



# Leader Half Pint Evaporator



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# THE HALF PINT EVAPORATOR

The Leader “half-pint” evaporator is named for its small size. It is specifically designed for the hobbyist maple sugar maker with 20 to 50 taps. Like its bigger brothers, the half-pint is designed as a continuous-flow, reverse-feed evaporating pan.

## **Continuous Flow**

Unlike a flat, open pan “batch” system, the half-pint evaporator was built to accept a continuous flow of sap into the pan, with periodic draw-offs of small batches of finished maple syrup. With a continuous-flow system, the sap is channeled using dividers in the pan so that the liquid works its way through the pan until finally becoming syrup. As soon as the first syrup is ready, it is drawn off. A short while later, more of the sap will have condensed to syrup and another small batch is drawn off and so on. The sap is cooked only long enough to make syrup—no more. By limiting the hours you are heating and re-heating the sap sugars, you can reduce the caramelizing that takes place. Thus, your maple syrup will generally be lighter colored and have a milder flavor. In addition to improved syrup quality, a major advantage of the continuous flow system is the ease of operation.

## **Half-Pint Preparation**

First, be sure your arch and pan are level and on a stable surface that is not susceptible to frost shifts. Because the sap will flow continuously at a fairly shallow level, it is important that no one area be higher so that the sap will be shallow and at a risk of scorching.

The arch is designed for a small wood fire. The more efficient your heat source, or fire, the more sap you will be able to boil per hour. (Most half-pint users are boiling away about 5 gallons of sap per hour.) Any improvements you can make in heating efficiency will increase your boiling efficiency. We recommend lining your arch with fire brick or other high-temperature insulating-type products to keep the heat from the fire flowing to the bottom of your boiling pan, not out the sides of the arch. Some people have even added small blowers to the front draft door to increase air-flow to the fire. With these improvements, some users have been able to boil away up to 7 or 8 gallons of sap an hour.

Keep in mind that your fire is only as good as your wood. Use only good, dry (two years minimum) wood, preferably hard wood. You want the highest BTU for your labor input – cutting, stacking and firing your evaporator. Start with good wood! The wood should be cut in 18 inch lengths and split fairly small. The greater the surface area, the greater the BTU’s from the fire. Large logs will only smolder with minimal heat output while the same log split into four pieces greatly increases the total surface area and the available BTU’s.

You will also need to add smoke stack to your arch. The collar is designed to attach 6” stove pipe. You will want a 6” elbow coming off the collar with 6’ of stack going up from there. Half pint evaporators are designed to be able to contain the fire to increase heat efficiency and avoid smoke and fly-ash in the syrup. This is an important quality control. Take advantage of this feature by getting the smoke up high enough to avoid contact with the syrup.



color differences in each section of the pan – as you move from sap to syrup, the liquid will take on a darker and darker amber color because the sap has cooked longer and the sugars have caramelized more as it gets closer and closer to syrup.

Although you can make finished syrup right in your half-pint evaporator, from a practical standpoint, most people find it easier to draw off small batches of almost finished syrup into a pail or pan and “finish” the syrup later inside on a stove. This keeps you from having to get just the right density on many small batches and reduces your risk of burning the syrup and scorching the pan. You can determine an approximate draw-off point using temperature. This is not nearly as accurate as testing density with a hydrometer and hydrometer cup, but will give you an idea of when to draw-off for finishing at a later time. Maple syrup boils at 7.5 degrees above the boiling point of water, which usually falls between 218 and 220 degrees. You should use your hydrometer to get a more accurate measure of when the solution is close to syrup. The use of a hydrometer is essential for the final testing of maple syrup.

### **Finishing Up/Starting Again**

The half-pint pan is never emptied, as you would using a batch method. When you are finished boiling for the day, draw-off a batch of that which is closest to syrup in a pail or bucket. This is to be sure it doesn't get heavier than syrup and burn while the pan is cooling down. Be sure there is still enough sap in the reservoir pan to feed the boiling pan throughout this cooling down time. Then let it set. The small amount of heat that continues from your fire will do a little bit of evaporation while you are away, without risk of burning. The sap/syrup stays right in the pan.

An advantage of the half-pint system is the capability of reversing the flow of sap. As sap thickens to syrup, the boiling temperature increases. At the boiling point of maple syrup, or approximately 219 degrees, the minerals naturally present in the sap solidify and make a niter we call sugar sand. Because the niter forms at the higher temperatures, it forms only in those areas of the pan where syrup is being finished. With an open-pan batch system, where the whole pan turns to syrup at once, sugar sand is formed throughout the pan. In a continuous-flow pan, sugar sand builds up in just one spot – the section where syrup forms and is drawn-off. Over time, the sand can build so much that the pan will scorch in that one area. To reduce this problem, most commercial evaporators are designed to reverse the direction of sap flow. Each day, the flow direction is reversed so that the feed and finishing areas of the pan get routinely changed. This “washes” the sand away from the finishing area and decreases the danger of scorching due to sugar sand build-up.

When you are ready with another batch of sap to boil, start your fire, again being sure the pan has sap. Before you fill your reservoir pan, rotate it 180 degrees and place it six inches from the back of the boiling pan. You will now feed the section you last made syrup in and you'll make syrup in the section you were previously feeding with raw syrup. This is the reversing process discussed above. Fill your reservoir pan with sap and adjust the valve opening as needed. The pail of “near-syrup” you pulled off the previous day can be slowly fed into the syrup section to be finished along with the new, or you can put it with the other small batches you've been saving to finish later.

## HALF PINT ARCH ASSEMBLY INSTRUCTIONS

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\* **NOTE:** Be sure to bolt only finger tight initially.

1. Assemble sides, **C** and **D** to **E** using 2 middle holes on each side (4 holes total). With the side flanges located under the bottom panel.  
(Use 1/2" long bolts)
2. Attach front panel **A** to **C** and **D** (with bolting flanges inside) and bolt complete, except for the top hole that is to be used later for the **BRACKET "I"**. **Refer to print notation "G" for proper location of panel "A"**.
3. Attach flange of **E** to **A** and bolt complete.
4. Attach back panel **B** to **C**, **D** and **E**, using the same method as **#2** and **#3**.
5. At this point all main components should be bolted together loosely,  
Now rotate the Arch onto its side **C** or **D**, (put cardboard or wood down to prevent scratching the sides.)  
Attach the legs **F** to remaining holes on the bottom of the unit, "either side first". (Use 3/4" long bolts.)
6. Stand unit upright onto the newly installed legs.
7. Reaching inside the unit, Place the Grate Rail **G** into place with the angle facing upward (as illustrated in assembly instructions.)
8. Square up the unit at any one corner and begin to tighten screws using a screwdriver and a 7/16 wrench, until all 4 corners are complete, Refer to assembly instructions.
9. Attach **BRACKETS** on top 4 corners, Refer to note **I** and **J** in assembly instructions.
10. Set unit where it will be fired and then place the grates inside on top of grate rails previously installed. (Be sure to position the grates as illustrated in the assembly instructions.)
11. Install firebrick as per instructions enclosed.
12. Place HALF PINT syrup pan on your newly assembled arch carefully. (Be sure that the pan seals well so as not to allow flame or smoke to escape around edges of syrup pan.)

***"CAUTION: TO PREVENT SERIOUS DAMAGE ALWAYS MAKE SURE THAT THERE IS ADEQUATE SAP IN THE PAN BEFORE A FIRE IS STARTED AND WHILE BOILING! INSUFFICIENT LIQUID CAN CAUSE THE PAN TO BURN AND THE WELDS TO CRACK.***

**Congratulations!** You have successfully assembled your **HALF PINT ARCH**.  
**HAPPY SUGARING!**

# HALF PINT ARCH PARTS LIST     B

QUANTITY	PART NAME	PART
	<u>NUMBER</u>	
<input type="checkbox"/> 1	FRONT PANEL	25021
<input type="checkbox"/> 1	BACK PANEL	25022
<input type="checkbox"/> 2	SIDE PANEL 1 LEFT    1 RIGHT	25023
<input type="checkbox"/> 1	BOTTOM PANEL	25024
<input type="checkbox"/> 1	DRAFT LATCH BOLT AND NUT 10-24 X 1 ½"	
<input type="checkbox"/> 1	DRAFT LATCH	

PACKED AND CHECKED BY \_\_\_\_\_

HALF PINT ARCH PARTS LIST      A

<u>QUANTITY</u>	<u>PART NAME</u>	<u>PART</u>
	<u>NUMBER</u>	
<input type="checkbox"/> 2	BRACE #1 "I"	25025
<input type="checkbox"/> 2	BRACE #2 "J"	25034
<input type="checkbox"/> 2	GRATE RAIL "G"	
<input type="checkbox"/> 44	MACHINE SCREWS ¼-20 X 1/2	
<input type="checkbox"/> 22	MACHINE SCREWS ¼-20 X ¾	
<input type="checkbox"/> 4	STEEL LEGS (3 HOLED) "F"	
<input type="checkbox"/> 1	GRATE ASSEMBLY "H"	

## **HALF PINT ARCH BRICKING INSTRUCTIONS**

**\* NOTE: Be sure to place the unit where it will be used, as the unit will be very heavy to move after installing the firebrick!**

**\*\* ONLY USE 3000 DEGREE TYPE FIREBRICK!!**

The following is necessary for bricking the unit but ***is not included with this arch.***

**42----**Full Sized Firebrick----measures 4<sup>1/2</sup>"x 9"x 2<sup>1/2</sup>".

**62----**Half Sized Firebrick---measures 4<sup>1/2</sup>"x 9"x 1<sup>1/4</sup>".

**1-----**30 lb. pail of Refractory Cement (Good to 3000 degrees).

**1-----**Masons Trowel (To apply the Refractory cement)

(Note: While bricking, cover all metal surfaces inside the arch lightly with Refractory cement and also the side facing on the firebrick. It is also necessary to use 1/8" of Refractory cement between each brick.)

1. Dry fit the 1/2 pint boiling pan into place and check that the unit is level .

Shim legs of unit as necessary, and check that the boiling pan *outlet fittings* are set *into* the *corner braces* on the arch. (See illustration "I" and "J" in assembly instructions) . After confirming proper placement of the braces remove boiling pan to begin the bricking process .

2. Begin the bricking process by lining the *bottom* of the arch "E" with a layer of refractory cement (coat lightly) . Start at one corner laying *half* bricks *flat*, horizontally and work across to the opposite corner . The unit has been designed to accommodate most standard sized firebricks . Cement approximately 1/8" thick between bricks

3. Continue by bricking the *sides* of the unit "C" and "D" with *full* brick, up to the underside of the grate rails "G", laying into place vertically, *flat* against the side of the arch . (**This distance from the bottom up to the grate rails should be exactly "one" brick stood on end.**) Place them in a row all the way from the front to the back of the arch. Cement the metal side and firebrick facing "both" with light coating of refractory cement . Cement approximately 1/8" thick between bricks.

4. Continue bricking using *half* bricks, resuming from the top of the grate rail "G" laying bricks horizontally *flat* against the side of the arch for one row only. Then place the next row vertically *flat* against the side of the arch, (this should finish all the way up the sides to the top rim .) Cement into place using refractory cement .

5. Now brick the back panel "B" using the same method as the side panels (Steps #3 and #4) except it is necessary to cut bricks around the stack ring . Be sure to cement this area well, filling in any gaps created from cutting firebrick .

6. To brick the front panel "A" it is also done using the same method as the side panels (Steps #3 and #4) except the bricks are cut **around** the casting front . (*which is the component pre-installed onto the front panel unit*). Be sure to cement this area well to close up any gaps created from cutting firebricks.

**Note:** Casting front area does not require bricking.

7. The last step is to install a firewall across the unit from "C" to "D". First locate the wall by measuring back 8<sup>1/2</sup>" from the back of the arch and make a mark with a pencil. This will be the front side of the firebrick and should be in line with the back side of the grate rail. Lay *full* firebricks horizontally across to meet the opposite side. Stagger each row by cutting a brick in half to start the next row and alternate this procedure until the wall is approximately 3" from the top of the arch.

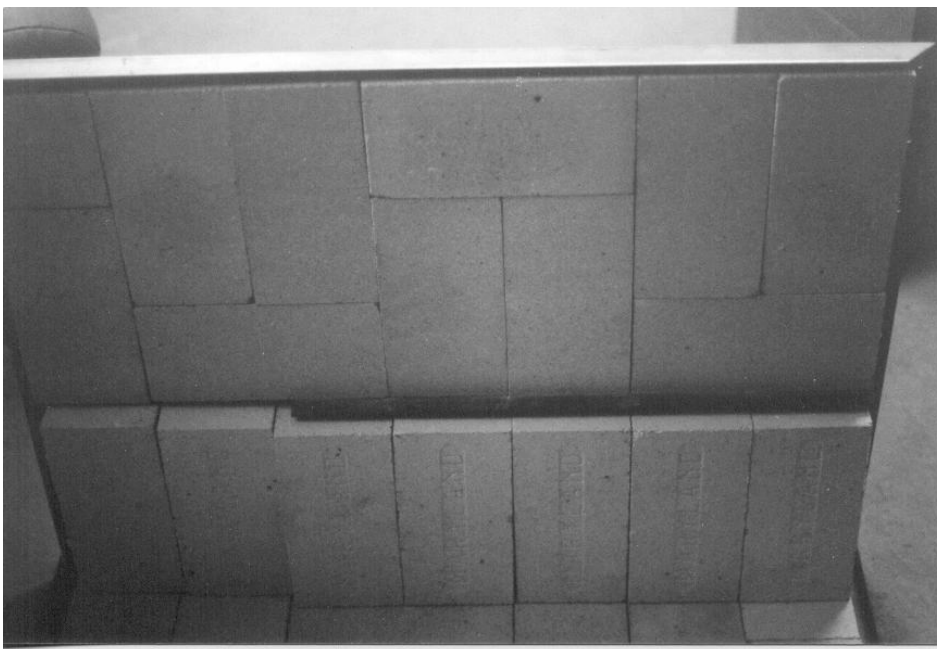
**Note:** This wall will serve the purpose of forcing the majority of the heat, up to the boiling pan and will greatly improve efficiency!

***HAPPY SUGARING!***

# Half Pint Arch Bricking Instructions



**This view shows the layout  
for the bottom of the arch  
("E" in the assembly  
instructions)**

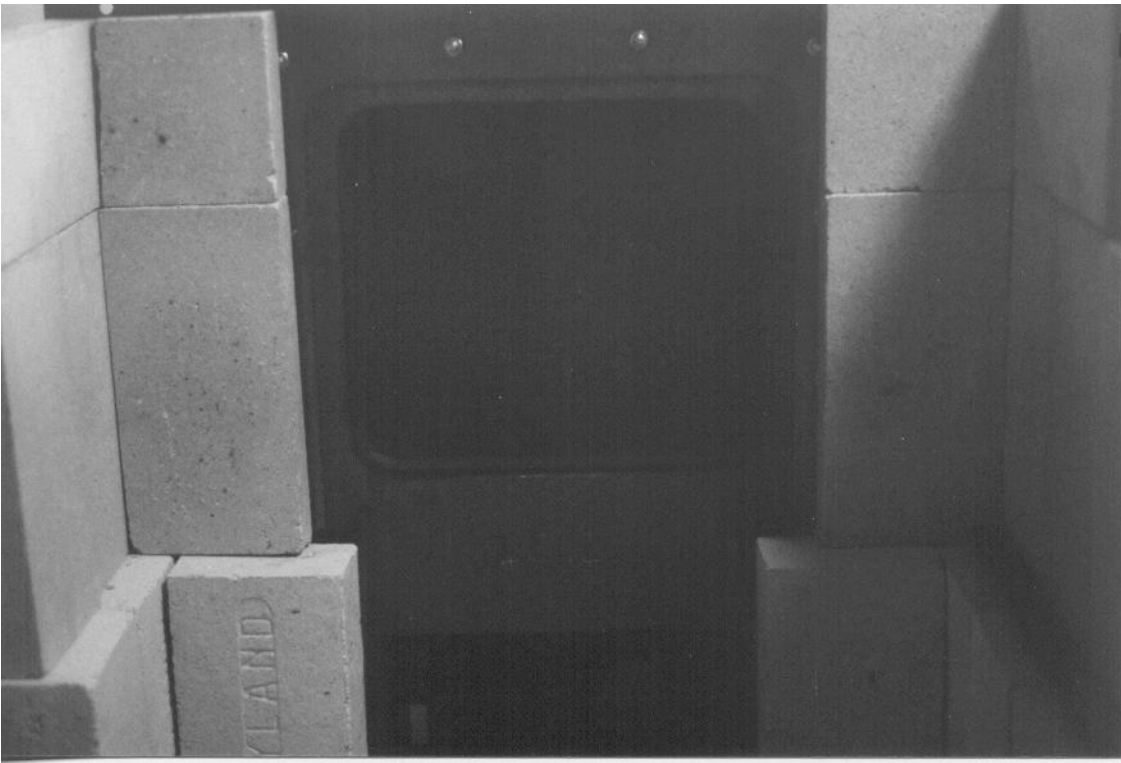


**This view shows  
the layout for  
either side "C"  
or "D"**



**This view shows the layout for the back panel (“B” in the assembly instructions.)**

**Gaps between the smoke stack and the collar should be filled in with refractory cement.**



**This view shows the layout for the front panel “A”.**

**Fill in around brick edges with refractory cement and across to on all panels.**



## **HALF PINT ARCH BRICKING INSTRUCTIONS**

These views show the layout for the firewall to be installed across the inside of the arch. (Recommended)

