



USER'S MANUAL



THE TORNADO HIGH EFFICIENCY OIL EVAPORATORS



Les Équipements d'Érablière CDL inc.

Thank you for choosing a CDL Tornado high efficiency oil evaporator. 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 on the back of the evaporator arch



TABLE OF CONTENT

Finding information	2
Table of content	3
Safety	3
Evaporator installation	4
Operating the evaporator	5
Maintenance	7
Troubleshooting	9
Performance	11
Dimensions	12
Parts	16
Warranty	17

SAFETY

An oil evaporator can be a dangerous piece of equipment. Always be careful when you have to work with hot syrup or steam. Often, visitors can be in the sugarhouse. Make sure they stay at a safe distance from the evaporator, especially children.

An oil evaporator works with liquid fuel and produces intense heat inside 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 under the evaporator
- 2) Level your arch with the adjustable legs.
- 3) 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.
- 4) Place the pans on the arch, install the base stack behind the flue pan and be sure that flue pan is levelled. If there is space left between the pans, tighten the pan tightener located at the front of the arch.
- 5) Install the float boxes and transfer connections.
- 6) Connect the oil tank to the burner, respecting CDL's and your local regulations for this type of installation.
- 7) Connect the burner controls to the electrical entrance of the sugarhouse (it is recommended to use a certified electrician).
- 8) It is highly recommended to have a make up air entry near the burner to improve combustion (especially if the building is insulated).
- 9) To reduce noise in the building, it is an option to move the blower outside the main room. Call your CDL representative for more information.
- 10) The only acceptable combustible is #1 or #2 oil.
- 11) A start up with a CDL technician is included with the purchase of a new oil evaporator, please contact your sales representative to take an appointment with CDL's service department. A technician will come on site to make the necessary adjustments and to start the evaporator for the first time. For the start up, the oil reservoir and all the electrical components must be hooked up and you need to have a big enough water supply to feed the evaporator. The start up can be done using soft water.

Prefabricated chimney

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. 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.



OPERATING THE EVAPORATOR

Before starting the evaporator

- Open the water entrance valve (from your storage tank)
 - Open the oil valve to the burner
 - Turn on the power to the burner (make sure there is power in the line)
 - Open the stack covers
 - Make sure all the pan outlets are unplugged
 - Make sure that the oil line is not frozen
 - Verify that the oil filter is clean
1. Close all valves on evaporator.
 2. Make sure supply tank to feed evaporator is at least 12” higher than the top of pans on evaporator, then fill with maple sap.
 3. Open valve from supply tank to rear float on flue pan, fill flue pan to 2” over the top of flues. After you start, bring the level to 1” above the flues.
 4. Open valve on front float box to fill syrup pans to at least 1 ½” above the bottom of pans. (**ADJUST FLOAT TO MAINTAIN LEVEL**).
 5. Make sure valve to feed flue pan and syrup stay open.
 6. Now you are ready to turn on the evaporator on low fire and make sure everything is working properly. When things settle down, switch to high fire.
 7. Have some vegetable oil or defoamer close by when operating evaporator, should pans start to foam up, put a drop into the pan and the foam will go down. This will prevent boiling over.
 8. Maintain these levels by the adjustment on your front and rear floats. (**THEY WILL HAVE TO BE ADJUSTED AS EVAPORATOR STARTS TO EVAPORATE WATER FROM THE MAPLE SAP**).
 9. At this point the thermometer that is being used has to be placed in boiling water for 5 minutes. (**WRITE THIS TEMPERATURE DOWN**) and then place the thermometer at the point where syrup is to be drawn from the evaporator.
 10. Finish syrup is always drawn off at 7 degrees above the boil point of water. (**EXAMPLE: IF BOILING WATER IS AT 212 DEGREES, THEN YOU WOULD OPEN VALVE AT 219 DEGREES**).



Close valve when temperature starts to drop.

11. Repeat step # 9 when next batch reaches 219 degrees.
12. When you become more experienced on the evaporation of your evaporator, you can bring the level of sap down to 3/4" above the flues in the flue pan.
(ALWAYS MAINTAIN 1 1/2" to 2" IN THE SYRUP PAN).

Should you have any problems, our service personnel will be pleased to assist you.

Our toll free number is: 800-762-5587

Draft adjustment

Draft adjustment of an oil fired evaporator is made by adjusting the draft key between the base stack and the back of the flue pan.

To get more draft, turn the key to increase the opening to the base stack.

Always have stack at least 3' above peak of the roof. You may need more if the sugar house is in a valley.



MAINTENANCE

Pan cleaning

- 1) Fill pans with permeate or clean water. Fill it to the top.
- 2) Add a CDL recommended cleaner, heat up and leave sitting all night.
- 3) Drain and rinse thoroughly with water.
- 4) Fill the pan to the top again with clean soft water and bring it to a boil for 15 minutes, to insure that there is no more cleaner residues left.
- 5) Use only a CDL recommended cleaner.
- 6) Never use abrasive products or steel brush, steel wool or any product containing chlorine or muriatic acid.
- 7) If there is burned syrup on the side of a pan, use commercial **cold** oven cleaner. It will dissolve the syrup without using abrasive products. To bring back the shine, use a foaming industrial glass cleaning product.

IMPORTANT: if there is any cleaning product left in the pan, it will seriously damage the pan. It could even make holes in it.

When to clean you pans

Pan cleaning depends on evaporator size and the amount of scale deposit produced by your evaporator. Front pans have to be checked every hour to prevent overheating. If too much scale deposit in your pan, you could burn it. So make sure that you check your flue pan at the end of every day, especially in the corners at the end of each flue. Too much scale deposits can cause a pan to overheat.



Oil system maintenance

- 1) Change the oil filter every year.
- 2) Every 2 to 5 years, change the burner oil nozzle (depending on the number of hours of use)
- 3) Change the insulation band on top of the arch every 2 to 5 years.
- 4) Make sure that no water dripped down the stacks. It could damage the wool in the arch.
- 5) Between each pan change, clean the oil diffuser with a tooth brush.

Note: When filling the oil reservoir, make sure that the evaporator is stopped for at least one hour. This will make the solid particle inside the tank to settle to the bottom. If this is not done, you could plug your oil filter.

Maintenance of the optional base stack preheater

- 1) It's very important to drain the preheater at the end of each day. If sap stays for a long time in a warm environment, bacterias will grow and they will be transferred to the pans when you start the evaporator.
- 2) It's also important that after every time concentrated sap is boiled, permeate water is boiled for 10 to 15 minutes. This will sterilize the interior of the preheater for the next time you will boil.
- 3) Empty the preheater.
- 4) Don't go over 180 F degrees in the preheater because if the sap gets to 212 F degrees, steam will come out of the water entrance relief pipe and could damage the preheater. If you have difficulty maintaining the temperature under 180 F degrees, call your local representative for support.



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).
- The sap tank is too high and puts too much pressure on the float arm; you need to install a secondary pressure control float box or to relocate the sap tank.

The evaporator doesn't start

- Make sure the oil feed valve is open.
- Verify if you still have oil in your oil reservoir.
- Make sure you have power to your burner.
- Verify the burner relay by pushing the big red button for 15 seconds (do not do this more than twice)
- Make sure the oil line from the tank to the burner is in only 1 piece and is the right diameter. The more connections in the line the higher the chances of problems.
- Purge the oil pump. Install a small container under the side screw before taking it off. (There might be an air bubble)
- Block off the burner's air intake with a towel and set the burner at LOW or send heat on the air intake. (This problem usually occurs at the beginning of the season)
- Verify if the oil line is frozen.
- Verify if there is water in the oil.
- Verify if the burner's electrode is making sparks.
- If you have a DETECTO, you could have permeate in the pans. Add sugar or salt in the sap level gauges.
- After doing all this, if the evaporator still doesn't start, call your local representative for service.

The base stack is vibrating severely (the fire is splitting from the burner)

- Set the button at the front of the burner at LOW FIRE and call CDL to get the burner adjusted.

Bad combustion (the bottom of the pans is black)

- Verify the quality of the flame. There is probably not enough air

The pans are overheating

- Verify the angle of the burner.
- The burner nozzle may be defective or the wrong type.



The burner shoots oil but it doesn't light up

- Verify the ignition transformer.
- Verify the 30 second relay.
- The solenoid may be defective.
- The air trap might stay open.

Note: After a few unsuccessful start up attempts, it's possible that there is an oil accumulation on the wool and it may cause an explosion with a return of flame. To fix the problem, you need to raise a syrup pan and burn the oil using a long stick.

Oil appears through the air trap

- The pump seal is defective.

There is air in the oil

- There is a leak in the oil line.
- The oil reservoir is empty.

Sap boils too hard in front or at the back of the evaporator

- Adjust the key in the back of the evaporator.



OIL EVAPORATOR PERFORMANCE

Number	Width	Length	Performance gallons US / hr
6703102ET	3	12	180
6703103ET	3	13	195
6703202ET	3- 1/2	12	210
6703203ET	3- 1/2	13	227
67033102ET	4	12	240
67033103ET	4	13	260
6703403ET	4	14	280
6703503ET	4	15	300
6703603ET	4	16	320
703605ET	5	14	350
6703606ET	5	15	375
67036055ET	5	16	400
6703705ET	6	14	420
6703806ET	6	15	450
6703805ET	6	16	480
6703905ET	6	18	540



SPECIFICATIONS

Tornado dimensions

Evaporator width	Total height (on top of the hoods)
6'	76"
5'	76"
4'	74"

Evaporator size	length of frame including burner cage
6' x 16'	223"
6' x 14'	198-3/4"
5' x 16'	224"
5' x 14'	199-3/4"
4' x 14'	195"
4' x 12'	171"

Evaporator width	Steam stack diameter	Smoke stack diameter
6'	20"	26"
5'	18"	22"
4'	16"	20"



Number of gallons of sap in a flue pan

Size (feet)	Flue height (inches)	Us gallons (equal to the flues)	US gallons (for every inch above flues)
2 x 4	5	10.8	4.8
2 x 5	5	13.5	6
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

Number of gallons of sap in base stack preheater

Size	US gallons
2'	11.4
2 ½'	13.8
3'	21
3 ½'	22.8
4'	26.4
5'	60
6'	68.4



Miscellaneous information

Small Tornado	Smoke stack diameter (inches)	Wire size	Amps	Oil line diameter (inches)	Gallons of water needed to start
3 x 12	14	12-3	20	3/8"	275
3-1/2 x 12	15	10-3	30	1/2"	275
3-1/2 x 13	15	10-3	30	1/2"	275
4 x 12	15	10-3	30	1/2"	350
4 x 13	16	10-3	30	1/2"	350

TORNADO	Smoke stack diameter (inches)	Wire size	Amps	Oil line diameter (inches)	Gallons of water needed to start
4 x 14	20	8-3	40	1/2"	400
4 x 15	22	8-3	40	1/2"	450
5 x 14	22	8-3	40	1/2"	550
5 x 15	22	8-3	40	1/2"	600
5 x 16	26	8-3	40	1/2"	650
6 x 14	26	8-3	40	1/2"	650
6 x 15	26	8-3	40	1/2"	700
6 x 16	26	8-3	40	1/2"	700
6 x 18	26	8-3	40	1/2"	700

Carlin burner information

Model	Volts	HP	Amps	US GPH	Oil entry size	Return
601	110	1/2	7.3	13.9	1/2" (2 burners) 3/8" (1 burner)	None
701	110-220	1/2	7.3-3.7	13.9	1/2" (1 or 2)	Return
801	110-220	3/4	10-5	19.8	1/2" (2 burners) 3/4" (1 burner)	3/4" (1 or 2)

Powerflame burner information

Model	Volts	HP	Amps	US GPH	Oil entry size	Return
CR2	110-220					
CR3	110-220					
CR4	110-220					



PARTS: Small Tornados with Carlin burner



Rear float box: 67904D

Front float box: 67904115D

Legs: 69PATT00
Wheels: 69KITROUEV

Green light cover: 60E22H3

Light only: 60E22D120

MOTOR CONTACTOR: 6035832

Hour counter:
60H7ETNFVB

RELAY RESET 15 SEC: 6040200-02S

Magnelic gauge: 6026629
Magnelic probe: 69SDMAGN



15A breaker: 60CUHBR115

Switch:
ON-OFF SWITCH : 60E22VB51

Filtreur à l'huile: 60ERA2A700DAL

600 psi gauge: 663337

Double out let: 60LEV4976W



Les Équipements d'Érablière CDL inc.

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. Any service beyond the first two years.
9. 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.
10. It doesn't cover the consumable products (as oil) or accessories.
11. If the product was damaged by abusive use, negligence, accident caused by the customer, modification made by the customer, water damage, variation in the electric power or power surge.
12. Damage cause 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.
13. Use of contaminated, recycled or sub standard oil.
14. Use of any other burning agent other than #1 and #2 oil.



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 states to states.

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. Products features or specifications as described or illustrated are subject to change without notice.

Les Équipements d'Érablière CDL
257 Route 279
St-Lazare, Québec, Canada
G0R 3J0
(418) 883-5158

CDL USA
3 Lemnah Drive
St. Albans, VT, 05478
(802) 527-0000

