to the front or back, not to the sides.

**Figure 8**

Notch top course of firebox as shown to provide a recess for the 1/4" angle iron lintel, which should be flush.

**Figure 9**

Set lintels in place. You can use a bed of Sairset to bring them up exactly flush.

Brackets on lintel are for heat shields (firebrick splits, installed later).

Building the Upper Firebox

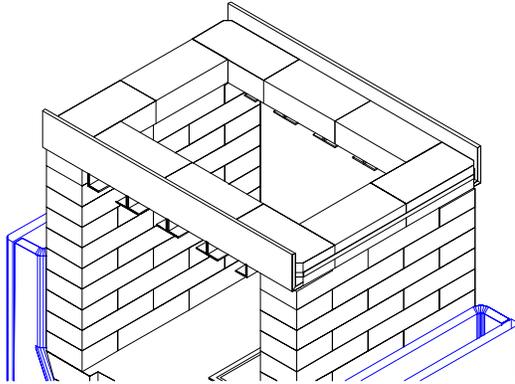


Figure 10

Lay up next course as shown. Use a dry joint with lintel. This course can be strapped as shown, but this is optional. If a strap is used, then round outside corners of bricks slightly.

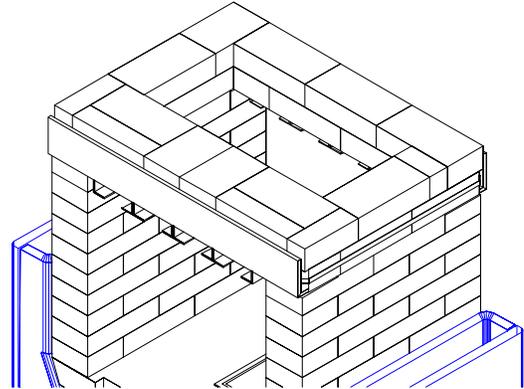


Figure 11

A total of 10 soaps (5 bricks ripped lengthwise) is used. All bricks are either full length (9"), $\frac{3}{4}$ length (6 $\frac{3}{4}$ ") or half length (4 $\frac{1}{2}$ ")

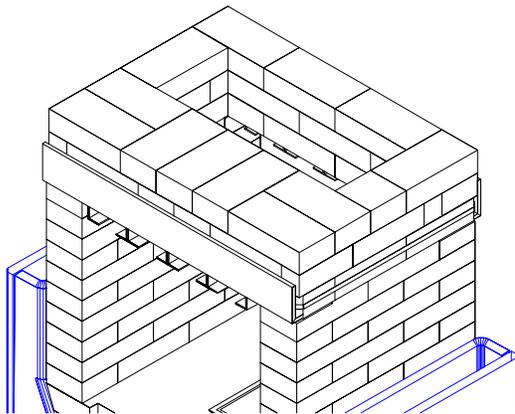


Figure 12

Next course.

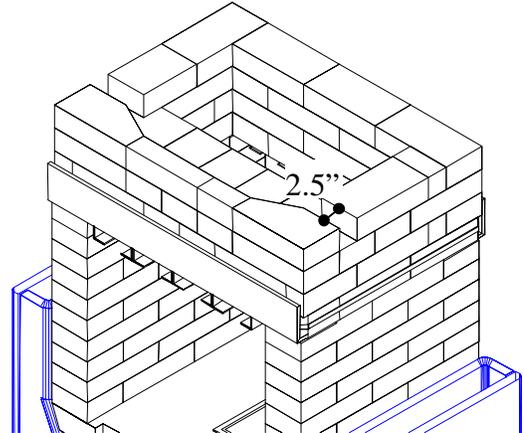


Figure 13

Check bricks for level before starting this course to see if there are high or low spots. When setting this course, carefully level the section where the oven will sit.

Cut front corner bricks as shown. Leave oven floor heat bypass gaps as shown. Standard gap is 2 $\frac{1}{2}$ inches.

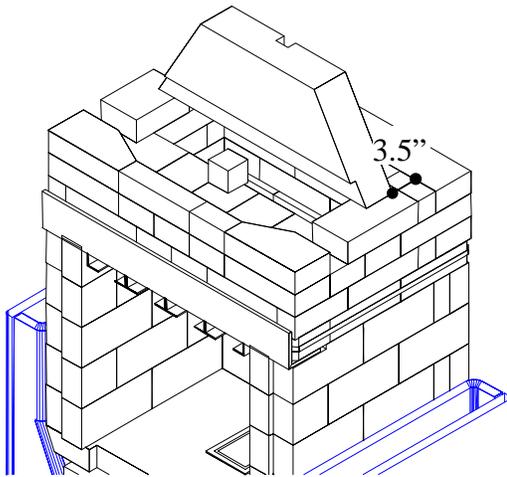


Figure 14

Dry set oven back as shown. Leave a 3½ inch channel behind. Install small floor support piece as shown.

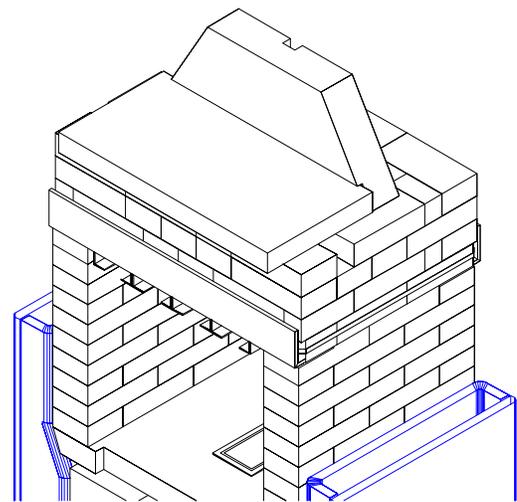


Figure 15

Install oven floor as shown. Set floor into Sairset. Inset into relief in oven back (not shown), without Sairset.

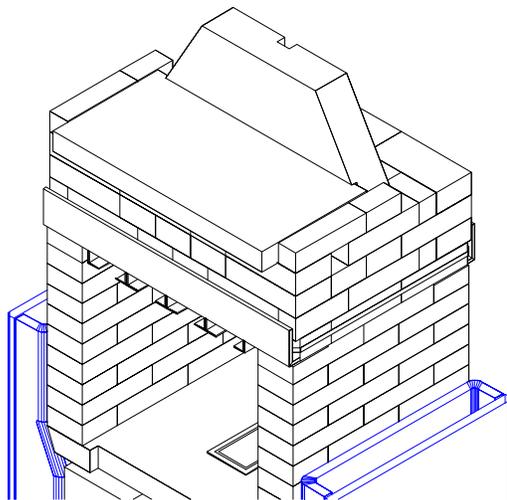


Figure 16

Install soaps as shown and level.

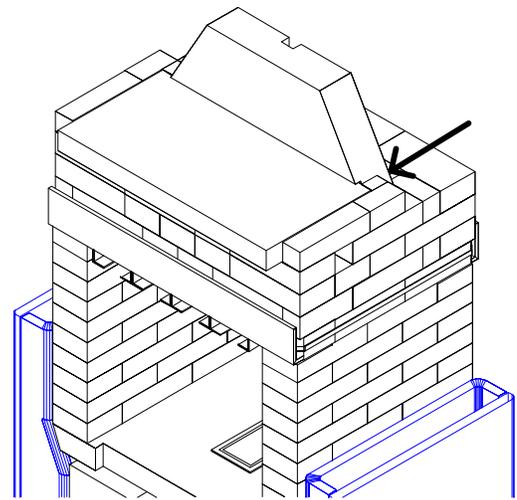
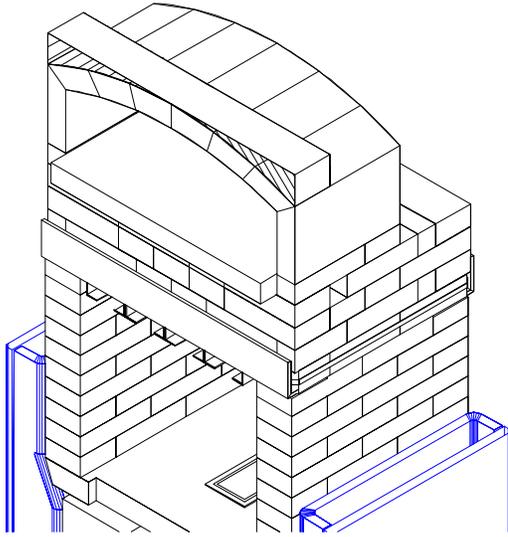
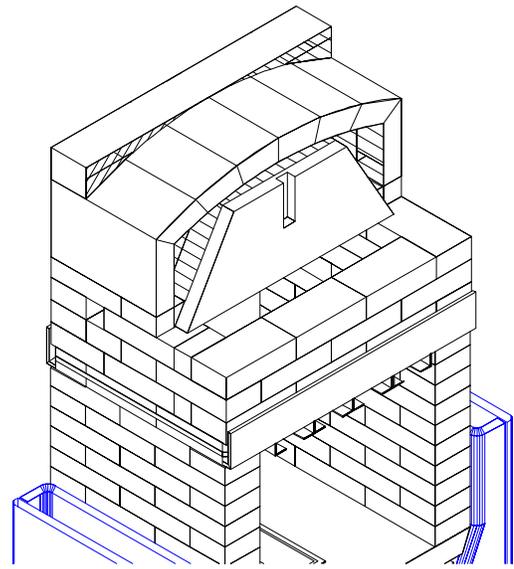


Figure 17

Install small wedge cuts (supplied) where shown. Set wedges in Sairset.

**Figure 18**

Apply Sairset to the soaps that will be under oven sidewalls. Make sure that you have adequate foot scaffold, and install large oven casting as shown. Use a helper, being sure to set oven straight down vertically onto back.

**Figure 19**

View from rear.

If necessary, oven back insert can be shimmed with cut-up brick ties to ensure snug gasket space at top (other side).

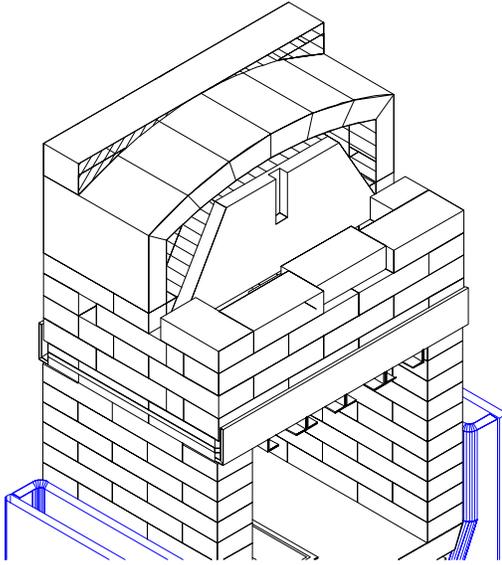


Figure 20

Project back brick $\frac{3}{4}$ " as shown to form ledge for millboard.

The recess formed by the setback brick can be filled later with ordinary mortar to maintain a smooth surface on the outside of the core.

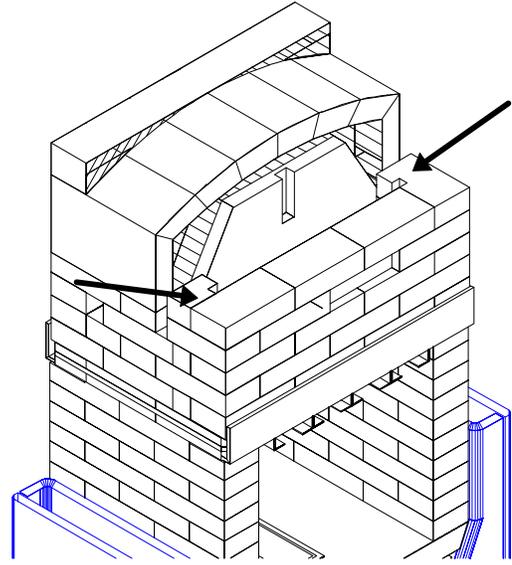
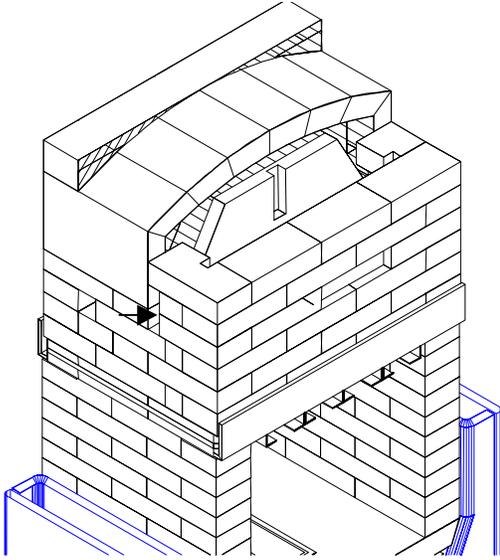


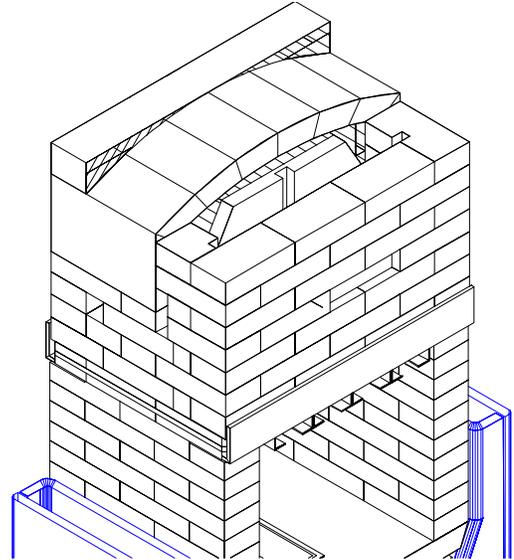
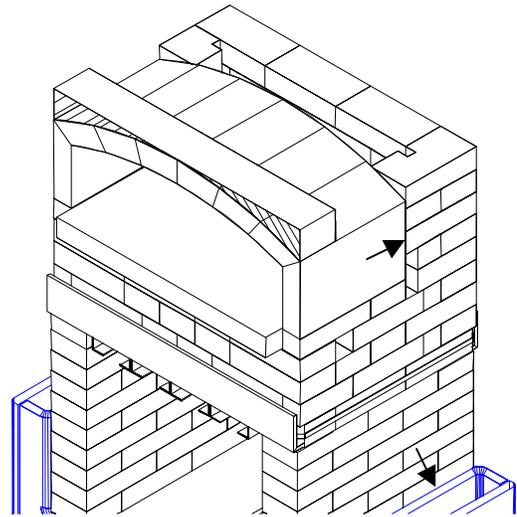
Figure 21

Form notches as shown for 1 inch millboard. Make notches slightly over 1 inch to allow for irregularities when sliding in millboard. The easiest way to cut these notches is to make 2 or 3 saw kerfs and pop the piece out with brick hammer.

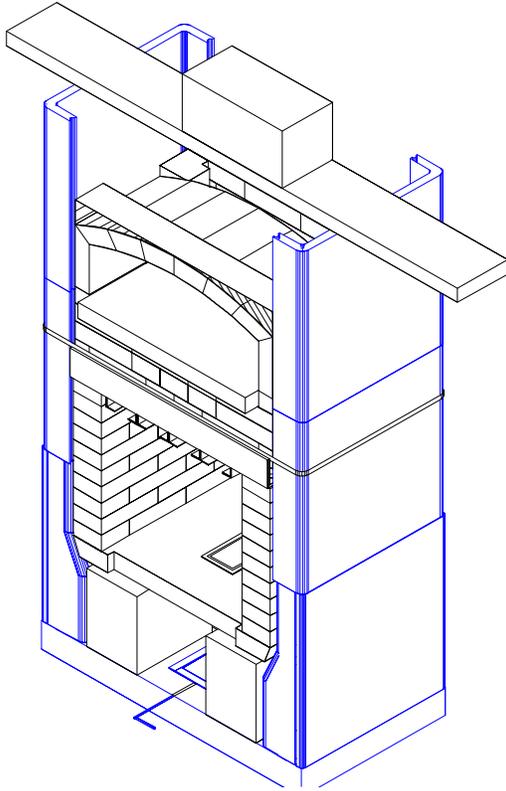
There are 5 courses of notches.

**Figure 22**

Note that first two courses of notched bricks are shorter, to clear oven back insert. Continue as shown

**Figure 23****Figure 24**

Seal horizontal gap between lower channels and heater with a bead of silicone.
Seal gap behind oven with a strip of ceramic blanket.

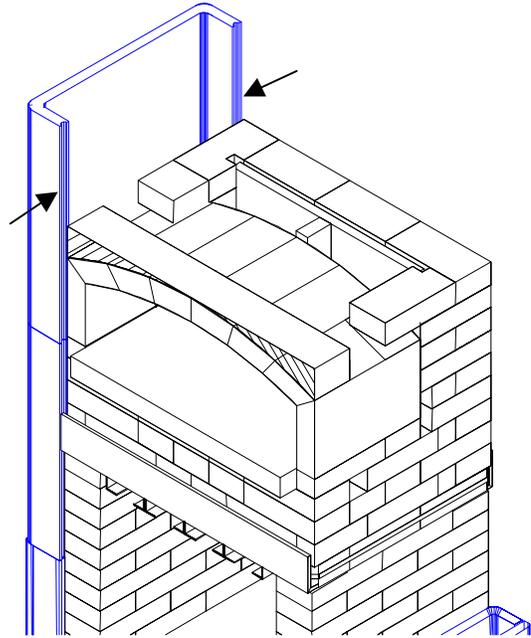
**Figure 25**

Install middle channels onto a bed of Sairset.

Strap middle channels or use tie wire. When strapping, compress expansion joint gaskets no more than 50%.

Clean off joints from inside. Make sure there is no mortar bridging at the expansion joints from inside. This is very important.

Install top channels and brace temporarily as shown.

**Figure 26**

Right channels not shown for clarity.

At this point, a height adjustment is necessary.

Measure the height of two courses of firebricks (for example, 4-1/2"). Add 5" to this distance (for example, 9-1/2")

Place a pencil mark this distance (9-1/2" in this example, for this particular brick) from the top on all 4 channel ears.

The pencil mark indicates the top of the next course. If an adjustment greater than 1-1/4" needs to be made, insert a course of splits. If the adjustment is less than 3/4", use ordinary brick mortar. For 3/4" to 1-1/4", use castable refractory. Alternatively, you can cut the bricks to height on a brick saw.

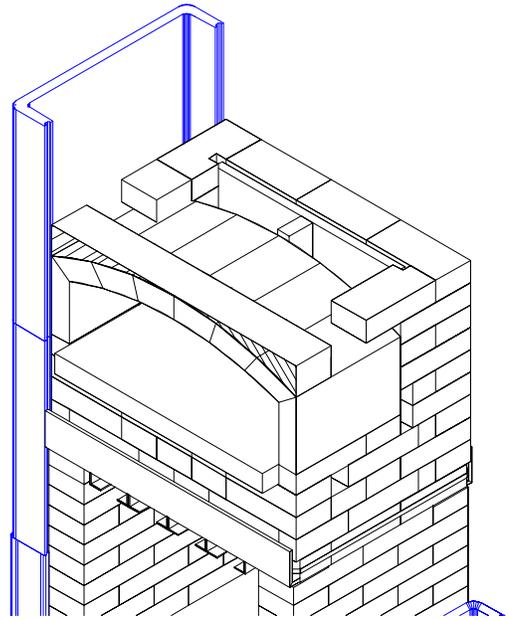


Figure 27

Slide in 24 1/2" x 12" millboard. Rip firebrick split and insert into oven back notch to form retainer for millboard as shown.

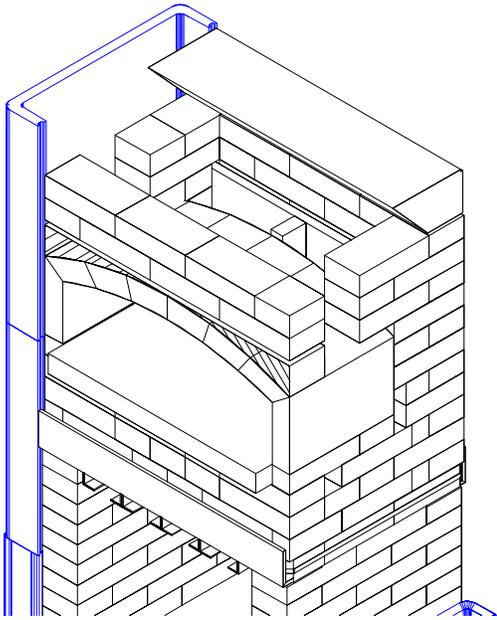


Figure 28

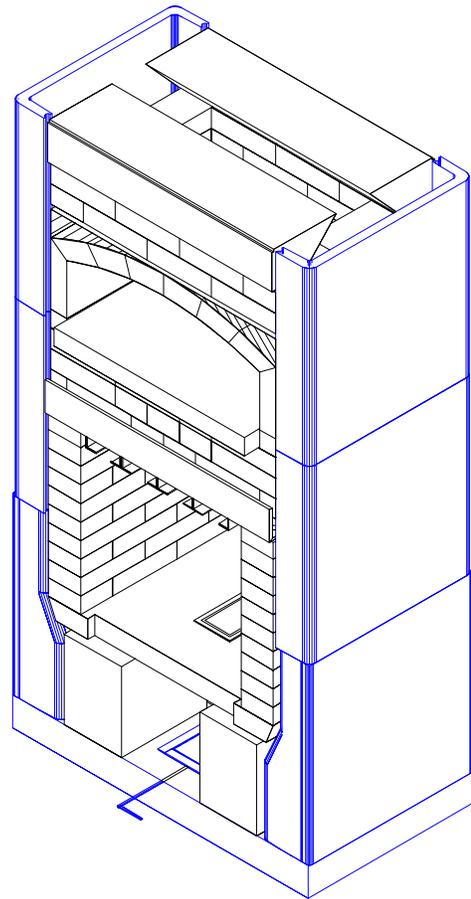


Figure 29

Install ceiling transitions. They should be 1/16" to 1/4" higher than side channels.

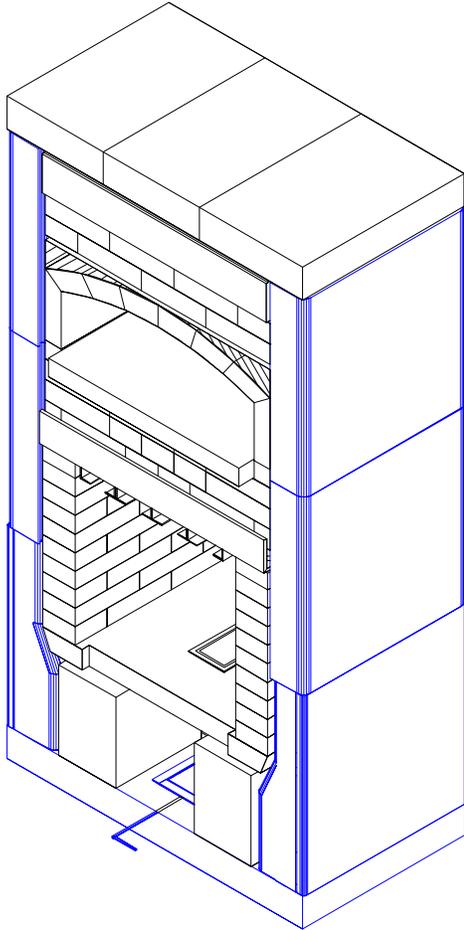


Figure 30

Install ceiling slabs. Set them dry onto the transition pieces.

Use a helper, and set up adequate staging (foot planks). Be careful handling them, as the insulating board is fragile.

Using GE clear silicone, carefully seal all ceiling slab joints, particularly the shiplap joint between the three slab pieces. Also fill the groove between the ceiling transition and the ceiling slab with silicone. If gap between slab and top of side channels is greater than 3/16", stuff with ceramic fiber first.

Next, check firebricks for full joints.

Next, check side channel gaskets and use silicone to tighten where needed.

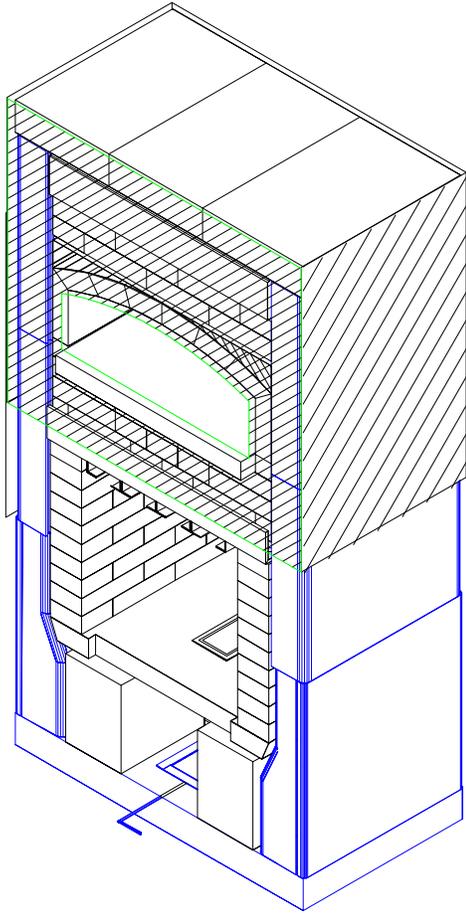


Figure 31

Next comes a double wrap of fiberglass matt to act as an expansion and slip joint. Quickly dab silicone approximately 4" - 6" o.c. over entire area indicated. Start at top of ceiling slab and go 38" down. Carefully unfold fiberglass mat and, with a helper, wrap around heater. Make sure mat goes all the way to top of ceiling slab. Have helper hold in ends in place, and go around heater, patting the mat onto the silicone. The mat is somewhat fragile. Trim to give approx. 4" overlap, and secure end with silicone dabs and several 3" pieces of duct tape.

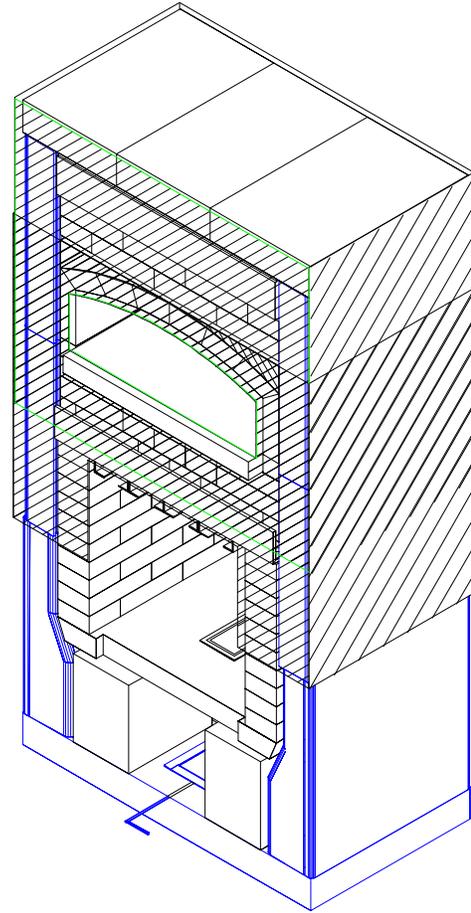


Figure 32

Second wrap of fiberglass mat starts at top of first channel and goes 38" up. Use same procedure as before. Trim around firebox and use offcuts to cover exposed firebricks at front.

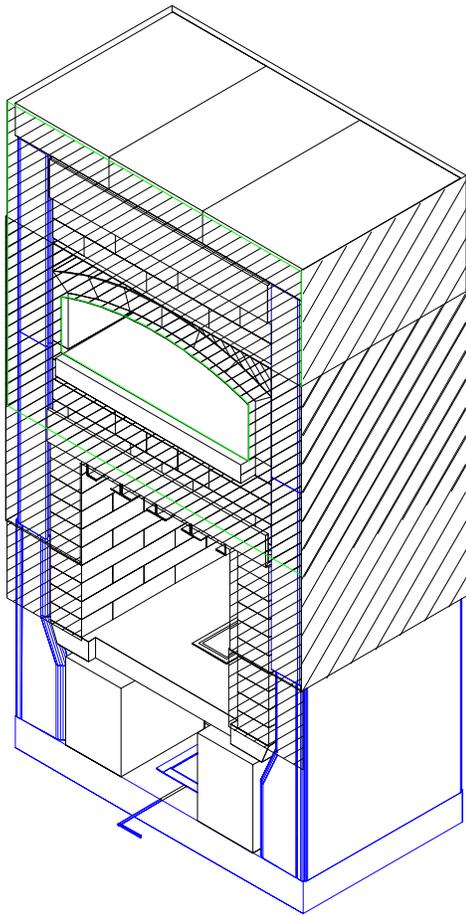


Figure 33

Add two additional pieces as shown.

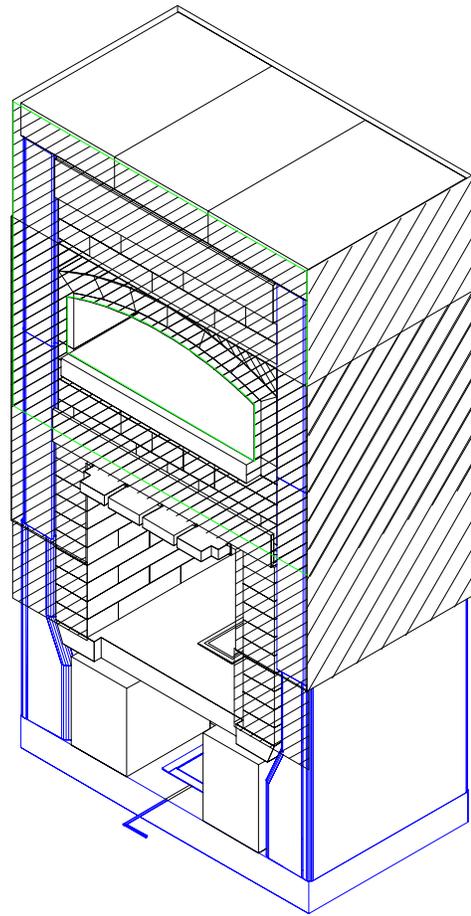


Figure 34

Note location of firebrick split heat shields.