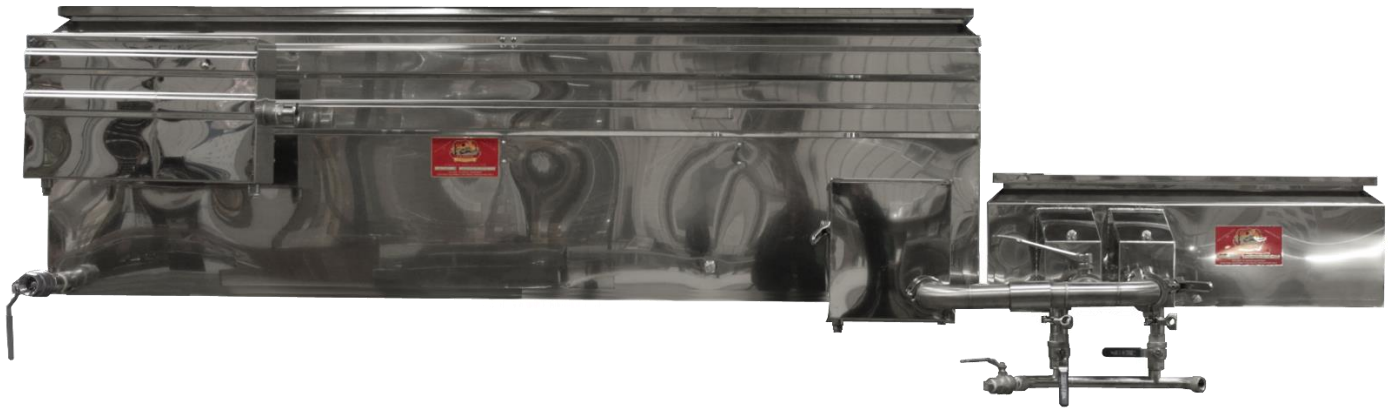
USER MANUAL

REVOLUTION SYRUP PAN

For Use with Max Style, Standard Raised, Standard Drop Flue Pans



LEADER™
WE HELP YOU GET MAPLE DONE

LEADER EVAPORATOR
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LeaderEvaporator.com

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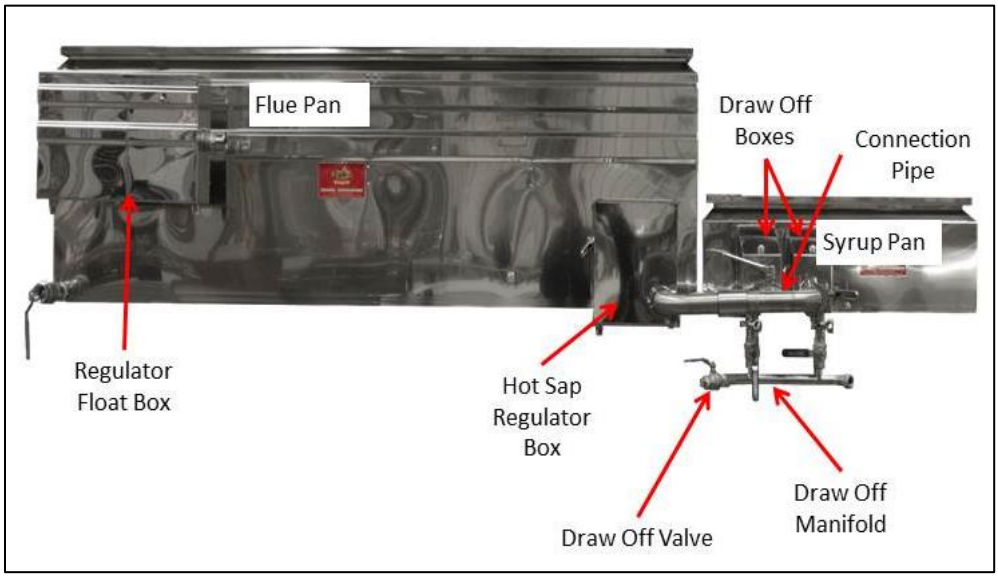
EQUIPMENT DESCRIPTION

The Revolution Max Combo and Revolution Max Evaporator combine a Revolution Max flue pan and a Revolution Syrup pan. The Revolution set of pans offers the user ease of flow reversal helping to limit the buildup of niter and sugar sand and minimizes the loss of time and energy. A Max Flue pan offers a significantly increased flue area for maximum heating surface area. The Max Combo flue pan adds the functioning of both a raised and drop flue.

The Revolution is also available with a standard raised flue pan and in a dropped flue configuration. Both offer the same ease of flow reversal in the syrup pan.

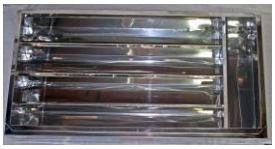
RAISED AND MAX TYPE FLUE PAN SETS



DROP FLUE PAN SETS

The dropped flue pan set will have a similar appearance and setup to the raised and max combo pan sets. The difference will be there is no hot sap regulator box on the drop flue pan set and the connection pipe will connect directly from the flue pan to the syrup pan.

Equipment Description List

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Syrup Pan	As Ordered	
Regulator Float Box	As Ordered (Left or Right Feed)	

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Flue Pan	As Ordered	
Regulator Packing – Regulator and Z-Arm	59065	

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Cold Sap Float	59025	
Hot Sap Z-Arm – NOT for dropped flue set	59051	
1 – 1/2 " Heavy Clamp QTY: 2 (Only used on pan sets less than 5' wide)	72245	
2" Heavy Clamp	72246	

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Hot Sap Float – NOT for dropped flue set	59028	
Box Braces QTY: 2		
1 – 1/2 " Teflon Seal QTY: 2 (Only used on pan sets less than 5' wide)	65621	
2" Teflon Seal	65620	

	Drop Flue Pan Sets less than 5' wide	Qty: 2
	Drop Flue Pan Sets 5' wide or wider	Qty: 3
	Raised or Max Style Flue Pan Sets less than 5' wide	Qty: 4
	Raised or Max Style Flue Pan Sets 5' or wider	Qty: 4

2" Butterfly Valves	60116	

	Drop Flue Pan Sets less than 5' wide	Qty: 3
	Drop Flue Pan Sets 5' wide or wider	Qty: 6
	Raised or Max Style Flue Pan Sets less than 5' wide	Qty: 2
	Raised or Max Style Flue Pan Sets 5' or wider	Qty: 5

Distributor Pipe		
Allen Wrench for Butterfly Valves	60140	

Distribution Box NOTE: If installed it will be on the end of the Distributor Pipe		
Hot Sap Regulator Box NOT for Drop Flue pan set		

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
2” Connection Pipe With Slip Fittings for Raised and Max style flue pans		
¾” Stainless Steel Ball Valve - Draw Off Valve for 3’ X 10’ or smaller evaporator	60104	
1” Stainless Steel Ball Valve – Draw Off Valve for 3’ X 12’ less than 5’ wide evaporators	60106	
Flue Brush for Max style flue pans	60058	
1 -1/2” Butterfly Valve for Raised and Max style flue pans	60115	
Ceramic Pan Gasket	36” – 65162 72” - 65168	
2” End Cap for 5’ and 6’ wide evaporators	72249	

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
2” Connection Pipe With Slip Fittings for Drop Flue pan		
¾” Stainless Steel Close Nipple	72106	
1” Stainless Steel Close Nipple	72111	
Flue Brush for Drop flue pans	60058	
Draw-Off Manifold for pan sets less than 5’ in width - couplers and piping will be ¾” for evaporators 3’ X 10’ or smaller and 1” for evaporators 3’ X 12’ or larger		
Draw Off Manifold for pan set 5” and 6” in width		
2” Clampable Draw Off Elbow	72179	

Flue Pan Drain Parts

Drop Flue Pan Sets of Width 36” or Less

¾” Stainless Steel Ball Valve	60104		¾” X 8” Stainless Steel Nipple	72124	

Drop Flue Pan Sets Greater than 36” in Width and All Max Combo and Max Raised Flue Pans

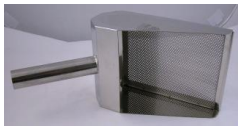
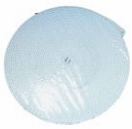
ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
1 -1 /4" Stainless Steel Ball Valve	60108	
¾" Stainless Steel Ball Valve	60104	
1 -1 /4" Stainless Steel Ball Valve	60108	

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
1 – ¼" X 6" Stainless Steel Nipple	72109	
Raised Flue Pan Sets of Width 36" or Less		
¾" Stainless Steel Close Nipple	72106	
Raised Flue Pan Sets Greater Than 36" in Width		
1 – ¼" Stainless Steel Close Nipple	72340	

Optional Setup Parts And Equipment

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Thermometer 3" or 5" face, 6" stem	61022 3" Face/6" Stem 61028 5" Face/6" Stem	
Brush, Inside	60062	
1 ¼" Stainless Steel Ball Valve	60108	
1 ¼" Stainless Steel Tee	72316	
½" Stainless Steel Close Nipple	72101	
Thermometer 3" face, 6" stem (Other sizes and configurations are available)	61022	 Two are recommended – one for each draw-off compartment of the syrup pan

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Silicon Lubricant (Food grade)	64436	
Pan Gasket Holder	Available in 24", 30", 36", 40", 48", 60", 72" widths	
1 ¼" Stainless Steel Close Nipple QTY: 2	72340	
½" Stainless Steel Ball Valve	60100	
1 ¼" to ½" Stainless Steel Close Adapter	72344	
Stack Thermometer	61052	 Install at shoulder to eye level in the smoke stack

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Timer, Firing (Not available through Leader Evaporator)		
Green Gloves	63125	
Short Test Cup 2” Diameter	59007	
Tall Test Cup	59006	
Pan Cleaner 1 Quart Also available in 1 gallon and 5 gallon containers	63006	
Small Skimmer Large Skimmer	59004 59003	
Woven Rail Gasket (1/4” X 1 ½”X 50’)	65156	

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Firing Gloves	63123	 For wood fired arches
Short Syrup Hydrometer – for use with 59007 Short Test Cup	61040	
Long Syrup Hydrometer – for use with Tall Test Cup	61067	
4 oz Defoamer Standard defoamer also available in quarts and gallons	63015	
Small Scoop Large scoop	59002 59001	
Grading Set, Temporary	62081	
Rail Gasket	65154 (1/2” X 2” X 25’) 65157 (1” X 2” X 25’)	

RECEIVING YOUR EQUIPMENT:

Upon receipt of your equipment, it is recommended you perform the following tasks:

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

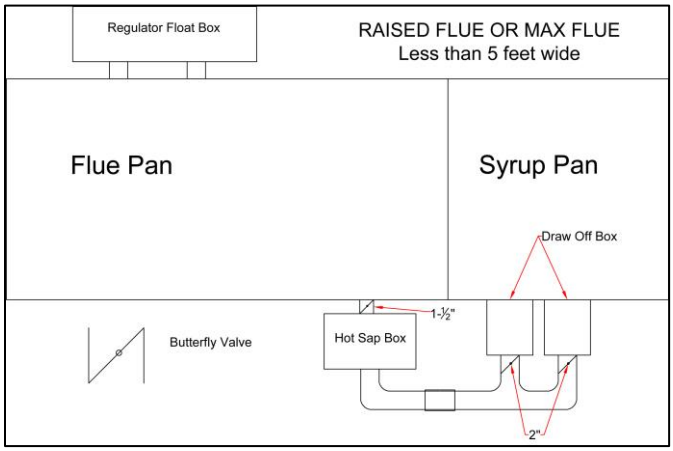
SETTING UP THE PANS:

NOTE: All directions as to arch sides are as if you were facing the front of the arch.

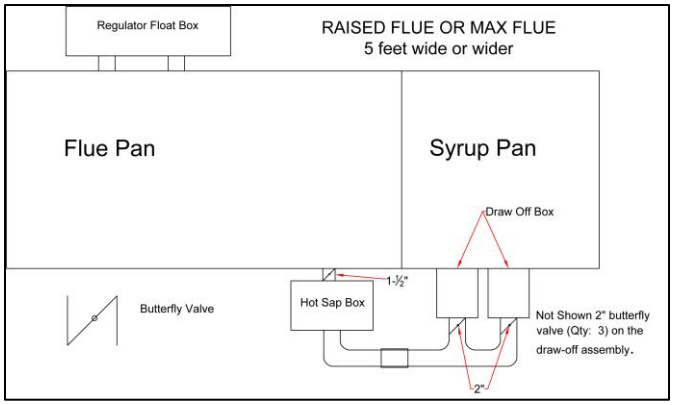
Butterfly Valve

NOTE: Do NOT install this valve without first disassembling. If not fully disassembled, the rubber section cannot be aligned properly and will be damaged.

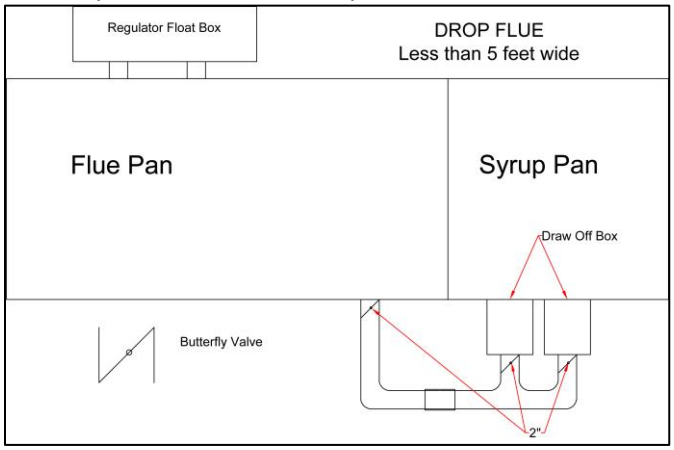
Butterfly Valve Locations MAX and Raised Flue Pan Set Less Than 5 Feet Wide:



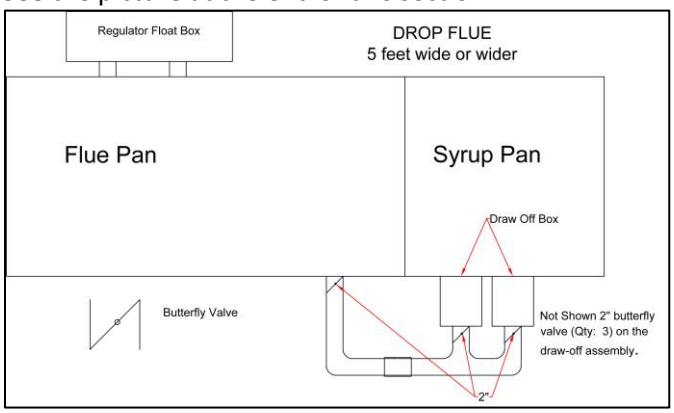
Butterfly Valve Locations MAX and Raised Flue Pan Set 5 Feet Wide or Wider:
See the picture at the end of this section.



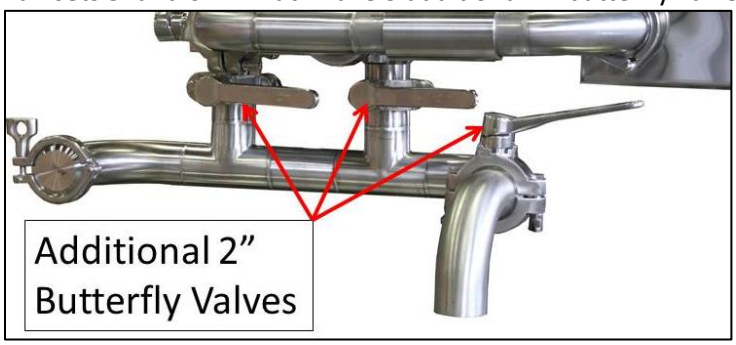
Butterfly Valve Locations Drop Flue Pan Set Less Than 5 Feet Wide:



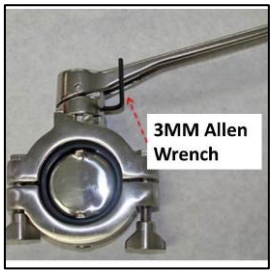
Butterfly Valve Locations Drop Flue Pan Set 5 Feet Wide or Wider:
See the picture at the end of this section.



PAN SETS 5’ AND 6’ IN WIDTH
Pan sets 5’ and 6’ in width have 3 additional 2” butterfly valves which are part of the draw off assembly

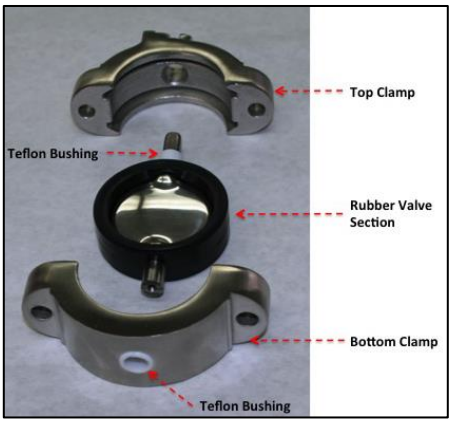


Disassembly and Assembly

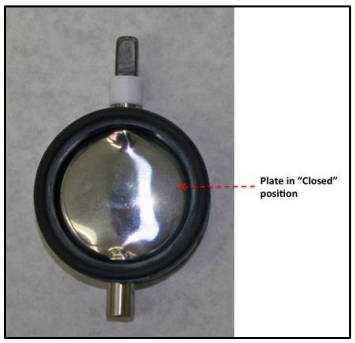


1. Disassemble the butterfly valve as follows:
    a. Using the supplied 3MM Allen wrench, loosed and remove the handle.

b. Loosen and remove the wing nuts and the bolts.

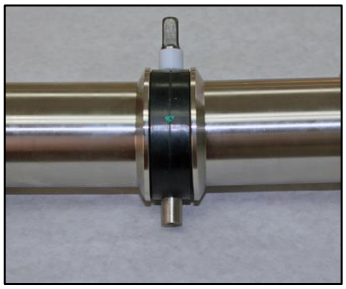


c. Remove the top and bottom sections of the valve clamp. Note the locations of the Teflon bushings. Do not lose or damage these bushings.

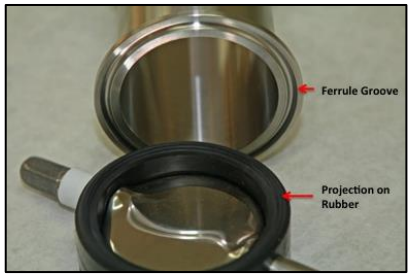


2. Assemble the butterfly valve as follows:

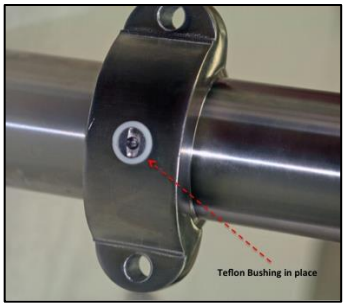
NOTE: To ease the step of aligning the valve to the handle, it is recommended during the installation steps, the valve remain in the "closed" position. In the "closed" position, the flat spot on the valve shaft is parallel to the valve plate.



a. Place the rubber section between the pipe ferrules to be connected with the handle end of the valve shaft positioned in its operating location. After the clamps are installed the valve orientation cannot be safely changed.



b. Align the projections on the rubber valve section with the grooves in the pipe ferrules. Ensure the Teflon Bushings are either on the shafts or in the clamps.



c. Ensure the Teflon bushing is properly positioned in the "bottom" part of the valve clamp. Fit the valve clamp over the "bottom" shaft of the valve and confirm the Teflon bushing remains in place.

d. Place the “top” part of the valve clamp over the “top” of the valve shaft, ensuring the Teflon bushing is in place.

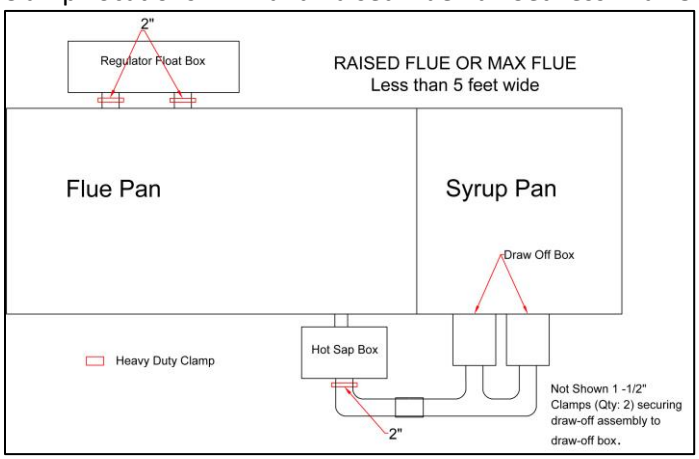
e. Insert the bolts through the clamp body such that the heads of the bolts are on the same side as the handle.

f. Position the handle so it will be parallel to the valve plate (parallel to the valve body if the plate was installed in the “closed” position). Make sure the handle will be able to move to both the close and open positions. If the valve will not fully open or close, disassemble the valve and reposition the rubber section.

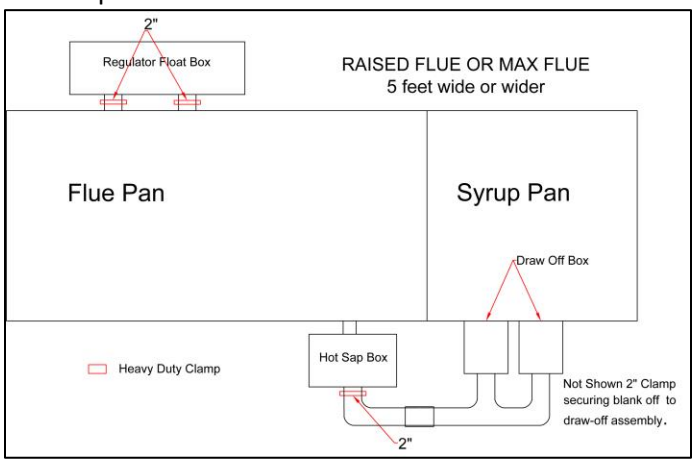
g. Tighten the handle with the included 3MM Allen wrench.

Stainless Steel Heavy Duty Clamps With Teflon Seals

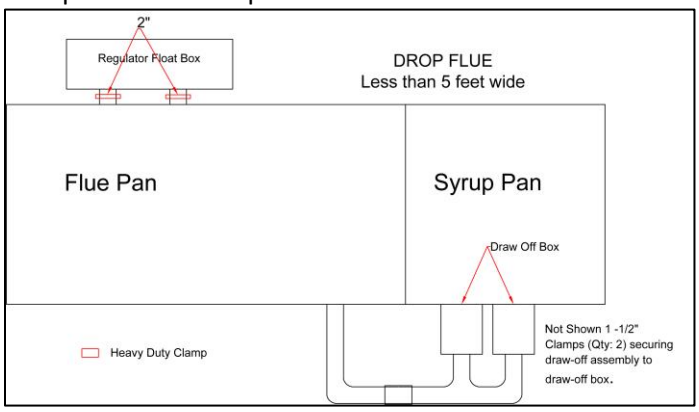
Clamp Locations MAX and Raised Flue Pan Set Less Than 5 Feet Wide:



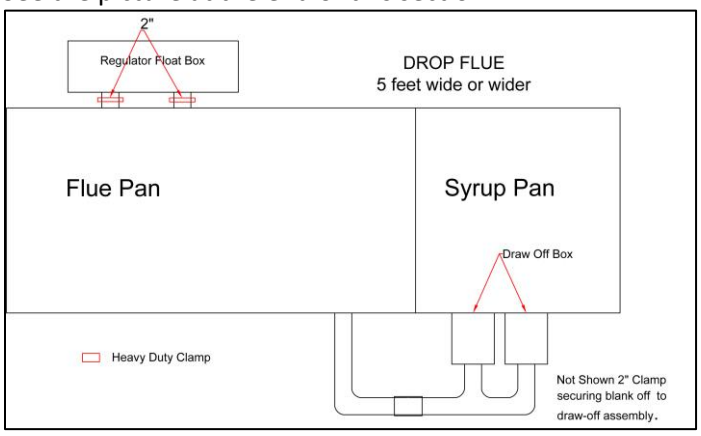
Clamp Locations MAX and Raised Flue Pan Set 5 Feet Wide or Wider:
See the picture at the end of this section.



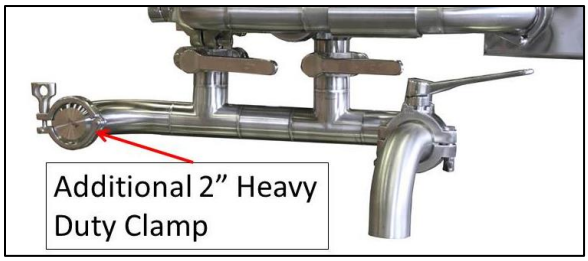
Clamp Locations Drop Flue Pan Set Less Than 5 Feet Wide:



Clamp Locations Drop Flue Pan Set 5 Feet Wide or Wider:
See the picture at the end of this section.

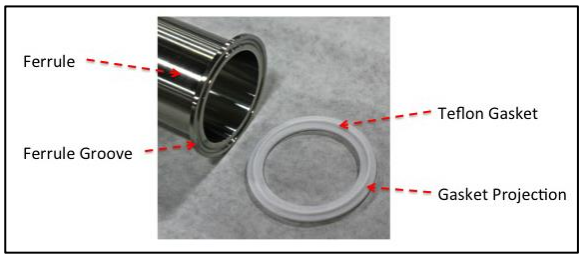


PAN SETS 5' AND 6' IN WIDTH
Pan sets 5' and 6' in width have 1 additional 2" stainless steel heavy duty clamp which is part of the draw off assembly



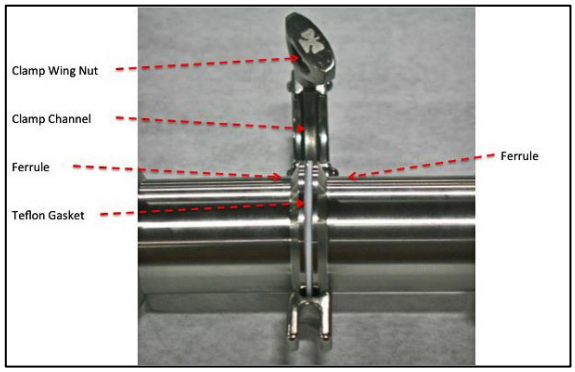
Heavy Duty Clamp Assembly

This section describes the use of Teflon gaskets, clamps and ferrules to make connections. The ferrules are welded in place to the items being connected. The Teflon gaskets and clamps are used as follows to complete the connections:



1. Match the groove in the ferrule to the projection on the Teflon gasket.
2. Place the clamp groove over the assembled ferrules and Teflon gasket. Ensure the gasket is properly seated in the ferrule prior to placing the clamp.

NOTE: The clamp does not rotate easily once placed over the ferrules. It is recommended you position the wing nut so it will be easy to access and will not be in a place where normal work is done.

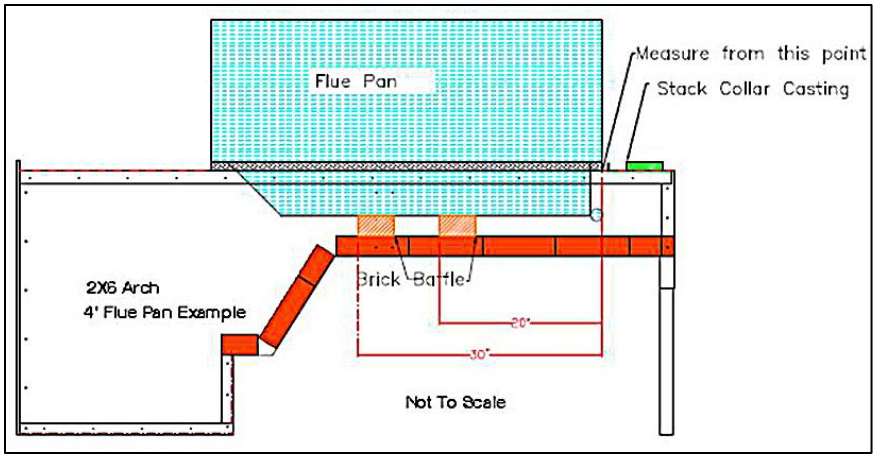


3. Close the bolt of the clamp and tighten the wing nut.

Setting the Pans

1. Ensure the arch is in place, insulated and leveled prior to starting work with the pans. As part of insulating a set of MAX COMBO pans with an INFERNO or standard wood fired arch a baffle or baffles (dependent on the size of the flue pan) must be added to the arch. The baffle is added to direct the heat up through the flue pan. This does not apply to a VORTEX arch.

    a. A baffle is constructed by adding a row(s) of bricks at a certain point (or points) on the arch floor.



The location of the baffle(s) is determined by measuring from the front of the arch collar casting as illustrated.

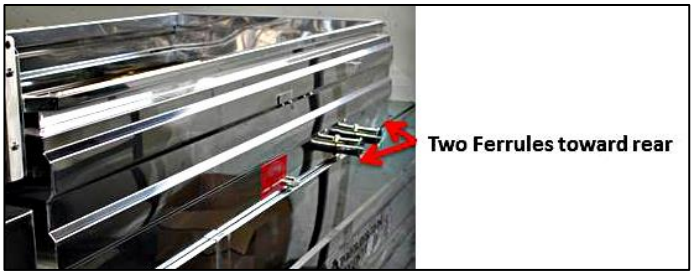
The table lists the baffle locations for different sized flue pans. The measurement should be taken from the front of the stack collar as indicated above to the front of the brick in the baffle.

Length of Flue Pan (ft.)	First Baffle Location (inches from front of casting)	Second Baffle Location (inches from front of casting)
3	20	
4	20	30
5	20	42
6	20	54
7	20	66
8	20	78
9	20	90
10	20	102

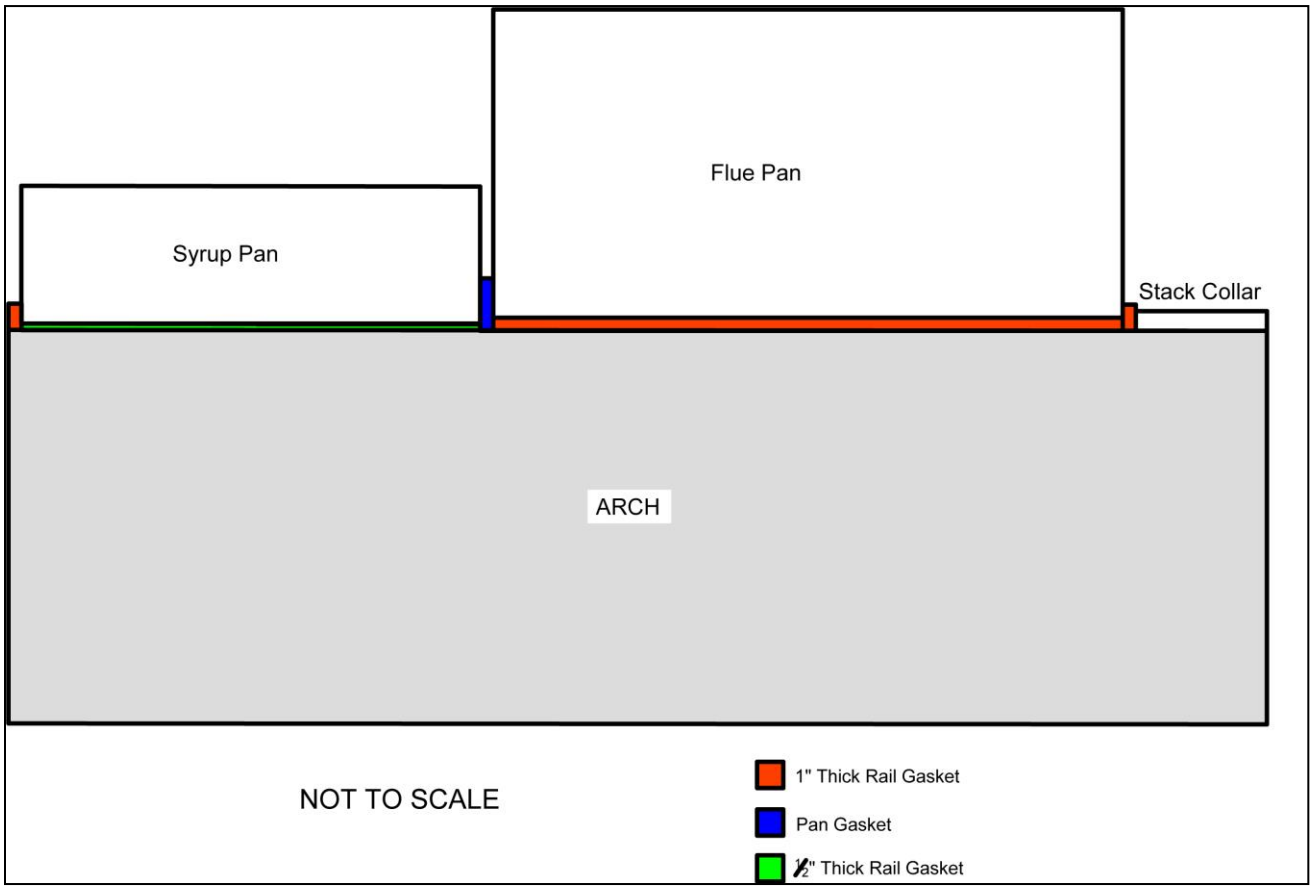
    b. The baffle should be constructed of either full or half bricks installed on top of the bricks on the floor of the arch. The height of the baffle should be to just under the bottom of the flues of the flue pan. When measuring where the flue pan flues will be, remember to include the ¼" to ½"thickness of the rail gasket.

2. The arch rail under the flue pan is to be lined with rail gasket. Use a utility knife to cut pieces to fit.

3. The arch rail under the syrup pan is to be lined with rail gasket. Use a utility knife to cut pieces to fit.
4. Cut a strip of 1” rail gasket the width of the flue pan + 4”. Place it against the front of the stack collar with 2” overlapping each rail. Tape the piece in place, if necessary.



5. Put the flue pan on the rail making sure the rail gasket stays in place. The rear of the flue pan will be the end closest to the side with the two welded ferrules. The flue pan should be tight against the rail gasket in front of the stack support. Remove the tape from the rail gasket if it was used.



Installation of the Flue Pan Drain

Drop Flue Pans of Width 36" or Less

Supplied with and use a ¾" stainless steel ball valve and a ¾" X 8" stainless steel nipple

Drop Flue Pans Greater Than 36" in Width and All Max Combo and Max Raised Flue Pans

Supplied with and use a 1 – ¼" stainless steel ball valve and a 1 – ¼" X 6" stainless steel nipple

Raised Flue Pans of Width 36" or Less

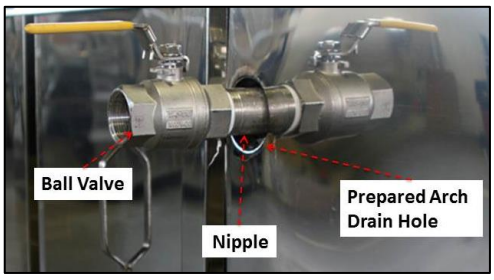
Supplied with and use a ¾" stainless steel ball valve and a ¾" close stainless steel nipple

Raised Flue Pans Greater Than 36" in Width

Supplied with and use a 1 – ¼" stainless steel ball valve and a 1 – ¼" close stainless steel nipple

DROPPED FLUE AND MAX COMBO PANS

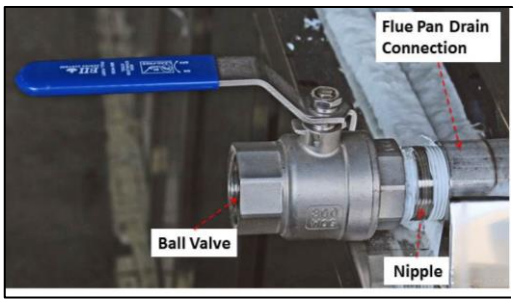
1. Line the flue pan drain fitting up with the hole prepared in the arch.
2. Wrap Teflon tape around both ends of the supplied stainless steel nipple.



3. Insert one end of the wrapped nipple into the flue pan drain fitting. Tighten.
4. Thread the supplied stainless steel ball valve onto the other end of the nipple. The handle of the valve should be pointed away from the arch when it is in the "open" position. Tighten.
5. Insulate around the drain pipe with rail gasket.

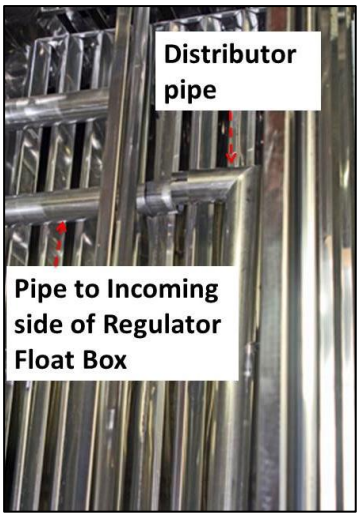
RAISED AND MAX RAISED FLUE PANS

1. Wrap Teflon tape around both ends of the supplied stainless steel nipple.

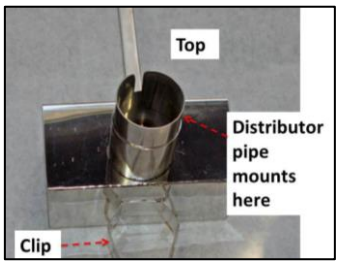


2. Insert one end of the wrapped nipple into the flue pan drain fitting. Tighten.
3. Thread the supplied stainless steel ball valve onto the other end of the nipple. The handle of the valve should be pointed away from the arch when it is in the "open" position. Tighten.

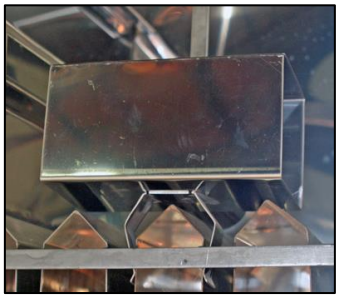
Installation of Distribution Pipe and Box



1. If not previously installed follow these steps to install the flue pan distributor pipe and distribution box:
   a. Locate the feed pipe from the regulator float box of the flue pan.
   b. Insert the distributor pipe into the flue box feed pipe. The distributor pipe should point toward the front of the flue pan. Let the pipe rest on the flues.



c. Slide the distribution box onto the open end of the distributor pipe. It should be positioned so the “clip” side will be down towards the flues.



d. Line the clip up with a flue, keeping the pipe as straight as possible, and slide it over the flue to secure it in place.

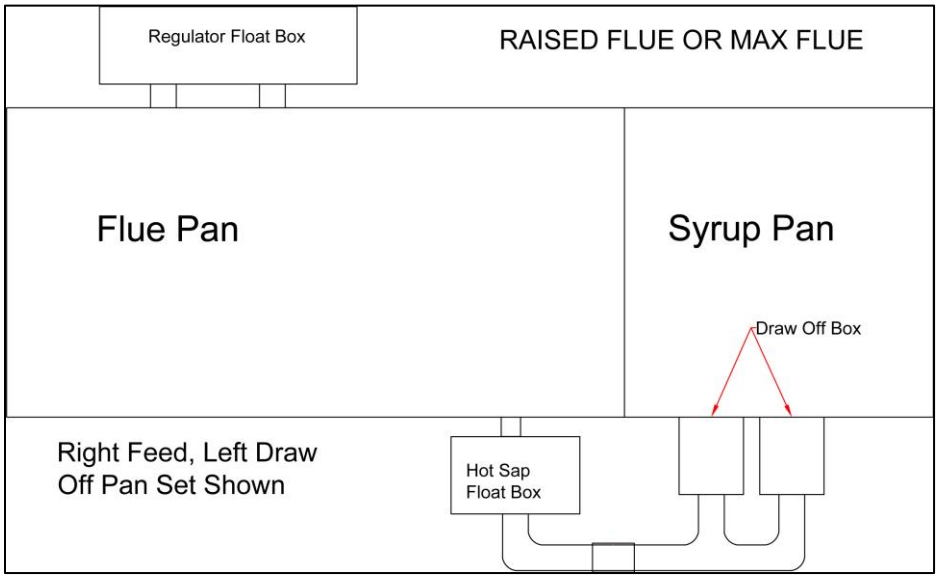
Set the Syrup Pan

1. Cut the pan gasket to the width of the pans. Place the pan gasket against the front of the flue pan, using a gasket holder (available through Leader Evaporator) or tape to hold it in place, if necessary.
2. Place the syrup pan on the rails of the arch as close to the flue pan as possible, compressing the pan gasket. The rear of the syrup pan is the end with the draw off boxes.
3. Place a piece of 1” rail gasket cut 4” wider than the flue pan, in front of the syrup pan to cover the opening between the syrup pan and the arch. Remove tape from the pan gasket, if it was used.

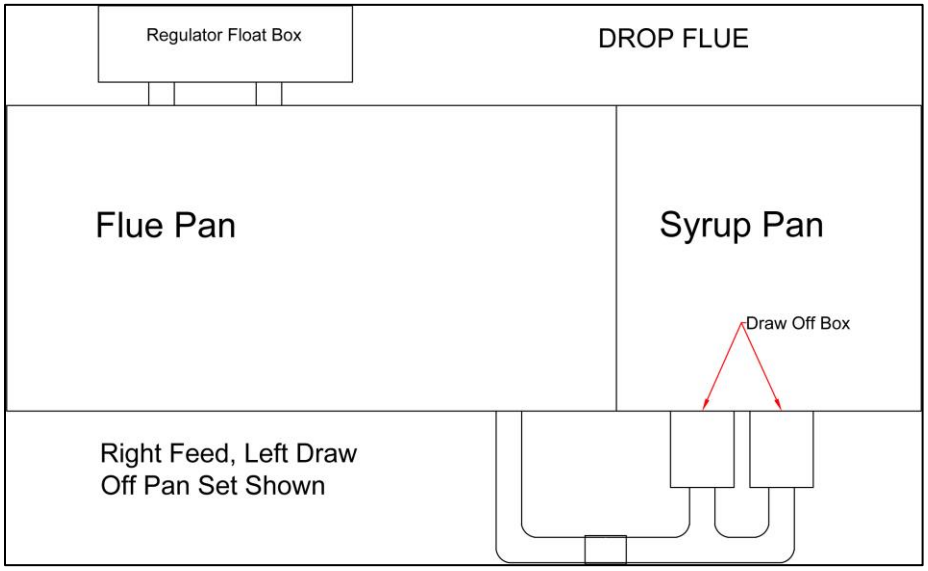
Installation of Float Boxes

In the following sections you will be installing the float boxes and connections controlling the flow of sap through the evaporator. The following illustration indicates an example of the locations of these boxes. Note the actual locations of the boxes will vary dependent on the functional locations you ordered. The illustration shows a right feed, left draw set of pans. if you had ordered a left feed, left draw set of pans all the boxes (regulator, hot sap and reverse flow draw-off) would be on the left side.

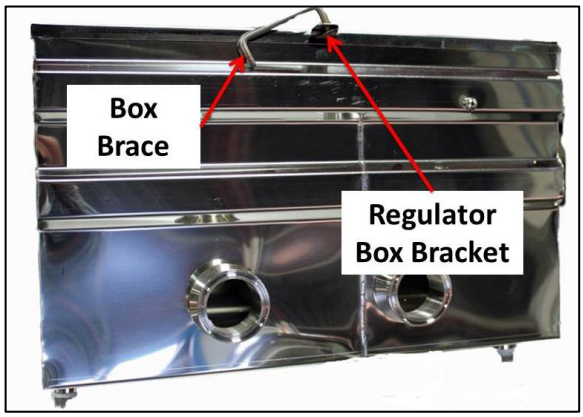
Max Raised, Max Combo or Raised Flue Pan Set

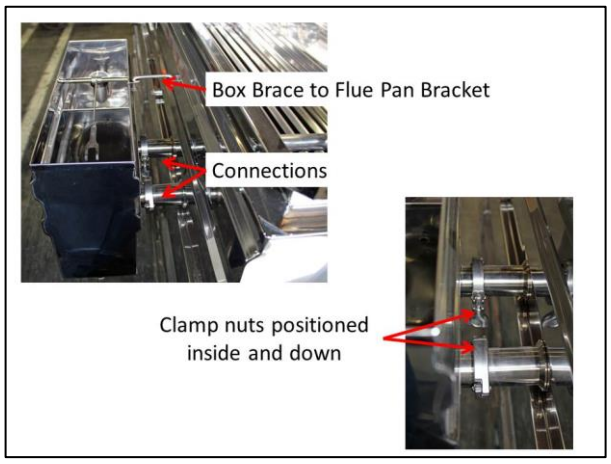


Drop Flue Pan Set



Installation of Cold Sap Regulator Box





NOTE: To ease assembly, place all parts within reach.

1. Insert a box brace into the regulator float box until the flat end of the brace is under the box bracket.

2. Line up the regulator float box ferrules to the ferrules at the rear of the flue pan. Hook the loose end of the box brace into the bracket on the flue pan, above the ferrules.

3. Place a 2” Teflon gasket between each set of ferrules. Put pressure on the float box to hold the gaskets in place then secure the connections with 2” heavy duty clamps.

Installation of the Draw Off Assembly

PAN SETS LESS THAN 5' IN WIDTH

Pan Sets 3' X 10' Or Smaller

Piping will be ¾" with a supplied ¾" stainless steel valve

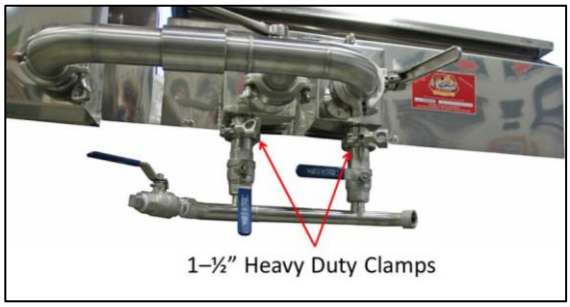
Pan Sets 3' X 12' Or Larger

Piping will be 1" with a supplied 1" stainless steel valve

1. Install the draw-off valve on the end of the draw-off manifold where the draw-off is to be done when boiling. It is recommended you select the end giving the best access to other equipment, such as a draw off tank, in use.

2. Wrap Teflon tape around the supplied stainless steel close nipple and thread it into the inlet side of the supplied stainless steel ball valve.

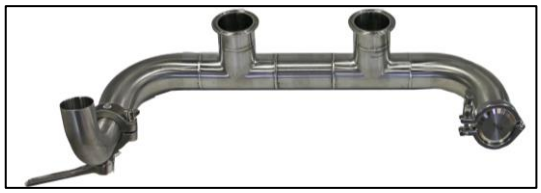
3. Wrap the free end of the close nipple with Teflon tape and tighten it into the end of the draw-off manifold. Ensure the handle is positioned so it can be operated without exposing the hands to the hot syrup flow.



4. Install the syrup pan draw-off manifold to the bottom of the syrup pan draw-off boxes. Position the manifold so the valve handles are facing away from the side of the box with the bracket (see the first picture in the next section).Place a 1 ½" Teflon gasket between each of the ferrules of the syrup pan reverse flow draw-off box and the draw-off manifold. When they are lined up, place the 1-½" stainless steel heavy duty clamps around the ferrules and tighten.

PAN SETS 5' AND 6" IN WIDTH

1. Install the end cap, using a 2" stainless steel heavy duty clamp, onto the end of the draw off pipe opposite the one where the draw off valve and nozzle will be installed.



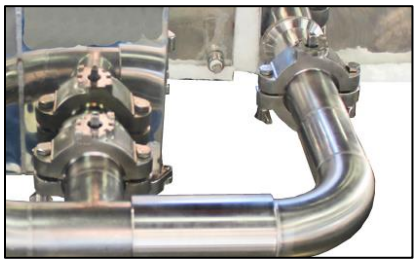
2. Install the draw off nozzle using a 2” butterfly valve. The butterfly valve will serve as the draw off valve.

3. Connect the draw off assembly to the draw off boxes of the syrup pan. Use a 2” stainless steel butterfly valve for each connection.

Installation of Flue Pan to Syrup Pan Connection Piping

NOTE: When installing the slip fittings the internal O-rings need to be lubricated with food grade grease such as LEADER EVAPORATOR order #: 64436.
NOTE: If using a Smart Draw it may be necessary to reposition the valves so they will operate correctly.

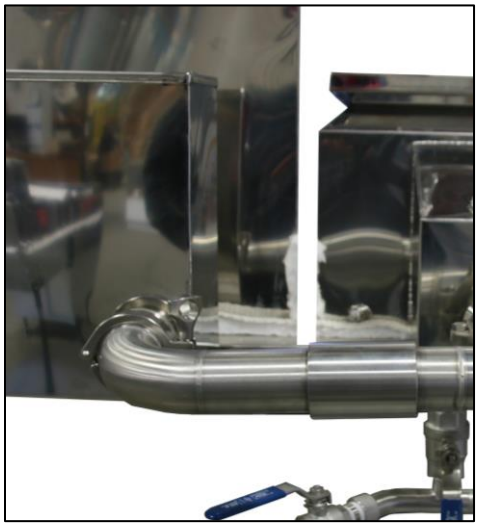
Drop Flue Pan Set



NOTE: To ease assembly, place all parts within reach.

1. Disassemble 3 – 2” butterfly valves. Make sure the Teflon inserts are not lost.
2. Place a butterfly valve rubber section between each of the ferrules on the reverse flow draw off box and the connection pipe. The handle shaft for the connection closest to the flue pan should be upright. The handle shaft for the connection closest to the front of the syrup pan should point toward the front of the syrup pan.
3. Install the top and bottom halves of the butterfly valves and tighten.
4. Slide the slip fitting until the ferrule on the flue pan lines up with the rear ferrule of the connection pipe.
5. Place a butterfly valve rubber section between the two ferrules (one on the flue pan and the other on the connection pipe). The handle shaft should be upright.
6. Install the top and bottom halves of the butterfly valve and tighten. Bolts and wing nuts.
7. Put the handles on the valves and tighten the set screws with the included 3MM Allen wrench.

Max Raised, Max Combo or Raised Flue Pan Set

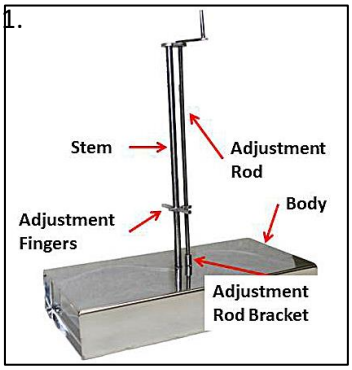


NOTE: To ease assembly, place all parts within reach.

1. Disassemble 2 – 2" butterfly valves. Make sure the Teflon inserts are not lost.
2. Place a butterfly valve rubber section between each of the ferrules on the reverse flow draw off box and the connection pipe. The handle shaft for the connection closest to the flue pan should be upright. The handle shaft for the connection closest to the front of the syrup pan should point toward the front of the syrup pan.
3. Install the top and bottom halves of the butterfly valves and tighten bolts and wing nuts.
4. Slide the slip fitting until the ferrule on the hot sap box lines up with the rear ferrule of the connection pipe.
5. Place a Teflon gasket between the two ferrules and secure with a 2" heavy duty clamp.
6. Put the handles on the valves and tighten the set screws with the included 3MM Allen wrench.

Installation of Floats

1.



1. Insert the regulator float into the cold sap regulator box. Do not force the regulator arm. The following is one method of inserting the float:

NOTE: The float should always be positioned so the stem is facing the fork of the regulator arm and the threaded adjustment rod is at the open end of the fork. When the float stem has been positioned under the regulator fork, ensure the adjustment collar is under the fork and the threaded rod is seated in the bracket on the float.

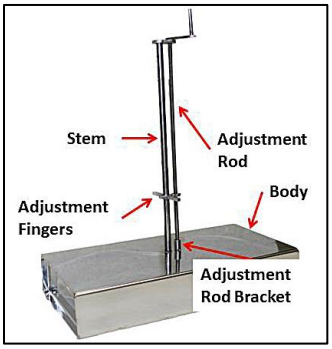
a. Begin inserting the float into the float box while holding up the regulator arm. The float should be angled slightly toward the outside of the float box (away from the flue pan) and lengthwise on end to be able to slide under the regulator arm. The regulator arm will be on the flue pan side of the float stem.

b. Continue to tip the float downward and under the regulator arm until the float is resting on the bottom of the float box. The regulator arm will be on the side of the float stem.

c. Tip the float toward the rear of the float box until the regulator fork will slide around the float stem over the adjustment ring. Lower the float back to the bottom of the float box.

2. Insert the hot sap float into the hot sap box. (Not on Drop Flue Pan Sets)

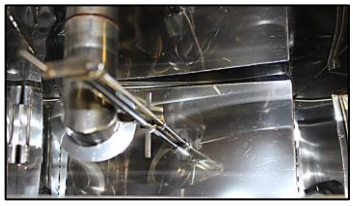
Parts of the float



a. If already installed remove the Z-arm by lifting out of the bracket mounted to the side of the hot sap box.

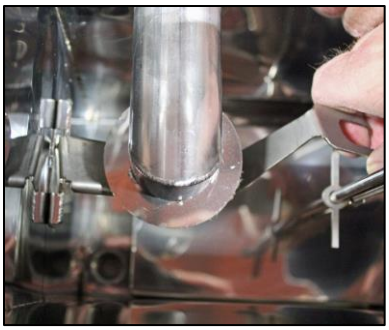
b. Holding the float by the stem and the body, tilt it and carefully lower it into the sap box. It will rest under the pipe from the flue pan. The stem (not the adjustment rod) should be toward the rear of the sap box.

c. Install the Z-arm:



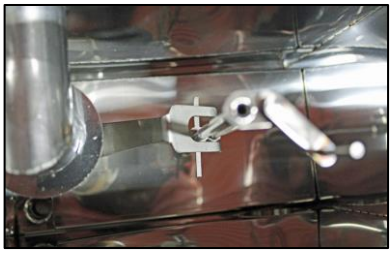
i. Turn the adjuster on the adjustment rod until the fingers on the moveable section are approximately 2” from the top of the float.

ii. Tilt the float toward the front and outside of the sap box.



iii. Position the Z-arm so the forked end points toward the front of the sap box and is on the side of the float stem closest to the flue pan.

iv. Tilt the Z-arm toward the flue pan and slip the end into the bracket on the back side of the sap box.



v. Tilt the float toward the front of the sap box and slip the stem between the forks. The adjustment fingers of the adjustment rod should be below the Z-arm fork.

Connect Sap Source to Cold Sap Regulator Box

Connect the raw sap feed to the flue pan regulator box. The bottom of the feed source should be a minimum 6 inches above the top of the regulator box. It is recommended a shutoff valve be installed between the sap source and the regulator box. The following is a recommended method of attaching the sap source to the regulator box. The parts listed for the connection below are not included with the pans.

NOTE: If you are setting up a MAX style flue pan and it is 2'X3', 2'X42" or 2'X4' and cold sap regulator box is on the same side as the hot sap box then disregard the following suggested installation.

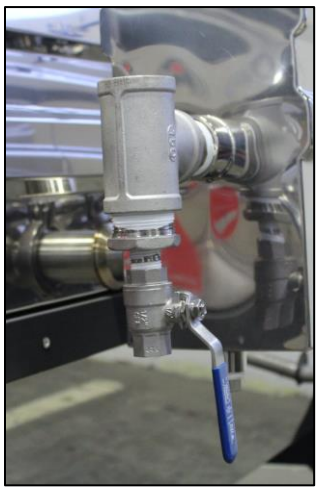
1. Teflon tape:
   a. two 1 ¼" stainless steel close nipples
   b. ½" stainless steel close nipple
   c. 1 ¼" to ½" stainless steel reducing bushing threads

2. Thread one end of a 1 ¼" close nipple into the threaded coupler on the end of the regulator box.

3. Thread the 1 ¼" stainless steel "tee" onto the stainless steel nipple and tighten until the open ends are straight up and down.

4. Thread a 1 ¼”to ½” stainless steel reducing bushing into the bottom of the tee.

5. Thread the ½” stainless steel close nipple into the ½” stainless steel ball valve.



6. Thread the ½” stainless steel ball valve and nipple assembly into the reducing bushing in the bottom of the tee and tighten all parts into the tee (reducing bushing, nipple and ball valve). . Make sure the handle of the ball valve can operate without interference.

7. Thread a Teflon taped 1 ¼” stainless steel close nipple into the 1 ¼” stainless steel ball valve.

8. Thread the taped end of the 1 ¼" stainless steel nipple (on the stainless steel ball valve) into the top of the stainless steel tee.

9. Tighten the parts (ball valve and close nipple) into the tee. Make sure the handle of the ball valve can operate without interference.

Final Installation Steps

1. All parts have now been installed for the pans. Check to ensure the following connections are properly installed and tight.
   a. 2 heavy duty clamps between the regulator box and the flue pan
   b. Raised and Max Combo pan sets - 2 butterfly valves and the heavy duty clamp on the connection pipe / Drop Flue pan sets – 3 butterfly valves
   c. Raised and Max Combo pan sets - The butterfly valve between the hot sap box and the flue pan
   d. 2 heavy duty clamps on the draw-off manifold / butterfly valves on 5' or 6' wide evaporators

   Position the valves as follows:

   a. Ball valves (or butterfly valves on a 5' or 6' wide evaporator) on the draw-off manifold - CLOSED
   b. Raised and Max Combo pan sets - Butterfly valve between the hot sap box and the flue pan - OPEN
   c. Drop Flue Pan sets – Butterfly valve between the flue pan and the connection pipe - OPEN
   d. 2 butterfly valves on the reverse flow draw-off box – OPEN
   e. Flue pan drain valve - CLOSED

NEW PAN CLEANING:

NOTES:

- Only Leader Evaporator approved chemicals are to be used in operations and maintenance.
- Ensure after use no chemical residue remains on items such as rail gaskets or pan gaskets.

1. To perform the initial cleaning you will need baking soda and water solution. It is mixed with unsoftened, non-chlorinated well or spring water at the rate of 1 pound per 200 gallons. The depth to be used in the calculations will be 2" to 3" as determined by user.

   NOTE: Have enough unsoftened, non-chlorinated well or spring water available to replenish the liquid levels in the pan. The volume needed can be approximated by checking the evaporation rate of your evaporator.

2. Close the draw-off manifold ball valves (or butterfly valves on a 5' or 6' wide evaporator).
3. Open the butterfly valves on the reverse flow draw-off box.
4. Mix the baking soda and the water to be used.
5. Begin adding water/baking soda solution to the flue pan. As the flue pan fills it fills the syrup pan.
6. When the solution is 2" to 3" above the tops of the flues in the flue pan and 2" to 3" in the syrup pan, stop filling the pan.

7. Fire the arch until the water/baking soda solution has boiled for 30 minutes. WATCH CAREFULLY AS THE PANS CANNOT BE ALLOWED TO BOIL DRY AND THE FLUE PAN LIQUID LEVEL SHOULD NOT BE ALLOWED TO DROP BELOW THE LEVEL OF THE TOP OF THE FLUES. MAINTAIN LEVELS WITH UNSOFTENED, NON-CHLORINATED WELL OR SPRING WATER.
8. Cool the arch and pans then drain the solution.
    a. To drain the flue pan, open the ball valve on the side of the arch opposite the regulator float box (unless ordered otherwise it will be on the right side of the arch). Drain the syrup pan by opening the valves under the reverse flow draw-off box. NOTE: both ends of the manifold may be open and draining.
9. Repeat steps 2 through 9 using clean unsoftened, non-chlorinated well or spring water.
10. Open all the drains and remove the plug from the end of the draw off manifold and flush the pans with clean unsoftened, non-chlorinated well or spring water until the draining water is clear. Replace the end plug on the draw off manifold.

THEORY OF OPERATION

A maple syrup evaporator works under the principal of a gradient. As the sap boils, it concentrates. As it concentrates, the volume is reduced and the solids (sugar concentration) increase. As the volume is reduced the liquid works to maintain the levels across the evaporator so less concentrated sap flows into areas where there is more concentrated sap. During the evaporation process the percent of sugar will change from the incoming (approximately 2%) to the draw off (approximately 66%). The design of the Revolution pan set, through the use of a few valves, makes it easier to maintain the gradient while changing the direction of the flow in the syrup pan.

Forming The Gradient

When the evaporator is first filled, the concentration of the sap is the same throughout. The gradient is formed as the water is evaporated from the sap in the syrup pan and the flue pan, and as the new sap enters the flue pan.

As the sap boils it loses moisture and becomes denser. As it is becoming denser it loses volume. As it loses volume additional sap will try to keep the levels constant and at the same concentration. This is occurring in both the flue pan and the syrup pan.

In the flue pan less concentrated sap enters through the regulator box into the first flue pan chamber and begins to concentrate. As it concentrates it moves toward the second chamber of the flue pan. Early in the boil the second chamber will become denser as the "fresh" sap is entering the first chamber from the regulator box keeping it less concentrated.

As the syrup pan boils, the sap becomes denser. In a 2 float system (one float controlling the level in the flue pan and one float controlling the level in the syrup pan as with raised and Max type flue pan sets), the hot sap box lets sap from the flue pan enter the syrup pan when the sap level concentrates and drops. The sap from the first syrup pan chamber is pushed to each of the next syrup pan chambers where the sap is denser until it reaches the "syrup" or "draw-off" chamber. The syrup is drawn off the evaporator and more sap flows across all the chambers to replace the volume drawn off. In a single float system (the drop flue pan set), the sap is pushed through the flue pan and directly into the syrup pan.

With a good gradient in place there will be a measureable difference in the liquid levels between the incoming sap compartment and the syrup compartment of the syrup pan. You may note a difference of up to ½".

Proper Operations To Maintain The Gradient

- Firing
- Defoamer
- Minimize Reversal Effects

During operations you will be working to maintain a consistent gradient. This is done through firing level, control of foaming, and minimizing the effects of reversal.

Firing

During firing you are seeking to maintain the same boil all the time as in doing so the liquid "push" in the pans will remain consistent. If the boil reduces, the flows will not be maintained and the gradient lost. In order to maintain the boil the following should be of concern – when burning wood:

1. Wood to use
    a. Mix of hardwood (longer lasting, more BTUs) and softwood (quicker, intense heat).
    b. Avoid slabs as they do not allow heat to evenly reach the pan
    c. Split wood to the diameter and sized in length for the evaporator in use

Width of Evaporator	Diameter to Split Wood
24"	2" to 3"
30" and 36"	2" to 4"
40" and 48"	2" to 5"
60" and 72"	3" to 6"

2. Loading wood into the arch
    a. Wood should stay on the grates and a minimum of 2" to 5" inside from the door so wood fire does not heat the arch face
    b. Criss-cross the wood as best possible so oxygen can reach all wood efficiently
    c. Do not hit flues when loading wood
3. When using a wood fired arch
    a. Keep stack temperature in range of 150°F
    b. Maintain arch ½ to ⅔ full
    c. Fire consistently with small amounts of wood to maintain level
    d. Use timer to stay on schedule with firings (every 5 to 10 minutes)
    e. Adjust firing intervals as needed to maintain an even boil

Defoamer

The purpose of defoamer is to prevent foam build up in the pans. Foam build up will prevent proper evaporation of the water from the sap. It will give a false liquid level to the float and will not allow the incoming sap to flow in a consistent manner. Inconsistent defoamer usage will create large volume adds of sap into the pans as the foam is reduced and the float seeks to replace the level with incoming sap. The following items should be of concern in the use of defoamer:

1. Use defoamer on a regular basis. It is suggested you add defoamer to the flue pan, near where the sap is entering, at a 5 to 10 minute interval or each time you fire a wood evaporator.
2. Add defoamer primarily to the flue pan. Modify this only under certain conditions
3. The estimated usage is as follows: NOTE: This is based on the use of ATMOS 300 Defoamer

Pan Set Width (Inches)	Drops of Defoamer
24	3
30	4
36	4 to 5
40	5 to 6
48	6 to 8
60	7 to 9
72	8 to 11

If using sap that has been concentrated by an RO, use an additional drop for each foot of pan width

4. NEVER add defoamer to the center compartments of the syrup pan. Use one drop at a time in the syrup compartment, when necessary, near the draw off box.

Minimize Reversal Effects

Reversal occurs when the boil in the evaporator is reduced (when firing is inconsistent, end of day, change pan flow direction). Reversal causes the concentrated sap to flow from the more concentrated channels of the evaporator pan to the less concentrated channels of the pans.

Drop Flue

As the flue pan boil reduces, the liquid level is reduced so more fresh sap is added and sap will flow to the flue pan from the syrup pan. The "sweet" in the syrup pan will mix back across the syrup pan and with the sap from the flue pan, decrease the concentration of the sap in the syrup pan.

Raised Flue or Max/Combo

As the boil reduces in each pan, the liquid level is reduced so more sap is added. Within each pan the more concentrated sap will flow across the channels of the pan and reduce the overall concentration.

To minimize this effect:

1. Maintain a consistent boil even during reversal.
2. After the last syrup draw of the day or when preparing for reversal, draw “sweet” from the syrup pan into a clean container. This will be added to the syrup pan at the beginning of the next boil and aid in setting up the gradient. Adding “sweet” to the draw off channel of the syrup pan will raise the concentration in that channel shortening the time it will take to reestablish the gradient.

OPERATING THE REVOLUTION EVAPORATOR

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.

Check The Evaporator

1. Check the evaporator
    a. Make sure all sap sources are flowing i.e. not frozen
    b. Ensure defoamer is usable
    c. Ensure all fittings are tight
    d. Make sure all valves are working properly and the floats are in position
    e. Wood Fired Arches - Clean the flues with the flue brush (daily for a standard wood fired arch and weekly for an INFERNO arch).
    f. Ensure the open area in the grates is clean and free of material
    g. Open stack covers, cupolas and thimbles.
    h. Open condensate drains.

Reversing the Syrup Pan

1. If this startup is for a new evaporator or for the first time of the season, skip to the next numbered paragraph.

    It is recommended in order to minimize the sugar sand and niter, the flow in the syrup pan be reversed daily or when it is noted the bubbles from boiling are drawn back down into the compartment as they break (appear like boiling mud). The following are the instructions for reversing the flow of a Revolution syrup pan. Flow reversal on the Revolution syrup pan involves collecting partially boiled sap and the control of 4 valves.

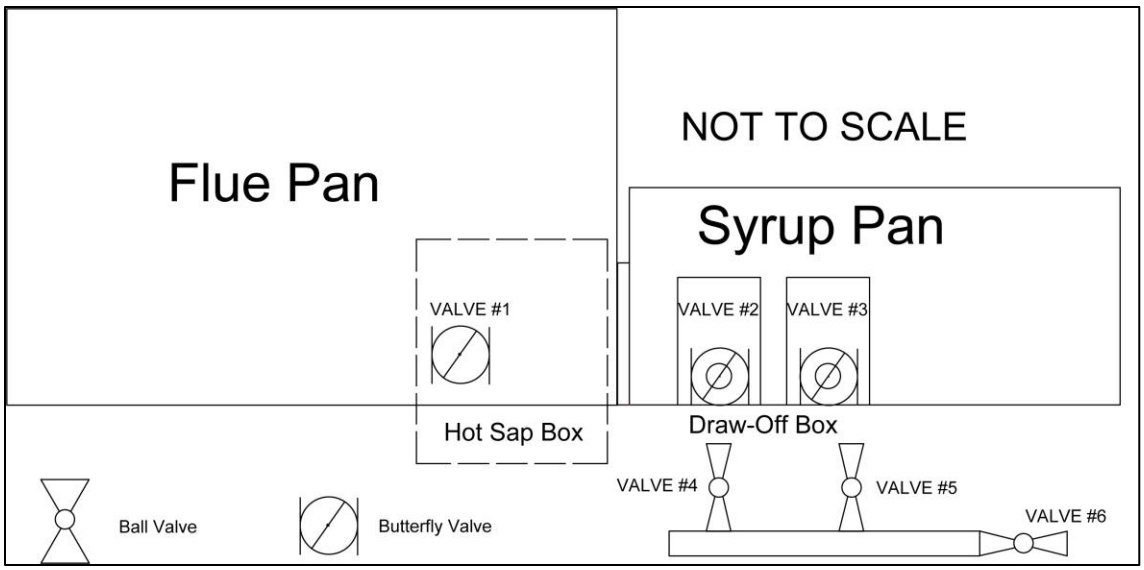
    a. Draw off “sweet” from the syrup pan and set aside.

GALLONS OF “SWEET” FOR A REVERSAL DRAW-OFF

PAN WIDTH	Suggested Minimum Gallons "SWEET"
24	2
30	2
36	4
40	6
48	9
60	13
72	15

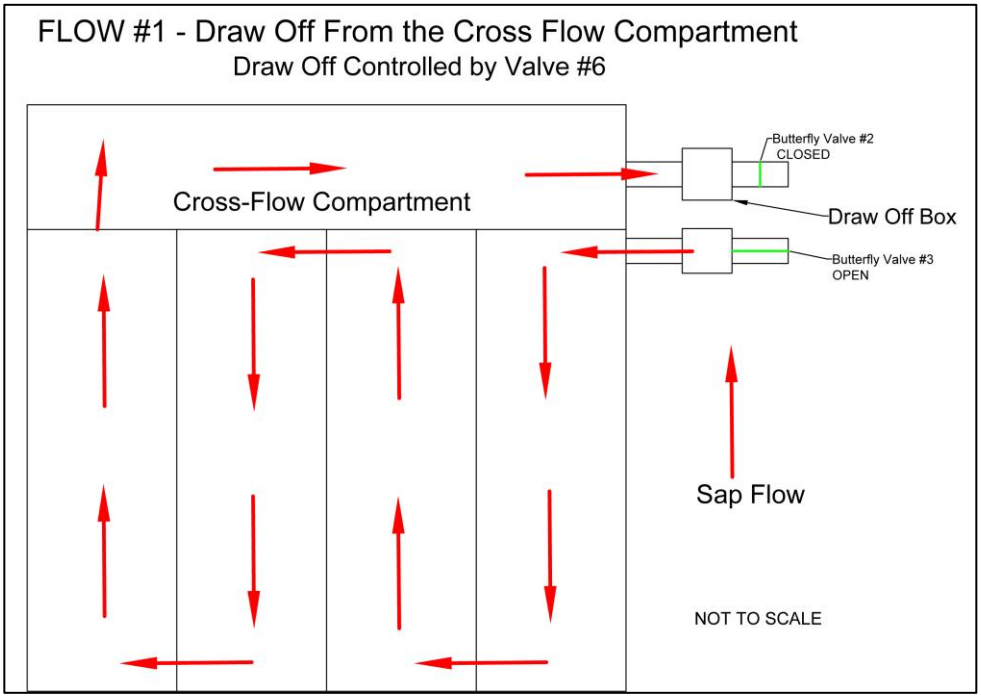
These are suggested minimum quantities. The amount should be adjusted with experience, the width of the pan and the concentration of sap being used

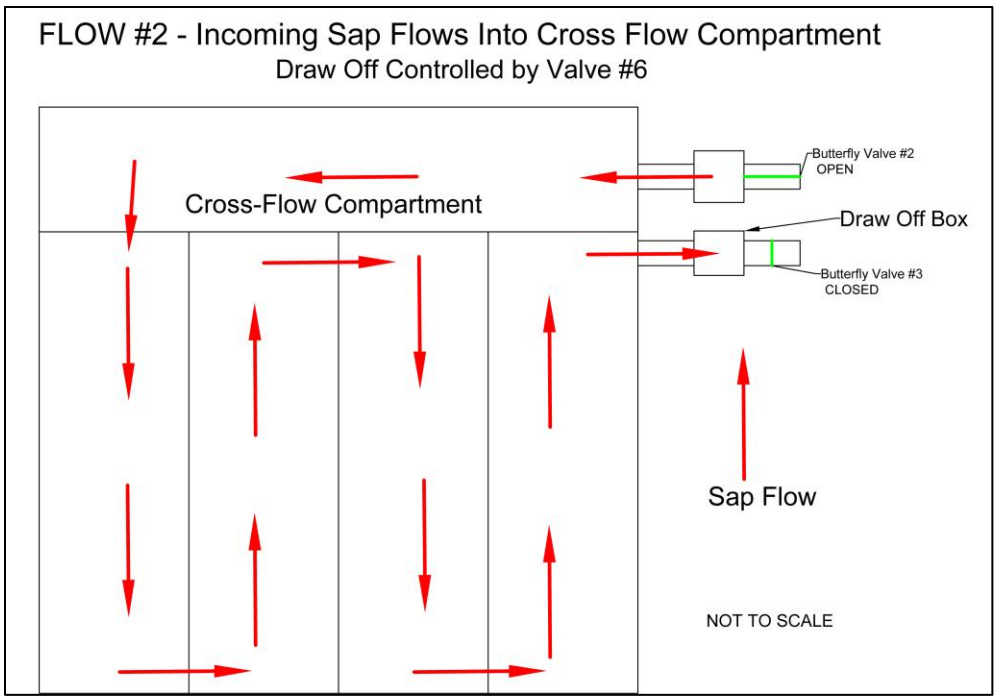
    b. Identify which valves are currently open, what the current sap flow is, and match to the chart below



NOTE: Valves 4, 5 and 6 on a 5’ or 6’ wide evaporator will be butterfly valves.

Flow Direction	Valve #1	Valve 2	Valve 3	Valve 4	Valve 5	Valve #6
Flow #1 Draw Off compartment is the cross-flow	Open	Closed	Open	Open	Closed	As needed for Draw Off
Flow #2 Incoming sap compartment is the cross-flow	Open	Open	Closed	Closed	Open	As needed for Draw Off



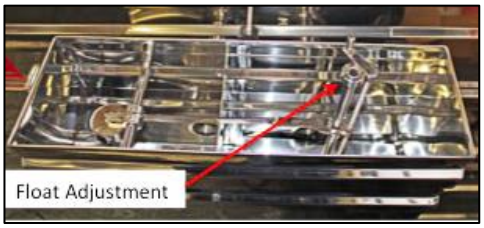


c. Reverse the flow through the syrup pan by closing the currently opened valves and opening the currently closed valves. Refer to the previous chart. Valve #6 will remain the draw off control valve.

d. Fire the evaporator and bring the syrup pan to a boil. When the middle of the syrup pan begins to boil slowly pour the "sweet" into the new draw-off compartment of the pan. If you opened valve #3, pour the "sweet " into the cross-flow compartment. If you opened valve #2, pour the "sweet" into the lengthwise compartment closest to the draw off box.

NOTE: If doing a mid-day reversal maintain an even fire throughout the reversal process and add the "sweet" when the boil is again reached in the center of the syrup pan.

Making Syrup



1. Open the valve between the sap source and the regulator float box. Adjust the float in the regulator float box so the sap level is as recommended in the appropriate table below. The level in the flue pan should be adjusted for the type of sap being run and the size of the pan. The higher the concentration of the sap (ex. From an RO) and the larger the pan, the deeper the sap should be run. To set the depth using the float, turn the adjustment handle on the threaded rod counterclockwise to raise the sap level and clockwise to lower the sap level.

2. Open valve #1. Make sure the level of sap in the syrup pan is at least 1 1/2". The level of the syrup pan should be adjusted as recommended in the appropriate table below. The level in the syrup pan should be adjusted for the type of sap being run and the size of the pan. The higher the concentration of the sap (ex. From an RO) and the larger the pan, the deeper the sap should be run. The level of the sap is adjusted using the float in the hot sap box.

NOTE: The following tables should be considered guidelines and actuals levels should be adjusted to your boiling style.

DROP FLUE

ARCH	Standard Draft	Forced air or Oil fired	Steam-Away or Preheater with hood	Reverse Osmosis
Evaporator Width	Sap Depth (Inches)			
2X4 to 30X10	1	Add ¼	Add ¼	Add ½
3X8 to 40X12	1 ¼	Add ¼	Add ¼	Add ½
4X10 to 4X14	1 ½	Add ¼	Add ¼	Add ½
5X12 to 5X16	1 ¾	Add ¼	Add ¼	Add ½
6X14 to 6X18	2	Add ¼	Add ¼	Add ½

NOTE: As you add enhancements to the evaporator, add the additional depth as specified for that enhancement. For example adding an RO to a 4X10 standard draft evaporator would bring the recommended depth to 2 inches.

RAISED FLUE

ARCH	Standard Draft		Forced air or Oil fired		Steam-Away or Preheater with hood		Reverse Osmosis	
Evaporator Width	Flue Pan Depth (inches)	Syrup Pan Depth (inches)	Flue Pan Depth (inches)	Syrup Pan Depth (inches)	Flue Pan Depth (inches)	Syrup Pan Depth (inches	Flue Pan Depth (inches)	Syrup Pan Depth (inches)
2X6 to 3X10	¾	1 ½	No change	Add ¼	Add ¼	Add ¼	Add ¼	Add ½
3X12 to 4X14	1	1 ¾	No Change	Add ¼	Add ¼	Add ¼	Add ¼	Add ½
5X14 to 6X16	1 ¼	2	No Change	Add ¼	Add ¼	Add ¼	Add ¼	Add ½

NOTE: As you add enhancements to the evaporator, add the additional depth as specified for that enhancement. For example adding an RO to a 4X10 standard draft evaporator would bring the recommended depth for the flue pan to 1 ¼ " and the depth for the syrup pan to 2 ¼".

3. If this is a new pan set startup or the first startup of the season, open butterfly valve #3, close butterfly valve #2, open ball valve #4 and close ball valve #5. Otherwise change the valves in use as outlined in the paragraph describing reversal of the syrup pan.

4. Using the directions provided with the arch, fire the evaporator.

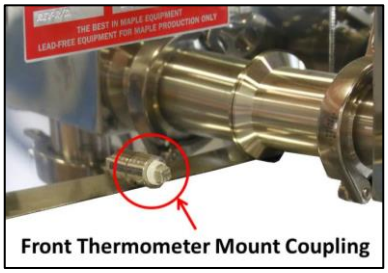
Pan Set Width (Inches)	Drops of Defoamer
24	3
30	4
36	4 to 5
40	5 to 6
48	6 to 8
60	7 to 9
72	8 to 11

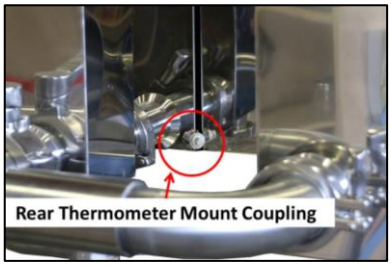
5. As the flue pan starts to boil, add defoamer (based on ATMOS 300) to the flue pan on the side where the fresh sap is entering. Defoamer should be added close to the inlet from the float box. During boiling add defoamer every 5 to 10 minutes or each time the arch is fired. Adjust the time as necessary to control the foam.

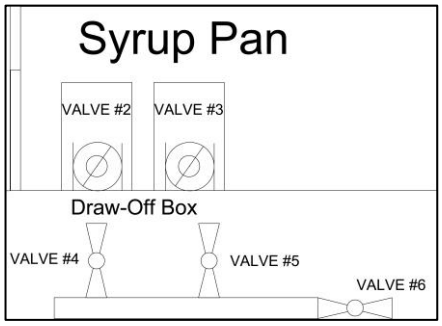
6. If this is the first boil of the season or "sweet" was not saved from a previous boil, skip to the next section.

   As the middle of the syrup pan starts to boil, add the "sweet" to the draw-off compartment of the syrup pan. If you opened valve #2, pour the "sweet" into the lengthwise compartment closest to the draw-off box. If you opened valve #3, pour the "sweet" into the cross-flow compartment.

7. As the syrup pan is boiling, watch for foam higher than the compartment dividers of the pan. If the foam is higher than the dividers, add 1 to 2 drops of defoamer to the syrup compartment and to flue pan. Add an additional 1 to 2 drops to the flue pan if the foam has not been controlled. If these additions of defoamer do not control the foaming, add 1 to 2 drops of defoamer to the draw-off compartment of the syrup pan. The addition should be done at the end of the pan where the draw off is located. REMEMBER you are trying to stop the foaming not the boiling. If foaming persists (adds of defoamer to the syrup pan are needed 2 or 3 times an hour) increase the defoamer added to the flue pan at each firing by 1 to 2 drops.







8. The sap in the syrup compartment of the syrup pan must be boiled until it reaches 7.1°F above the boiling point of water (the draw off temperature). The boiling point of water is not a consistent point. Therefore the following is the recommended method for determining the draw-off temperature.
   a. Prior to using the evaporator, install a thermometer in the syrup pan in the ¼" threaded fitting. Depending on the rail width of the arch being used a ¼" x 2" stainless steel nipple (Leader Evaporator order #72130) and a ¼" stainless steel threaded coupling (Leader Evaporator order #72131) might be required to install the thermometer. There are two locations possible for mounting the thermometer:
      i. the rear corner of the syrup pan (behind the draw-off box) and
      ii. in front of and on the same side as the draw-off box

   Note the orientation of the thermometer ("upside down"). It is done as a preference to ease the reading of the thermometer during operations.
   b. As the sap begins boiling in the syrup pan, monitor the thermometer. The thermometer needle will need to go around completely once and come back to the "7" mark on the thermometer.
   c. When the "7" mark is reached, use a hydrometer to test the syrup. See ATTACHMENT #1 on the use of a hydrometer.
   d. Adjust the thermometer to "7" when the hydrometer indicates the sap in the pan has turned to syrup. To adjust the thermometer, place the Allen wrench, provided with the thermometer, into the screw and turn until the "7" aligns with the needle.

9. Open the draw-off valve, ball valve #6, and allow the syrup to flow slowly, maintaining the temperature at the "7" mark as long as possible. When the temperature starts to drop below the "7" mark, close the draw off valve.

10. Check your incoming sap, at the regulator float box, to ensure it is flowing properly.

Daily Shutdown:

Wood Fired Arch

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, depending on the arch style, 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 arch so ensure there is adequate volume left prior to the last firing.
2. After the last draw off and last firing, draw-off "sweet", from the evaporator into a clean container. Set the container aside and cover it. The table below indicates suggested quantities for draw.

PAN WIDTH	Suggested Minimum Gallons "SWEET"
24	2
30	2
36	4
40	6
48	9
60	13
72	15

These are suggested minimum quantities. The amount should be adjusted with experience, the width of the pan and the concentration of sap being used.

3. Continue to monitor the evaporator as done for normal operations.
4. When there is no more boil in either pan 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.

Oil or Gas Fired Arch

The arch can be run until the last sap to be boiled enters the flue pan float box.

1. Do a draw of sweet as referenced in the table above.
2. Monitor the evaporator until the boil stops.

MAINTENANCE

NOTES:

- Only Leader Evaporator approved chemicals are to be used in operations and maintenance.
- Ensure after use no chemical residue remains on items such as rail gaskets or pan gaskets.

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

1. Remove spills and splashes from the pan by wiping with hot unsoftened, non-chlorinated well or spring water.
2. Follow the steps listed for Syrup Pan Reversal
3. If using a wood fired arch, clean out the ash chamber and the slots in the grates NOT the "V" grooves of the grates.
4. Check all fittings for leakage. Repair / replace as necessary.
5. Standard Wood Fired Arch: Using the supplied brush and rod, brush the underside of the flue pan to remove accumulated material.

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. When using a standard wood fired arch, brush daily. If using an INFERNO arch, brush weekly.
2. Inspect the rail gasket and pan gasket for areas where heat and smoke maybe escaping. Replace if necessary.
3. If excessive niter and sugar sand is coating the surfaces of the pans with scale, 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, 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 unsoftened, non-chlorinated well or spring 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.

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 at the rear of the flue pan.
2. Drain the syrup pan by opening the draw-off valve and the valves between the hot sap box and the syrup pan.
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, 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. Remove the plug from the end of the draw off manifold during rinsing and replace when rinsing is complete.

2. Disassemble pan connections. Inspect all seals and gaskets.
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 unless already covered by steam hoods.

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. Ensure proper operation of stack covers, dampers and cupolas.
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

ATTACHMENT #1: HYDROMETERS

HYDROMETER FUNCTION

A hydrometer works based on the density of the maple syrup. There are two scales on the hydrometer; Brix and Baume. The Brix scale indicates the percentage of sugar in the maple syrup. The Baume scale is a measure of how dense the maple syrup is related to the density of water. The correct density for maple syrup is a minimum of 66% sugar (66°Brix/35.6°Baume). You will need to verify your state's rules and adjust your readings as necessary. The hydrometers supplied by LEADER EVAPORATOR have been calibrated at two temperatures; 60°F Cold Test (66.9°Brix/36°Baume) and 211°F Hot Test (59.1°Brix/32.1°Baume). The maple syrup is expected to be at the upper temperature when it is measured immediately after being drawn off the evaporator.

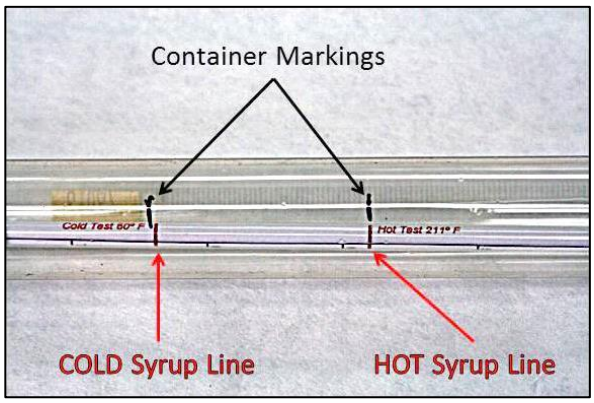
NOTE: Hydrometers from Leader Evaporator by law are calibrated by the State of Vermont. The HOT and COLD test lines should be considered guidelines. Hydrometers should only be used by reading temperature and Brix/Baume readings.

USE OF A HYDROMETER

NOTE: Hydrometers are very fragile. The two most susceptible points of damage during use are the bottom and where the stem meets the body. Take extreme care when handling a hydrometer.

As hydrometers are susceptible to damage it is recommended the sugar house have a spare.

Preparing A New Hydrometer For Use:

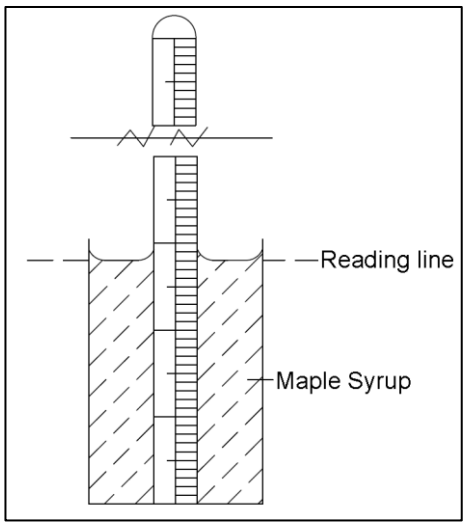


1. Unpack the hydrometer from its tube or box.
2. Carefully inspect the hydrometer for any breakage. If you suspect any cracks, fill your test cup with hot water and immerse the hydrometer. If it leaks then it is damaged and can't be used.
3. Place the hydrometer in its original container seated in the packaging and mark the container where the bottom of the hydrometer aligns.
4. Mark the container at the same lines as the HOT and COLD test lines in the hydrometer. When using the hydrometer in the future these lines are a check to ensure the scale inside the hydrometer has not moved.

Using The Hydrometer

1. Prior to using the hydrometer for the day, place it into its original container and check the hydrometer lines against the lines you marked on the container. If they do not match then replace the hydrometer.
2. Ensure the hydrometer is clean prior to every use. Accumulated material on the hydrometer will cause the hydrometer readings to be incorrect as it will have extra weight and not float as easily.
3. Hold the test cup upright. Fill the test cup up to ½" to ¾" from the top with the syrup to be tested or from the syrup compartment of the syrup pan. DO NOT HAVE THE HYDROMETER IN THE CUP.
4. Do not allow the syrup to cool. Place the cup on a level surface. Immerse a thermometer into the test cup. Slowly immerse the hydrometer into the syrup in the test cup until it reaches the "HOT" test mark then carefully release it. NEVER DROP THE HYDROMETER INTO THE TEST CUP.
5. Read the temperature from the thermometer.

6. Read the Brix or Baume number from the hydrometer.



NOTE: To correctly determine the Brix/Baume, you need to read from the line of the syrup.

LEADER EVAPORATOR Hydrometers: Hydrometers from LEADER EVAPORATOR are calibrated by the State of Vermont at two temperatures; 60°F Cold Test (66.9°Brix/36°Baume) and 211°F Hot Test (59.1°Brix/32.1°Baume). After numerous measurements it was determined 211°F is the average temperature of syrup when measured immediately after draw-off from the evaporator. When checking syrup at 211°F, the syrup is at the proper concentration when the reading line is at the Hot Test line. If the Hot Test Line is below the reading line of the liquid, continue to boil as the syrup is "light". If the Hot Test Line is above the reading line of the liquid, the syrup is "heavy" and will need to be diluted with sap.

TEMPERATURE °F	Degrees Baume	Degrees Brix
209	32.0	59.0
202	32.25	59.6
193	32.5	60.0
185	32.75	60.4
176	33.0	60.9
167	33.25	61.4
158	33.5	61.8
149	33.75	62.3
140	34.0	62.8
130	34.25	63.3
120	34.5	63.8
110	34.75	64.3
100	35.0	64.8
90	35.25	65.4
80	35.5	65.9
70	35.75	66.4
60	36.0	66.9
50	36.25	67.4

7. Refer to the chart to determine if your syrup is "light" or "heavy". If the reading is higher than the number on the table your syrup is "heavy" and will need to be diluted. If the number is lower than the number in the table, the syrup is "light" and will need to be boiled more.

8. After reading the hydrometer, remove it from the test cup and rinse it with either hot water or hot sap to ensure it is clean. Dump the contents of the test cup into the syrup compartment of the syrup pan or back into its storage container. Rinse the test cup with hot sap or hot water.
9. During the boiling period, store the hydrometer in a container of clean hot water or hot sap.