USER MANUAL

WSE DROP FLUE PAN SET

LEADER™
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LEADER EVAPORATOR
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INTRODUCTION: 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%).

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 / more concentrated. As it is becoming concentrated 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 float box into the first flue pan compartment and begins to concentrate. As it concentrates it moves toward the second compartment of the flue pan. Early in the boil the second compartment will become denser as the "fresh" sap entering the first compartment from the float box keeps pushing the denser sap around.

As the syrup pan boils, the sap becomes denser. The flue pan sap is pushed into the syrup pan making sap in the first syrup pan compartment less dense. The sap from the first syrup pan compartment is pushed to the next compartment where the sap is denser and then to the densest compartment, the "syrup" compartment. The syrup is drawn off the evaporator from this compartment and more sap flows across all the compartment s of the evaporator to replace the volume of syrup drawn off.

With a good gradient in place there will be a measurable difference in the liquid levels between one side of the syrup pan and the other. You may note a difference of ½".

PROPER OPERATIONS TO MAINTAIN 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. By doing so the liquid "push" in the pans will remain consistent. If the boil reduces, the syrup pan flow will reverse and flow to the flue pan. In order to maintain the boil the following should be of concern:

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 2" to 3" in diameter and approximately 24" in length
2. Loading wood into the arch

a. Wood should stay on the grates and 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 the flues when loading wood

3. When to fire
    a. Keep stack temperature in range of 650°F to 800°F
    b. Maintain the arch ½ to ⅔ full
    c. Fire consistently with small amounts of wood to maintain level of heat
    d. Use timer to stay on schedule with firings
    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 not allowing 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 (when you do add defoamer) 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 each time you fire the evaporator.
2. Add defoamer primarily to the flue pan. Modify this only under certain conditions.
3. The estimated usage for a 2 foot wide WSE is 3 drops. The usage may need to be changed as the sap characteristics change. NOTE: This is based on the use of ATMOS 300 Defoamer
4. NEVER add defoamer to the center compartments of the syrup pan. Use one drop at a time in the syrup (draw-off) compartment.

Minimize Reversal Effects

Reversal occurs when the boil in the flue pan is reduced (when firing is inconsistent, end of day, change pan flow direction). As the flue pan boil reduces, the level is reduced so more fresh sap is added and sap will flow back from the syrup pan. This causes the “sweet” in the syrup pan to mix back across the syrup pan and increases the volume of sap in the flue pan. To minimize this effect:

1. Maintain a consistent boil
2. After the last syrup draw of the day, draw 1 to 1 ½ gallons of “sweet” from the syrup pan into a clean container. This will be added to the boiling syrup pan at the beginning of the next boil and aid in setting up the gradient.

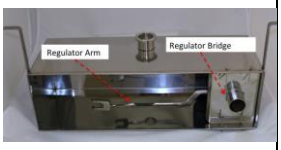
EQUIPMENT DESCRIPTION

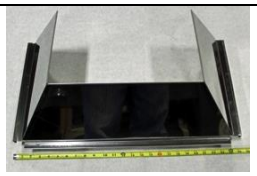
The flue pan and the syrup pan are tig welded of 20 gauge bright annealed stainless steel which is the same as the larger evaporators. A sample arch is shown with the pan set in the cover picture.

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

Sides of the evaporator (i.e. left or right) are as facing the front of the evaporator.

The Leader WSE Evaporator consists are the following parts:

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
1-½" #24 SS Band Clamps (qty: 2)	60046	
Flue Pan Specify draw side	382402 (2X2) 382404 (2X4)	
Float Box Regulator Arm (Included – part of float box) Regulator Bridge (Included – part of box)	Special Order 59048 59061	 
Float with Collar (10 ½" X 5 ½" X 2")	59024	 float
1–½" SS Clamps (qty: 4)	72245	
¼" SS Thumb Screws (qty: 2)	72422	
WSE ¾" SS Draw Off Valve	390000	

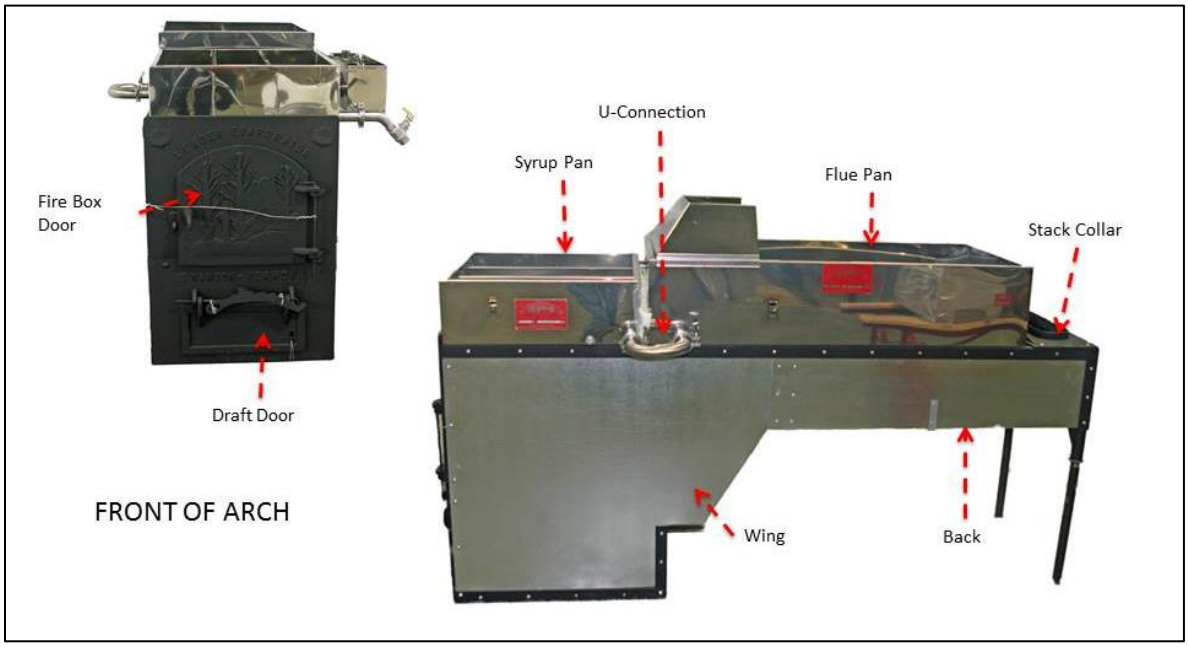
ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
3 Sided SS Splash Guard	58974	
Syrup Pan (2X2) Specify draw side	372402	
Regulator Packing (included with regulator arm)	59065	
SS "U" Connection	390005	
1–½" Teflon Gasket (qty: 4)	65621	
1-½" X 2" Hose Connection	Special Order	
4" X 36" Ceramic Pan Gasket	65162	

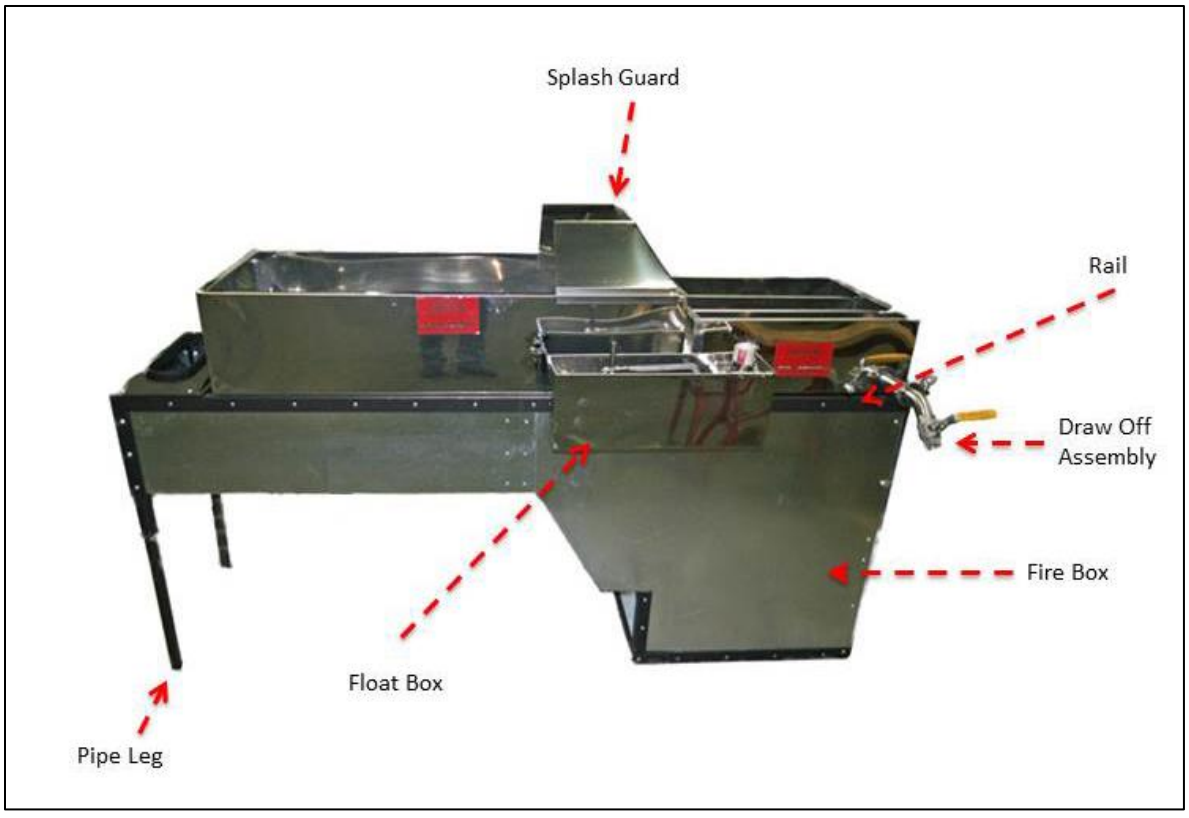
OPTIONAL SETUP MATERIAL, ADDITIONAL SPARE PARTS AND OPERATIONAL SUPPLIES

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Rail Gasket	65154 (1/2" X 2" X 25')	
Upgrade Butterfly 1 ½" WSE	390002	Valve allows for isolating the flue pan from the syrup pan so the flue pan does not need to be drained when you change sides of the syrup pan. 
4 oz Defoamer (Organic defoamer available Order # 63010)	63015	
Green Gloves	63125	
Short Test Cup 2" Diameter	59007	

ITEM	LEADER ORDER #	DESCRIPTION / PHOTO
Thermometer 3" or 5" face, 6" stem	61022 3" Face/6" Stem 61028 5" Face/6" Stem	Two are recommended – one for each side of the syrup pan 
Stack Thermometer	61052	 Install at shoulder to eye level in the smoke stack
Firing Gloves	63123	
Short Syrup Hydrometer	61040	

DIAGRAM OF THE WSE DROP FLUE EVAPORATOR





SETUP OF THE WSE EVAPORATOR

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

The following documentation is pertinent to the setup of the WSE drop flue pan set. Information about the setup and use of other equipment can be found on the Leader Evaporator website – www.leaderevaporator.com under LEARN – PRODUCT MANUALS option. Other equipment may include the arch for a 2X6 (reference setup document MAN030) or 2X4 (reference setup document MAN015) WSE pan set.

RECEIVING YOUR PAN SET:

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

1. Protect all incoming materials from damage and the environment. If possible, place the equipment 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.
3. Immediately notify Leader Evaporator or your local dealer if there are questions on the received equipment.

SUGAR HOUSE SETUP:

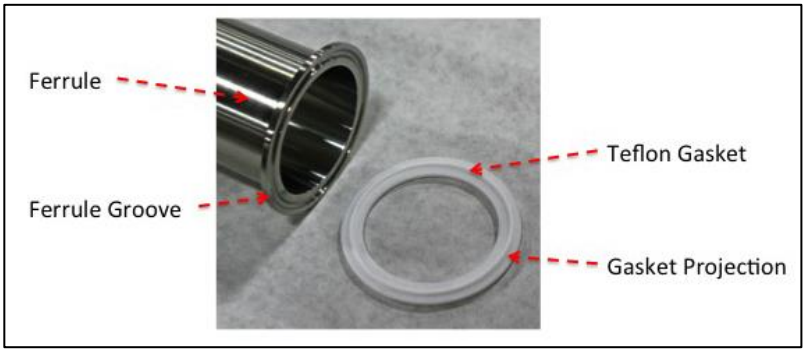
Prior to setup of the sugar house, it is suggested future needs be considered. The requirements for the setup of the WSE evaporator may not be adequate if in the future additional or larger equipment will be needed. If assistance is needed in determining possible future requirements please contact Leader Evaporator Sales or your local dealer.

SETTING UP THE PANS:

NOTE: All arch side directions are as if you were facing the fire door of the arch.

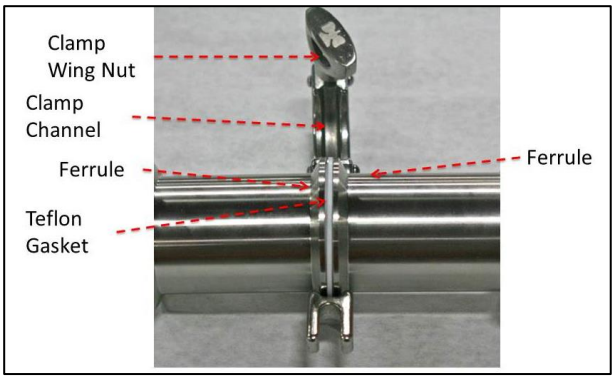
NOTE: The pictures used in this section are from a Right Draw Evaporator.

During setup ferrules, Teflon gaskets and clamps are used 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 for each ferrule.
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.
3. Align the clamp so the wing nut is accessible for turning and will be turned away from any work area.

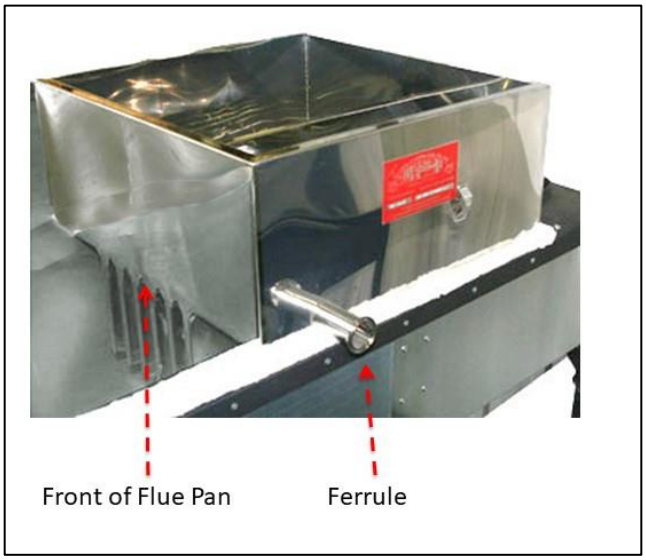
NOTE: The clamp does not rotate easily once placed over the ferrules. It is recommended you position it initially so the wing nut will be easy to access.



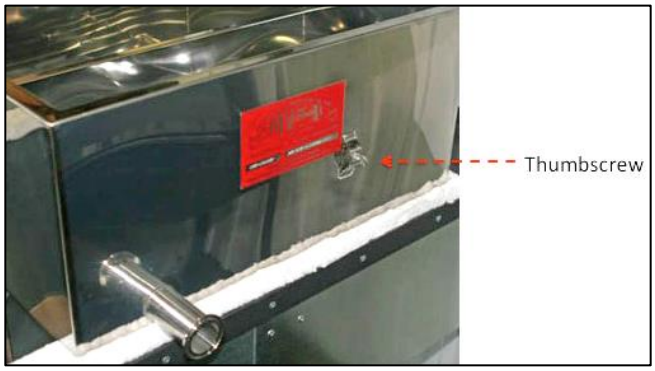
4. Close the bolt of the clamp and tighten the wing nut

<u>Setting the Pans</u>

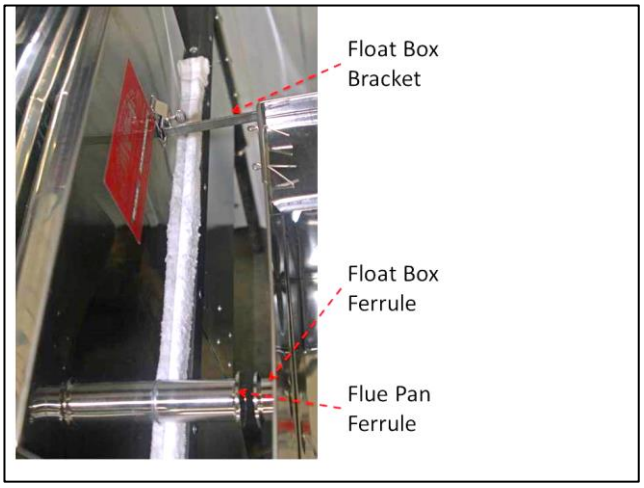
1. Prior to placing the pans on the arch, line the rails with ½" ceramic rail gasket (not included). Use a utility knife to cut the gasket to make a square fit with no gaps.



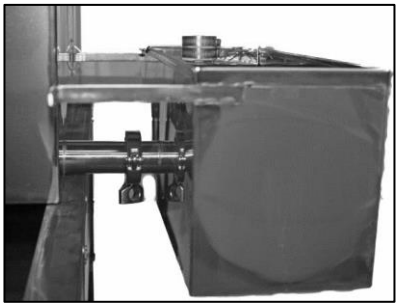
2. The rear of the flue pan is the end where the sides do not have ferrules welded. Place the flue pan on the arch so the rear of the pan is on the rail gasket and against the stack collar projection.



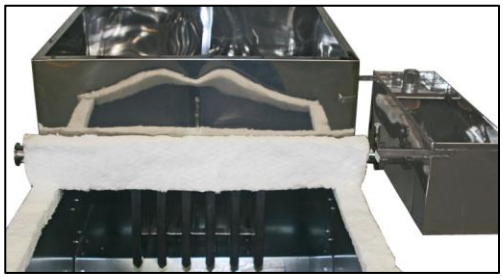
3. Loosely thread a thumbscrew into the mounting bracket on the side of the flue pan. Use the bracket on the same side as the draw off is to be installed (left draw - bracket on left, right draw - bracket on right).



4. Slide the float box brace into the bracket where the thumbscrew is installed. Ensure the float box ferrule is facing the flue pan ferrule.
5. Place a 1 ½" Teflon gasket between the flue box and float box ferrules. Ensure the gasket aligns with the grooves in the ferrules

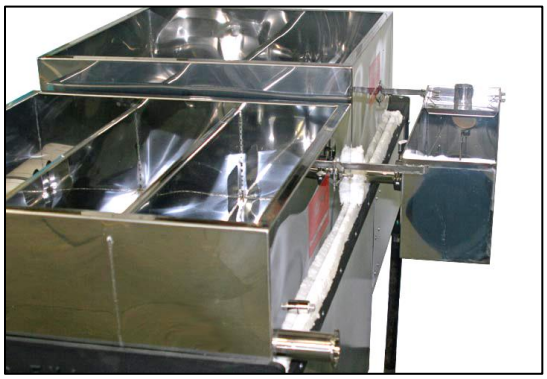


6. Loosen the wing nut on a 1 ½" clamp and open the clamp. Place the clamp over the ferrules and gasket. Align the clamp so the wing nut faces down. Close the clamp with the wing nut and tighten enough to securely hold the float box.
7. Tighten the thumbscrew in the bracket.



8. Cut the supplied pan gasket to the width of the pans. Place the pan gasket between the pans. It should be centered so the ends overlap the rails. If necessary, use a small piece of tape to hold the gasket in place.

9. Place the syrup pan on the arch so one welded ferrule is in the rear on the side opposite the float box. A left draw pan has the rear ferrule on the right. A right draw pan has the ferrule on the left.



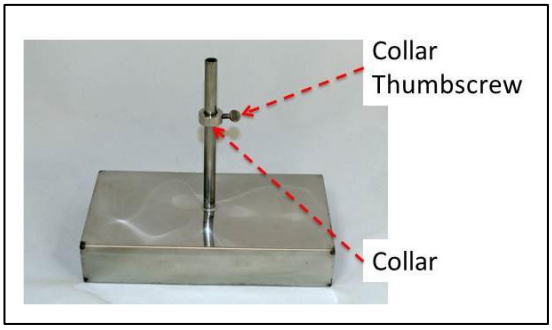
10. Move the syrup pan toward the flue pan:
    a. Slide the float box brace into the bracket on the side of the syrup pan.
    b. Compress the pan gasket to hold it in place.
    c. Place the thumbscrew into the syrup pan bracket and tighten the thumbscrew of the syrup and flue pans.

11. Install the U-tube
    a. Place a 1 ½" Teflon gaskets and heavy duty clamps, mount the U-tube with one side connected to the ferrule on the flue pan and the other on the rear ferrule of the syrup pan.

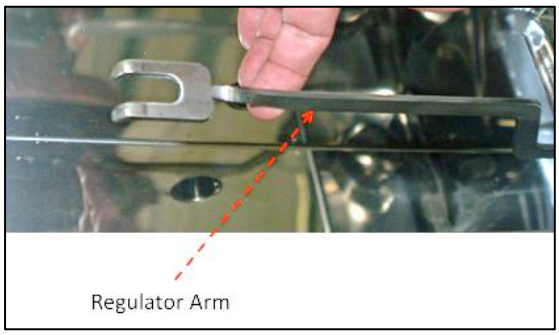
NOTE: LEADER EVAPORATOR offers an upgrade to the WSE (LEADER EVAPORATOR part number 390002). The kit replaces the u-tube with a connector including a butterfly valve. The valve can be closed and the flue pan does not need to be drained when doing reversals or work on the syrup pan. This lessens the effects on the gradient in the evaporator.

12. If tape was used to hold the pan gasket, remove it now.

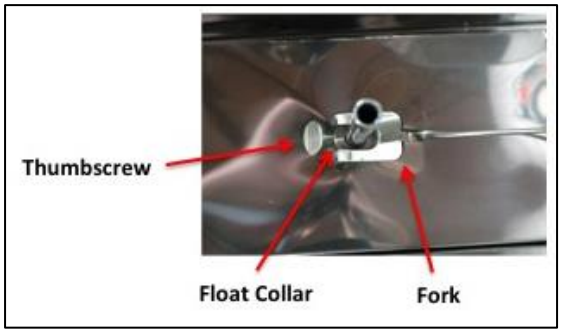
13. Install the draw off valve assembly. The draw off assembly should be as vertical as possible with the open end pointed down.
    a. Use a 1 ½" Teflon gasket and heavy duty clamp between the ferrule on the front of the syrup pan and the draw off valve assembly to install the assembly.
    b. The valve should be as vertical as possible.



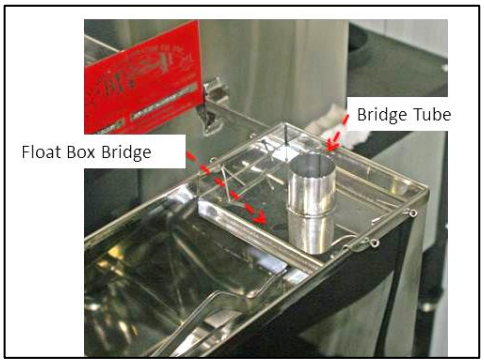
14. Install the float
    a. Loosen the thumbscrew on the float collar and adjust the float collar to approximately ½" from the top of the float. Retighten the thumbscrew.
    b. Align the long side of the float with the long side of the float box.



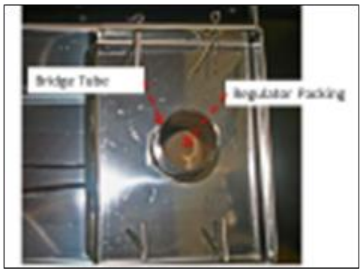
    c. Raise the regulator arm.

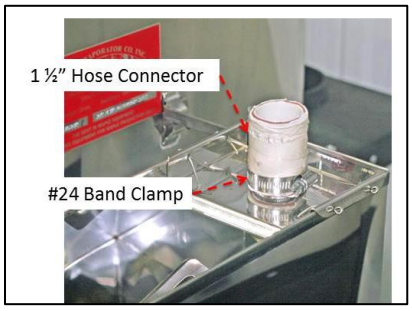


    d. Tilt the float under the arm and lower into the float box until it is seated on the bottom of the float box. The float collar should be positioned under the fork of the regulator arm and the thumbscrew of the collar should be at the open end of the fork.

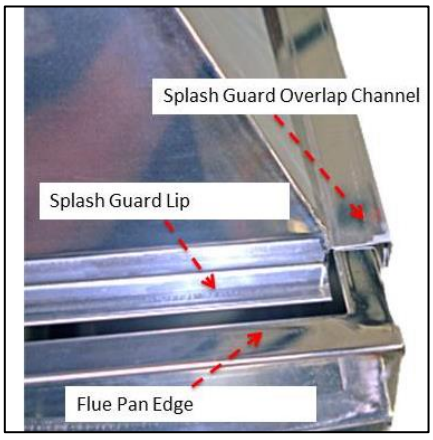


15. Install Hose Connector
    a. Locate the bridge of the float box.
    b. Ensure there is packing on the regulator arm. You can check this by looking down the bridge tube. There will be either a tan or black colored appearance.

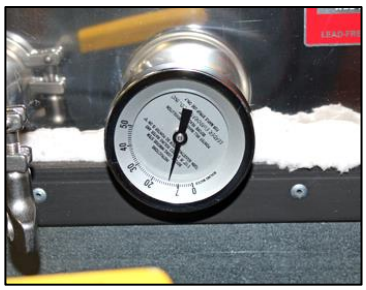




    c. Slide the hose connector onto the float box bridge and place a #24 band clamp over the lower end of the hose where it overlaps the bridge tube. Tighten the clamp.
    d. Slide a #24 band clamp onto the other end of the hose connector. Place your sap source line into the connector and tighten the band clamp to hold your line. NOTE: It is recommended a valve be installed between the sap source and the regulator box.



17. Install the Splash Guard
    a. The open end of the splash guard will be placed facing the rear of the arch.
    b. Bring the splash guard to the front of the flue pan with the wide part of the guard toward the flue pan.
    c. Raise the rear of the splash guard to allow for the splash guard lip to slide under the front edge of the flue pan.
    d. Lower the splash guard onto the sides of the flue pan with the splash guard channels overlapping the sides of the flue pan. Ensure the splash guard lip is forward under the front edge of the flue pan.



18. It is recommended a thermometer be installed. The thermometer is used to aid in determining when the boiling sap has reached the conditions for draw off. To install the thermometer, remove the ¼" plug in the coupler on the draw off side of the syrup pan. Teflon tape the threads of the thermometer then thread the thermometer into the ¼" coupler. Tighten the thermometer so the "7" on the thermometer is on the bottom.

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. To season the bricking, start by building a small fire in the fire box and very gradually build to a normal fire.
3. 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.
4. Check all equipment:
    a. No leaks at fittings
    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.

5. Drain the solution after the evaporator has cooled. CAUTION – ensure the equipment is cool enough to be safely handled for draining.
6. Check the interior of the arch to ensure insulation and bricking are in place.
7. Refill the pans to the 2 to 3 inch level with clean water.
8. Boil for 30 minutes then drain the pans – after the evaporator has cooled. CAUTION – ensure the equipment is cool enough to be safely handled for draining.

OPERATING THE WSE 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. Ensure defoamer is usable.
    c. Ensure all fittings are tight.
    d. Make sure all valves are working properly and the float is properly positioned.
    e. Clean the flues with the flue brush, when the evaporator is cool) 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.

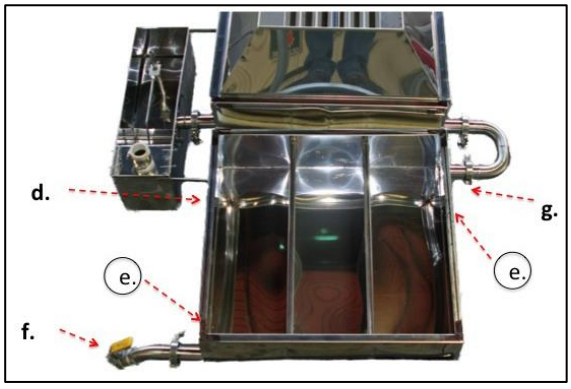
f. Ensure the open area in the grates is clean and free of material. Do NOT remove the ash from the "V" grooves of the grates.
g. Remove the ashes from below the grates.
h. If present, open cupola, thimbles and hood condensate drains.

2. If this startup is for a new evaporator or for the first time of the season, go to the Section titled MAKING SYRUP.

   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 syrup pan on the WSE:

SYRUP PAN REVERSAL

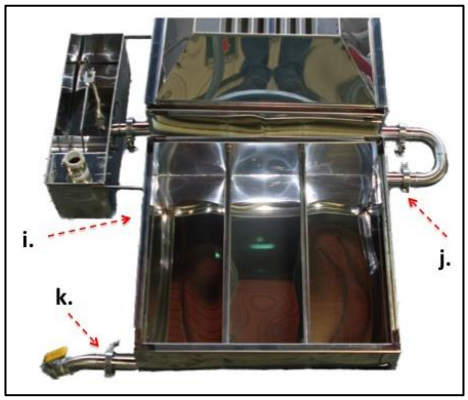
DISASSEMBLE



1. At the end of the day or whenever a reversal is to be done, while still hot, draw off 1 to 1 ½ gallons of "sweet" from the syrup pan and set aside.
   a. Allow the evaporator to cool.
   b. Close off the sap feed from the source. Open the draw off valve on the syrup pan and drain the sap from the flue pan and the syrup pan into containers; approximately 11 gallons for 2X4 WSE and approximately 16 gallons for a 2X6.
   c. Wipe out any loose material using clean cloths.
   d. Remove the thumbscrew securing the float box bracket from the syrup pan mount and thread into the mount on the opposite side of the syrup pan.

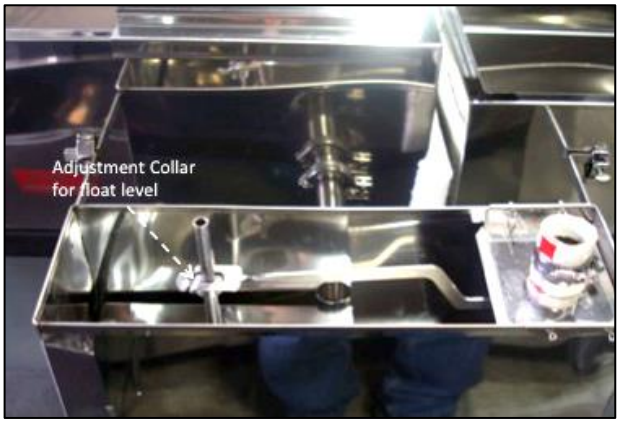
e. If you have installed a single dial thermometer, remove it from its position near the draw off valve and install it in the ¼" threaded fitting on the opposite side of the pan. Plug the empty thermometer fitting with a ¼" plug.
f. Loosen and remove the clamp from the draw off assembly on the syrup pan then remove the Teflon gasket and draw off assembly.
g. Loosen and remove the clamp on the syrup pan side of the u-tube. Remove the Teflon gasket. Loosen but do not remove the clamp on the flue pan side of the u-tube.
h. Turn the pan 180° so the draw off ferrule is now the syrup pan u-tube connection ferrule.

RE-ASSEMBLE



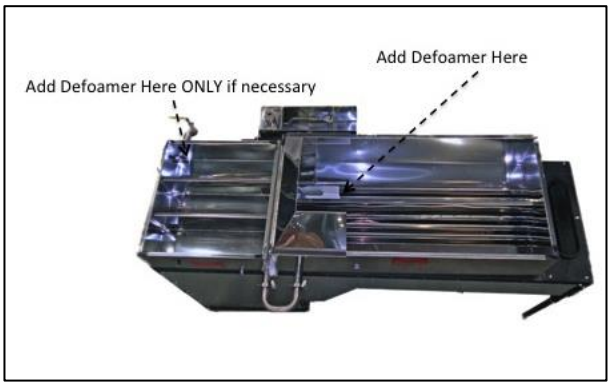
i. Slide the float box support into the syrup box bracket
j. Reconnect the u-tube by securing with a Teflon gasket and clamp.
k. Reconnect the draw off assembly with a Teflon gasket and clamp.
l. Ensure the pan gasket between the pans is secure and will not move.
m. Tighten the thumbscrew (step i.)
n. Refill the evaporator with the sap drained off at the start of the procedure.

MAKING SYRUP

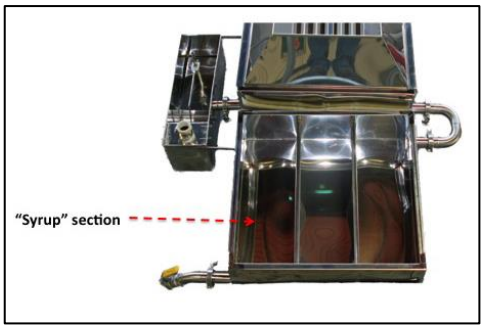


1. Set the float so the level of sap over the flues is 1" in depth. To set the depth using the float, loosen the thumbscrew on the side of the float shaft collar. Raise the collar to lower the level of the sap. Lower the collar to raise the level of the sap. Tighten the thumbscrew when the proper level is set.

2. Fire the arch.



3. As the flue pan starts to boil, add three (3) drops of defoamer (based on ATMOS 300) to the flue pan on the float box side. Defoamer should be added close to the inlet from the float box. Open the sap feed valve on your sap source line.



4. As the syrup pan is boiling, watch for foam higher than the compartment divider of the pan. If the foam is higher than the divider, add 1 drop of defoamer to the syrup pan syrup compartment directly in front of the draw off valve. If the problem repeats increase the amount of defoamer used in the flue pan. It will take 15 to 20 minutes before any change is noted. REMEMBER you are trying to stop the foaming not the boiling.

5. The sap in the syrup compartment of the syrup pan must be boiled until it reaches 7.0°F to 7.5°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. As the sap begins boiling in the syrup pan, monitor the thermometer. The thermometer will need to go around completely once and come back to the "7" mark on the thermometer. When the "7" mark is reached, use a hydrometer to test the density of the syrup. See ATTACHMENT #1 on the use of a hydrometer.

b. Adjust the thermometer to "7" when the hydrometer indicates the sap in the pan has turned to syrup i.e. is at the "HOT TEST" mark. To adjust the thermometer, place the Allen wrench, provided with the thermometer, into the screw and turn until the "7" aligns with the needle.

6. Draw off the syrup into a container. You should open the valve and allow a pencil size stream of syrup to flow, 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.
7. Check your incoming sap, at the float box, to ensure it is flowing properly.
8. If you have not determined the firing interval, monitor your boil. Check the stack thermometer to maintain the temperature between 650°F and 800°F Determine how long it takes between firings to keep the temperature in the right range then use that time as your firing interval. The use of a timing device with an audible alarm to notify you when to fire the evaporator, is recommended. Adjust your interval as necessary to maintain a steady boil. The firing interval should be between 5 and 10 minutes depending on the wood being used.

DAILY SHUTDOWN

1. There are two factors influencing the shutdown of the evaporator; time and sap volume.
    a. It will require approximately 1 hour from the last firing to bring the fire down to embers (coals on the grates).
    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.
        i. 2X4 WSE will require 20 gallons of sap after the last firing
        ii. 2X6 WSE will require 25 gallons of sap after the last firing
2. After the last firing and the last syrup draw (there may be 1 to 2 draws after the last firing) draw off 1 to 1 – ½ gallons of "sweet" from the evaporator into a clean container. Set the container aside and cover it.
3. Continue to monitor the arch as done for normal operations but do not add any additional wood. If you want to hasten the shutdown, rake the burning material in the firebox to aid the flow of oxygen.
4. When there is no more boil in either pan and the fire is down to coals on the grates, add sap until the pans are at a depth of 2". This is done by holding the float down or by loosening the float collar and lowering it. If the sap remaining does not cover the pans to the 2" depth then add clean, non-chlorinated, potable 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

CLEANING- this procedure is to be used when chemical cleaning of the pans is required.

a. Drain all sap from both pans. Save the sap in covered containers if it is to be reused.
b. Add water to the pans until the coating to be removed is covered with water.
c. Add 1 quart of concentrated pan cleaner Leader order #63006 (1 quart size) for each 40 gallons of water in the pans.
d. Heat the solution to simmering and keep at that level for one hour and the scale is noted to dissolve.
e. Wearing protective gloves, brush the loose scale.

f. If scale is removed flush the pans with water. If the scale is thick you may need to continue simmering the solution in the pan.
g. When the scale has been removed, drain off the solution, fill the pans with clean 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.
h. Rinse the pans with clean non chlorinated well or spring water.
i. Ensure all solution is rinsed from the pans.

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

1. Remove spills and splashes from the pan by wiping with hot water.
2. Follow the steps listed in the above section titled SYRUP PAN REVERSAL
3. 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.

PERIODIC

2. 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.
3. Inspect the rail gasket and pan gasket for areas where heat and smoke maybe escaping. Replace if necessary.
4. If excessive niter and sugar sand is coating the surfaces of the pans with scale, clean the pans as described in the CLEANING section.

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. Clean the pans as described in the CLEANING section.
1. Disassemble pan connections. Inspect all seals and gaskets.
2. Discard the rail gasket and pan gasket.
3. Inspect the brick and cement. Replace missing or damaged bricks or loose cement.
4. Clean the grates and replace in the arch.
5. Raise the flue pan out of the arch and finish draining.
6. Thoroughly brush the soot from the flues of the flue pan.
7. 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.
8. 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.
9. 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 (ex. Draw-off, u-tube) and float box.
5. Wipe and/or rinse out the pans.
6. 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.

ATTACHMENT #1: HYDROMETER USAGE

HYDROMETER FUNCTION

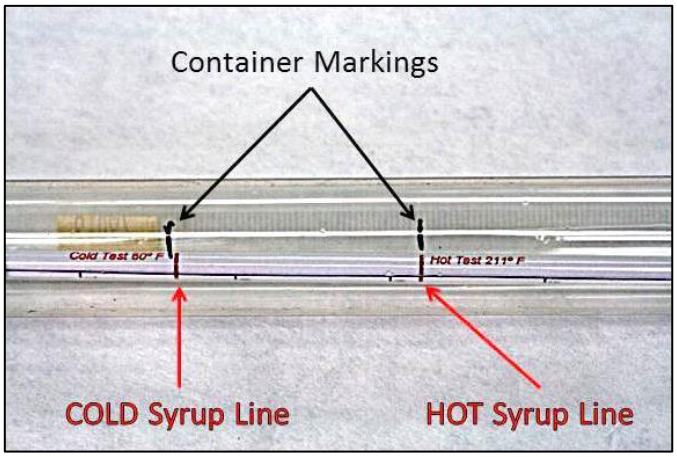
A hydrometer works based on the density of the maple syrup. There are two scales on the hydrometer; Brix and Baume. The Brix scale indicates the percentage of sugar in the maple syrup. The Baume scale is a measure of how dense the maple syrup is related to the density of water. The correct density for 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. 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:

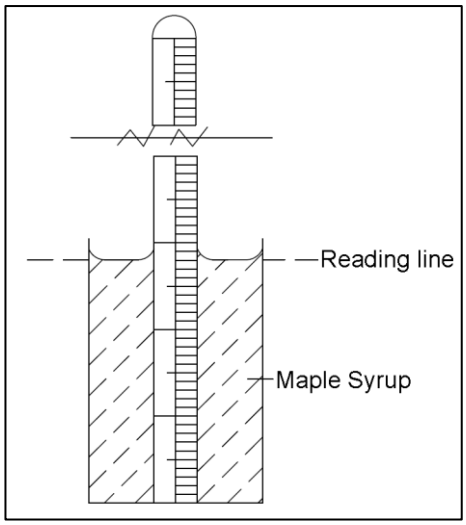


1. Unpack the hydrometer from its tube or box.
2. Carefully inspect the hydrometer for any breakage. If you suspect any cracks, fill your test cup with hot water and immerse the hydrometer. If it leaks then it is damaged and can't be used.
3. Place the hydrometer in its original container seated in the 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 it's 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.