



USER MANUAL



High efficiency wood evaporator

CDL Maple sugaring equipment

13/02/2019

With automated air adjustment system

Thank you for choosing a The Chinook high efficiency wood evaporator by CDL. Our 40 years of experience working with sugarmakers ensures you that you acquired a performant and quality piece of equipment. Before using this product, make sure you understand all the following instructions. If there is any problem upon reception of this product, please immediately contact CDL or your local representative.

FINDING INFORMATION

Make a record for future use

Brand: _____

Purchased Date: _____

Model Number: _____

Serial Number: _____

Serial number location

The serial number is located to the back of the evaporator.



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SAFETY

A wood evaporator can be a dangerous piece of equipment. Always wear heat resistant gloves and clothing when you fire an evaporator. Often, visitors can be in the sugarhouse. Make sure they stay at a safe distance from the evaporator, especially children.

A wood evaporator works with solid material (wood) and produces intense heat in front of the arch and around the smoke stack. For the location of your evaporator, make sure you have a concrete or ceramic floor strong enough to support the weight of the evaporator and its content as well as at least 24" between any wall and the smoke stack. If you need to put it closer to the wall, a heat barrier (ceramic blanket for example) should be installed. Also, make sure that your steam and smoke stacks have a free way to the roof of the building (avoid rafters). Also, your ceiling should be high enough for you to raise the hoods safely with a cable and pulley system.

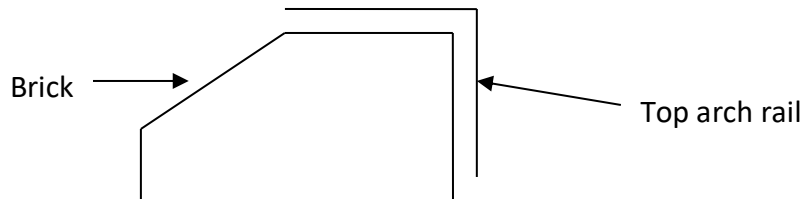
IMPORTANT: Make sure to contact your insurance company in order to verify their safety standards.

If your building is not insulated, you will have a better combustion and a better steam evacuation. If it is insulated, you will need to have an air intake inside your building (air trap, open window, etc)



INSTALLATION

- 1) Remove the wheels from the evaporator (if you have some).
- 2) Level your arch with the adjustable legs. Use a carpenter's level onto the smooth rail (pans are off the arch at this point) and adjust the leg adjustable bolts located at the very bottom of the legs as needed.
- 3) Once the evaporator is leveled (length and width), make sure the locking nuts are secured and tight.
- 4) Brick your arch (see drawing #C)
 - 4.1 Place insulation board against inside arch panels using refractor cement to help hold board in place if necessary. The insulation board can be cut with a utility knife or saw. Always use a dust mask when insulating your arch.
 - 4.2 Start placing firebricks in the firebox. Start around the grates and work up and towards the rear of the arch. Refractory cement is applied in THIN layers only to stick the firebricks to the insulation board and to each other.
 - 4.3 The last layer of bricks at the top of the arch should be cut at an angle to allow heat to touch as much pan surface as possible.
(drawing A). Do not force bricks into location. A too tightly bricked arch could create problems.



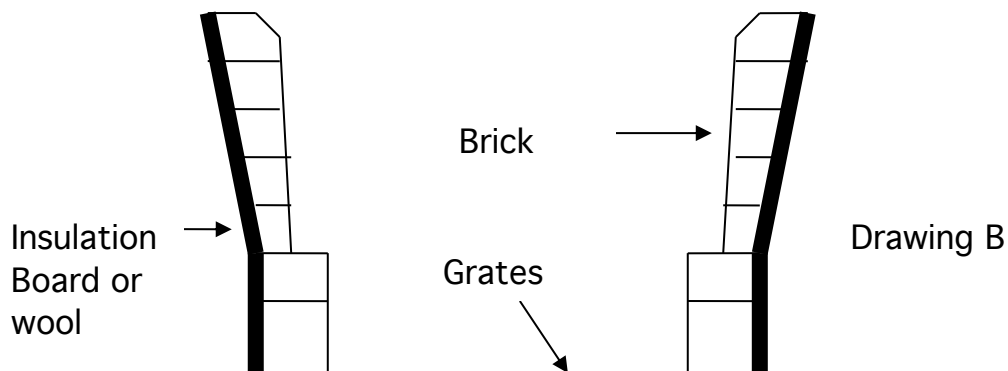
Drawing A

- 4.4 Build a wooden form to allow you to pour castable concrete around the front end of the arch. No bare metal should be exposed to the intense heat.
- 4.5 Fill the form slowly to make sure you have no air pockets in the concrete.
- 4.6 Allow 24 hours for concrete and mortar to set and dry with a room temperature between 60 and 70 °F.
- 4.7 After a minimum of 24 hours, check to see if any area may need refractory cement to fill any cracks or crevices.
- 4.8 Remove the form.
- 4.9 **IMPORTANT:** Make sure there is no air space between the top of the bricks and the top steel rail. If there is, push in some wool insulation. If heat directly hits the railing, it will warp.

4.10 It's highly recommended to cure the concrete. Follow the following procedure for optimal results:

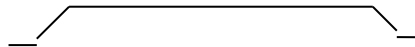
- a) Air cure at ambient temperature (no less than 40°F and no more than 100°F) for 24 hours, keeping surface damp with light water spray, curing compound or covering with plastic
- b) Elevate temperature to 250°F and hold for 1 hour per inch of thickness
- c) Elevate temperature 50°F per hour to 500°F and hold 1 hour per inch of thickness
- d) Elevate 100°F per hour to 1000°F and hold for 12 hours
- e) Elevate 100°F per hour until 1500°F, and let the temperature gradually come back to the ambient temperature.

Note: if at any time during the heat up excessive steaming is noted, STOP the procedure at that point until steaming slows. If steaming is during a holding period and continues for more than 15 minutes, reduce temperature by 100°F



- 5) Place the pans on the arch. Start with the flue pan (the bigger one). Adjust it to the back collar. Then install the syrup pan(s) on the front of the arch. Install the base stack behind the flue pan and be sure that flue pan is levelled.

Don't forget to install the insulation bars between each pan, they have to be installed like this :



You don't want the insulation to be touched directly by the flames.

- 6) Install the roof jack, base stack, stack pipe, collar and stack cover (please make sure that the stack cover is installed, the cover has to be against dominant wind). Ideally, have a rope coming down from the stack cover to a place where it is easy to operate.
- 7) If you have a drop flue pan, you need to raise the front of the pan (3/16") to help drainage.

- 8) Install the float boxes and transfer fittings. All valves and fittings will need Teflon tape applied prior to installation.
- 9) Install the sap level gage (if acquired) on the side of the flue pan. Remove glass tube before installing. Don't overtighten the glass tube holding nut.
- 10) Install the draw off valve on your syrup pan.
- 11) Connect power to the fan of the Chinook (by a licensed electrician), IMPORTANT, the blower motor runs on **220Volts**. If you hook it on 120V, you will burn the motor and it won't be warrantied.
- 12) Use only dry wood free of paint, glue or other chemicals. Never use tubing, rope, plastic bags, old tires (rubber), coal or any other combustible.

Note: the quality of the wood you will use is an important factor in the performance of your evaporator. Poor quality wood will cause a more frequent opening of the doors and can reduce the quality of the final product (darker syrup). For example: oak provides 29 million BTU per cord vs 16 million BTU for spruce. (see table 1)

TABLE 1

Heat produced by each type of wood (Million BTU per cord)

Oak	29
Sugar maple	29
Beech	28
Yellow birch	26
Ash tree	25
Elm tree	25
Larch	24
White birch	23
Poplar	18
White pine	17
Lime tree	17
Spruce	16
Fir	16

PRE-FABRICATED CHIMNEYS

If you decided to buy a pre-fabricated chimney to install with your evaporator, please refer to the manufacturer's instructions. A chimney can get up to 1000 F degrees and even more on an Chinook. Before installing this type of equipment, make sure it's made for this kind



of conditions and validate with your insurance company that it's in compliance with their safety standards.

Air inlet

If your building is not insulated, you will have good combustion and better evacuation of steam. On the other hand, if it is well insulated, you will have to make sure you have air inlets to improve the combustion and the chimneys.

IMPORTANT

We highly recommend to use a spark catcher with the smoke stack cover. Any forced air evaporator may blow sparks out of the chimney. A spark catcher will help reduce the risk of a fire. That's why proper air adjustment is very important in order to reduce the amount of sparks leaving the arch. We also recommend to inspect and clean everyday the spark catcher because ashes may plug it over time. There is always a risk of fire when burning wood, so don't leave anything flammable outside the sugarhouse.

Chimney stack cover :

Always install the chimney stack cover to prevent it from being closed by the wind or that it oscillates or damages itself in high winds.

IMPORTANT : Contact your insurance company to make sure that your installation complies with all the safety rules required by your insurer.



INTENS-O-FIRE BRICK INTERIOR



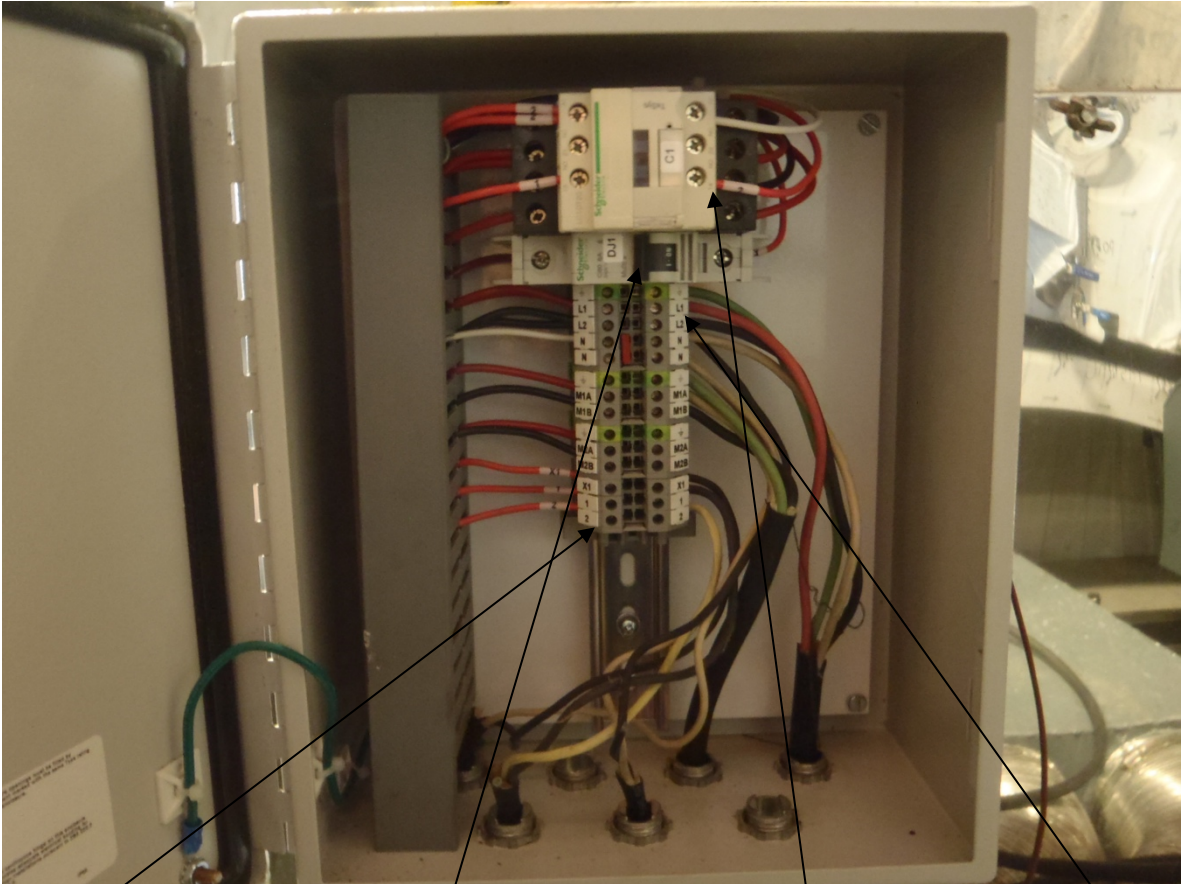
NOTE: In a bricked firebox, steel parts and components must not be exposed to fire. The fire in the chamber is hot enough that it can quickly damage steel.



Here is a photo of a firebox. Note that the back is flat, but the tops of the walls are angled to allow as much heat to reach the pans as possible. Layer bricks against each other, using a thin layer of high-temperature cement to hold them together.



ELECTRICAL BOX



Modulator terminals

Control circuit CB1 switch

Blower contactor C1

L1, L2, N, 1 Connection



OPERATING THE EVAPORATOR

Before starting the evaporator

- Open the stack covers
 - Make sure all valves are operational
 - Make sure the pan outlets are not clogged
1. Close all valves on the evaporator.
 2. Make sure the evaporator feed tank is at least 12" higher than the water level in the rear pan. Connect the tank to the rear float box. A valve must be installed at the tank output.
 3. Install a thermometer at the output of the last syrup pan. Calibrate it by placing it in boiling water and setting the temperature to 0 degrees.
 4. Open the valve of the maple water tank that leads to the flue pan. Fill the pan to 2" over the top of the flues. After starting the evaporator, bring the level to around 1" above the flues. (Adjust the rear float to maintain the water level)
 5. Open the valve on the front float box and raise the water level in the syrup pans to at least 1 ½". (Adjust the front float to maintain the water level)
 6. Make sure the valve at the feed tank output is always open. If it is closed, you may burn the flue.
 7. Now you are ready to make a fire. Use wood that is 20" long and split to 2–3" in diameter for smaller evaporators; larger units may take larger wood. Fill the firebox with paper, cardboard and wood. Place the wood 6" from the door.
 8. Close the air shutters by pushing the 3 adjustment knobs all the way in (Photo 1). Photo 1 ->
 9. Adjust the temperature of the automatic controller to +/- 500 °F in order to have full manual control once the evaporator has started.
 10. Start the fire and close the door.
 11. Start the blower



12. Pull the grate adjustment knob to 1/3 (Photo 2) Photo 2 ->

13. Let the wood burn for about 10 minutes or until it is well lit.

14. Push the air grate knob all the way in (off position) and fill the firebox with wood to within 4–6” of the syrup pans.



15. This means that the blower does not need to be stopped when reloading wood. Only the air flow to the grates must be manually closed each time to prevent flashback. Once the wood has been reloaded, simply open the air grates to maximum (100%). Once the evaporator base stack has reached normal operating temperature (which may take up to 30 minutes after lighting), automatic mode (**photo 3 on next page**) will take over air adjustment to optimize operation. The controller optimizes combustion to maintain the base stack temperature as indicated on the controller. However, the temperature can be adjusted up to 700 °F or less. The higher the temperature, the faster the evaporation. However, the evaporator will consume more wood at higher temperatures. The rear air knob must be set to maximum and the air door knob open 50–100%, depending on whether you want the evaporator to boil more towards the front or the back. Aim to keep the pressure positive (+0 to 0.05) for best performance. You may notice that the magnehelic needle dips towards 0 when the controller requires more air in the grates; this is normal. **When to reload? When the controller can no longer maintain the maximum temperature.**

16. Have a defoamer nearby when operating the evaporator. If the syrup starts to foam up excessively, put a drop of defoamer in the pan and the foam will go down. Defoamer helps prevent syrup from moving between pans and creating a big mess.

17. Maintain the front and rear water levels by adjusting the floats.

18. The maple syrup is ready when it is 7 degrees above the boiling point of water. Open the valve when the syrup reaches this temperature and close the valve once the temperature drops.

19. Repeat the previous step every time the temperature reaches 7 degrees above boiling.

20. Once you have more experience, you can decrease the sap level in your pans. The ideal level is 1” above the flue in the flue pan and 1½–2” in the syrup pans. The lower the level, the faster the boil. However, lower levels also increase the risk of burning the pans.



PHOTO 3

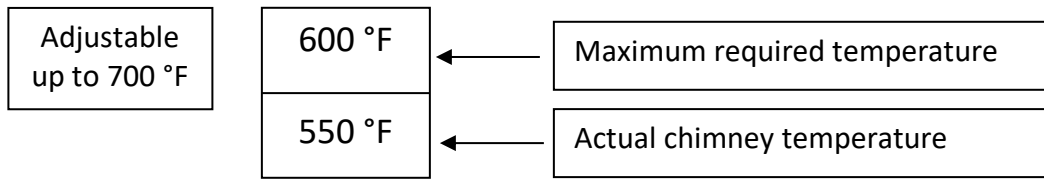
Open to 100% once the evaporator has reached normal operating temperature (+/- 30 minutes). The modulator modulates the air flow.



Close when loading.



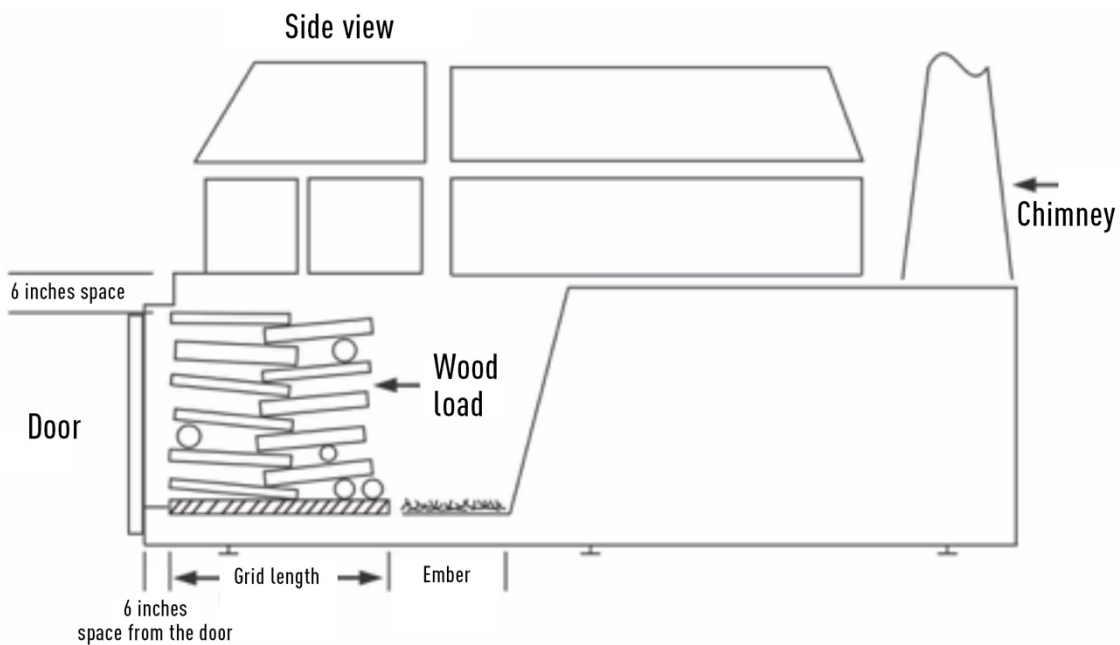
Example



When the evaporator is working optimally, it will reach 600 °F and aim to maintain that temperature. When the temperature starts to drop by 10–15 °F, it's time to reload.

When reloading, push the embers to the back and keep 1–2" on the grates to light the new wood more quickly. Put a row of wood on the grates up to 6" below the pans. Do not go past the edges of the grates.

Diagram:



Control panel



Blower ON/OFF Button

Firebox temperature display

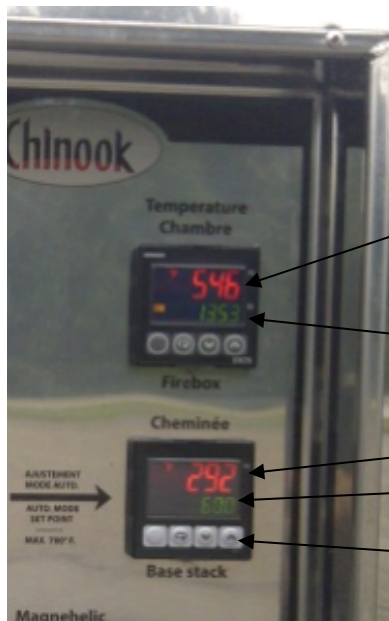
Base stack temperature

Maximum requested temperature

600 °F
580 °F

Actual base stack temperature

Negative pressure (draft) in the firebox



Firebox temperature

Not used

Base stack temperature

Requested temperature

Press the arrows to adjust the requested temperature



IMPORTANT SAFETY NOTE: THE HEAT COMING OUT OF THE FRONT OF A WOOD EVAPORATOR IS INTENSE WHEN THE DOOR IS OPEN. ALWAYS WEAR HEAT PROTECTIVE CLOTHES COVERING ALL YOUR BODY, INCLUDING GLOVES AND GOGGLES. SEVERE BURNING COULD OCCUR IF THE EVAPORATOR IS OPERATED WITHOUT ADEQUATE PROTECTION.

If there is a power outage, let the air adjustment for the door and the back the same, close the air under the grates and open the door slightly (1/2") to bring enough air in to burn what's left inside the evaporator safely.

Similarly, when stopping the evaporator at the end of the day or the boiling period leave the door open for the same reasons.



Troubleshooting guide

Float doesn't hold a constant level of sap

- The rubber piece of the float arm needs to be replaced or readjusted.
- Float box arm needs to be realigned.
- Make sure there isn't sap inside the float (hole in the float).

Syrup is being made in the first pan

- It's normal when you start. Draw off some syrup and put it in the flue pan to get the movement going.
- If problem continues, reduce your draft (see draft adjustment) to reduce the heat in the front pans.

Intense heat in front (the doors become red)

- Not enough air coming from the door, adjust the door air knob.
- Not enough draft (see draft adjustment).
- The burning wood is too close to the doors (need to be at least 6" from the doors).

Intense heat in the base stack (or the evaporator boils slowly)

- Too much air coming from the grates, adjust grate air knob.
- Too much draft (see draft adjustment).

The front of the evaporator warps or the metal is crumbling

- The metal frame is exposed to the heat, protect it by repairing with castable concrete on all the exposed surfaces.

If the control modulator is no longer working, you can continue to operate the evaporator in "manual mode" by going below the evaporator (access through the side door) to disengage the control motor that trigger the air line. Thus, you will be able to adjust the air of the grid manually.

***** For any other problem, please refer to your local representative.**



MAINTENANCE

Pan cleaning

- 1) Fill the pans with filtrate or clean water. Fill them to the top.
- 2) Add CDL-recommended pan cleaner (read the label to determine how much to add). Heat the water to approximately 90 °C, extinguish the fire and let sit overnight.
- 3) Drain and rinse the pans with a lot of water to ensure that no acid remains.
- 4) Fill the pans to the top again, then add sodium percarbonate to neutralize any remaining acid. Let sit for 15 minutes. Drain and rinse one last time.
- 5) Never use abrasive products, wire brushes, steel wool or products containing chlorine or muriatic acid.
- 6) If there is burnt syrup on the exterior of the pans, you can use a commercial oven cleaner (**cold oven**) to remove it. The cleaner will dissolve the syrup without damaging the pans. To make the pans shiny again, use an industrial foaming glass cleaner.

IMPORTANT: If even the slightest amount of acid is left in the pans between seasons, the acid will have eaten holes in the pans by the next season.

When to clean the pans

How often your pans will need to be cleaned depends on the time of the season and the amount of deposit left at the bottom of the pans. Check syrup pans every hour. When there is too much deposit at the bottom, clean the pan or replace it with a clean one. For rear pans, cleaning frequency depends on the size of the evaporator and the amount of minerals in the sap. Generally, one clean in mid-season is enough. If there is too much of a mineral deposit in the water pan, it could burn or crack at the bottom of the grooves. It should be checked every day.



At mid-season and end of the season

Remove the hatch from behind the evaporator (photo below) to gain access to the base of the heat exchanger and remove all ash and dust accumulated using a vacuum cleaner.

Remove the hatch to gain access to the bottom of the base stack to clean ashes.



In between season storage

- 1) Put all your pans on wood blocks to let air circulate in the arch and under the pans. Too much humidity can cause damage.
- 2) It is necessary to brush all the flues inside and outside with the appropriate brush. Always make sure the flues of the pan are clean;
- 3) Never leave any kind of cleaning product in the pans, it will damage them and it's not covered by the warranty;
- 4) O-rings should be greased with food use grease (to prevent shrinking and drying)
- 5) Visually check and visually inspect the condition of the ceramic wool in the evaporator assembly and similarly for the brick of the firebox and see if it is necessary to make the replacement and repair.



DIMENSIONS AND PERFORMANCE

Specs	Complete evaporator	Frame only	Performance us gallons/hr
Width x length	Part #	Part #	
2,5X8	6700301C	677422AFC	100
2,5X10	6700401C	677424AFC	125
3X10	6700501C	677430AFC	150
3X12	6700601C	677432AFC	180
3,5X12	6700701C	677436AFC	227.5
3,5X13	67007011C	677435AFC	245
3,5X14	6700801C	677437AFC	245
4X12	6700901C	677442AFC	240
4X13	6701001C	677443AFC	260
4X14	6701101C	677444AFC	280
4X15	6701201C	677445AFC	300
5X12	6701301C	677446AFC	300
5X14	6701401C	677450AFC	350
5X15	6701501C	677451AFC	375
5X16	6701601C	677452AFC	400
6X14	6701701C	677454AFC	420
6X15	6701801C	677453AFC	450
6X16	6701901C	677455AFC	480
6X18	6702001C	677456AFC	540

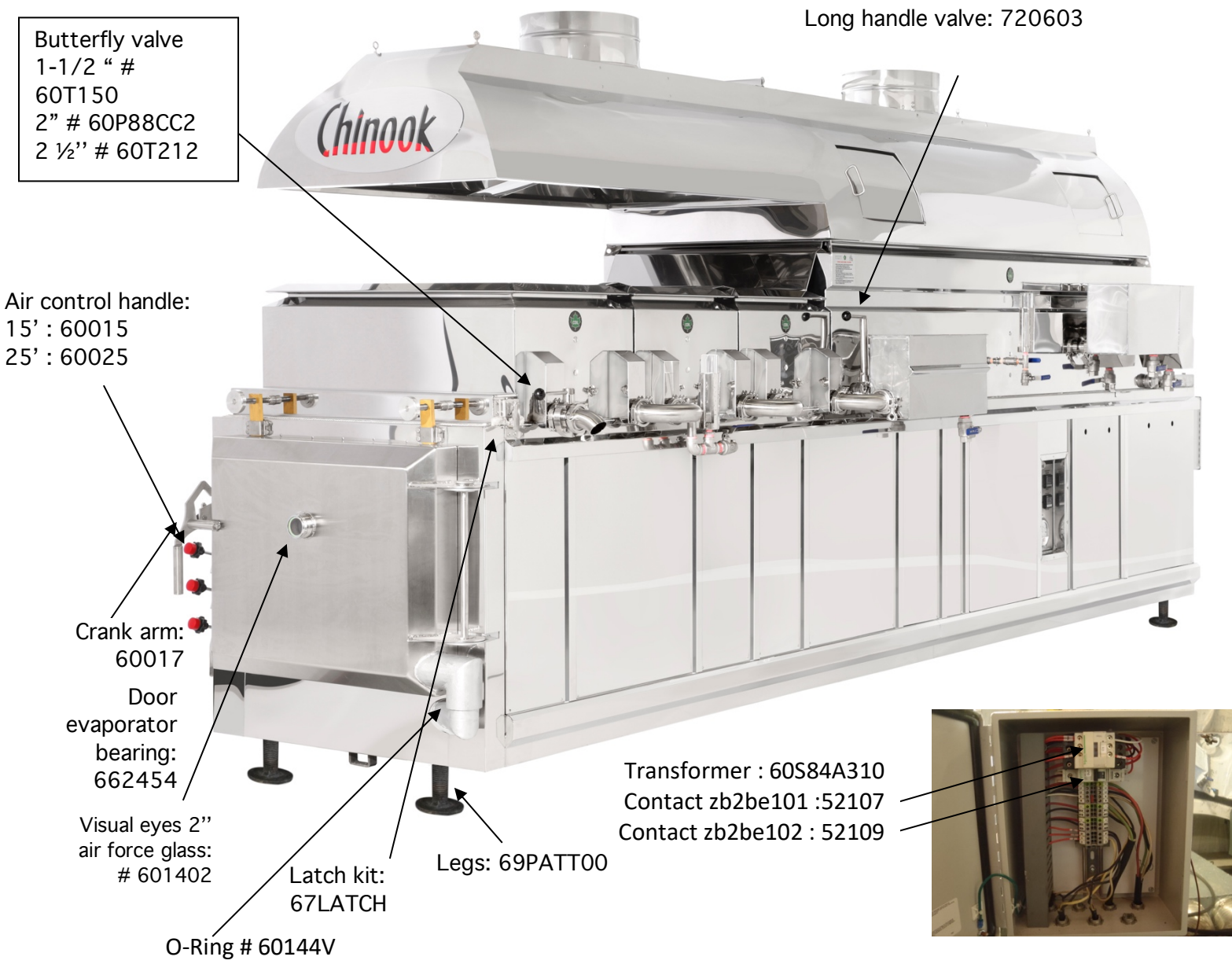


Gallons quantity in a flue pan

Size (feet)	Flue height (inches)	US gallons (equal to the flues)	US gallons (for every inch above flues)
2 ½ x 5	5	15.6	7.5
2 ½ x 6	7	21.9	9
3 x 7	7	30.9	13.2
3 x 8	7	35.1	15
4 x 8	7	45.9	19.8
4 x 10	7	56.1	24.9
5 x 10	7	70.3	30.9
5 x 12	7	83.4	37.2
6 x 10	7	84.3	37.2
6 x 12	7	99.6	44.7



Parts: CHINOOK



Butterfly valve
 1-1/2 " #
 60T150
 2" # 60P88CC2
 2 1/2" # 60T212

Long handle valve: 720603

Air control handle:
 15' : 60015
 25' : 60025

Crank arm:
 60017

Door
 evaporator
 bearing:
 662454

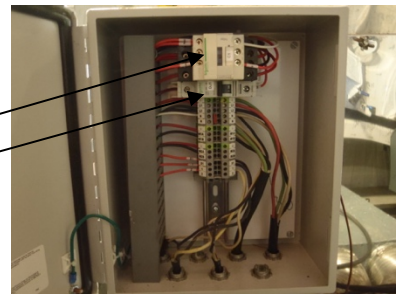
Visual eyes 2"
 air force glass:
 # 601402

Latch kit:
 67LATCH

O-Ring # 60144V

Legs: 69PATT00

Transformer : 60S84A310
 Contact zb2be101 :52107
 Contact zb2be102 : 52109





Belimo motor # 66776

Start-stop button: 51215

Controller: 66E5CNR

Modulating controller:
66E5CNC

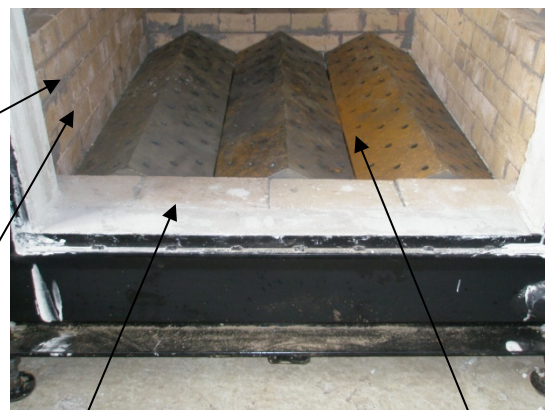
Magnehelic
gauge: 6026629

Bricks: 66868

Pyromix:
668664

Cement dry high temperature: 66875

Grates: 601139



EVAPORATOR WARRANTY

Your evaporator is covered by a two year limited warranty. For two years from your original date of purchase, Les Équipements d'Érablière CDL (CDL), will replace or replace any parts of this evaporator that prove to be defective in materials or workmanship when such evaporator is installed, used and maintained in accordance with the provided instructions.

Exclusions

This warranty does not cover the following:

1. Products with original serial number that have been removed, altered or cannot be readily determined.
2. Product that has been transferred from its original owner to another party or removed outside the USA or Canada.
3. Production loss due to any kind of failure of the evaporator.
4. Revenu losses due to syrup quality.
5. Service calls which do not involve malfunction or defect in materials or workmanship, or used other than in accordance with the provided instructions.
6. Service calls to correct the installation of your evaporator or to instruct you how to use your evaporator.
7. Expenses for making the evaporator accessible for servicing, such as the removal of wall, shelves etc.
8. Service calls to repair insulation or the bricking job.
9. Crack cast iron parts if a blower was used in the evaporator.
10. Any service beyond the first two years.
11. Damages caused by: services performed by unauthorized service companies; use of parts other than genuine CDL parts or parts obtained from persons other than authorized service companies; or external causes



such as abuse, misuse, inadequate power supply, accidents, fires, or acts of God.

12. It doesn't cover the consumable products or accessories.
13. If the product was damaged by abusive use, negligence, accident caused by the customer, modification made by the customer, variation in the electric power.
14. Damage caused by the use of products that are not meant for use with our equipment or a bad use of a product as acids, cleaning products.
15. Use of painted wood or any wood containing chemicals, glue or any other added agent.
16. Use of any other burning agent than wood.

Disclaimer of implied warranties; limitation of remedies

Customer's sole and exclusive remedy under this limited warranty shall be repair or replacement as provided herein. Claims based on implied warranties, including warranties of merchantability or fitness for a particular purpose, are limited to two years or the shortest period allowed by law, but not less than two years. CDL shall not be liable for consequential or incidental damages such as property damages and incidental expenses or loss or revenues caused by any event covered by this warranty. Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages, or limitations on the duration of implied warranties, so these limitations or exclusions may not apply to you. This written warranty gives you specific legal rights. You may also have other rights that vary from state to state.

If you need service

Keep your receipt, delivery slip or some other appropriate payment record to establish the warranty period should service be required. If service is performed, it is in your best interest to obtain and keep all receipts. Service under this warranty must be obtained by contacting CDL at the addresses or phone numbers below. Obligations for service and parts under this warranty will be performed by CDL in Canada. Product features or specifications as described or illustrated are subject to change without notice.

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