LEADER EVAPORATOR STANDARD WOOD FIRED ARCH OVER TWO FOOT IN WIDTH

Leader Evaporator Co., Inc.

49 Jonergin Drive

Swanton, VT 05488

Tel: 802-868-5444

www.leaderevaporator.com

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EQUIPMENT DESCRIPTION

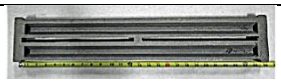
A standard wood fired arch from Leader Evaporator is designed to have a deeper and wider firebox to increase firing capacity. There is a large draft door to maximize airflow. Grates are designed with a double "V" to give the strongest and most warp resistant properties.

NOTE: Pictures, sketches and drawings presented in this document are not to scale.

A left feed evaporator is defined, as the regulator float box assembly will be on the left side of the flue pan when standing facing the firing door. A right feed evaporator is defined, as the regulator float box assembly will be on the right side of the flue pan when standing facing the firing door.

The Leader AMERICAN Evaporator consists of the following parts:

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Arch	As Ordered	
Base Taper	To match arch ordered see table below	
Draft Door Latch Wire tied to draft door of arch	75169	
Pipe legs Wire tied to inside rear of arch	77021	

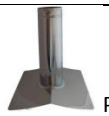
ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Grates	Quantity and size for arch ordered – See table below	
Smoke stack	Quantity and size to meet specifications for arch ordered – see table below	
Flue Brush Rod (8')	60071 (6') 60072 (8')	  Rod end is threaded to allow mounting of flue brush

GRATE AND SMOKE STACK INFORMATION

ARCH	Grate Size (inches)	Number of Grates	Stack Taper Length (ft)	Stack Diameter (inches)	Number of Pieces of Stack
30 X 8	30	4	3	10	4
30 X 10	30	4	3	10	6
3 X 8	30	5	6	12	3
3 X 10	36	5	6	12	5
3 X 12	36	5	6	14	6
40 X 10	36	6	6	14	5

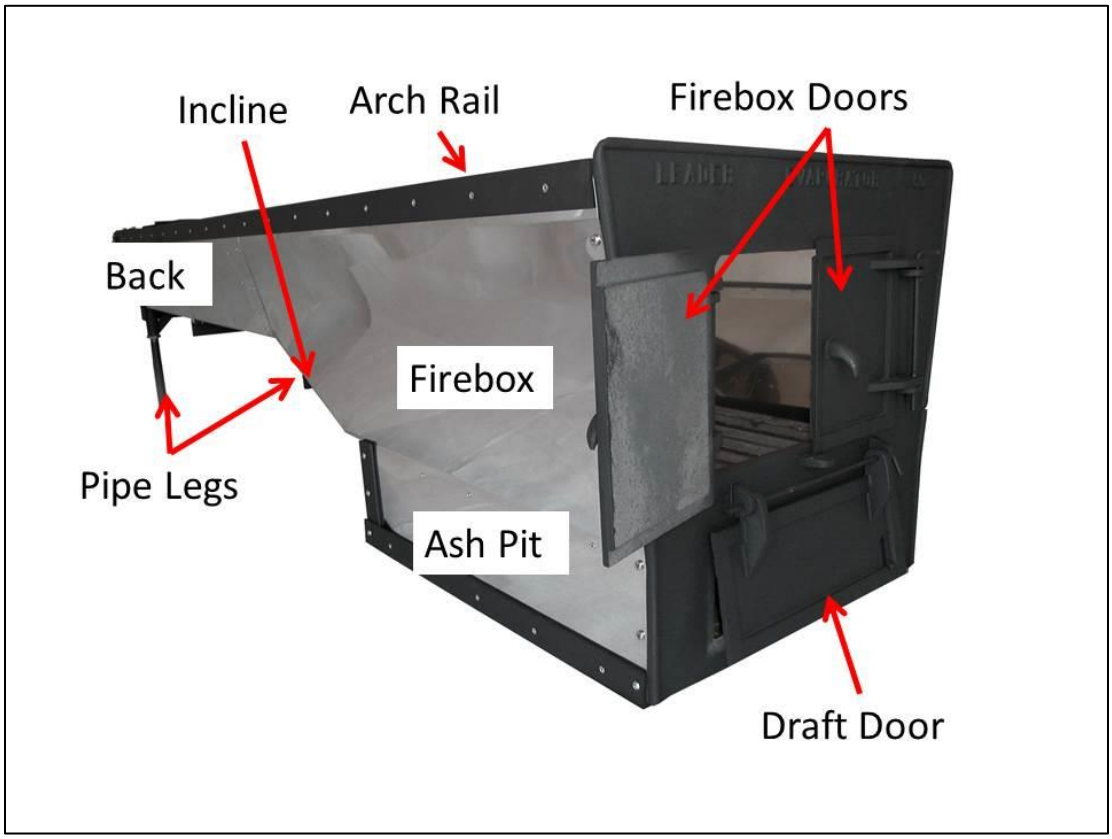
ARCH	Grate Size (inches)	Number of Grates	Stack Taper Length (ft)	Stack Diameter (inches)	Number of Pieces of Stack
40 X 12	36	6	6	14	6
40 X 14	36	6	6	14	7
4 X 12	36	9	6	18	6
4 X 14	36	9	6	18	7
5 X 12	48	9	6	22	6
5 X 14	48	9	6	22	7
5 X 16	48	9	6	22	9
6 X 14	48	11	6	24	7
6 X 16	48	11	6	24	9

OPTIONAL SPARE PARTS, SETUP PARTS AND OPERATIONS EQUIPMENT AND SUPPLIES

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Front Only	Contact Leader Evaporator	
Leader Style Roof Jack		 Peak or  Side of Roof Style
3000° Full Brick	65003	
Refractory Cement	65001	

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Stack Cover – available for each stack size		
INSULBOARD 1" – 1'X3' (3 sq. ft)	65000	
3000° Half Brick	65006	
Jaco Firestop Plus (10.5 oz tube)	65196	

DIAGRAM OF THE STANDARD WOOD FIRED ARCH



SETUP OF THE STANDARD WOOD FIRED ARCH

NOTE: The following information pertaining to setup of an arch is to be considered one suggested method. Installations should meet all applicable governmental regulations and standards.

RECEIVING YOUR ARCH:

Upon receipt of the arch, it is recommended the following tasks be performed:

1. Protect all incoming materials from damage and the environment. If possible place the arch at the location where it will be setup (See section titled SUGAR HOUSE SETUP).
2. Unpack all materials and check the received materials against the Equipment Description list provided above.
3. Immediately notify Leader Evaporator or your local dealer if there are questions on the received equipment.

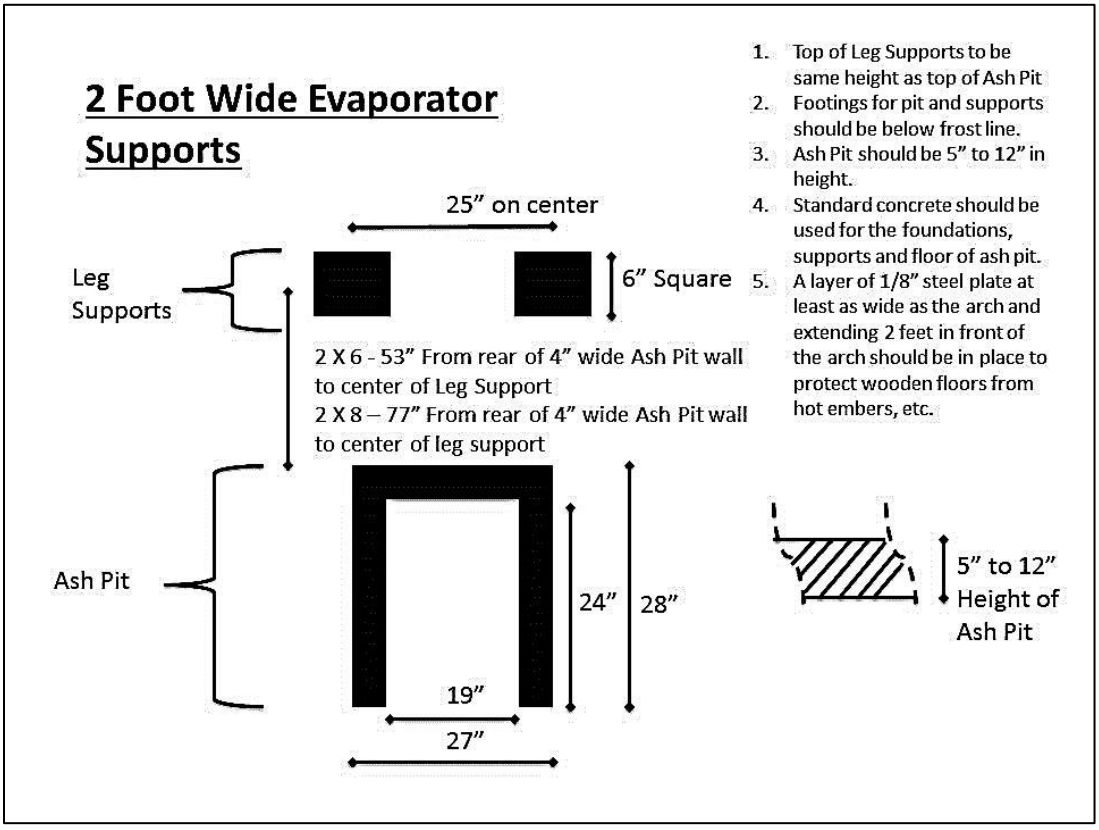
SUGAR HOUSE SETUP:

Prior to setup of the sugar house, it is suggested future needs be considered. The requirements for the setup of the standard arch may not be adequate if in the future additional or larger equipment will be needed. If assistance is needed in determining possible future requirements please contact Leader Evaporator Sales or your local dealer.
The following are *minimum* clearances recommended for around the arch. When determining the clearances, keep in mind any additional items/equipment (ex. packaging supplies, canner, table(s), chairs) and where they will be located in the sugar house:

1. Front of the arch: six (6) feet
    a. Allows room for firing and cleaning out of ashes
2. Back of the arch: three (3) feet
    a. Allows for cleaning and removal of the stack
3. Sides of the arch: four (4) feet
    a. Allows for draw off and movement

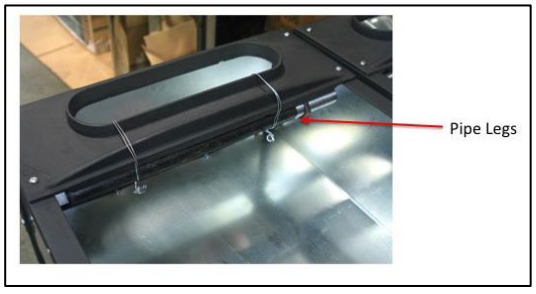
FOUNDATION FOR THE ARCH

The following is one suggested method of preparing a foundation for the arch. The example shown is for a 2 foot wide arch. Adjust the width and the length to match the dimensions of your arch.



SETTING THE ARCH ON THE FOUNDATION:

1. Place the arch on the foundation.
    a. The firebox of the arch should be centered on the foundation of the Ash Pit.
    b. The front of the arch should be on the open side of the Ash Pit.
    c. Center the firebox on the Ash Pit foundation.



2. The pipe legs are wire tied to the inside rear of the arch for transport. Remove the pipe legs from the arch.

3. Move the pipe leg nuts to a position approximately half way on the threads.
4. Place a pipe leg into each socket. The sockets are located at the rear of the arch. The threaded end of the pipe leg should be inserted into the sockets.
    a. Seat the pipe legs in the Leg Support.

5. Level the arch on the foundation.
    a. Place a 4-foot level on the rail of the arch front to back. (The rail is the part where the pans are rested).

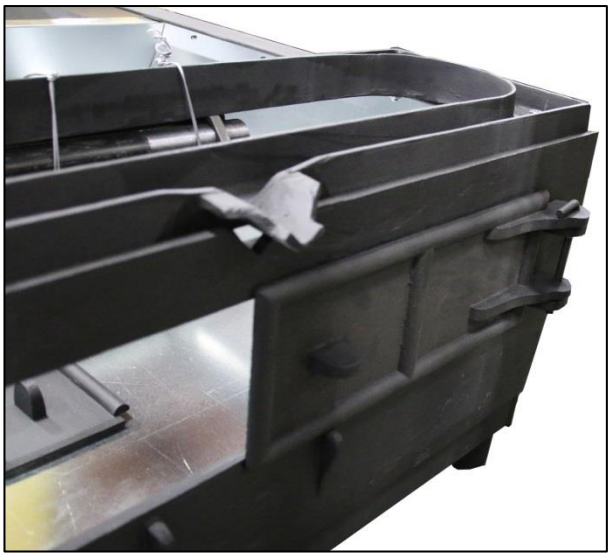
    b. Adjust the level of the arch by raising or lowering the pipe leg nuts. The use of two pipe wrenches is suggested. Metal shims may be needed on the front of the arch..
    c. Place the level on the rail of the arch side-to-side.
    d. Adjust the level of the arch by raising or lowering the pipe leg nuts.

INSTALL THE REAR CLEAN OUT DOORS

1. The doors for the rear of the arch are shipped inside the arch with the pins taped in place.

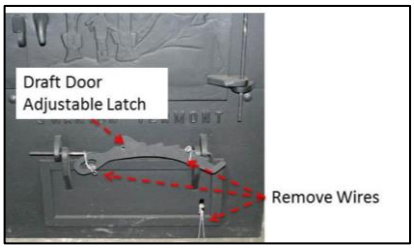
2. Remove
3. the hinge pins from the doors.

4. To identify which side the door should be located, check the “hinge arm”. The top of the door is the side where the “hinge arm” is closest to the edge.

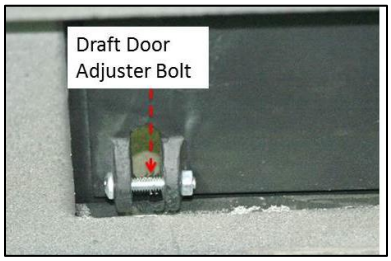


5. Position the door into its location.
6. Line up the holes of the arch hinge point and the holes of the door hinge point.
7. Slide the hinge pin through both sets of holes.

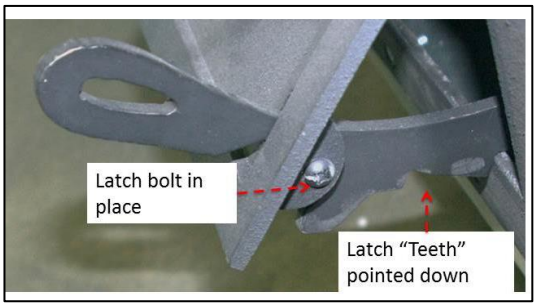
INSTALL THE FRONT DRAFT DOOR ADJUSTMENT LATCH



1. Install the draft door adjustable latch
   a. The latch is wire tied to the front of the draft door. Remove the wires to free the latch. Remove the wire securing the draft door.



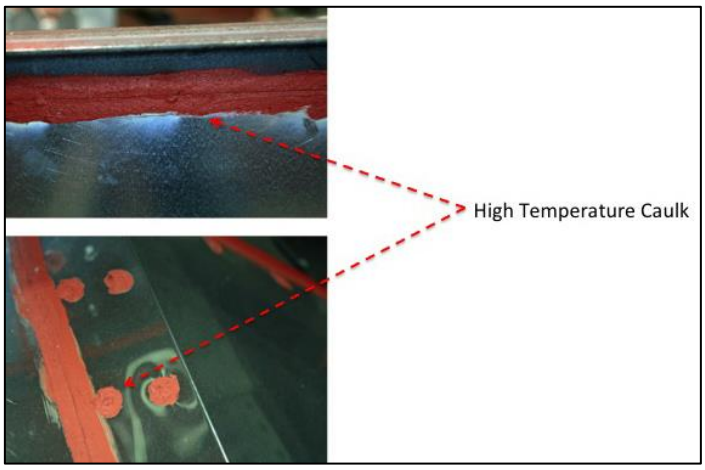
   b. Remove the draft door adjuster bolt. The draft door adjuster bolt is located on the rear of the draft door across the latch slot.



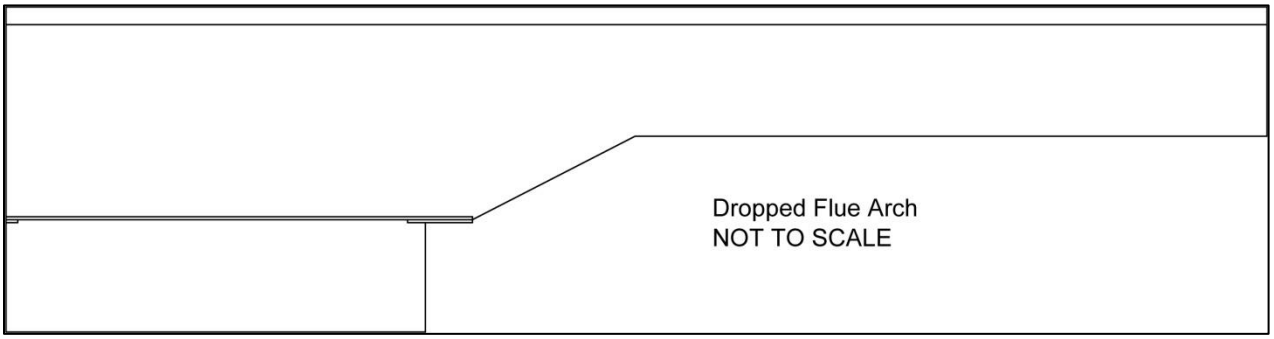
c. Slide the latch into the slot until the mounting hole in the latch is in line with the bolt holes in draft door. Ensure the "teeth" of the latch are pointed down. Insert the bolt through the bolt holes and the latch and tighten the nut.

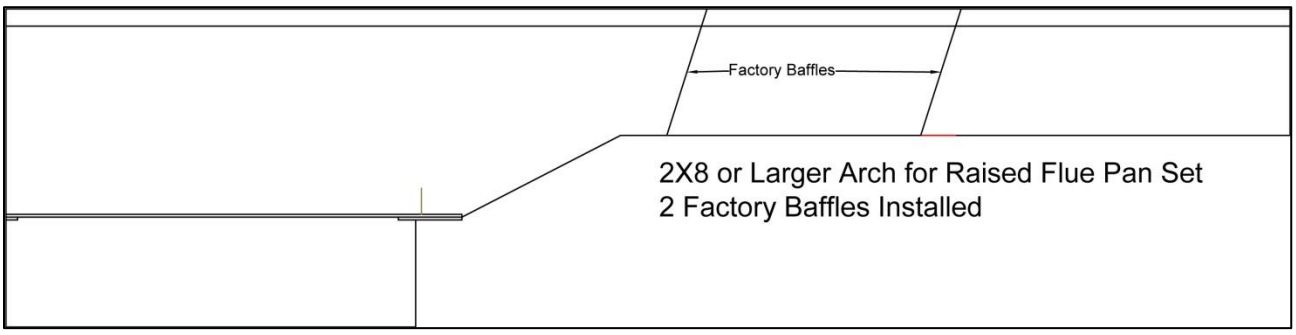
INSULATING THE ARCH:

General Notes



1. Prior to insulating the arch it is recommended high temperature caulking (ex. JACO Firestop Plus LEADER Order #65196) be used to seal all joints, rivets and bolts. This is to prevent sparks and smoke from exiting the arch.
2. Each of the presented drawings is accompanied by a table of approximate dimensions for cutting and fitting pieces. The ID for each piece to be cut can be cross referenced between the drawing and the table.
3. Layout of the insulation of the arch will be dependent on the type of evaporator pan set to be used. Arches are built for dropped flue and raised flue pan sets. The difference will be in the factory and user installation of baffles for the raised flue pan sets. Dropped flue pan sets do not use baffles. Raised flue pan sets have factory baffles installed. With the exception of a 2X6 (or smaller) arches for raised flue pans have 2 factory installed baffles. The diagrams below illustrate the arches:





4. Obtain the right number of 3000° fire bricks, refractory cement containers and insulation board:

NOTE: The quantities on the table are approximate usages. Actual quantities will vary depending on the actual techniques and layouts employed.

Dropped Flue

Arch	Half Bricks	Full Bricks	Insulation Board	Refractory Cement (30 lbs. buckets)
30 X 8	112	26	9	3
30 X 10	127	36	9	3
3X8	120	40	10	3
3X10	136	52	12	4
3 X 12	149	67	12	4
40 X 10	145	53	12	4
40 X 12	168	65	13	5
40 x 14	183	82	13	5
4 X 12	169	85	14	5
4 X 14	185	108	14	5
5 X 12	197	104	17	6
5 X 14	212	134	17	6
5 X 16	249	157	19	7
6X14	226	168	19	7
6 X 16	263	201	21	8

Raised Flue

Arch	Half Bricks	Full Bricks	Insulation Board	Refractory Cement (30 lbs. buckets)	Vermiculite (bags)
30 X 8	156	8	11	3	1
30 X 10	185	8	11	4	2
3X8	170	11	12	4	2
3X10	204	11	13	4	2
3 X 12	232	11	13	5	3
40 X 10	227	12	14	5	2
40 X 12	263	12	15	5	3
40 x 14	306	12	15	6	4
4 X 12	289	14	16	6	4
4 X 14	333	14	16	6	5
5 X 12	342	16	20	7	4
5 X 14	393	16	20	8	6
5 X 16	444	16	22	8	7
6X14	425	19	22	8	7
6 X 16	490	19	25	9	9

5. Begin by fitting the insulation board and bricks in the arch "dry" (no cement). This will allow you to cut and fit all the insulation board and bricks into the arch so the cementing can be done in one continuous application.

NOTE: The use of a wet saw or masonry blade in a circular saw is recommended to cut the bricks where required.

NOTE: The use of a mini hacksaw is suggested for cutting the insulation board.

The following sections are the outline for the preparing and sequencing of the fitting of the insulation board and brick into the arch. Adjustments to shown sizes will be required as the installation proceeds. The rule of "*Measure twice and cut once*" will reduce waste in fitting the pieces. As you go through each of the following pages, cut, "dry fit" then cement the parts into place.

When fitting pieces in the arch there will be bolts and rivets where the pieces are being fit. In order to properly fit for the bolts and rivets either:

- Measure the locations on the sheet and cut out the necessary area for clearance of the rivets/bolts

OR

- Place the sheet in position and press it against the rivets/bolts in order to mark the rear of the sheet then cut out the marked area to allow for clearance of the rivets/bolts.

NOTE: Insulating sheets at the top of the arch are cut may leave a ¾" gap between the sheet top and the bottom of the arch rail. If this occurs, after the cement has dried, fill the gap with rail gasket material.

Cementing of Insulation Board and Bricks

1. Skim coat a layer of refractory cement to the inside arch wall covering the approximate area of the piece of arch board to be mounted. Place the board against the cement.
2. The cement does not need to dry prior to installing the bricks.
3. To install brick, skim coat the rear of the brick and apply a heavier coat to the sides of the brick. Place it into position. As more bricks are added the cement will be forced from the joints. Scrape and smooth off the excess cement. Make sure all openings between the bricks are filled with cement..
4. Allow the cement to dry for 36 hours at room temperature (65°F or higher).

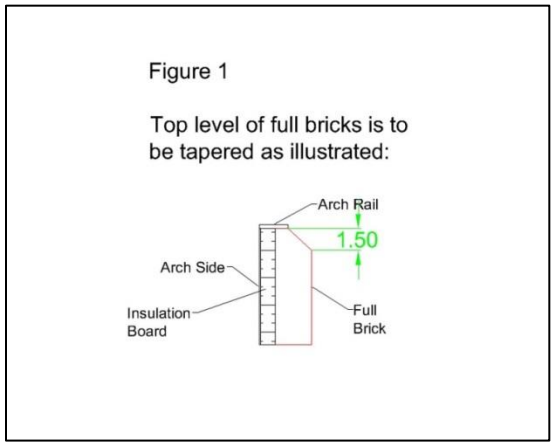
NOTE: THE LAYOUTS AND DIMENSIONS PRESENTED IN THE FOLLOWING PAGES ARE FOR USE AS GUIDELINES. ALWAYS MEASURE AND"DRY FIT" BOARD AND BRICKS PRIOR TO FINAL PLACEMENT.

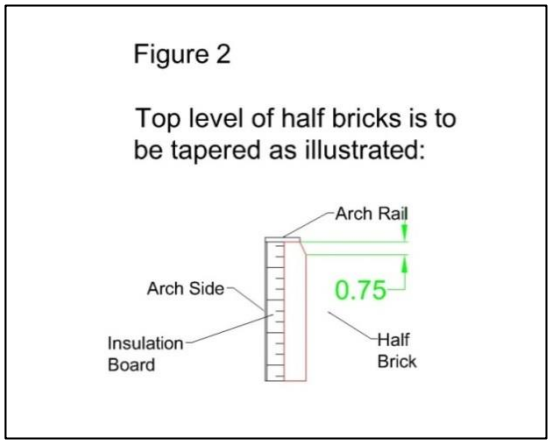
Bricks

In the drawings standard bricks are labelled as follows:

LABEL	BRICK TYPE
FB	Full Brick (9" X 4.5" X 2.5")
HFB	Half a Full Brick (4.5" X 4.5" X 2.5")
HB	Half Thickness Brick(9" X 4.5" X 1.25")
HHB	Half a Half Thickness Brick (4.5" X 4.5" X 1.25")

The top row of bricks should be cut so they do not prevent the heat from reaching the pans. The bricks will need to be tapered on the top. See the illustration below.





Insulating the incline of arches >24" in width

1. Measure the length of the grate add ½" to the length of the grate (Measurement A)
2. Measure the distance from inside the cast front to the front of the rear grate shelf (Measurement B).
3. Subtract Measurement B from Measurement A. The result is the amount required to be left open on the rear grate shelf.

Standard Wood Fired Arch Design

Leader standard wood fired arches have two different overall designs. They are divided by widths; 24" and greater than 24". The generalized designs are shown in the following pictures.

Two Foot Wide Front

Two Foot Wide Rear

Over Two Foot Wide Style Front

Over Two Foot Wide Style Rear

Considerations For A MAX/COMBO Flue Pan

In order to properly direct the heat into the flues of a MAX/COMBO flue pan, additional bricking must be added to form baffles at certain locations.

Baffles should be located as indicated in the following table. The measurements are from the front of the stack collar to the front of the brick baffle.

Flue Pan Length (FT)	Qty of Baffles	Location of Baffles (inches in front of stack collar)		
3	1	20		
4	2	20	30	
5	2	20	42	
6	2	20	54	
7	2	20	66	
8	3	20	50	78
9	3	20	56	90
10	3	20	62	102

1. Extra full thickness bricks will need to be ordered to add the baffles. The table below lists the number of bricks needed to add a baffle for each width of arch. Determine the number of baffles to be added and multiply with the number of bricks per baffle in the table

ARCH WIDTH (INCHES)	QUANTITY OF BRICKS PER BAFFLE
24	3
3	3
36	4
40	4
48	5
60	6
72	7

2. Begin by bricking the arch as described for a dropped flue arch.
3. At the locations specified in the table run a row of full thickness bricks across the arch.
    a. The front of the row of bricks will be at the location specified in the table.
    b. The bricks should be laid face down on the bricks on the floor of the arch.

Insulating a Drop Flue Arch

Insulating an Over 2 Foot Wide Arch Using a 3 Foot Wide Arch Example

In the following sections a general description and illustration of the areas to be insulated (insulation board or brick) is provided. Following the general information there is a specific example based on a 3X8 arch.

The order of insulation is as follows:

1. INSULATION BOARD
    a. Front
    b. Rear
    c. Left Side
    d. Right Side
    e. Ash Pit Rear
    f. Incline

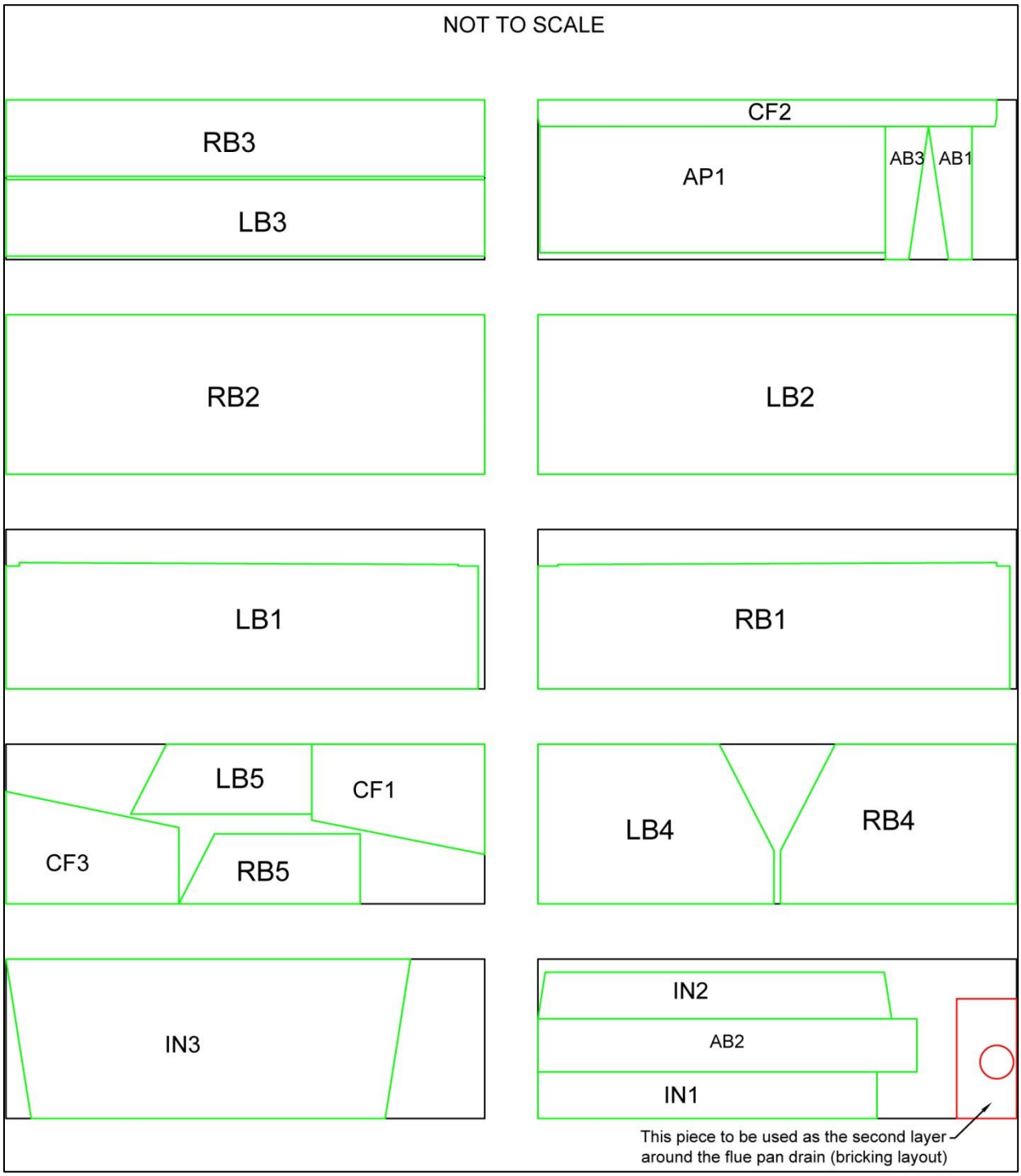
2. BRICKING
    a. Rear Floor
    b. Left Side
    c. Right Side
    d. Ash Pit Rear
    e. Install the Grates
    f. Incline
    g. Front

Insulation Board

Example Cutout Diagram

As insulation boards are cut and fit into the arch, cut and fit reamining pieces to best use the insulation board with the least waste. For example, two (2) small pieces can be used instead of one (1) large piece.

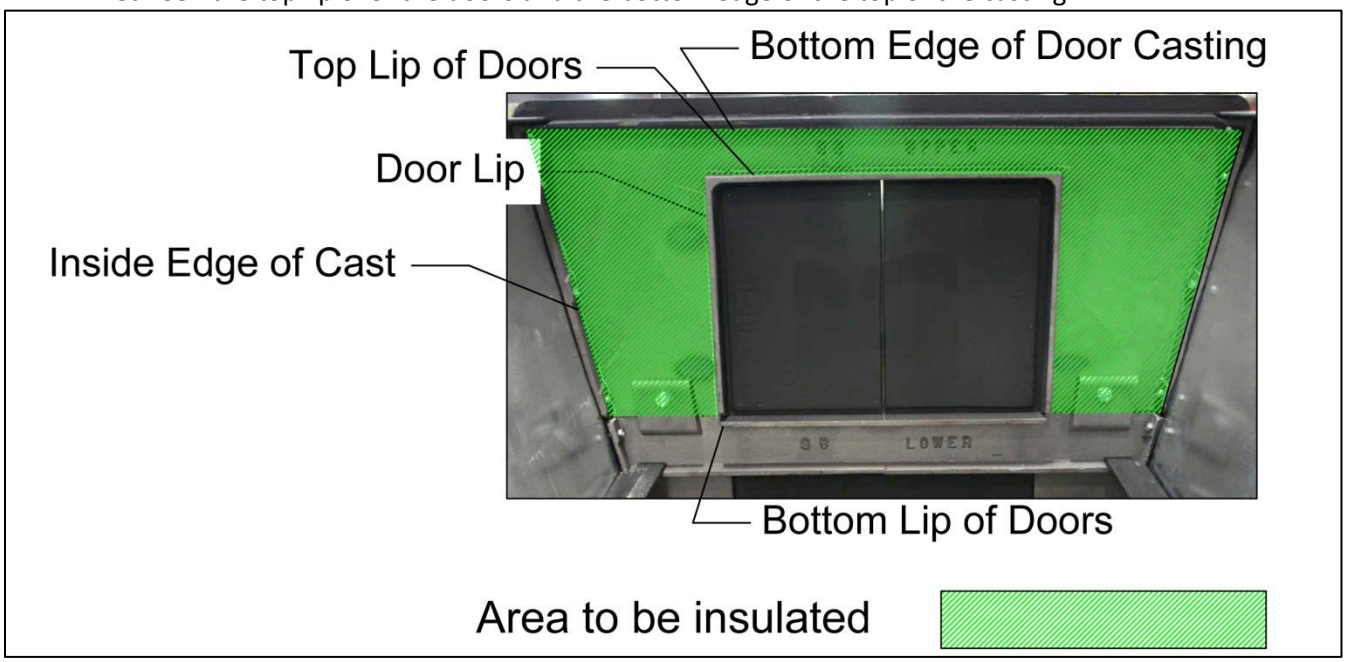
The following is a suggested layout of the insulation board for the 3 foot wide example arch. The sizes for each piece can be found on the section diagrams of the arch.



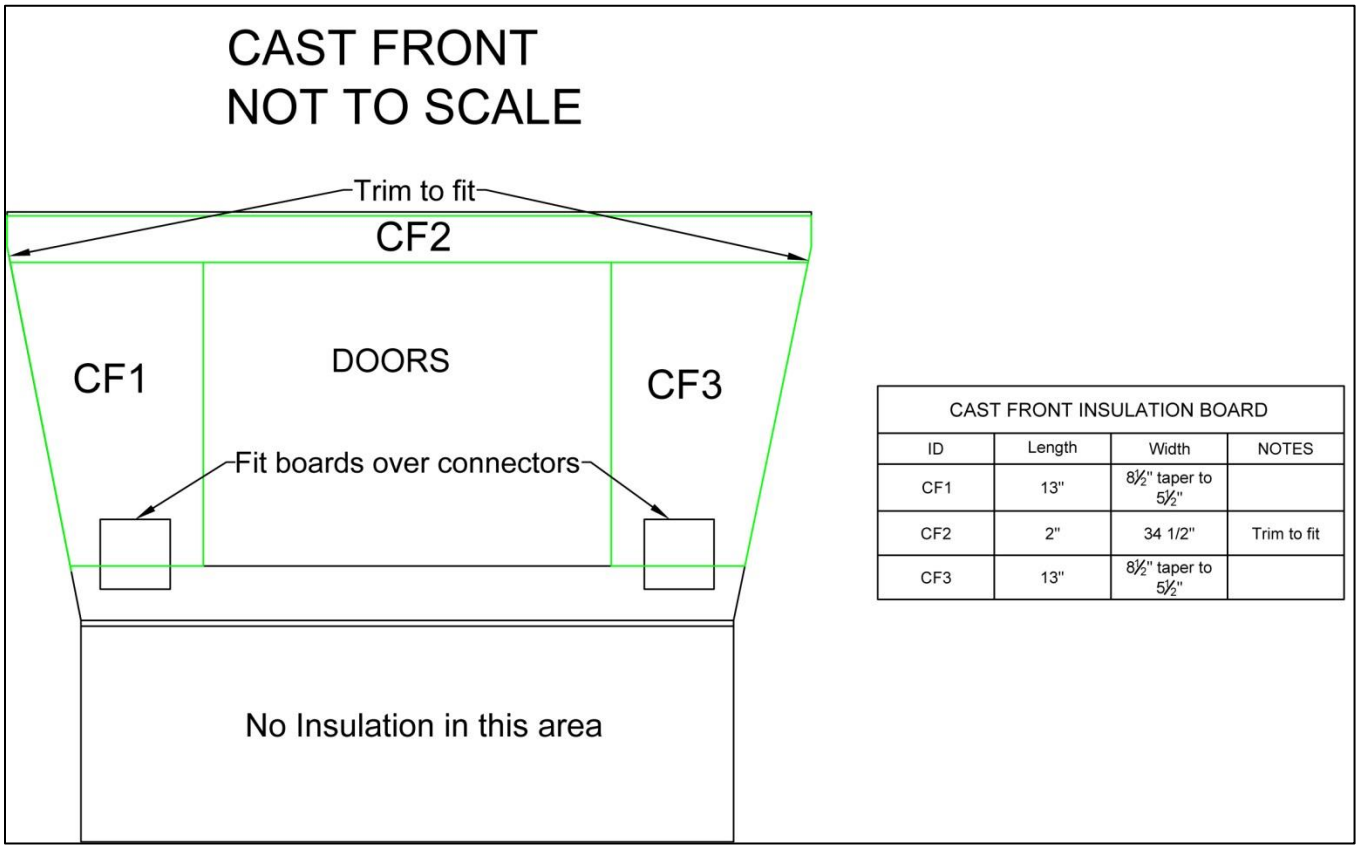
Front

The insulation board for the cast front covers the area;

- Starting at the level of the bottom lip of the doors
- Between the lips on either side of the doors to the inside edges of the cast front
- Between the top lip over the doors and the bottom edge of the top of the casting.



3 X 8 EXAMPLE

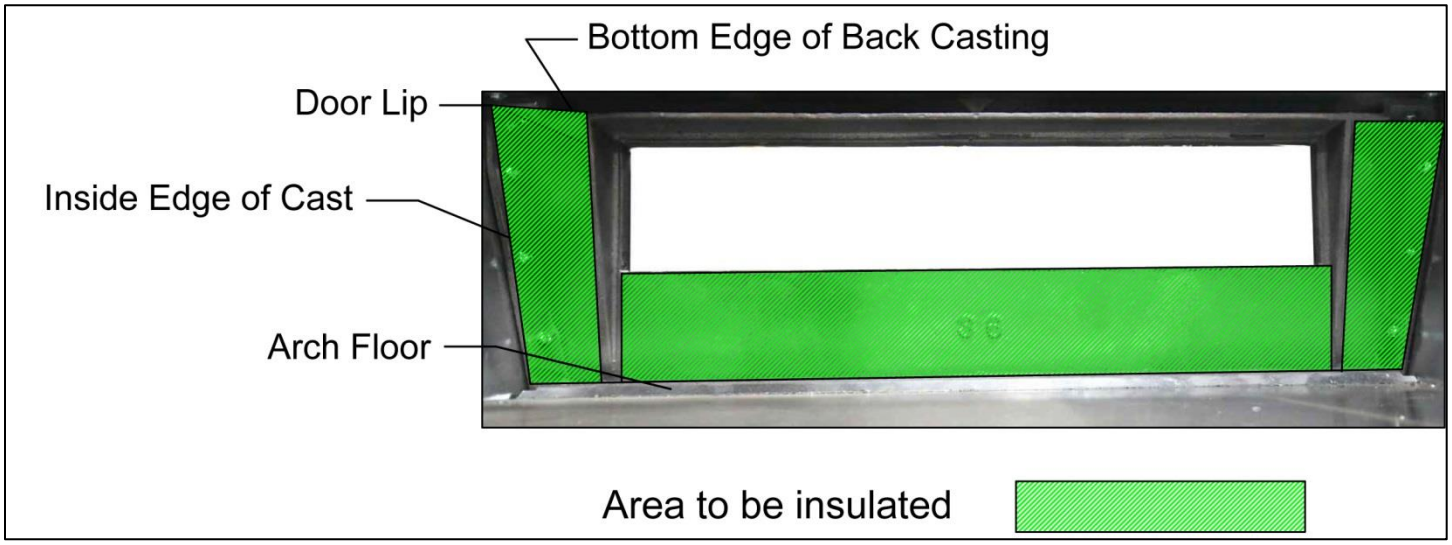


CAST FRONT INSULATION BOARD			
ID	Length	Width	NOTES
CF1	13"	8½" taper to 5½"	
CF2	2"	34 1/2"	Trim to fit
CF3	13"	8½" taper to 5½"	

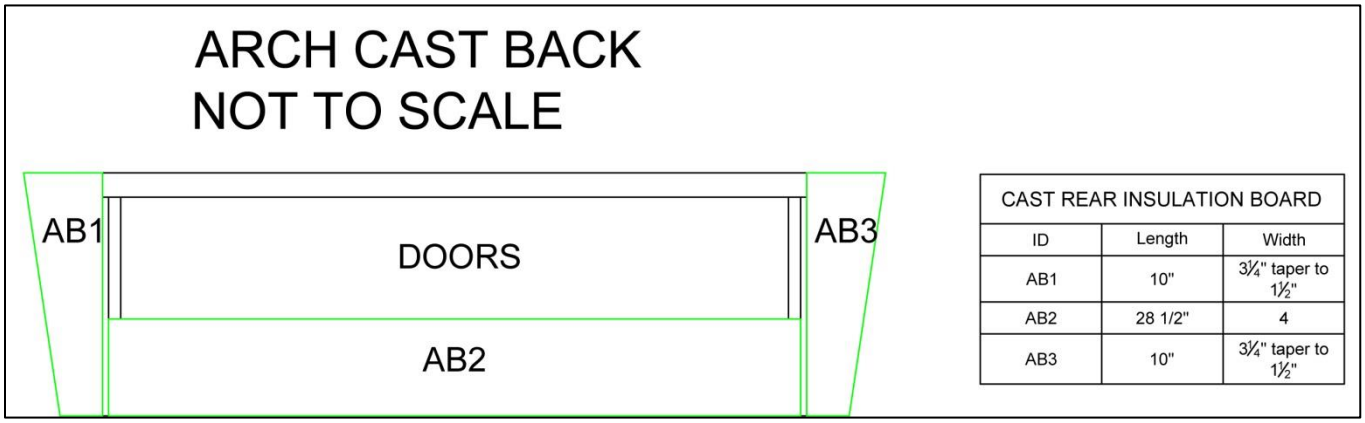
Back

The insulation board for the cast back covers the area;

- Form the arch floor to the bottom edge of the doors
- From the lip of the doors to the inside edge of the casting



3 X 8 EXAMPLE

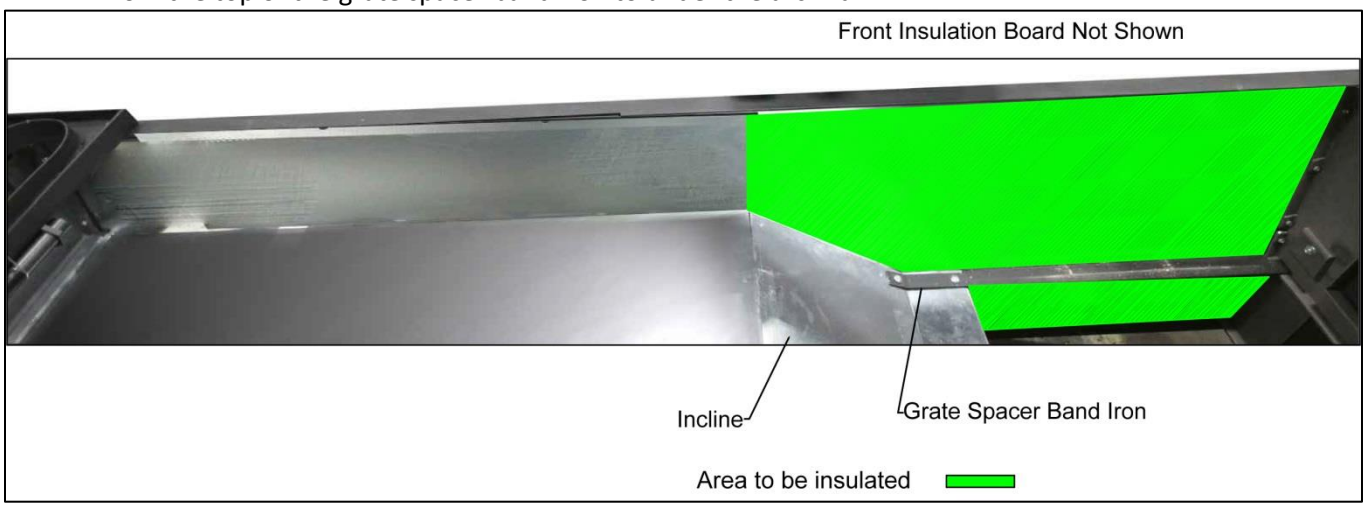


CAST REAR INSULATION BOARD		
ID	Length	Width
AB1	10"	3¼" taper to 1½"
AB2	28 1/2"	4
AB3	10"	3¼" taper to 1½"

Left Side

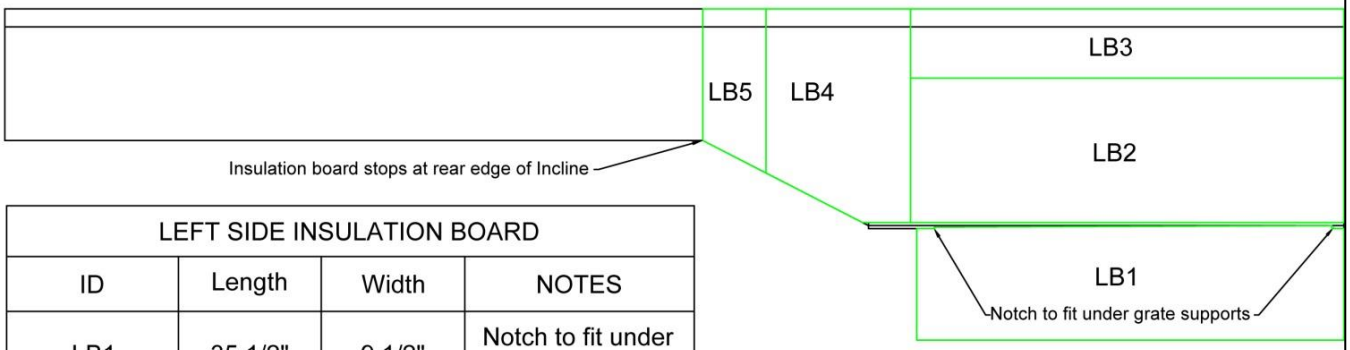
Insulation board on the sides of the arch is fit to the side of the arch. The insulation board should cover;

- From the insulation board in the cast front to the top of the incline
- From the bottom angle iron of the ash pit to under the grate spacer band iron
- From the top of the grate spacer band iron to under the arch rail



3 X 8 EXAMPLE

LEFT SIDE
Drawing with sides not slanted
NOT TO SCALE



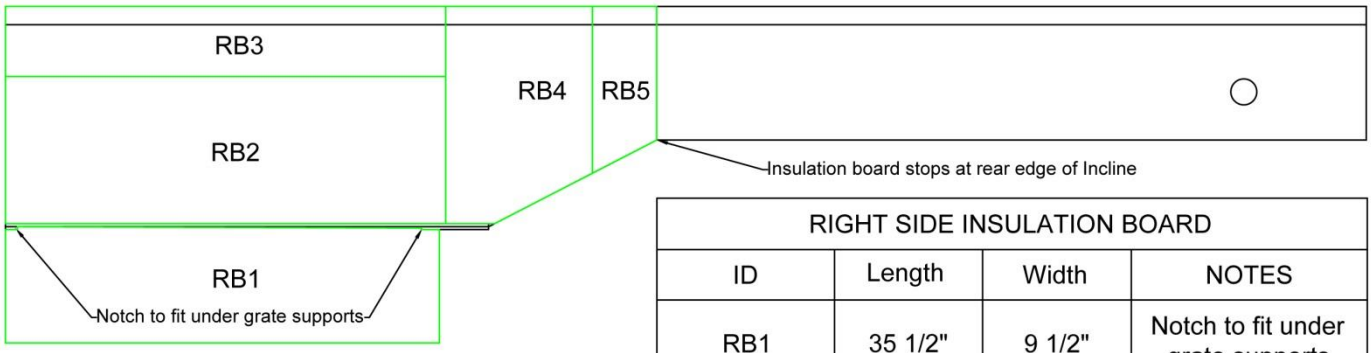
LEFT SIDE INSULATION BOARD			
ID	Length	Width	NOTES
LB1	35 1/2"	9 1/2"	Notch to fit under grate supports
LB2	36"	12"	
LB3	36"	5 3/4"	
LB4	17¾" taper to 13½"	12"	
LB5	13½" taper to 11"	5 1/4"	

Right Side

3 X 8 EXAMPLE

RIGHT SIDE
Drawing with sides not slanted
NOT TO SCALE

The flue pan drain cutout is approximately 2⅛" in diameter with the center of the hole located 7⅞" below the front edge of the collar. This cutout could be located on the Left Side dependent on the arch specification. Verify all measurements.

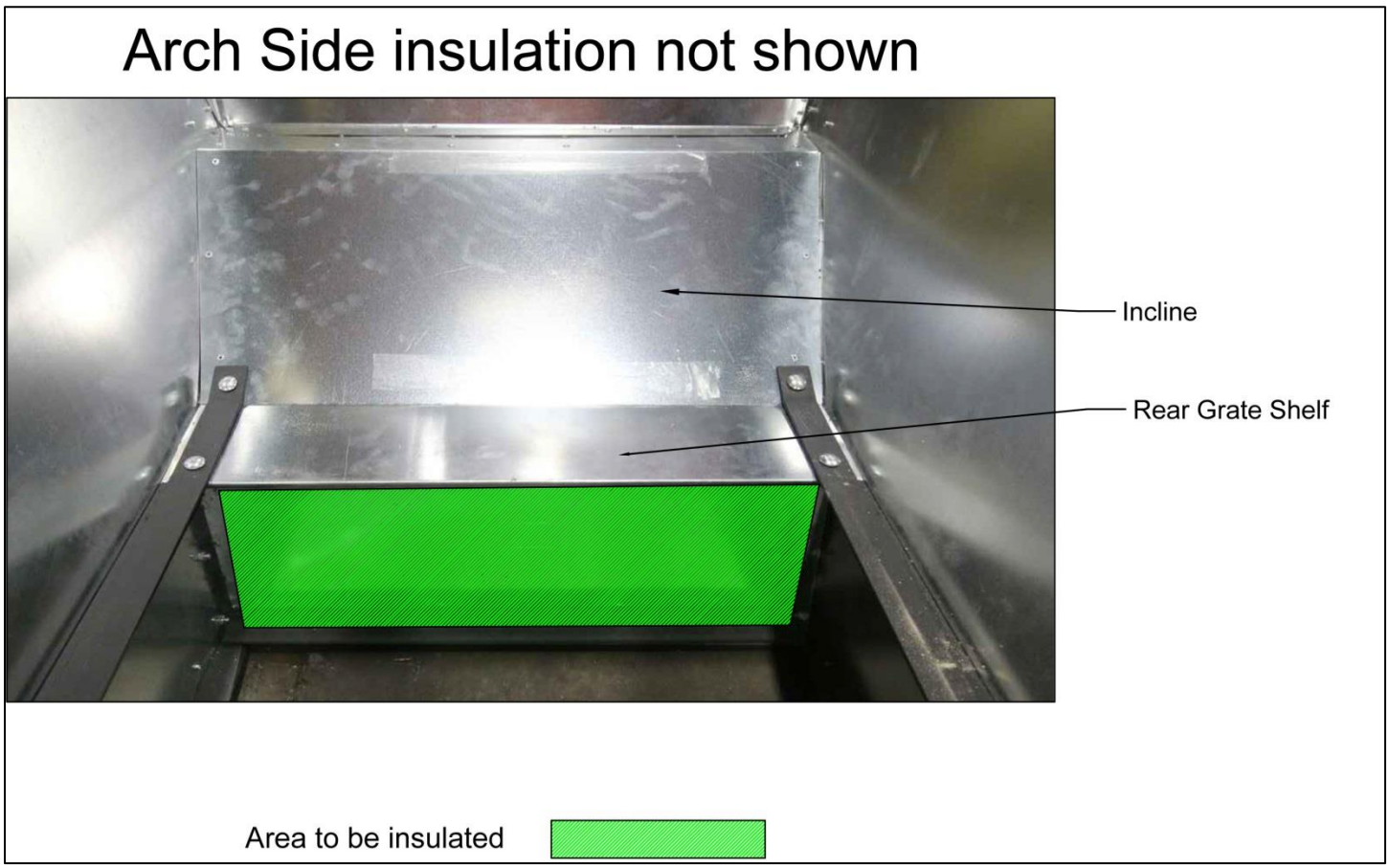


RIGHT SIDE INSULATION BOARD			
ID	Length	Width	NOTES
RB1	35 1/2"	9 1/2"	Notch to fit under grate supports
RB2	36"	12"	
B3	36"	5 3/4"	
RB4	17¾" taper to 13½"	12"	
RB5	13½" taper to 11"	5 1/4"	

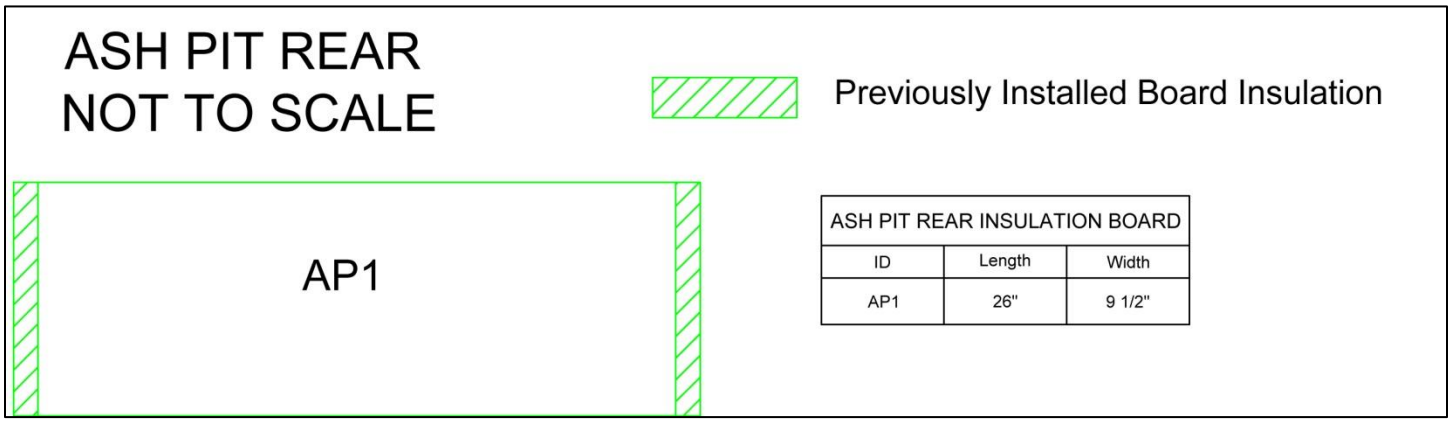
Ash Pit Rear

The insulation board should cover:

- From the bottom of the arch frame under the rear grate shelf to under the edge of the rear grate shelf
- Between the insulation board on each side of the arch



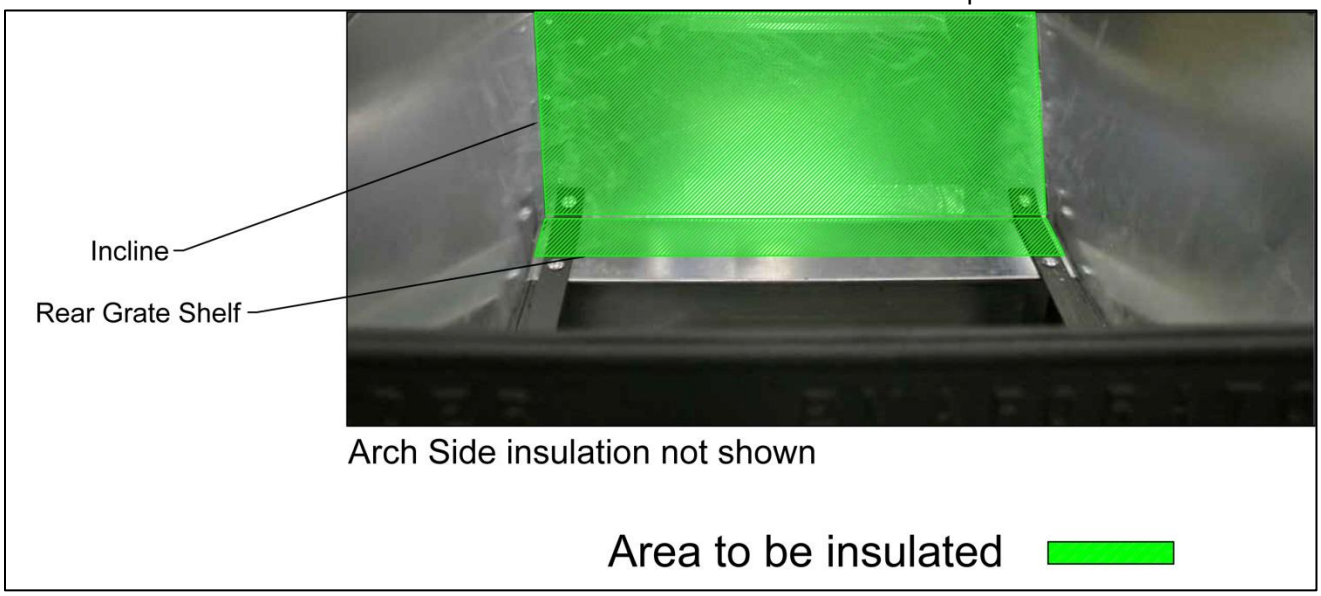
3 X 8 EXAMPLE



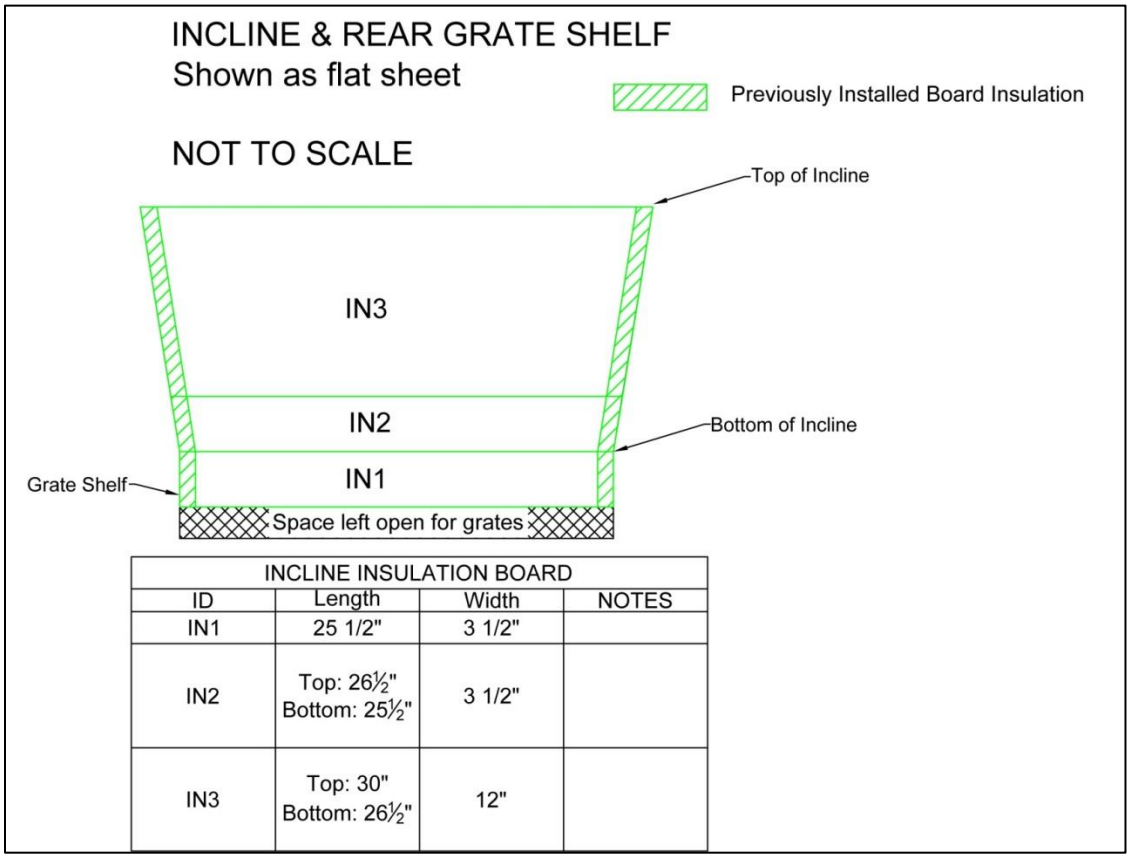
Incline

The insulation board for this section will need to be fit to the tapers of the walls and should cover;

- The rear grate shelf
  - From the area for the grates to the bottom of the incline
  - From the insulation board on one side of the arch to the other
- The incline
  - From the insulation board on the rear grate shelf to the top of the incline
  - From the insulation board on one side of the arch to the other tapered to meet the sides



3 X 8 EXAMPLE



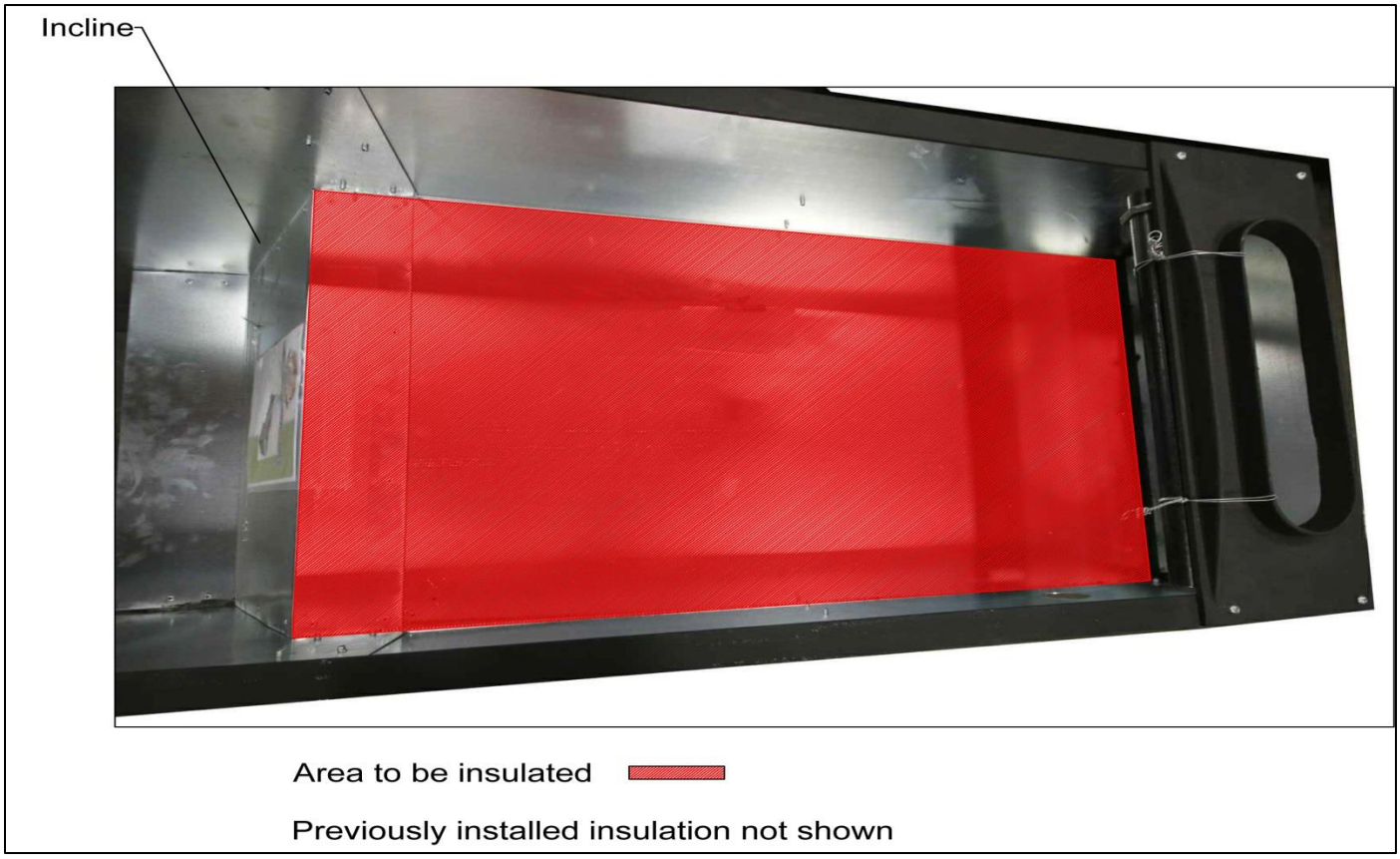
INCLINE INSULATION BOARD			
ID	Length	Width	NOTES
IN1	25 1/2"	3 1/2"	
IN2	Top: 26½" Bottom: 25½"	3 1/2"	
IN3	Top: 30" Bottom: 26½"	12"	

Bricking

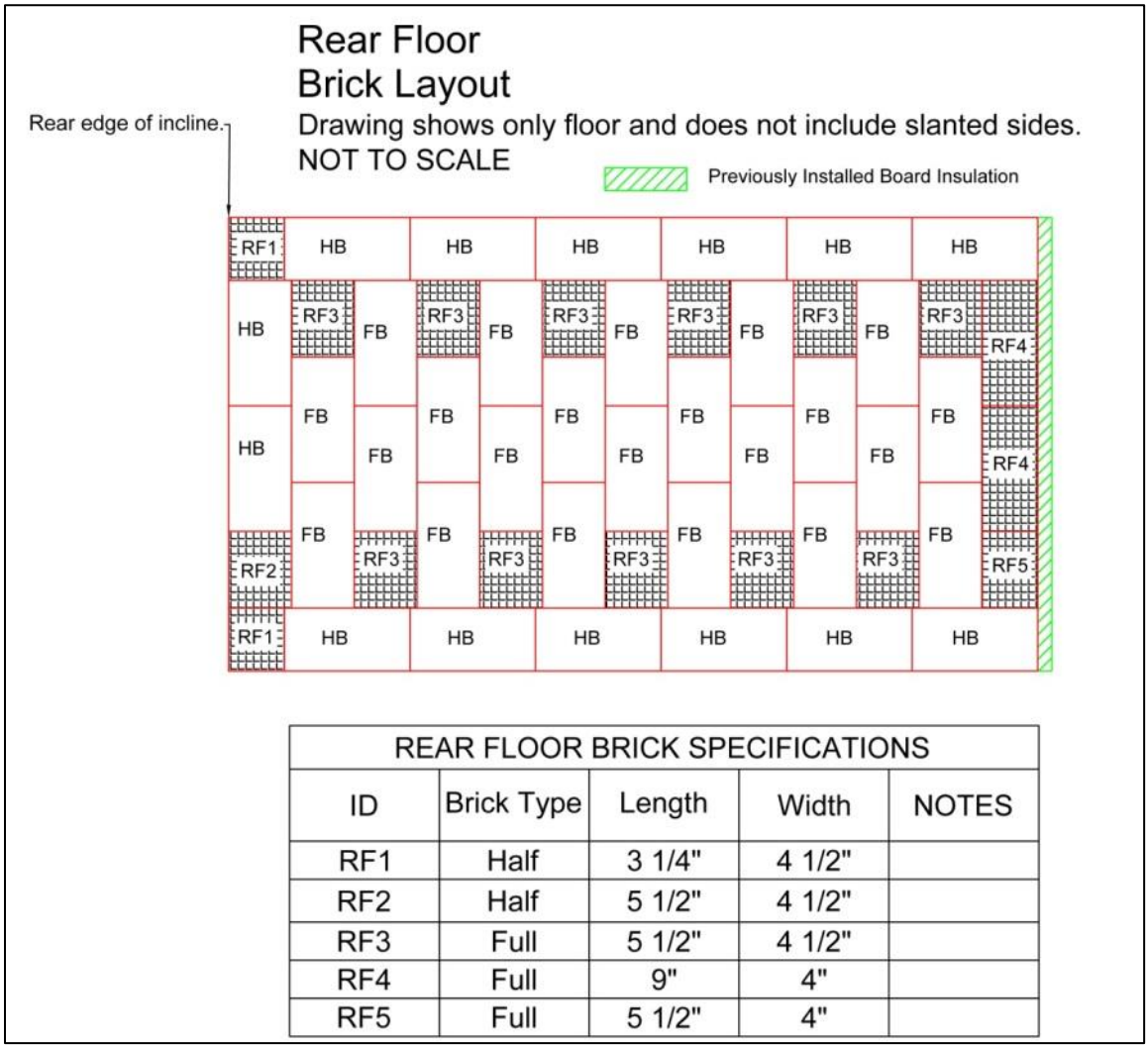
Rear Floor

The bricks to be used here are a combination of half thickness and full thickness bricks. All bricks should be laid face down toward the arch floor. Brick as follows;

- Starting under the collar at the rear of the arch lay a half thickness brick lengthwise along the side of the arch and against the insulation in the cast back.
- Continue to lay bricks against the side until the brick at the top of the incline is reached. Fit the last brick to the brick at the top of the incline.
- Line both sides of the arch in the same manner.
- At the top of the incline, fit a row of half thickness bricks parallel to the top of the incline.
- Complete bricking the floor between the bricks on the sides by fitting and laying rows of full thickness bricks.



3 X 8 EXAMPLE

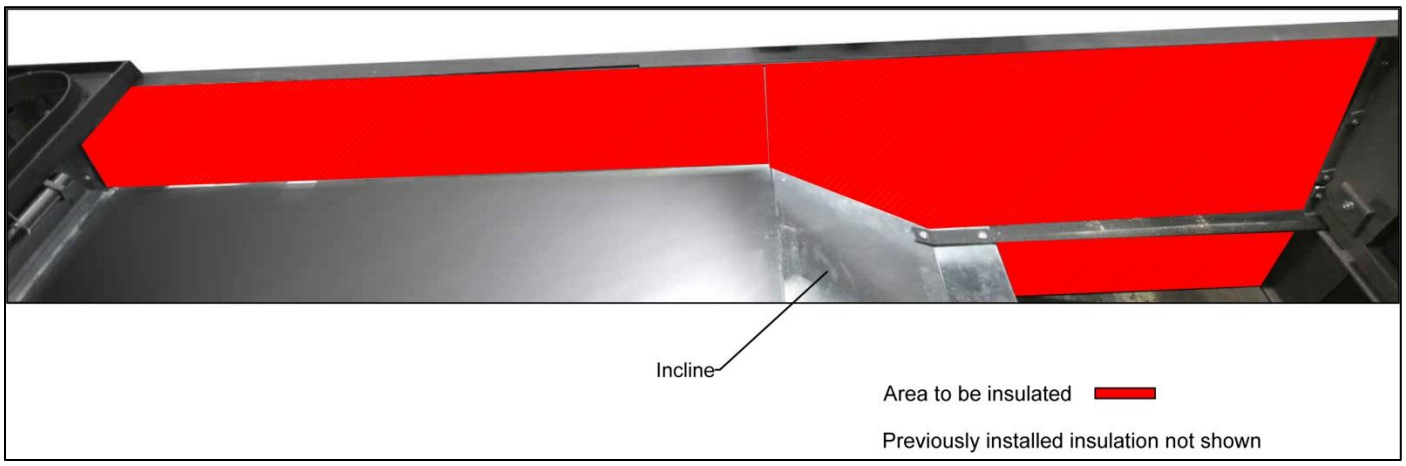


REAR FLOOR BRICK SPECIFICATIONS				
ID	Brick Type	Length	Width	NOTES
RF1	Half	3 1/4"	4 1/2"	
RF2	Half	5 1/2"	4 1/2"	
RF3	Full	5 1/2"	4 1/2"	
RF4	Full	9"	4"	
RF5	Full	5 1/2"	4"	

Left Side

Arch Sides (left and right) - The bricks to be used on the sides are half thickness bricks. Brick as follows;

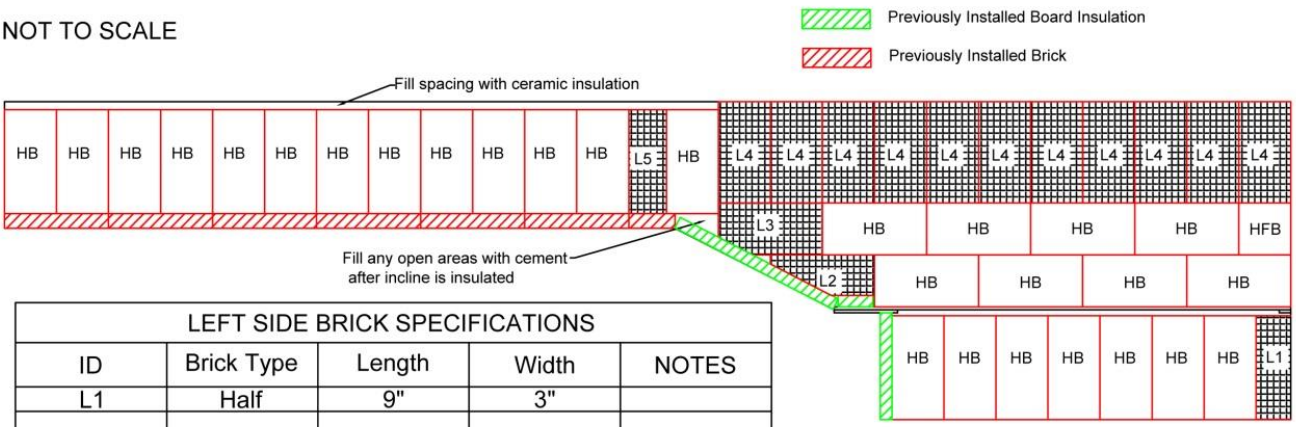
- Stand half bricks on end on the angle iron in the bottom of the ash pit. Bricks should be against the insulation board on the side of the arch. Start at the rear of the ash pit and work toward the front.
- Lay a brick lengthwise on the grate spacer band iron and against the insulation in the front casting.
- Continue the row toward the rear of the arch, fitting the last brick to the incline.
- Start the second row of bricks with a brick cut in half (4 ½" X 4 ½") so the brick rows will be staggered.
- Continue staggering rows until the top of the row of bricks is approximately 9" below the underside edge of the arch rail
- Starting against the cast front fit a brick on edge between the top of the last row and bricks and the bottom of the arch rail. Ensure the top edge of the bricks are tapered (see page 14)
- Starting against the cast front fit a brick on edge between the top of the last row and bricks and the bottom of the arch rail.
- Continue with this row until the top of the incline is reached.
- Starting against the cast back, place a brick on end on the brick on the floor. The brick should be set vertically and not against the wall.
- Continue placing bricks in this manner until the brick at the front of the incline is reach. Fit a piece of brick to complete the wall.
- If space remains between the top of the vertical brick and the bottom edge of the arch rail, fill with rail gasket



3 X 8 EXAMPLE

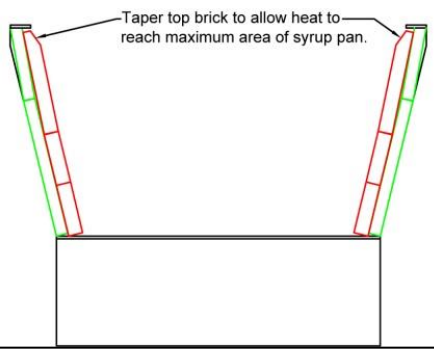
LEFT SIDE
Drawing with sides not slanted

NOT TO SCALE



LEFT SIDE BRICK SPECIFICATIONS				
ID	Brick Type	Length	Width	NOTES
L1	Half	9"	3"	
L2	Half	9" taper to 3 1/2"	4 1/2"	
L3	Half	9" taper to 6"	4 1/2"	
L4	Half	8 3/4"	4 1/2"	
L5	Half	9"	3 1/4"	

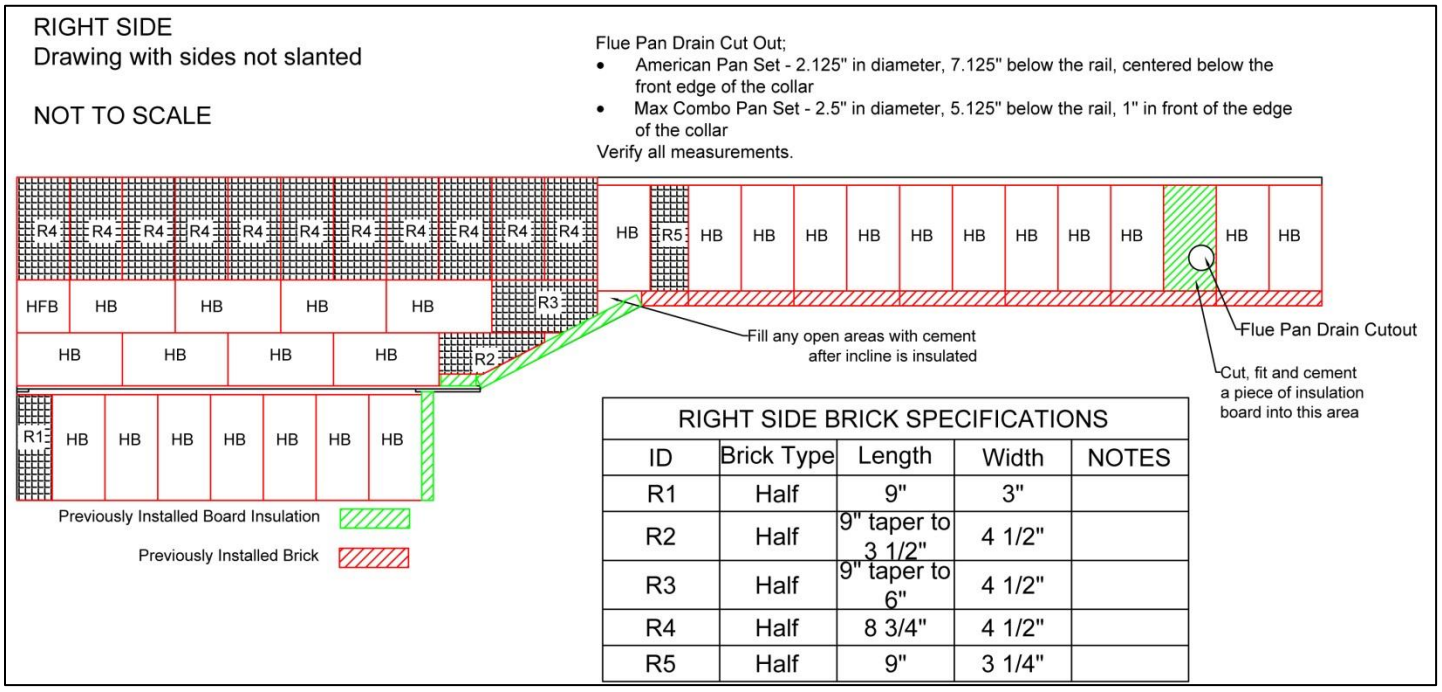
Firebox Cross Section



Rear Cross Section

Right Side

3 X 8 EXAMPLE



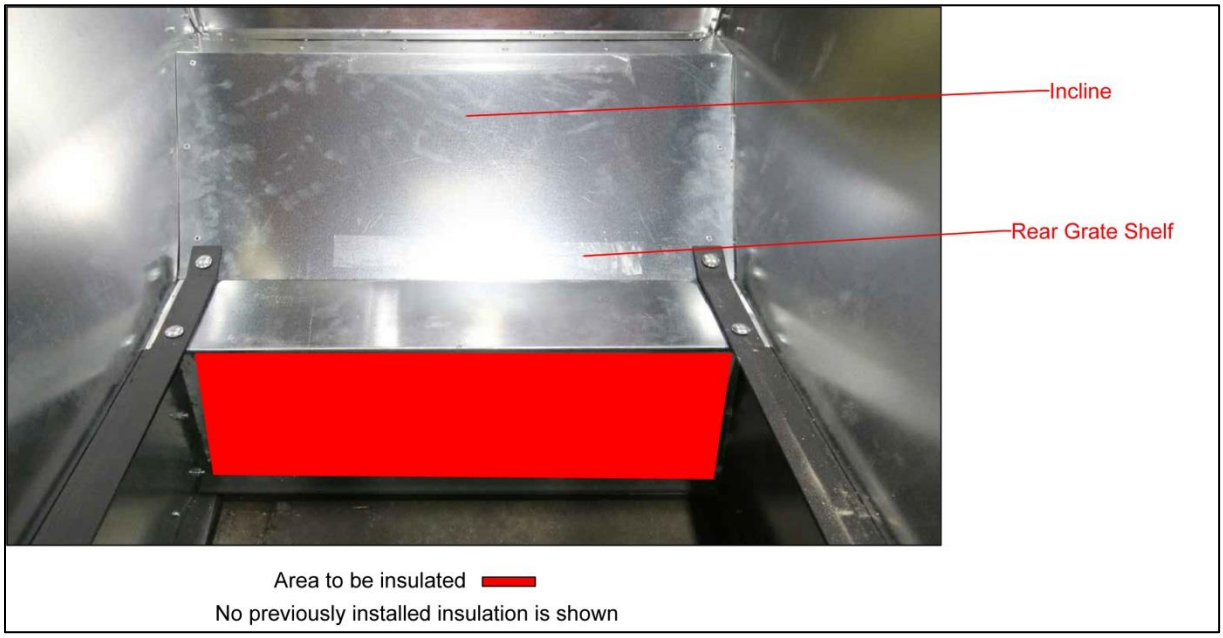
RIGHT SIDE BRICK SPECIFICATIONS

ID	Brick Type	Length	Width	NOTES
R1	Half	9"	3"	
R2	Half	9" taper to 3 1/2"	4 1/2"	
R3	Half	9" taper to 6"	4 1/2"	
R4	Half	8 3/4"	4 1/2"	
R5	Half	9"	3 1/4"	

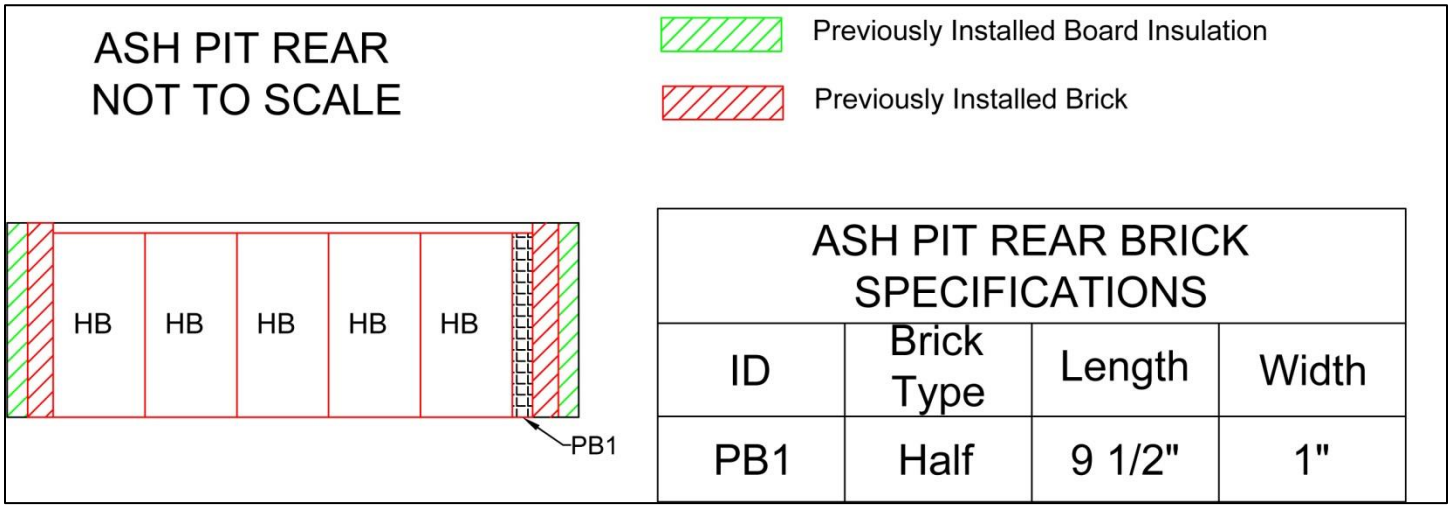
Ash Pit Rear

The bricks to be used are half thickness bricks. Brick as follows;

- Place a brick on end on the angle iron at the bottom of the ash pit and against the insulation on the side of the arch.
- Continue to place bricks until the other side of the arch is reached. Fit the last brick against the side of the arch.

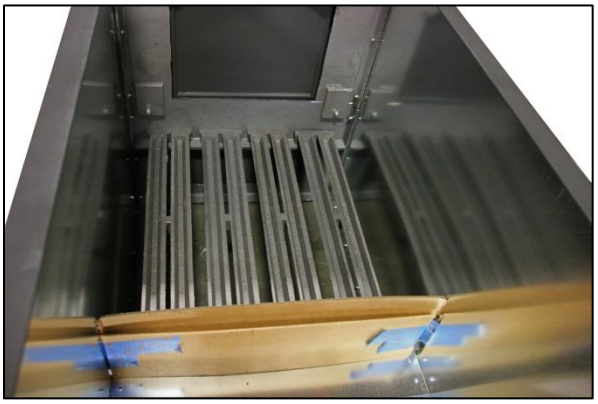


3 X 8 EXAMPLE



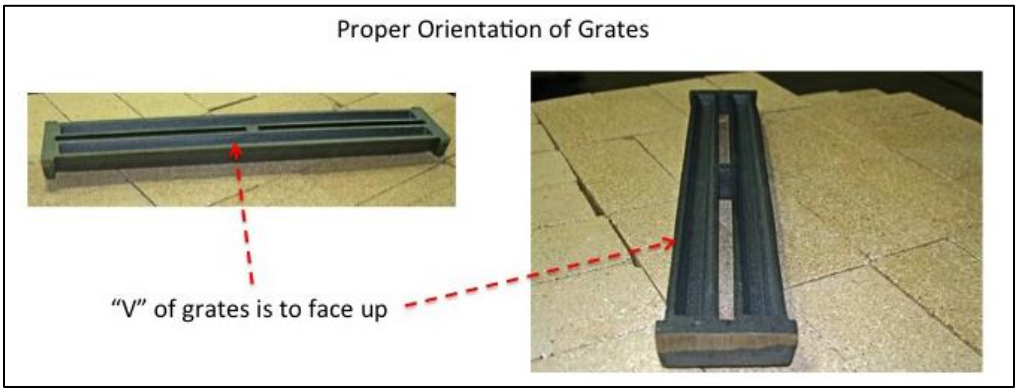
ASH PIT REAR BRICK SPECIFICATIONS			
ID	Brick Type	Length	Width
PB1	Half	9 1/2"	1"

Install the Grates



Place the arch grates evenly spaced into the arch with the grates touching the front of the arch- Obtain a piece of “C flute” cardboard (most common type of cardboard) approximately the width of the grate shelf x 12” in height. Fold it into thirds along the length and tape with a non-plastic tape (ex. masking tape). Place it behind the grates toward the rear of the arch. The cardboard will provide the spacing needed to remove the grates after the bricks have been fit in place. The cardboard does not need to be removed as it will be consumed during the first firing of the arch.

PROPER ORIENTATION OF GRATES

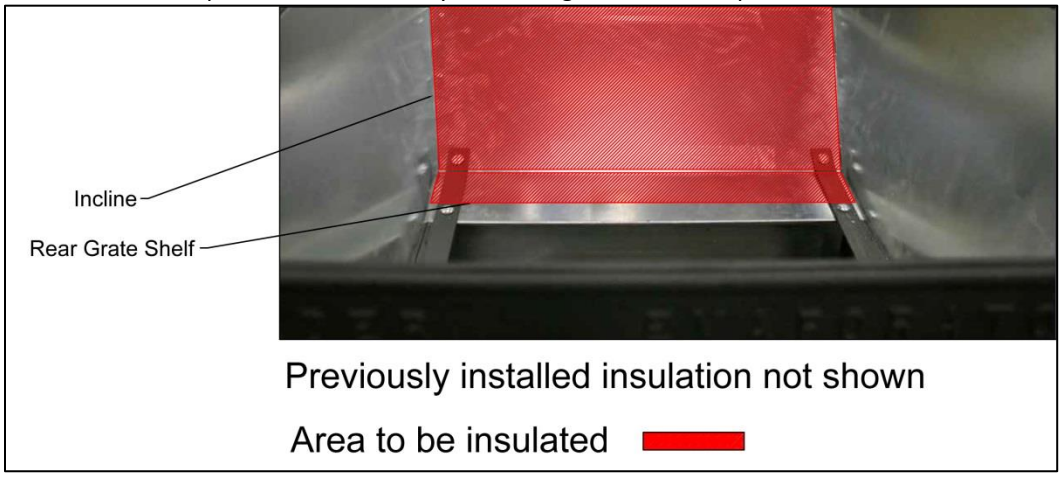


Grates should be installed so the “V” groove is up. In other words the opening of the “V” will be in a position to catch and fill with ashes.

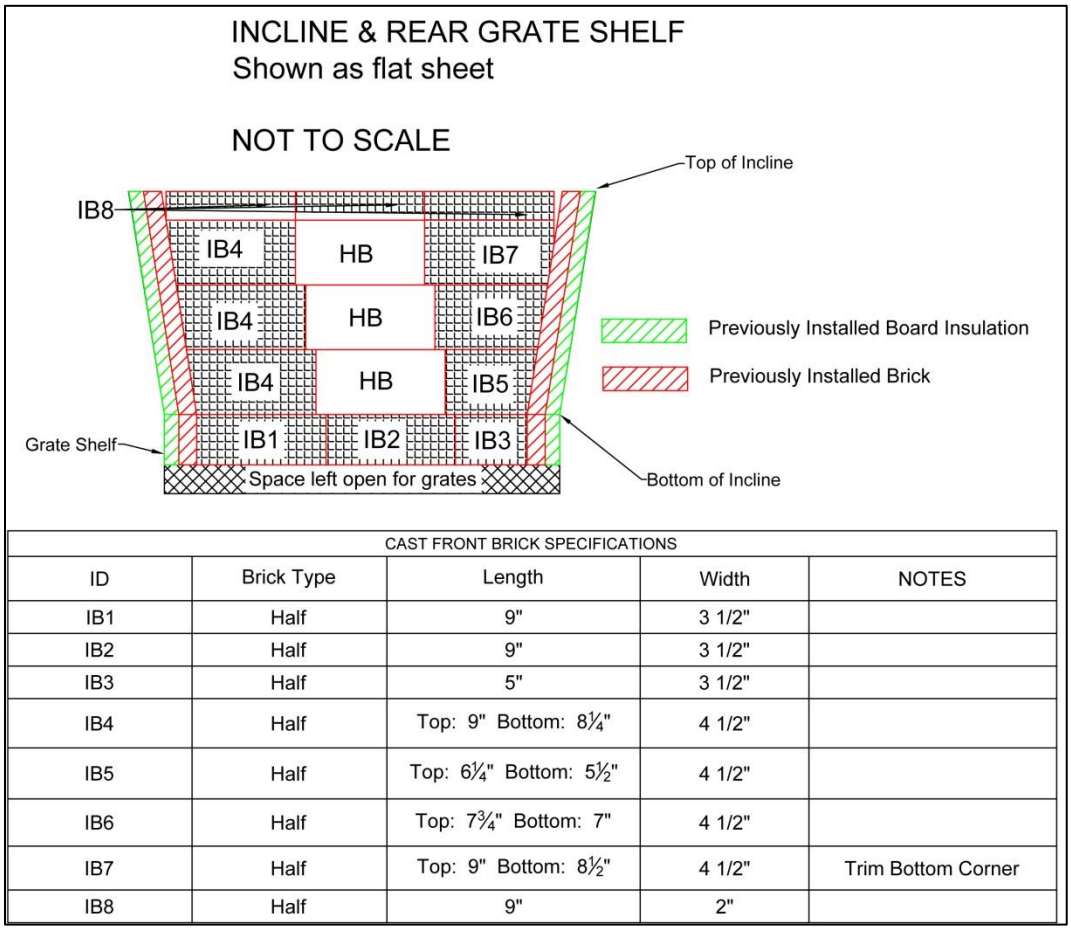
Incline

The bricks to be used in this section are half thickness bricks. Brick as follows;

- On the grate support shelf, beginning at the cardboard behind the grates, fit bricks between the cardboard and the bottom of the incline and between the insulation on the sides of the arch.
- Beginning at the brick on the grate support shelf, fit a brick to the angle of the side.
- Place a full length brick(s) until the other side of the arch is reached. Fit a brick to the angle of the side of the arch.
- Continue to the top of the incline fitting rows of brick as described above.
- Cut the top row of bricks so they are not higher than the top of the incline.



3 X 8 EXAMPLE

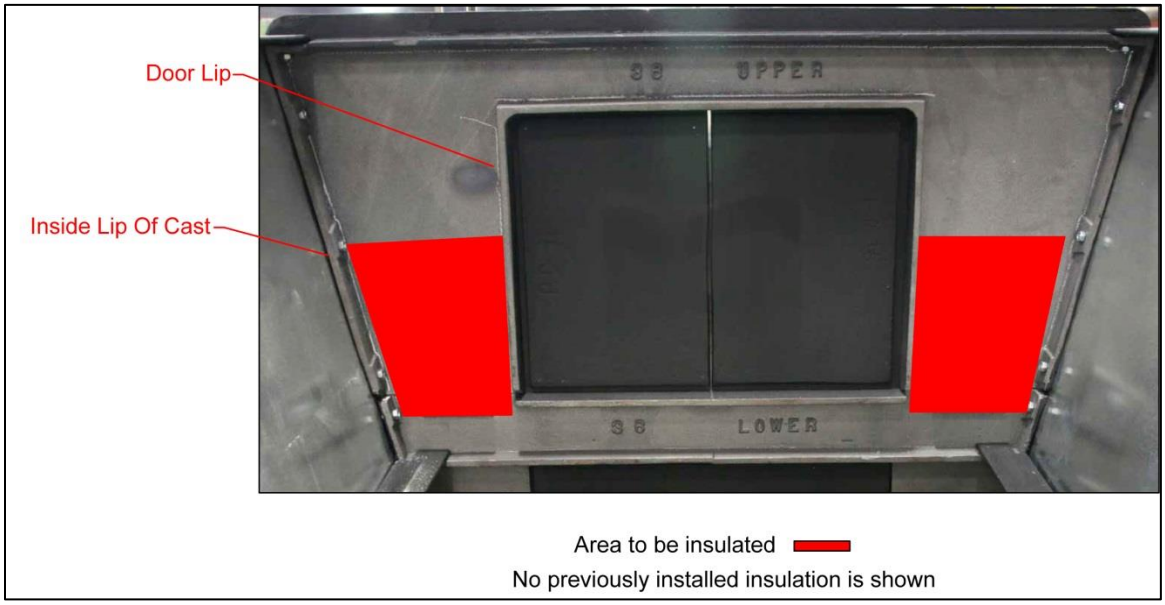


CAST FRONT BRICK SPECIFICATIONS				
ID	Brick Type	Length	Width	NOTES
IB1	Half	9"	3 1/2"	
IB2	Half	9"	3 1/2"	
IB3	Half	5"	3 1/2"	
IB4	Half	Top: 9" Bottom: 8¼"	4 1/2"	
IB5	Half	Top: 6¼" Bottom: 5½"	4 1/2"	
IB6	Half	Top: 7¾" Bottom: 7"	4 1/2"	
IB7	Half	Top: 9" Bottom: 8½"	4 1/2"	Trim Bottom Corner
IB8	Half	9"	2"	

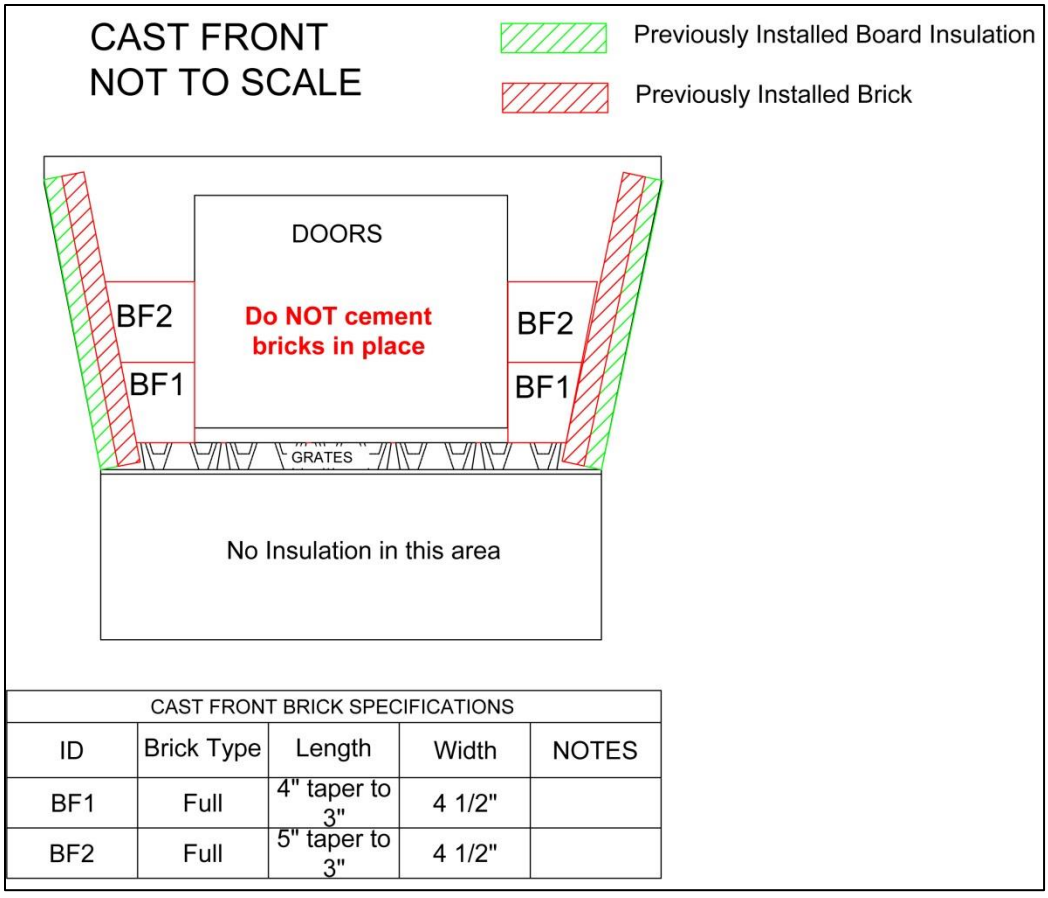
Front

The bricks to be used in this section are full thickness bricks. **NOTE: Bricks are NOT to be cemented in place**. Brick as follows;

- Fit a brick lengthwise and on edge between the door lip and the inside lip of the cast.
- Place a second brick lengthwise on edge on the first, again fitting the brick between the door lip and the inside lip of the cast.



3 X 8 EXAMPLE



CAST FRONT BRICK SPECIFICATIONS				
ID	Brick Type	Length	Width	NOTES
BF1	Full	4" taper to 3"	4 1/2"	
BF2	Full	5" taper to 3"	4 1/2"	

Insulating a Raised Flue Arch (Not Max Combo)

Insulating an Over 2 Foot Wide Arch Using a 3 Foot Wide Arch Example

In the following sections a general description and illustration of the areas to be insulated (insulation board or brick) is provided. Following the general information there is a specific example based on a 3X8 arch.

The order of insulation is as follows:

1. INSULATION BOARD
    a. Front
    b. Rear
    c. Left Side
    d. Right Side
    e. Ash Pit Rear
    f. Rear Grate Shelf to Top of Front Factory Baffle

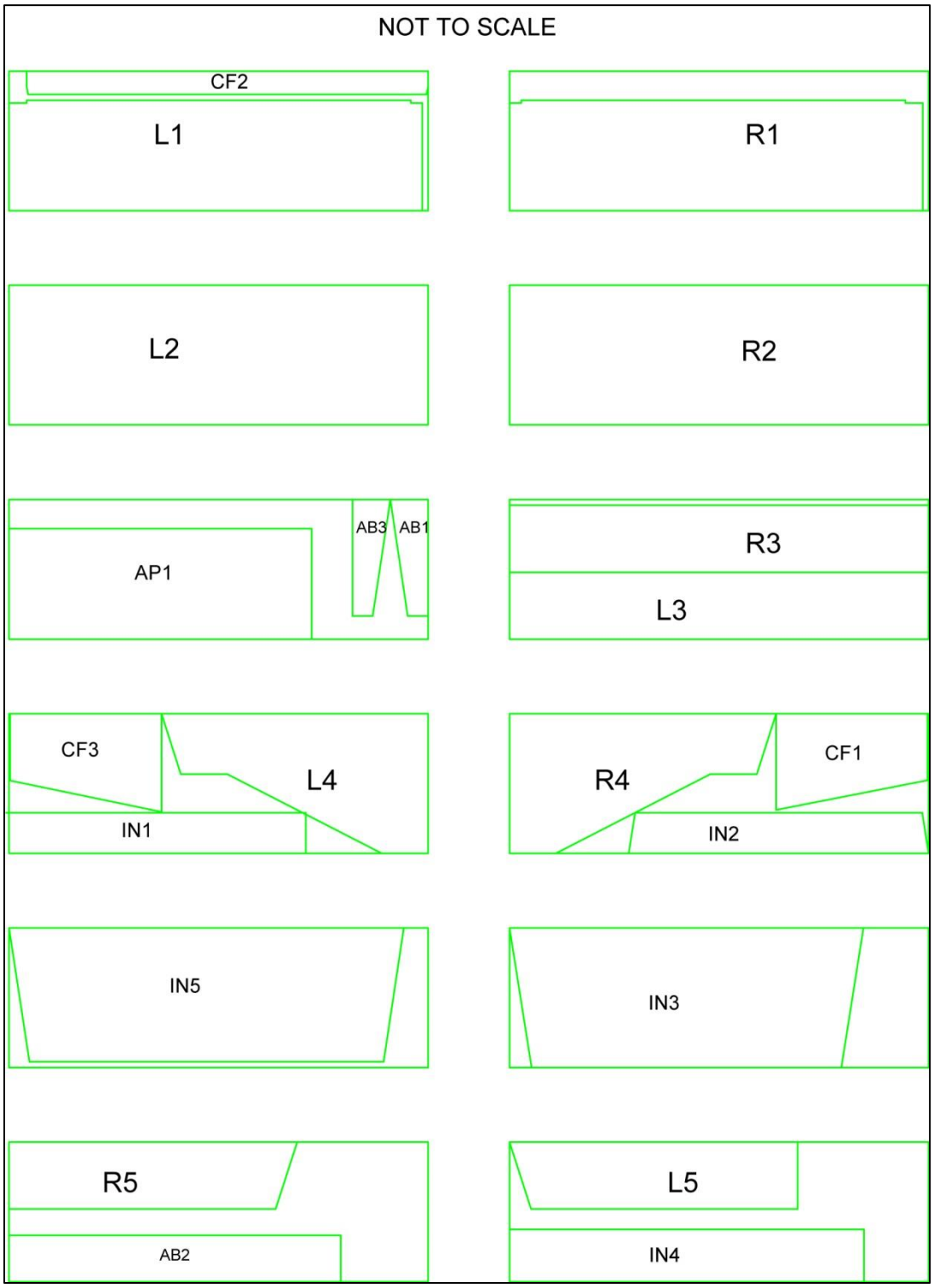
2. BRICKING
    a. Rear Floor Behind Front Factory Baffle
    b. Left Side
    c. Right Side
    d. Ash Pit Rear
    e. Install the grates
    f. Front
    g. Rear Grate Shelf to Top of Front Factory Baffle
    h. Behind the Rear Factory Baffle
    i. Baffle Area Completion

Insulation Board

Cutout Diagram

As insulation boards are cut and fit into the arch, cut and fit reamining pieces to best use the insulation board with the least waste. For example, two (2) small pieces can be used instead of one (1) large piece.

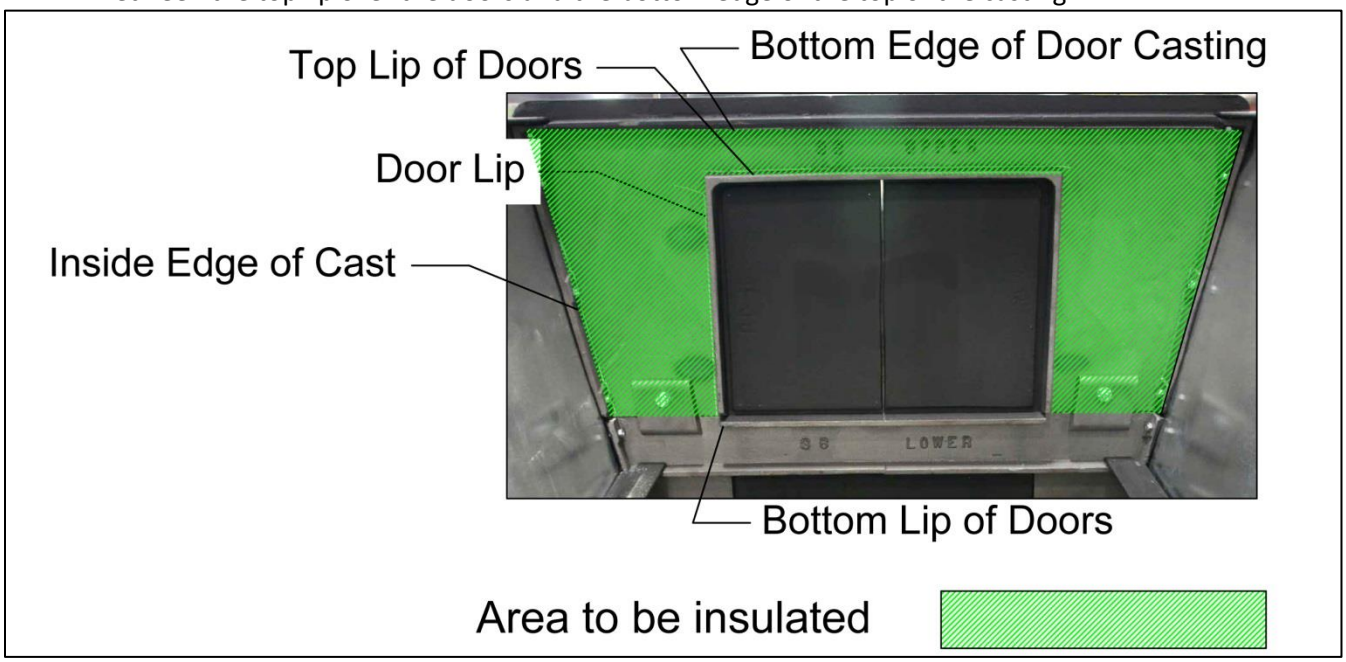
The following is a layout of the insulation board for the 3 foot wide example arch. The sizes for each piece can be found on the section diagrams of the arch.



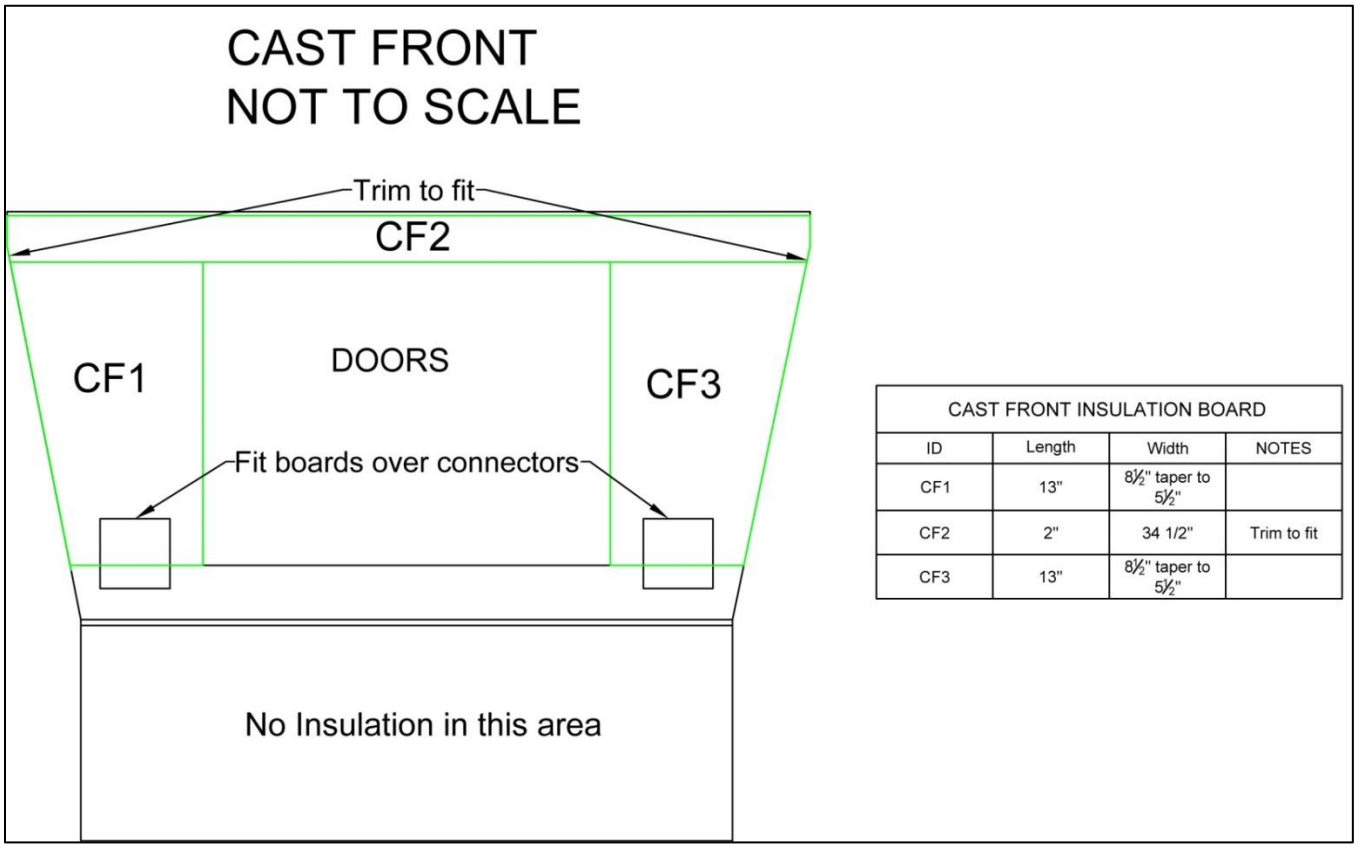
Front

The insulation board for the cast front covers the area;

- Starting at the level of the bottom lip of the doors
- Between the lips on either side of the doors to the inside edges of the cast front
- Between the top lip over the doors and the bottom edge of the top of the casting.



3 X 8 EXAMPLE

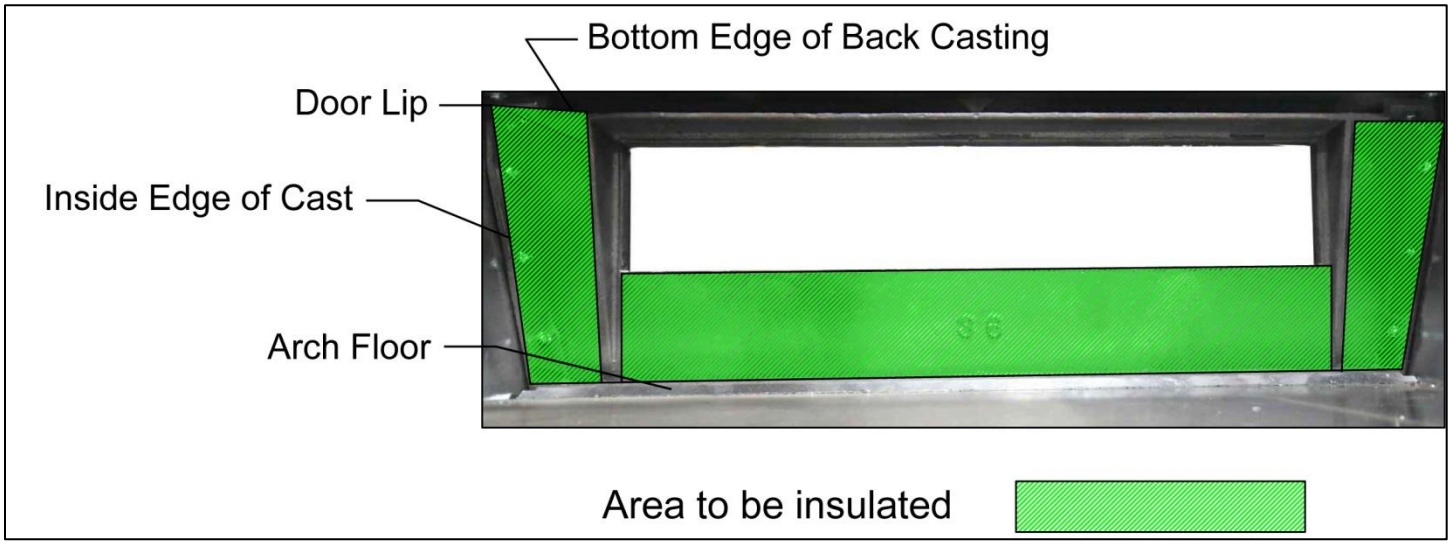


CAST FRONT INSULATION BOARD			
ID	Length	Width	NOTES
CF1	13"	8½" taper to 5½"	
CF2	2"	34 1/2"	Trim to fit
CF3	13"	8½" taper to 5½"	

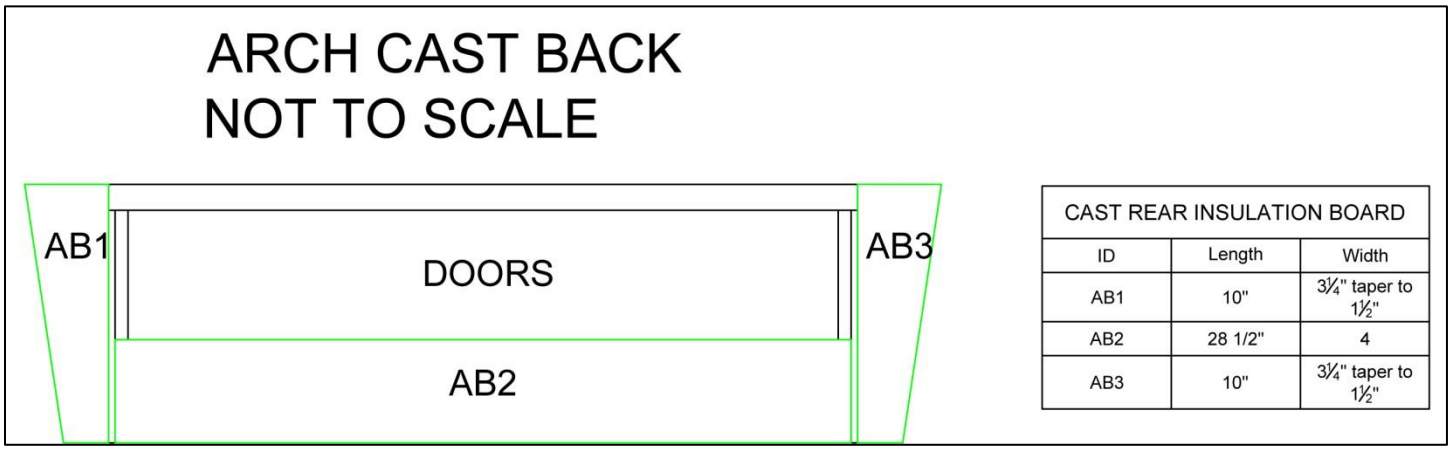
Back

The insulation board for the cast back covers the area;

- Form the arch floor to the bottom edge of the doors
- From the lip of the doors to the inside edge of the casting



3 X 8 EXAMPLE

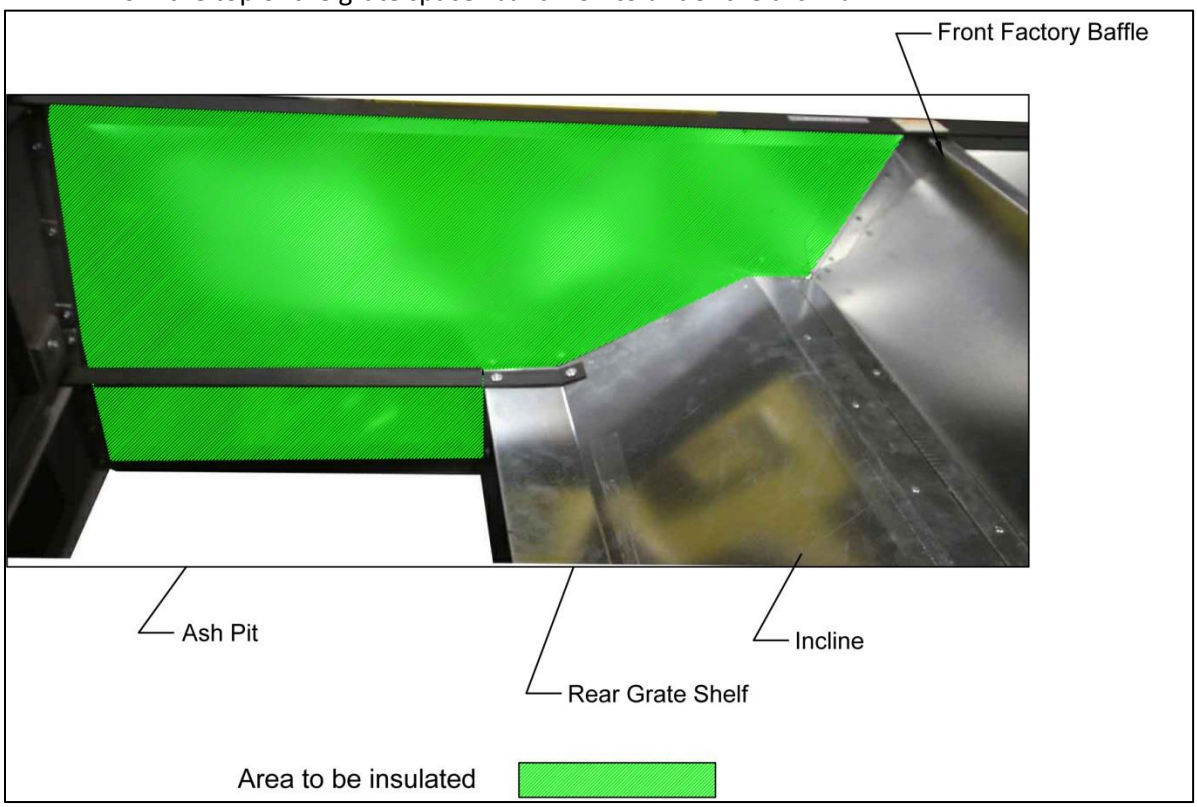


CAST REAR INSULATION BOARD		
ID	Length	Width
AB1	10"	3¼" taper to 1½"
AB2	28 1/2"	4
AB3	10"	3¼" taper to 1½"

Left Side

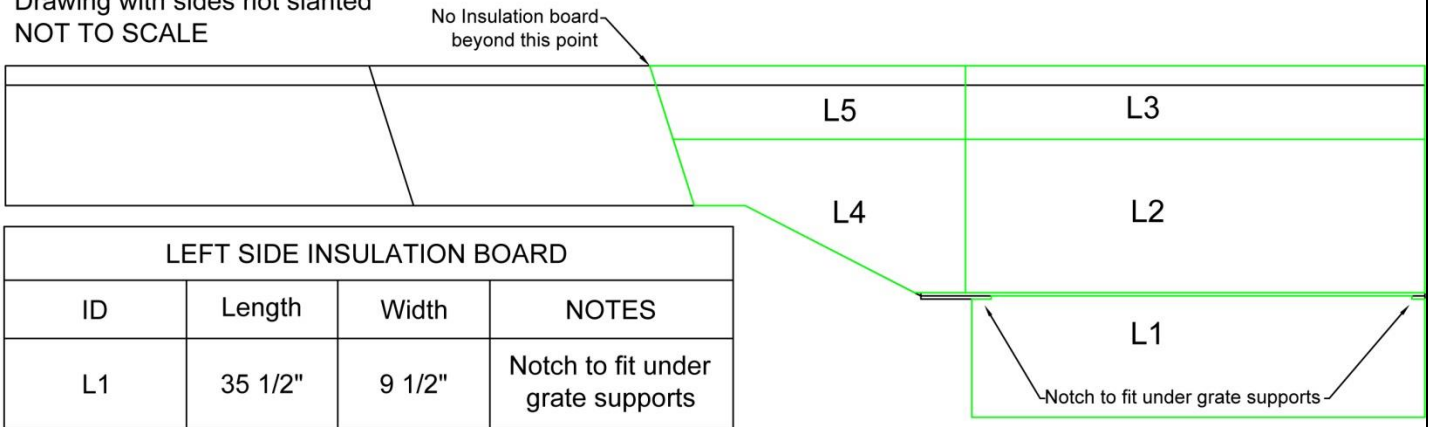
Insulation board on the sides of the arch is fit to the side of the arch. The insulation board should cover;

- From the insulation board in the cast front to the top of the front factory baffle
- From the bottom angle iron in the ash pit of the arch to under the grate spacer band iron
- From the top of the grate spacer band iron to under the arch rail



3 X 8 EXAMPLE

LEFT SIDE
Drawing with sides not slanted
NOT TO SCALE

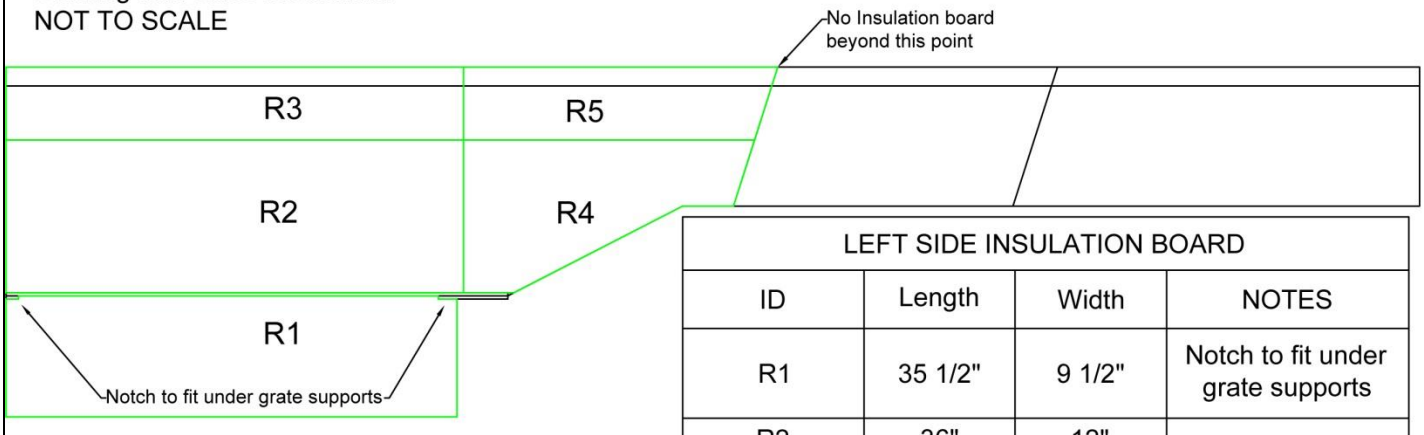


LEFT SIDE INSULATION BOARD			
ID	Length	Width	NOTES
L1	35 1/2"	9 1/2"	Notch to fit under grate supports
L2	36"	12"	
L3	36"	5 3/4"	
L4	23"	12"	Cut to fit as shown
L5	24¾" taper to 23"	5 3/4"	

Right Side

3 X 8 EXAMPLE

RIGHT SIDE
Drawing with sides not slanted
NOT TO SCALE

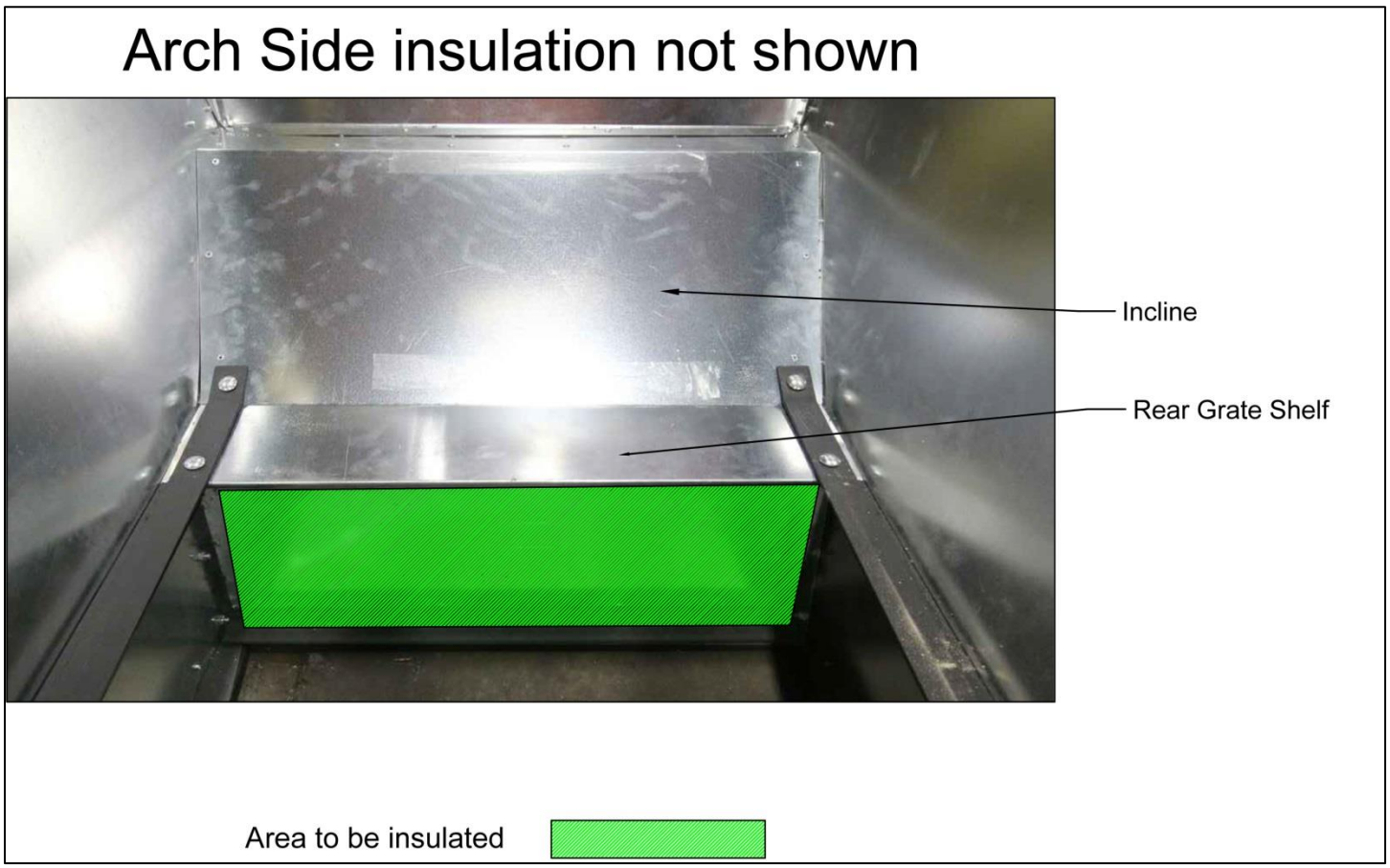


LEFT SIDE INSULATION BOARD			
ID	Length	Width	NOTES
R1	35 1/2"	9 1/2"	Notch to fit under grate supports
R2	36"	12"	
R3	36"	5 3/4"	
R4	23"	12"	Cut to fit as shown
R5	24¾" taper to 23"	5 3/4"	

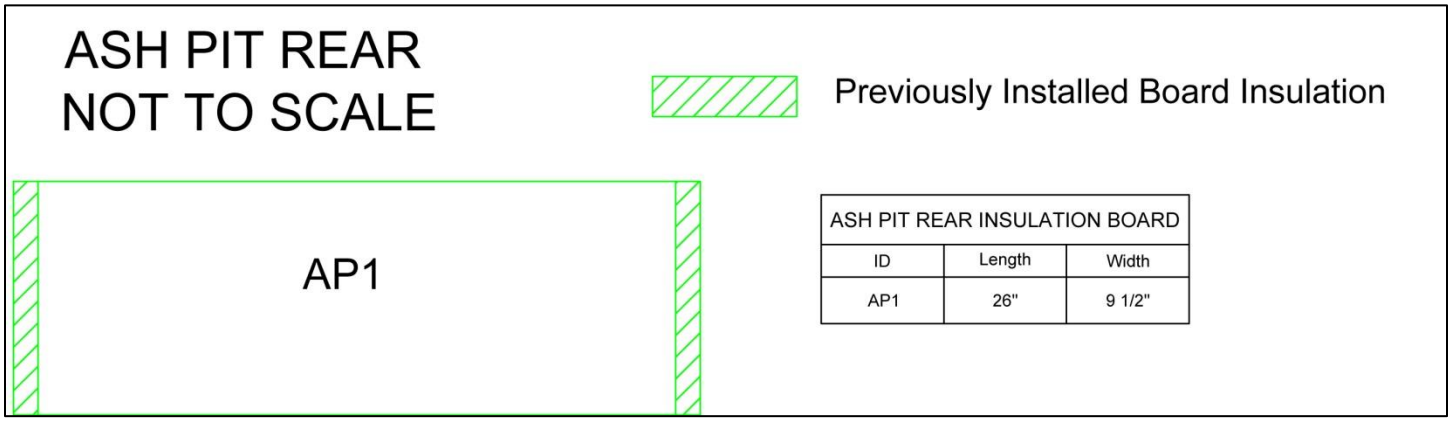
Ash Pit Rear

The insulation board should cover:

- From the bottom of the arch frame under the rear grate shelf to under the edge of the rear grate shelf
- Between the insulation board on each side of the arch



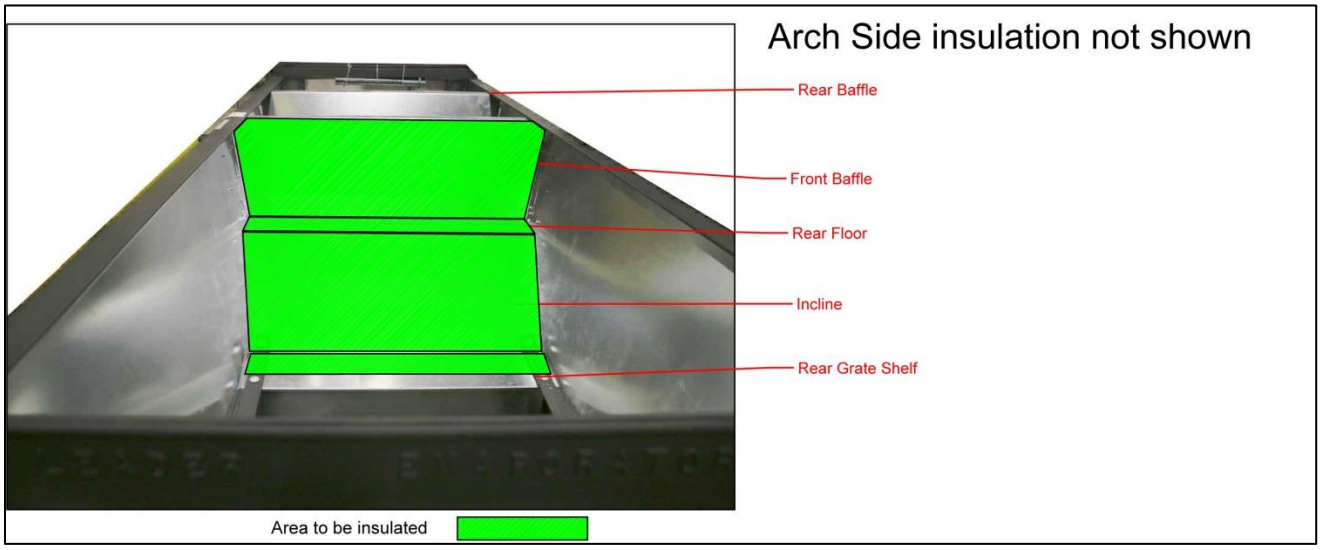
3 X 8 EXAMPLE



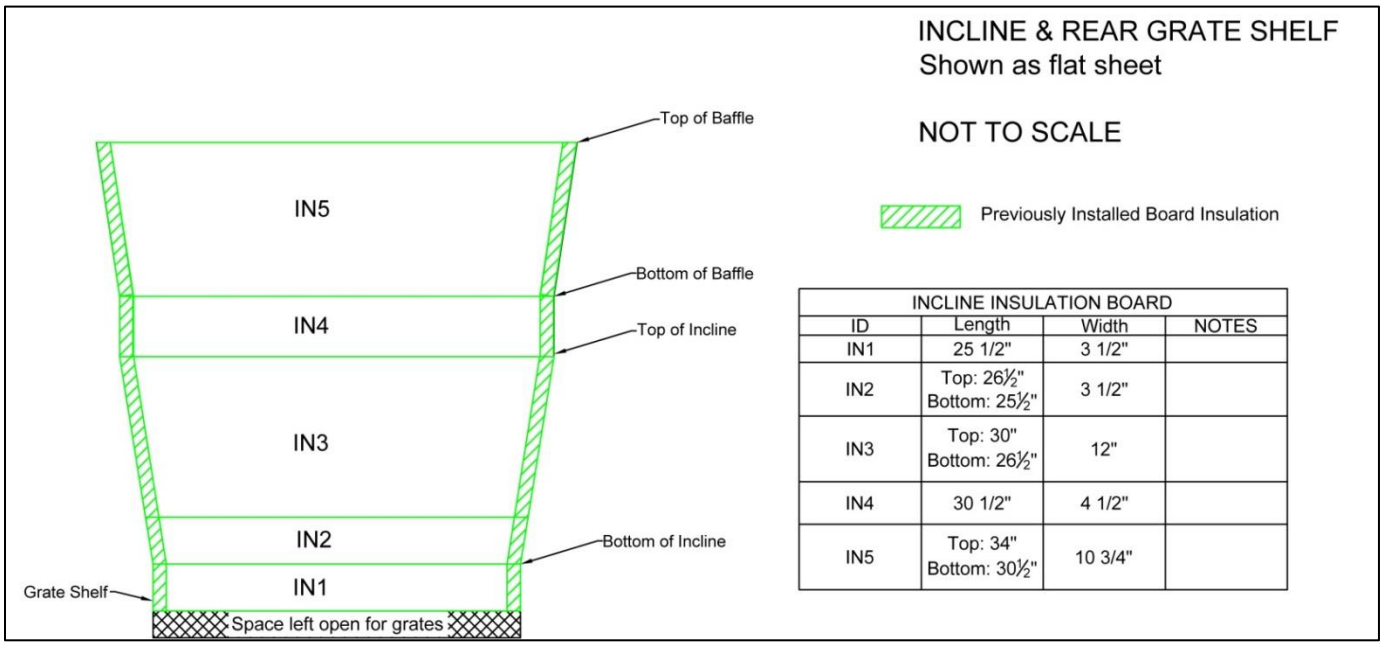
Rear Grate Shelf to Top of Front Factory Baffle

The insulation board for this section will need to be fit to the tapers of the walls and should cover;

- The rear grate shelf
  - From the area for the grates to the bottom of the incline
  - From the insulation board on one side of the arch to the other
- The incline
  - From the insulation board on the rear grate shelf to the top of the incline
  - From the insulation board on one side of the arch to the other tapered to meet the sides
- Rear arch floor
  - From the top of the incline to the bottom of the baffle
  - From the insulation board on one side of the arch to the other
- Front Baffle
  - From the top of the insulation board on the rear arch floor to even with the top of the baffle
  - From the insulation board on one side of the arch to the other



3 X 8 EXAMPLE



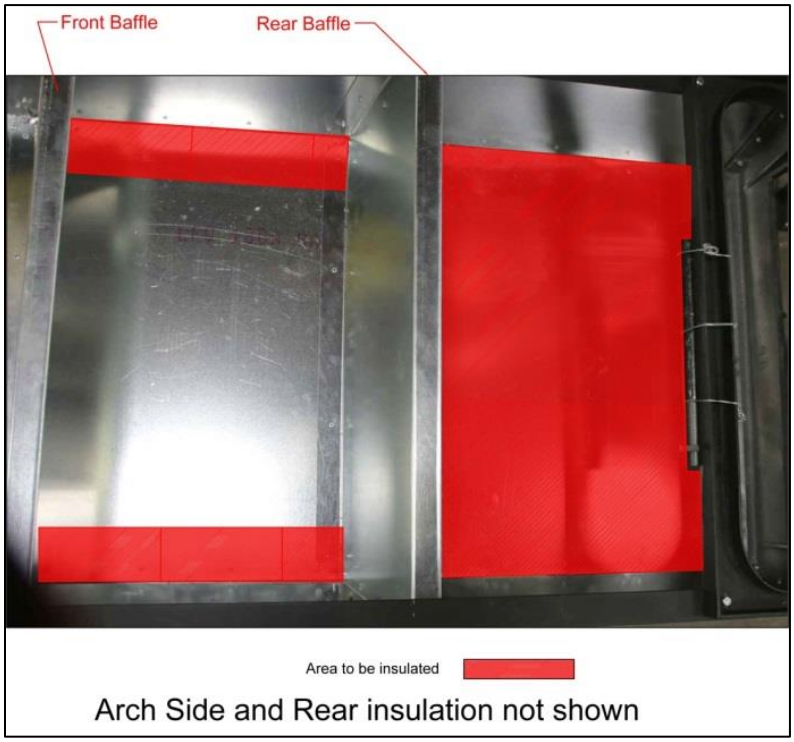
INCLINE INSULATION BOARD			
ID	Length	Width	NOTES
IN1	25 1/2"	3 1/2"	
IN2	Top: 26½" Bottom: 25½"	3 1/2"	
IN3	Top: 30" Bottom: 26½"	12"	
IN4	30 1/2"	4 1/2"	
IN5	Top: 34" Bottom: 30½"	10 3/4"	

Bricking

Rear Floor Behind Front Factory Baffle

The bricks to be used here are half thickness bricks. All bricks should be laid face down toward the arch floor. Brick as follows;

- Between the factory baffles
  - On each side lay a row of bricks lengthwise against the insulation on the side of the arch.
- Behind the rear factory baffle
  - On each side, place a brick lengthwise against the insulation on the side of the arch and against the insulation in the cast back
  - Continue the row of bricks along the side to under the rear baffle. Fit the last brick under the rear baffle.
  - Fill between the rows at the sides of the arch with rows of bricks fit to run parallel to the baffle.



Arch Side and Rear insulation not shown

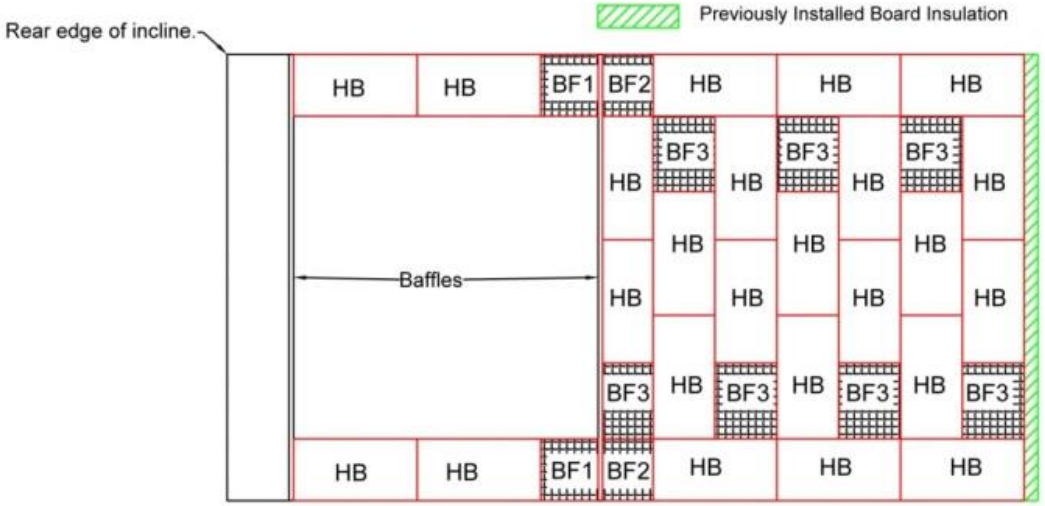
3 X 8 EXAMPLE

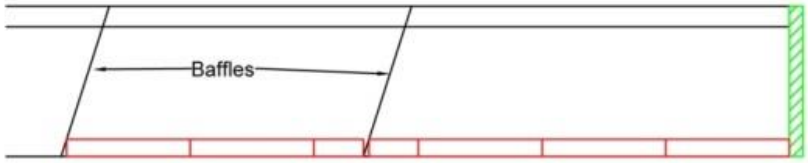
REAR FLOOR BEHIND FRONT FACTORY BAFFLE
Shown as flat sheet

NOT TO SCALE

Top View

Previously Installed Board Insulation





Side View

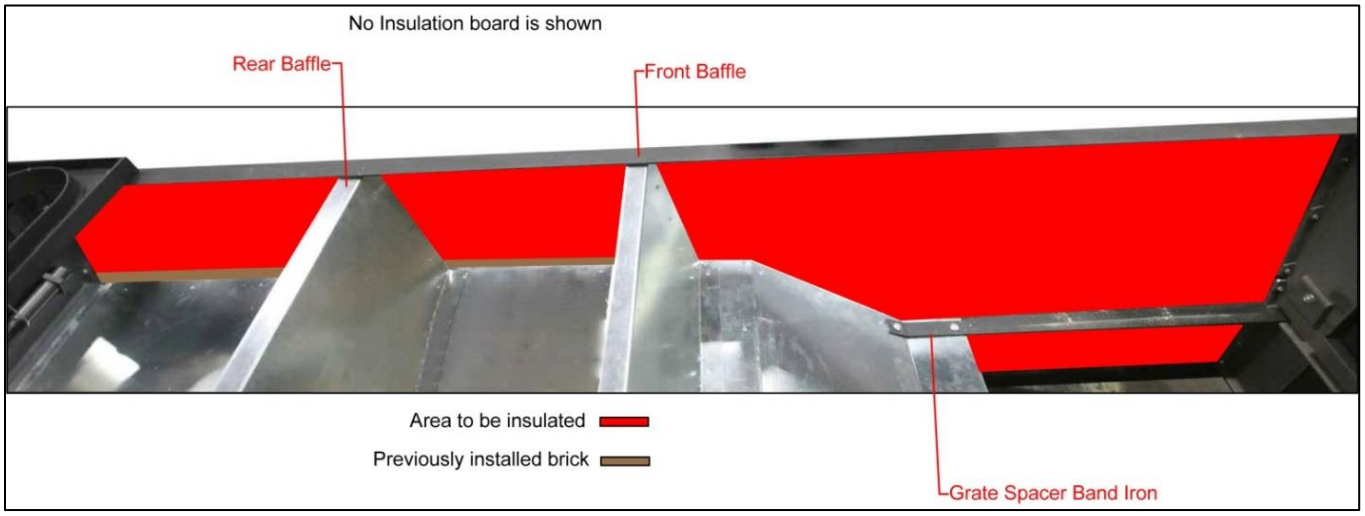
REAR FLOOR BRICK SPECIFICATIONS				
ID	Brick Type	Length	Width	NOTES
BF1	Half	4"	4 1/2"	
BF2	Half	3 1/2"	4 1/2"	
BF3	Half	5 1/2"	4 1/2"	

Arch Sides

Arch Sides (left and right) - The bricks to be used on the sides are half thickness bricks. Brick each side as follows;

- From the rear factory baffle to the rear cast
  - Place the short end of a brick on the brick on the floor against the insulation in the back cast
  - Continue to place bricks until the rear of the rear baffle is reached. Fit the last brick under the rear baffle.
- Between the baffles
  - Place the short end of a brick on the floor where the front of the rear baffle meets the brick on the floor of the arch.
  - Fit a piece of brick between the rear of the previously placed brick and the front of the rear baffle.
  - Continue to place bricks until the rear of the front baffle is reached. Fit the last brick under the rear of the front baffle.
- In front of the front baffle
  - Below the grate spacer band iron
    - Place a brick on its short end on the angle iron in the bottom of the ash pit and against the insulation board on the rear of the ash pit.
    - Continue to place bricks until the front cast is reached. Fit the last brick against the front cast.
  - Between the arch rail and the grate spacer band iron
    - Start at the grate spacer band against the cast front insulation and lay a line of bricks lengthwise to the incline.
    - Fit the last brick to the insulation board on the incline.
    - Start the second row of bricks with a brick cut in half (4 ½" X 4 ½") so the brick rows will be staggered.
    - Continue staggering rows until the top of the row of bricks is approximately 9" below the underside edge of the arch rail
    - Fit a vertical row of bricks on edge between the last horizontal row of bricks and the underside of the arch rail. Ensure the top edges of the bricks are tapered (see page 14). Start the row against the front cast insulation and continue to the front of the front baffle.
- If space remains between the top of the vertical brick and the bottom edge of the arch rail, fill with rail gasket

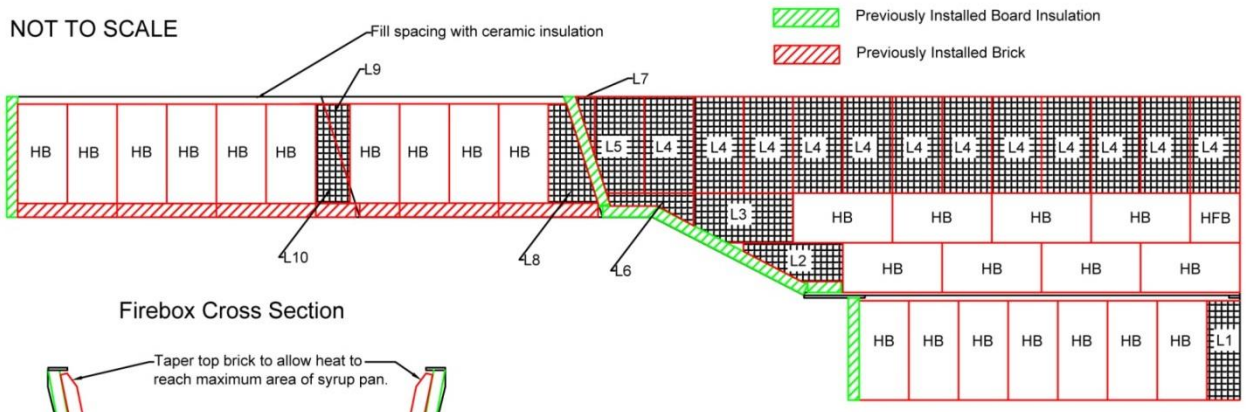
Right Side Shown in Picture



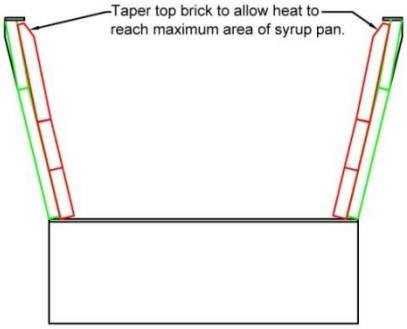
3 X 8 EXAMPLE

LEFT SIDE
Drawing with sides not slanted

NOT TO SCALE



Firebox Cross Section

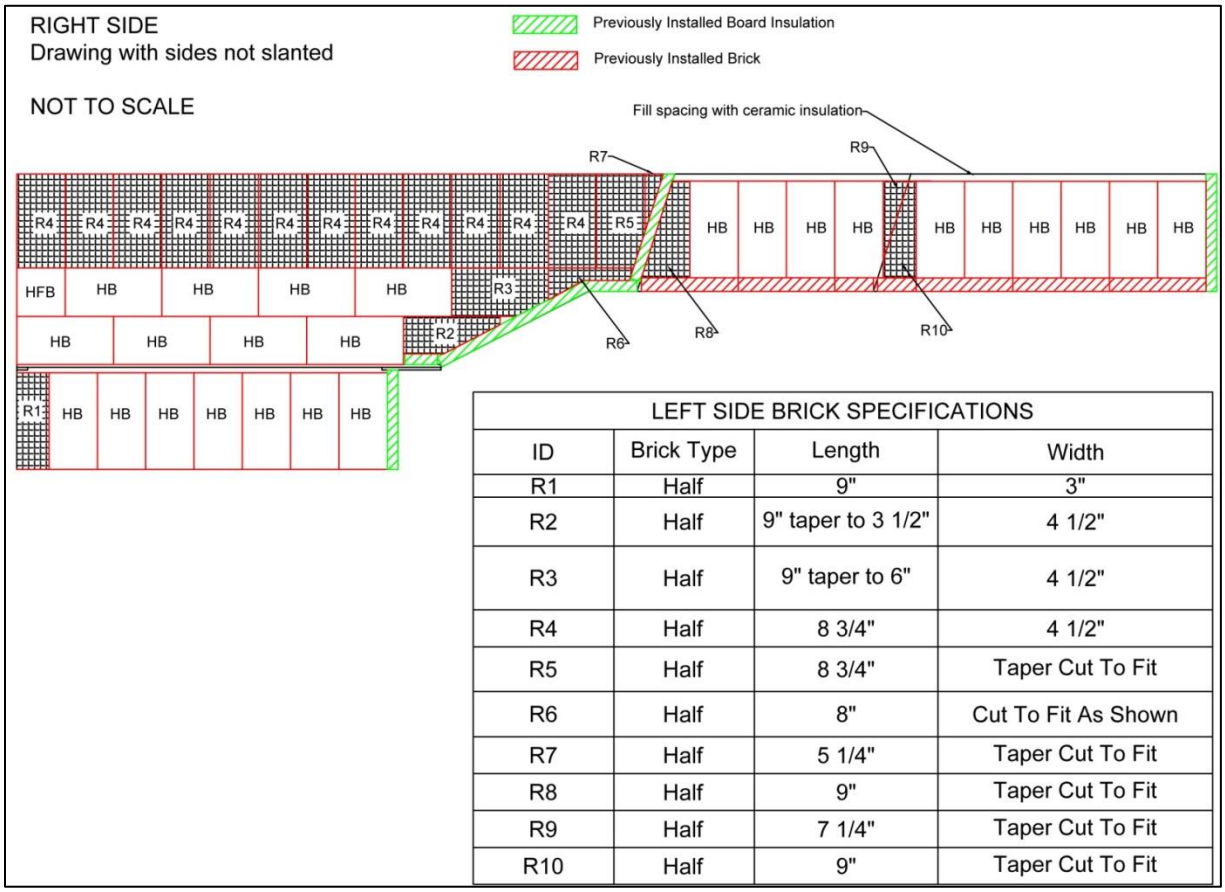


Rear Cross Section

LEFT SIDE BRICK SPECIFICATIONS			
ID	Brick Type	Length	Width
L1	Half	9"	3"
L2	Half	9" taper to 3 1/2"	4 1/2"
L3	Half	9" taper to 6"	4 1/2"
L4	Half	8 3/4"	4 1/2"
L5	Half	8 3/4"	Taper Cut To Fit
L6	Half	8"	Cut To Fit As Shown
L7	Half	5 1/4"	Taper Cut To Fit
L8	Half	9"	Taper Cut To Fit
L9	Half	7 1/4"	Taper Cut To Fit
L10	Half	9"	Taper Cut To Fit

Right Side

3 X 8 EXAMPLE

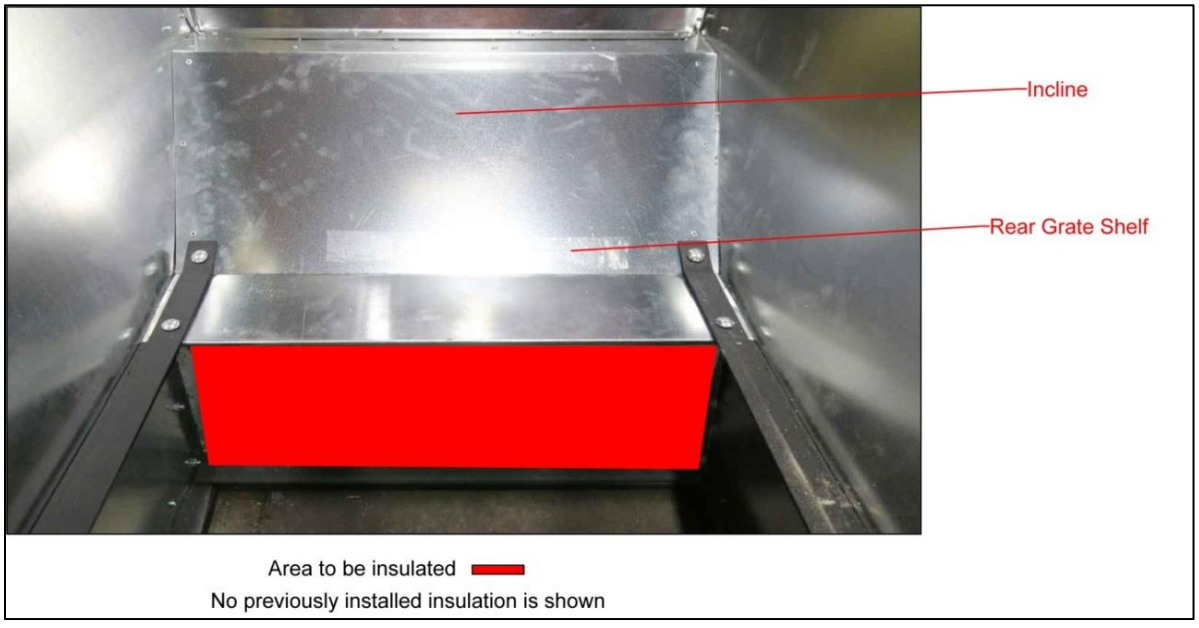


LEFT SIDE BRICK SPECIFICATIONS			
ID	Brick Type	Length	Width
R1	Half	9"	3"
R2	Half	9" taper to 3 1/2"	4 1/2"
R3	Half	9" taper to 6"	4 1/2"
R4	Half	8 3/4"	4 1/2"
R5	Half	8 3/4"	Taper Cut To Fit
R6	Half	8"	Cut To Fit As Shown
R7	Half	5 1/4"	Taper Cut To Fit
R8	Half	9"	Taper Cut To Fit
R9	Half	7 1/4"	Taper Cut To Fit
R10	Half	9"	Taper Cut To Fit

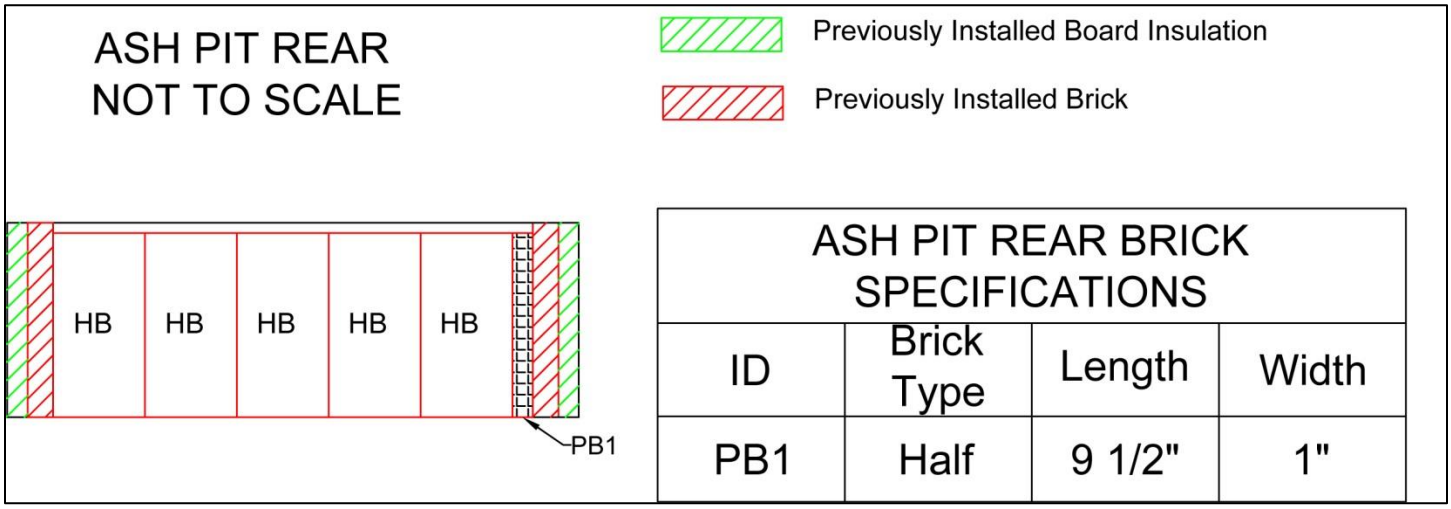
Ash Pit Rear

The bricks to be used are half thickness bricks. Brick as follows;

- Place a brick on end on the angle iron at the bottom of the ash pit and against the insulation on the side of the arch.
- Continue to place bricks until the other side of the arch is reached. Fit the last brick against the side of the arch.

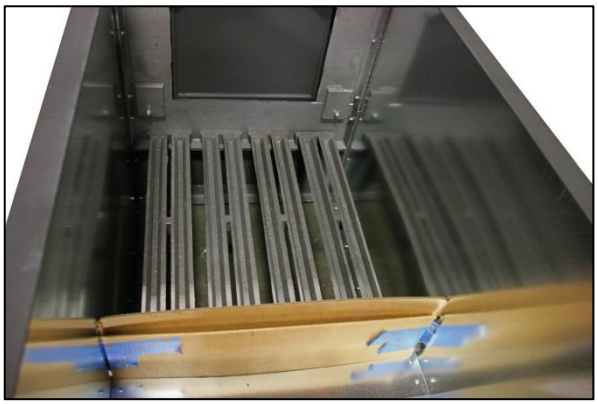


3 X 8 EXAMPLE



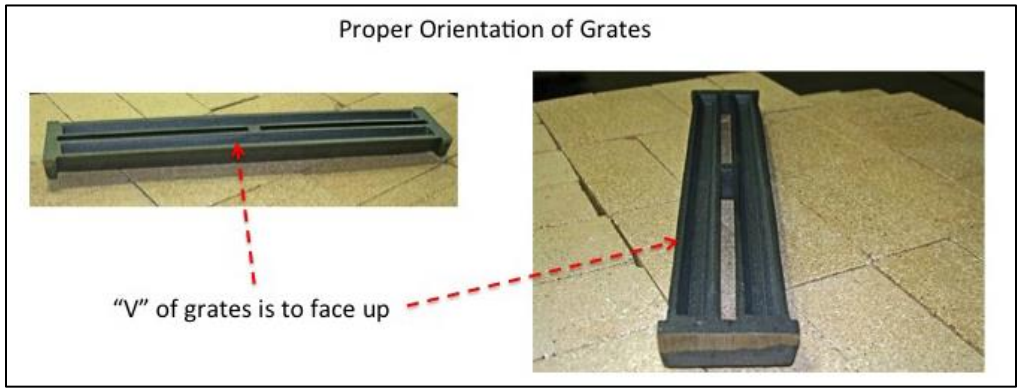
ASH PIT REAR BRICK SPECIFICATIONS			
ID	Brick Type	Length	Width
PB1	Half	9 1/2"	1"

Install the Grates



Place the arch grates evenly spaced into the arch with the grates touching the front of the arch. Obtain a piece of "C flute" cardboard (most common type of cardboard) approximately the width of the grate shelf x 12" in height. Fold it into thirds along the length and tape with a non-plastic tape (ex. masking tape). Place it behind the grates toward the rear of the arch. The cardboard will provide the spacing needed to remove the grates after the bricks have been fit in place. The cardboard does not need to be removed as it will be consumed during the first firing of the arch.

PROPER ORIENTATION OF GRATES

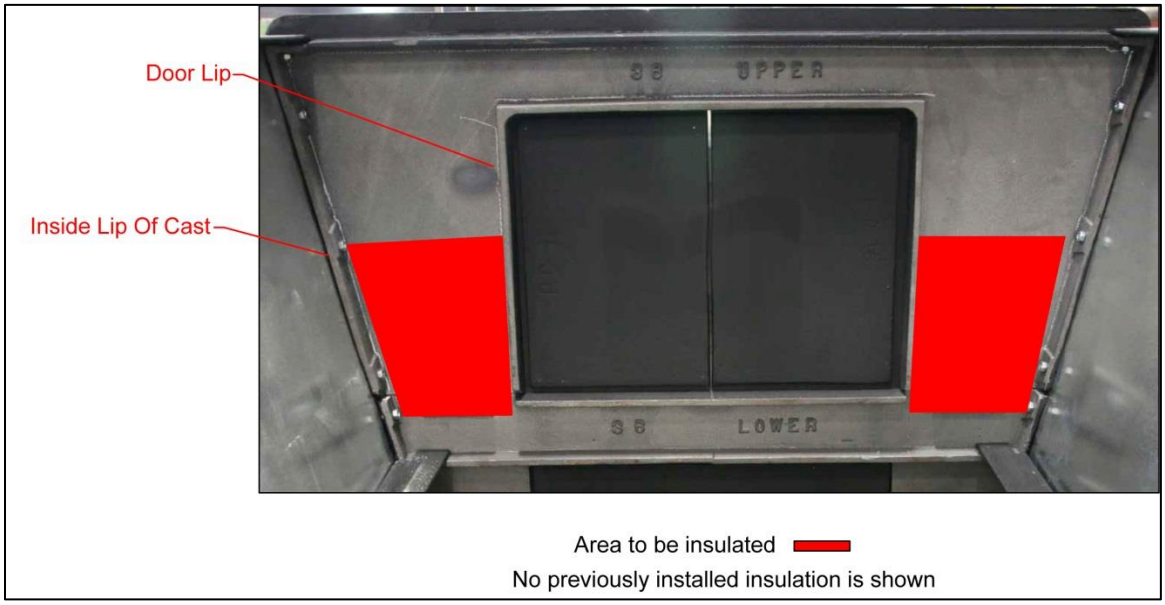


Grates should be installed so the "V" groove is up. In other words the opening of the "V" will be in a position to catch and fill with ashes.

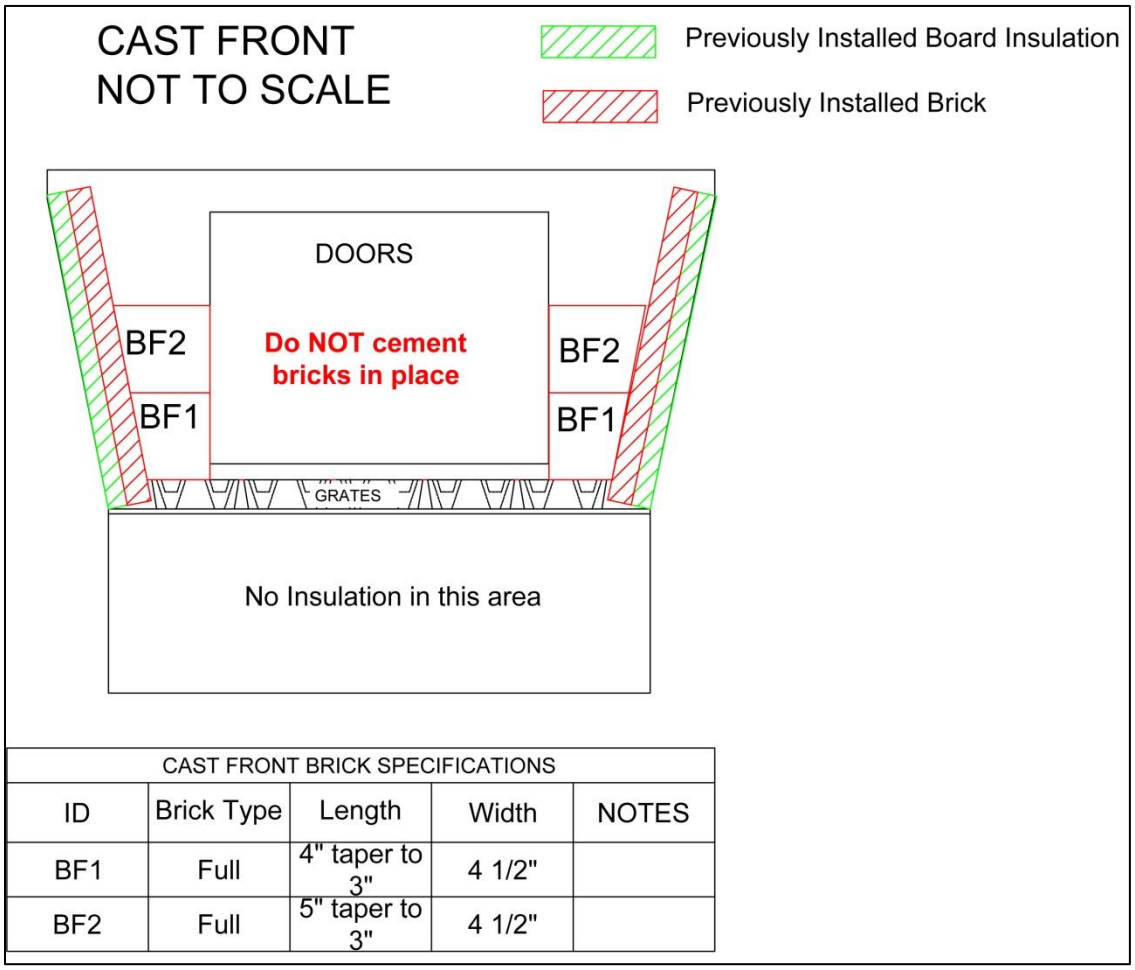
Front

The bricks to be used in this section are full thickness bricks. **NOTE: Bricks are NOT to be cemented in place**. Brick as follows;

- Fit a brick lengthwise and on edge between the door lip and the inside lip of the cast.
- Place a second brick lengthwise and on edge on the first, again fitting the brick between the door lip and the inside lip of the cast.



3 X 8 EXAMPLE

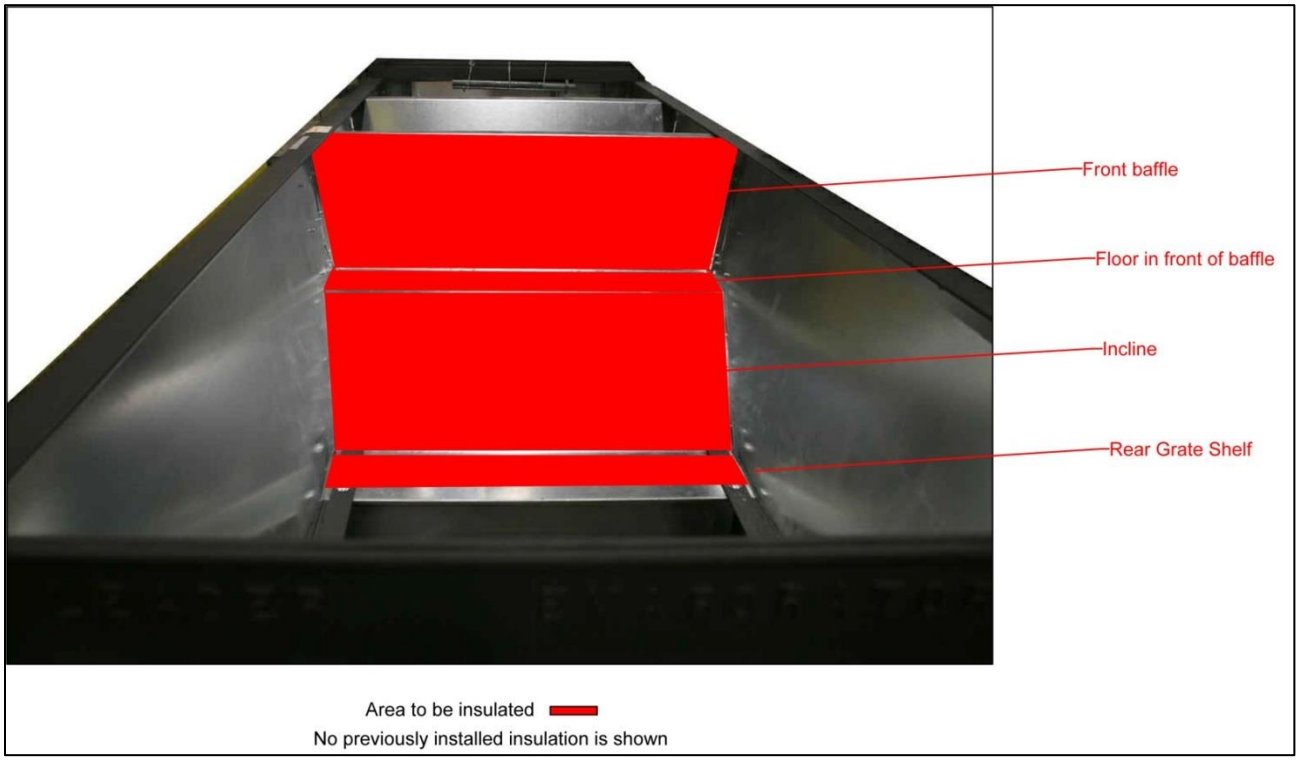


CAST FRONT BRICK SPECIFICATIONS				
ID	Brick Type	Length	Width	NOTES
BF1	Full	4" taper to 3"	4 1/2"	
BF2	Full	5" taper to 3"	4 1/2"	

Rear Grate Shelf to Top of Front Factory Baffle

The bricks to be used in this section are half thickness bricks. Brick as follows;

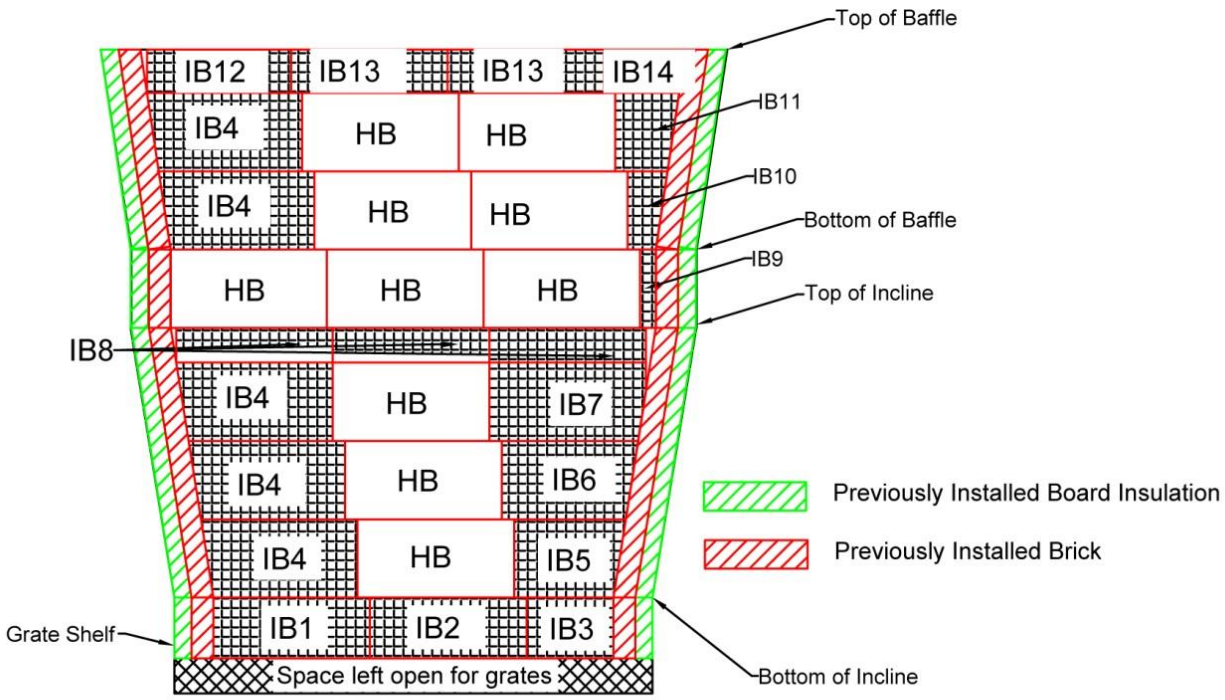
- Rear Grate Support Shelf
  - On the grate support shelf, beginning at the cardboard behind the grates, fit bricks between the cardboard and the bottom of the incline and between the insulation on the sides of the arch.
- Incline
  - Beginning at the brick on the grate support shelf, fit a brick to the angle of the side.
  - Place a full length brick(s) until the other side of the arch is reached. Fit a brick to the angle of the side of the arch.
  - Continue to the top of the incline fitting rows of brick as described above.
  - Cut the top row of bricks so they are not higher than the top of the incline.
- Rear Floor in Front of Factory Baffle
  - Lay a brick lengthwise against the insulation on the front of the front baffle and against the insulation on the side of the arch.
  - Continue to lay bricks to reach the other side.
- Front Factory Baffle
  - Fit the short end of a brick to the taper of the side of the arch.
  - Continue laying bricks until the other side of the arch is reached and fit the last brick in the row to the taper of the side of the arch.
  - Continue fitting rows up the baffle until the top of the baffle is reached. Fit bricks so they do not exceed the height of the baffle.



3 X 8 EXAMPLE

INCLINE & REAR GRATE SHELF
Shown as flat sheet

NOT TO SCALE

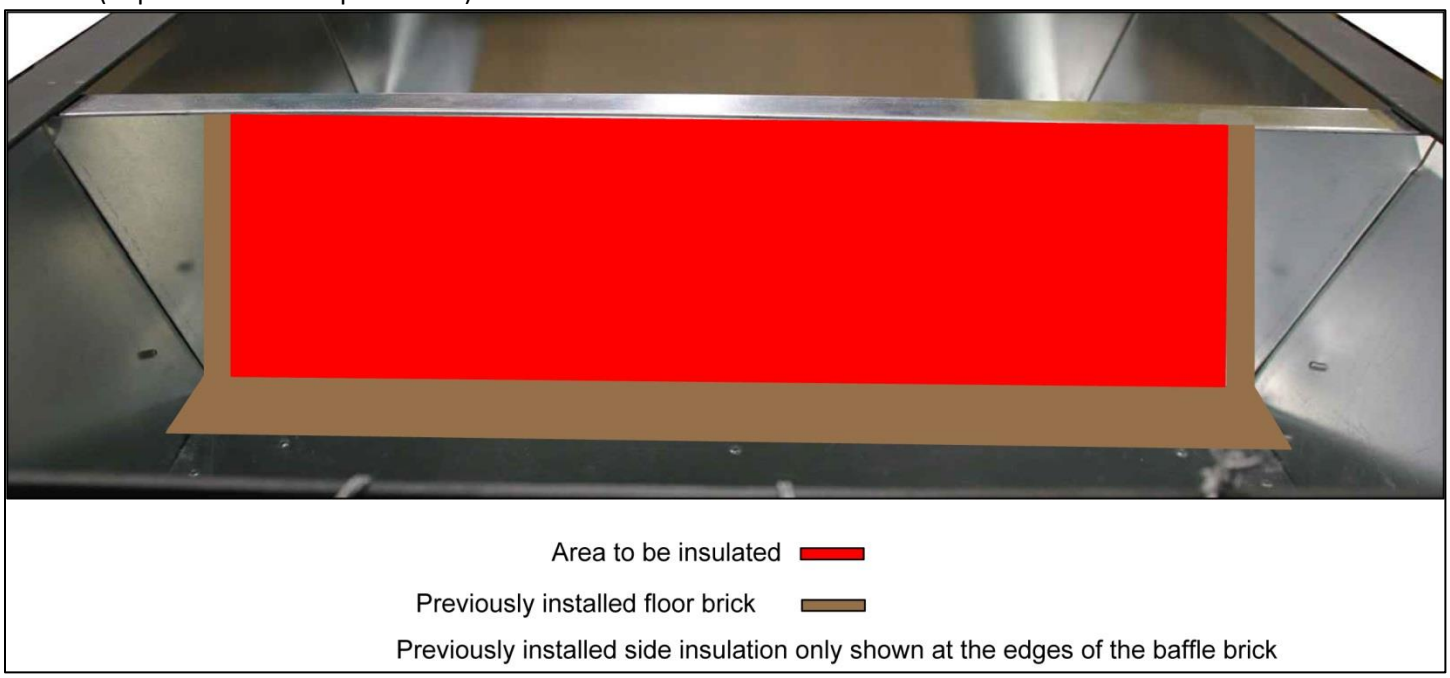


CAST FRONT BRICK SPECIFICATIONS				
ID	Brick Type	Length	Width	NOTES
IB1	Half	9"	3 1/2"	
IB2	Half	9"	3 1/2"	
IB3	Half	5"	3 1/2"	
IB4	Half	Top: 9" Bottom: 8¼"	4 1/2"	
IB5	Half	Top: 6¼" Bottom: 5½"	4 1/2"	
IB6	Half	Top: 7¾" Bottom: 7"	4 1/2"	
IB7	Half	Top: 9" Bottom: 8½"	4 1/2"	Trim Bottom Corner
IB8	Half	9"	2"	
IB9	Half	1"	4 1/2"	
IB10	Half	Top: 2" Bottom: 4½"	4 1/2"	
IB11	Half	Top: 3½" Bottom: 3"	4 1/2"	
IB12	Half	8¼"	2 1/2"	
IB13	Half	9"	2 1/2"	
IB14	Half	Top: 4½" Bottom: 4¼"	2 1/2"	

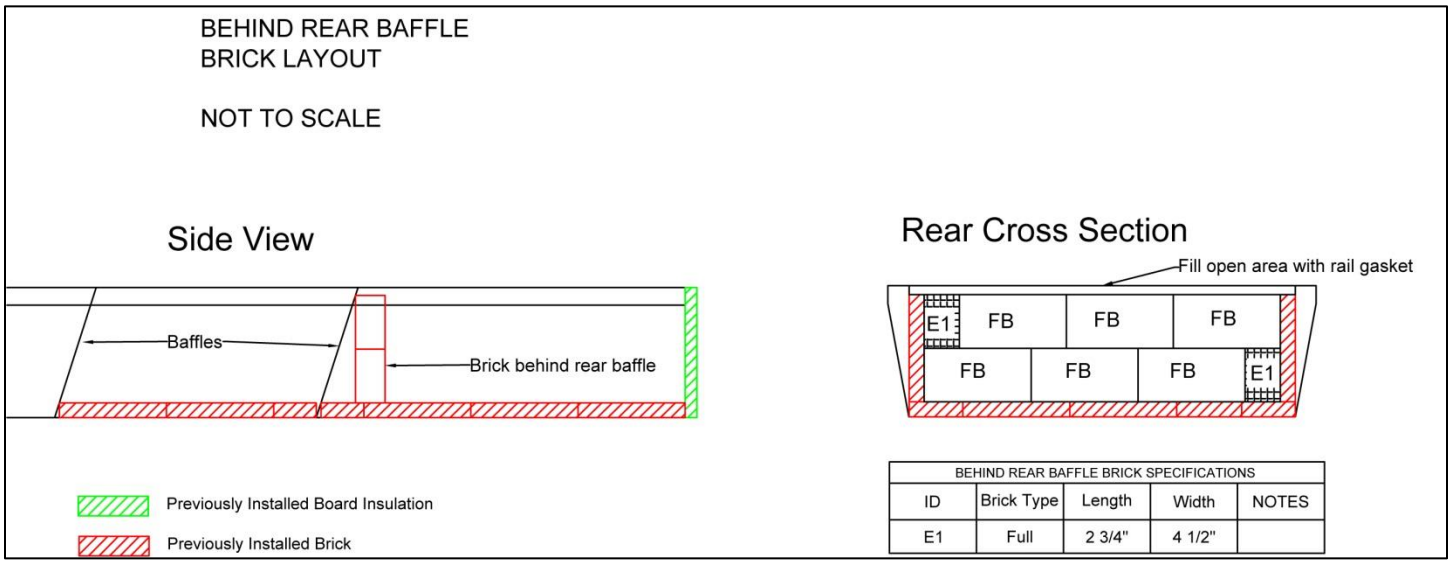
Behind Rear Factory Baffle

The bricks to be used in this section are full thickness bricks. Brick as follows;

- Start a row of bricks set on edge against the bricks on one side of the arch. The bricks will be lengthwise against the bottom of the arch.
- Start a second row on edge starting against the bricks on the other side of the arch
- Fill any gap between the top of the bricks on the bottom edge of the baffle with either cement or rail gasket (dependent on the space to fill)



3 X 8 EXAMPLE



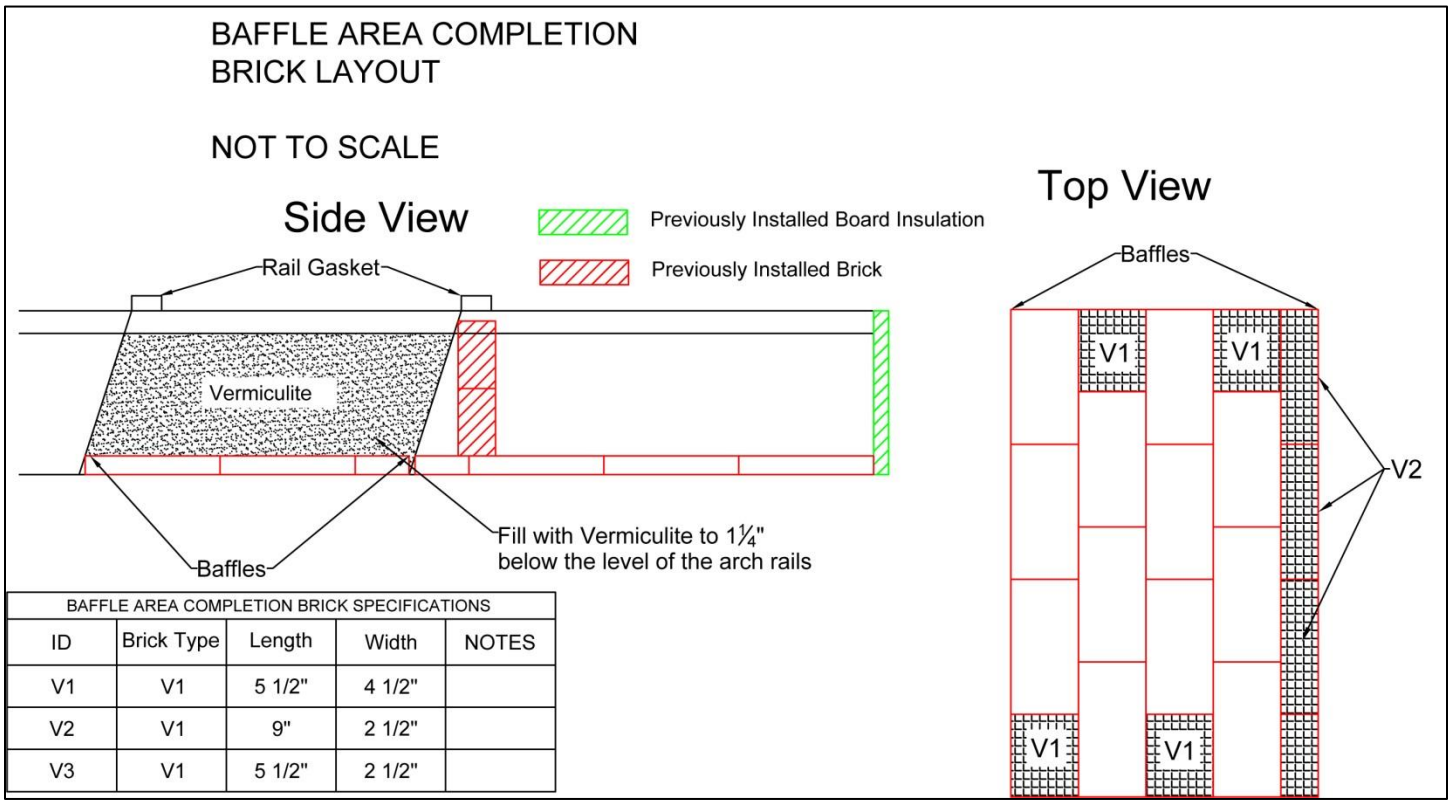
Baffle Area Completion

The bricks to be used in this section are half thickness bricks. The bricks are to cover the vermiculite insulation so it will not be dislodged with air movement. To complete the area between the baffles;

- Fill the area between the baffles with vermiculite up to 1 ¼" below the bottom of the arch rail
- Brick over the top of the vermiculite (optionally use insulation board);

- Start a row of bricks behind and parallel to the top of the front baffle. The bricks should be even with the arch rail.
- Start a second row of bricks against the opposite side of the arch.
- Continue staggered rows until the area between the baffles is covered.

3 X 8 EXAMPLE



BAFFLE AREA COMPLETION BRICK SPECIFICATIONS				
ID	Brick Type	Length	Width	NOTES
V1	V1	5 1/2"	4 1/2"	
V2	V1	9"	2 1/2"	
V3	V1	5 1/2"	2 1/2"	

As an option insulation board can be used in place of the bricks over the Vermiculite. If insulation board is used, fill the Vermiculite area up to 1” below the arch rail. Reduce the number of half bricks by the area over the Vermiculite and increase the number of insulation boards to cover the same area. It is recommended a minimum of piecing be done to prevent movement of the insulation board.

INSTALL TAPER AND STACK

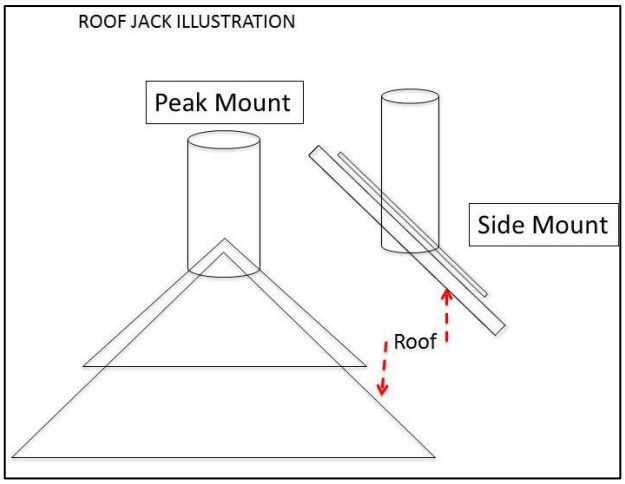
A roof jack should be installed prior to setting up your taper and stack. Leader Evaporator recommends a water tight roof jack for the evaporator. Leader Evaporator offers two styles of roof jack; water tight or with collar in either a peak or side mount.

In order to determine your requirements you will need to know where you will penetrate the roof with the stack and the pitch of your roof.

Roof Penetration and the Type of Roof Jack:

a. Obtain a plumb bob with sufficient line to reach from the roof to the stack collar of the arch.

b. Run the plumb bob from the center of the stack collar to the roof, moving the roof point until the plumb bob is properly positioned. Ensure there are no bends in the line caused by other items.



c. If the plumb bob line end is at the peak of the roof - order a Leader peak mount roof jack. If the plumb bob line end is at the side of the roof – order a Leader side mount roof jack.

d. Prior to taking down the plumb bob, mark the inside of the roof, as this will be used when making the roof penetration for the stack or installation of the roof jack.

e. Roof penetration:

   i. When installing a roof jack refer to the LEADER CUSTOMIZED ROOF JACK document.

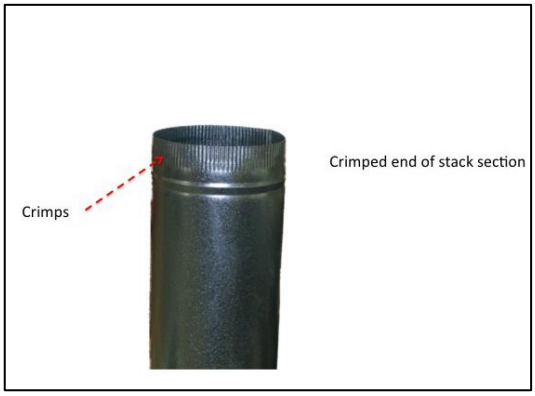
   ii. If not using a roof jack, make a hole at the point marked on the inside of the roof in the previous step. Mark the roof a minimum of 2” out from and around the template. Refer to the applicable governmental regulations as to minimum clearances required dependent on materials of roof construction.

Install the Taper and Stack

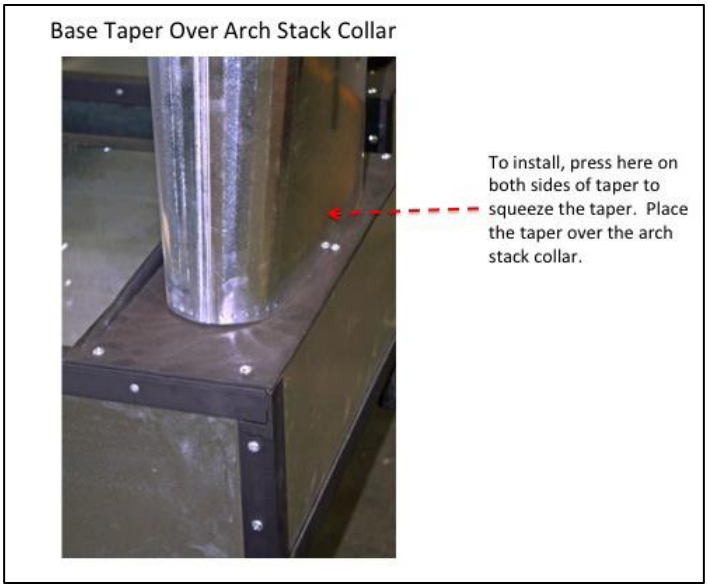
NOTE: It is recommended you install all supplied exhaust stack, as a minimum. Additional stack may be required to ensure proper draft.

Draft is correct when:

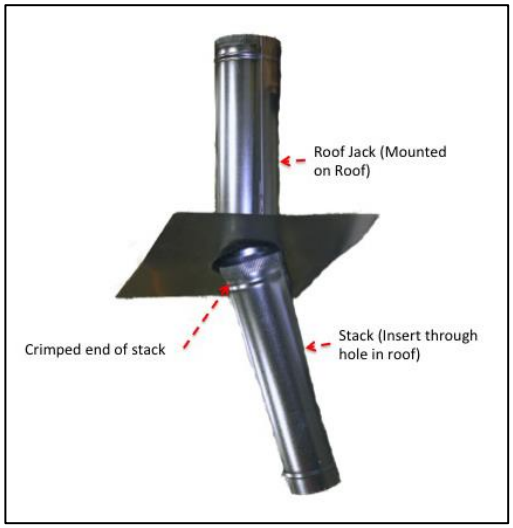
- The boil is the same in the syrup pan front-to-back and side-to-side
- The fire door is open the flame, sparks, etc. are drawn toward the rear of the arch.



NOTE: When working with stack sections, recognize that the crimped end of the stack section is the upper / top section.

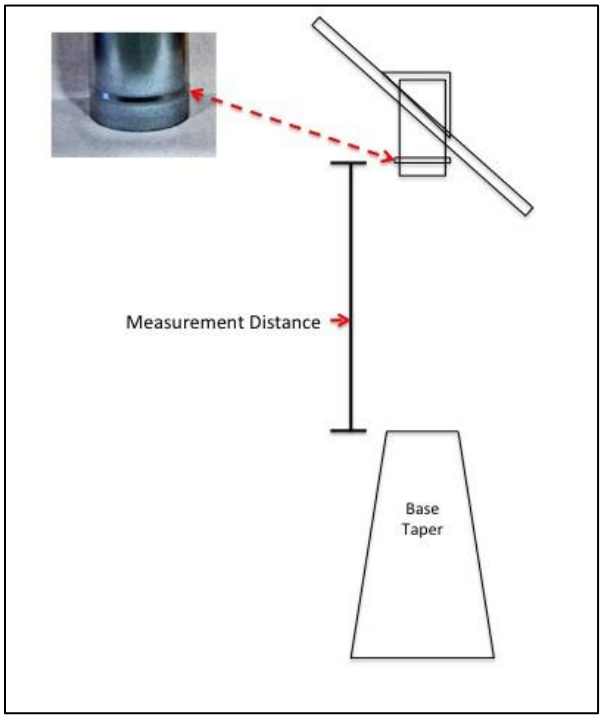


1. Place the base taper on the arch stack collar. If you have difficulty placing the base taper onto the collar, squeeze the base taper by pressing on the long sides at the base.



2. If a roof jack is used,

    a. Insert one piece of stack into the roof jack until it is a lightly wedged. The Leader style roof jack is tapered from larger to smaller. The end to be inserted into the roof jack is the crimped end. NOTE: You will be moving the piece of stack back down by approximately 2 ½" when you connect to the next stack section so ensure it will be able to move.



b. Measure from the top of the taper to the bead at the bottom of the stack section in the roof jack.

c. Determine the number of lengths of stack required by dividing the measurement taken in inches by 34".
   i. For example if the measurement was 68", then 68" ÷ 34" = 2 so 2 lengths of stack are required.
   ii. For example if the measurement was 60", then 60" ÷ 34" = 1.76 lengths of stack are required. This would mean one full length and a length measuring 26" would be required. To obtain the 26" length you can either
   iii. Special order a piece of stack the length required or cut a standard length of stack to fit. If you cut a length of stack to fit, measure the length from the bead of the stack and cut off the top crimped end.

3. Install the stack sections starting from the base taper. Ensure you place the crimped end up when connecting the stack sections.
4. When you put the last indoor section in place, lower the stack section from the roof jack (if used) approximately 2 ½" down onto the top piece of stack, or lower a stack section through the penetration in the roof.
5. If a roof jack is used, use all remaining sections of stack by placing the beaded / bottom end over the top of the roof jack.
6. Continue installing stack until all pieces have been installed. Ensure you have a good overlap for each stack joint. Overlap will be 2 to 2 ½". It is recommended you screw all sections together using self tapping stainless steel screws.
7. Stack above the roof should be guide wired in at least three directions (tripod configuration) to minimize the effects of wind.
   a. It is recommended you install a stack cover on the last / top section of stack. A closed stack cover will minimize the rain and moisture entering the stack and arch. When installing a stack cover refer to the LEADER STACK COVER document.

THE FIRST BOIL

The first boil is done to remove any residual materials from the pans and to "season" the bricking and insulation.

1. Fill the flue pan and syrup pan with a baking soda : water mix (1 pound:200 gallons) to a level of 2 to 3 inches.
2. Check all fittings for leakage. If there is no leakage, insulate around the flue drain with rail gasket material.
3. To season the bricking, start by building a small fire in the fire box and very gradually build to a normal fire.
4. Boil the solution for approximately 30 minutes. Watch the boil carefully and replenish the solution as needed to ensure the solution in the pans remains at the 2 to 3 inch level.
5. Check all equipment:
    a. No leaks at connections and valves
    b. Pans are boiling evenly
    c. Valves work properly
    d. Draft is correct

        Draft is correct when:
        - The boil is the same in the syrup pan front-to-back and side-to-side
        - The fire door is open the flame, sparks, etc. are drawn toward the rear of the arch.
6. Drain the solution after the evaporator has cooled. CAUTION – ensure the equipment is cool enough to be safely handled for draining.
7. Check the interior of the arch to ensure insulation and bricking are in place.
8. Refill the pans to the 2 to 3 inch level with clean unsoftened, non chlorinated well or spring water.
9. Boil for 30 minutes then after the evaporator has cooled, drain the pans. CAUTION – ensure the equipment is cool enough to be safely handled for draining.

OPERATING THE EVAPORATOR

NOTE: When operating the evaporator be cautious of hazards such as hot surfaces, hot liquids, sparks, and exposed flames.

NOTE: You must be aware at all times of the level of sap in all compartments of the pans. If the level drops too low you can and will damage your pans. If there is too much foam you risk damaging your pans.

NOTE: If you have purchased a scoop or skimmer, do NOT use them to push sap through the evaporator. Doing so will change the gradient in the evaporator.

1. Check the evaporator
    a. Make sure all sap sources are flowing freely i.e. not frozen.
    b. Open hood thimbles and drains, cupolas and stack covers.
    c. Ensure defoamer is usable.
    d. Ensure all fittings are tight.
    e. Make sure all valves are working properly and the float is properly positioned.
    f. Clean the flues with the flue brush every 8 to 12 hours of boiling. NOTE: The rod supplied with the arch has a threaded end. The flue brush can be screwed onto the rod to clean the flues.
    g. Ensure the open area in the grates is clean and free of material. Do not remove ashes from the "V" grooves of the grates.
    h. Remove the ashes from below the grates.
2. If this startup is for a new evaporator or for the first time of the season, go to the Section titled MAKING SYRUP.

DAILY SHUTDOWN

1. There are two factors influencing the shutdown of the evaporator; time and sap volume.
    a. It will require approximately 30 minutes to 1 hour from the last firing to bring the fire down to embers (coals on the grates) in a wood fired arch.
    b. It will require a volume of sap from the last firing to embers and to flood the evaporator so ensure there is adequate volume left prior to the last firing.
2. Continue to monitor the arch as done for normal operations.
3. When there is no more boil in either the flue or the syrup pans and the fire is down to coals on the grates (in a wood fired arch), add sap until the pans are at a depth of 2". This is done by holding the float down or by adjusting the float handles and lowering it. If the sap remaining does not cover the pans to the 2" depth then add clean, unsoftened, non-chlorinated well or spring water until the depth is reached.

NOTE: The extra sap depth is required as the insulation of the arch (ex. bricks) will hold heat and continue the evaporation process until the heat has been dissipated.

MAINTENANCE

Daily – prior to performing maintenance make sure the surfaces have been cooled.

1. Remove spills and splashes from the pans by wiping with hot water.
2. Clean out the ash chamber and the slots in the grates, NOT the "V" grooves of the grates.
3. Check all fittings for leakage. Repair / replace as necessary.

Periodic

1. Using the supplied brush and rod, brush the underside of the flue pan to remove accumulated material. Cleaning will allow the heat to better reach the sap in the pan.
2. Inspect the rail gasket and pan gasket for areas where heat and smoke maybe escaping. Replace if necessary.

End Of Season

NOTES:

- Do not allow sap or acid solutions to soak in the pans for more than 24 hours.
- Use ONLY cleaners stated to be for maple syrup equipment.
- Never store or transport the flue pan upside down.

1. Drain the flue pan by closing the sap source to the regulator box and opening the ball valve (for the drain) at the rear of the flue pan.
2. Drain the syrup pan by opening the draw-off valves.
3. Rinse the pans with unsoftened, non chlorinated well or spring water and then drain.
4. Close the valves on the pans.
5. Clean the pans with a pan cleaner such as LEADER Order #63006 (1 quart size). The directions are as follows:
    a. Add unsoftened, non-chlorinated well or spring water to the pans until the coating to be removed is covered with water.
    b. Add 1 quart of concentrated pan cleaner for each 40 gallons of water in the pans.
    c. Heat the solution to simmering and keep at that level for one hour and the scale is noted to dissolve.
    d. Wearing protective gloves and eyewear, brush the loose scale.
    e. If scale is removed flush the pans with unsoftened, non-chlorinated well or spring water. If the scale is thick you may need to continue simmering the solution in the pan.

f. When the scale has been removed, drain off the solution, fill the pans with clean unsoftened, non-chlorinated well or spring water. Add 2 pounds of baking soda to 200 gallons of clean water. Heat to a light boil, brush the pans, and empty the water from the pans.
g. Ensure all solution is rinsed from the pans using unsoftened, non-chlorinated well or spring water.

2. Disassemble pan connections. Inspect all connection hoses.
3. Discard the rail gasket and pan gasket.
4. Inspect all arch insulating materials (brick, insulating board, blanket). Replace if missing or damaged.
5. Clean the grates.
6. Raise the flue pan out of the arch and finish draining.
7. Thoroughly brush the soot from the flues of the flue pan.
8. Set 2X4s across the rail of the arch where the flue pan is usually placed then set the flue pan right side up on the 2X4s.
9. Set 2X4s across the rail of the arch where the syrup pan is usually placed then set the syrup pan right side up on the 2X4s.
10. Cover the pans and arch with plastic or a tarp.

Beginning Of Season Startup

1. Remove the cover and take the pans and 2X4s off from the arch.
2. Install a new rail gasket.
3. Place the pans on the arch and install a new pan gasket between the pans.
4. Assemble the pan connections and install the float box.
5. Wipe and/or rinse out the pans.
6. Insulate around the flue pan drain.
7. When filling the pans for the first time check all fittings for leakage and repair if necessary.

FEEDBACK

Please use the following e-mail address (feedback@leaderevaporator.com) to suggest improvements or enter comments on this document. Reference the document title in your note. You may also contact LEADER Customer Service.

NOTES