

# OPERATING YOUR STOVE OR FIREPLACE INSERT

All Federal Airtight stoves and fireplace inserts have been built to be operated with several goals in mind. These goals are:

- 1) optimize safe operation
- 2) minimize fuel usage
- 3) maximize heating output

Whether these goals are achieved in your setting will depend in substantial part on how you install and run your stove or fireplace insert. We have provided the keys. Everything you need for successful, safe, and efficient operation is built in. It is now up to you. No special skills are required although a good dose of common sense will make operation of your stove more satisfying. Be sure to read these operating instructions and the installation instructions in the previous sections carefully. Retain them for future use. Understanding these instructions will enhance stove operation.

## CONTROLLING YOUR STOVE OR FIREPLACE INSERT

On each Federal Airtight, there are three air supplies. These air supplies are your main controls over firing and the rate of combustion of your fuel. An optional flue damper, inserted in the first length of stove pipe or as part of the flue collar, can provide an added degree of control over the exit pace of the stove exhaust. A flue damper is highly recommended.

**Air supplies:** All Federals except the FA267CL have three dial dampers (FA267CL owners should refer to their assembly instructions for details about their air supplies.)

- 1) The dial on the ash drawer is the underfire air, used to start both wood and coal fires, to achieve peak output from wood fires in model FA455, and maintain coal fires.
- 2) The air supply on the loading door is the overfire air. This is typically used to maintain wood fires and to help with secondary coal burning.
- 3) The dial damper on the stove sides (above the side door on 455, 224, 264, 264R, 267, and 288 models) is used to feed additional, preheated combustion air to the position just below the combustor. This further improves the stove's efficiency by helping to burn off an even greater percentage of the wood smoke. This should be closed during coal fires and slow-burning wood fires.

**Operating Your Air Supplies:** You will be able to control the amount of heat your stove produces, the burn time you will get on a load of fuel, and your stove's overall efficiency through the 3 air supplies. The more air you let in the faster your fuel will burn. Generally speaking, the higher the burn, the less efficient it is.

Each dial damper is fitted with a square steel head onto which your door handle will fit. To close the dampers, rotate in a clockwise direction until the damper is tightly sealed. Open by rotating it in a counter-clockwise direction.

Typical settings of the underfire and overfire air dampers (the main variables in starting and maintaining a fire) will vary according to the fuel used and the amount of heat you wish to generate. Heating output can be increased rapidly by opening the dampers more. However, the dampers should be mostly closed to maintain an overnight fire.

**Typical settings are:**

**Coal fire: underfire air 1-3 turns open  
overfire air ¼-½ turns open or closed**

**Wood fire: underfire air closed  
overfire air 3-4 turns open (1-2 turns open for Model FA455)**

When first using the stove, keep track of how many turns open you have set your dampers. You will quickly find that a specific air setting will give you a fixed amount of output. It normally takes about 10 days to determine optimum settings for your installation, as each is different. Remember typical settings are average settings. You may require different damper settings depending on heat output, burn time, draft requirements, etc.

In efficiency testing, the combustor air supply was found to increase the stove's efficiency during high and medium burns. It is necessary that the combustor receive additional air during these burn rates as there is not enough left over from the initial combustion (of the wood in the firebox) to aid the combustor in the burning of the gasses. For wood fires that last about 6 hours or less (medium or high burns), the combustion air dial damper should be opened 1 or more turns. This damper should be closed tightly when maintaining an overnight burn with wood or during the later part of a wood burn cycle.

### **Rules for Using Air Supplies:**

- 1) Do not assume you need a large quantity of combustion air, especially if you have a good draft. When burning wood especially, you will not need much air.
- 2) Trial and error will give you the best settings for your particular installation. By keeping track of the various air settings and resulting heat, you will come to the appropriate setting to meet your heating goals.
- 4) **DO NOT OPERATE THE STOVE WITH THE ASH DOOR OPEN. THIS CAN LEAD TO EXTREME OVERFIRING. OVERFIRING A STOVE IS DANGEROUS.**

**Draft Control:** Optional Stove Pipe Dampers: The performance of each type of Federal Airtight stove can be enhanced by the addition of a stove pipe damper in the first length of pipe exiting the stove or in the flue collar that is used with the stove. Using a stove pipe damper is particularly helpful in installations with strong drafts. Closing the damper will reduce the amount of exhaust from the stove and increase the amount of heat that stays in the stove and that is transferred to the room. It will also improve burn times. We recommend them highly, and some states require them. Check with your local building inspector.

Consolidated Dutchwest offers separate dampers for mounting both in pipe and in oval-to-round adapter/dampers which replace the oval flue collars normally provided. Oval dampers are also available to fit into the oval flue collars. The following is a list of Federal Stoves and adapter/dampers which have been designed to fit them. Note that adapter/dampers for inserts are also

**Draft Control:** (continued)

available. These dampers include an arm, lever, and brass handle, and are operated externally from in front of the shroud through a bolt hole provided on the shroud. They replace the function of most fireplace dampers, which are controlled by an arm inside the fireplace opening, and which are usually removed to install positive connections.

**Table 10**  
**Stove**

	Appropriate Adapter
FA207CL	Mount 6" stove pipe damper in pipe
FA209CL	Mount 6" stove pipe damper in pipe
FA211CL	Mount 6" stove pipe damper in pipe
FA224ACL	FA729 - 6" Oval to Round Adapter with Damper
FA224CCL	FA729 - 6" Oval to Round Adapter with Damper
FA267CL	FA729 - 6" Oval to Round Adapter with Damper
FA264CCL/R	FA729 - 6" Oval to Round Adapter with Damper
FA288CCL	FA727 - 8" Oval to Round Adapter with Damper
FA455	FA727 - 8" Oval to Round Adapter with Damper
7A, 7B Inserts	FA528 - 8" to 6" Oval to Round Adapter
8A, 8B, 8C Inserts	FA741 - 6" Adapter/Damper for Inserts
9B, 9C Inserts	FA736 - 6" Adapter/Damper for Inserts
11B Insert	FA750 - 8" Adapter/Damper for Inserts
	FA724 - 8" Oval-to-Round Adapter
	FA528 - 8" to 6" Oval-to-Round Adapter

OR oval damper on standard flue collar in low clearance fireplace installations.

**The Bypass Gate:** Another important element in controlling the air flow within the stove is the bypass gate. The bypass gate is operated from the left side of the stove (except for the FA264CCL/R, where it is operated from the right side), by use of a brass handle. The small, square-headed operating rod, located just behind the combustor air damper, is rotated to open and close the bypass gate. Unlike a damper, the bypass has only two positions; open or closed. Rotate the handle clockwise to open the bypass gate and counterclockwise to close it (reverse order for right side loader model FA264CCL-R).

**The bypass gate MUST be open during the following situations:**

- 1) When starting a fire, in order to create a draft.
- 2) When opening any of the stove's side or front doors.
- 3) When using a firescreen to burn an open fire. Failure to open the bypass gate in this and the above circumstances will lead to heavy smoking in the room, because the smoke will be much more easily pulled out through the open door than up to the chimney through the combustion chamber
- 4) When reloading your fire, for approximately 5 minutes.

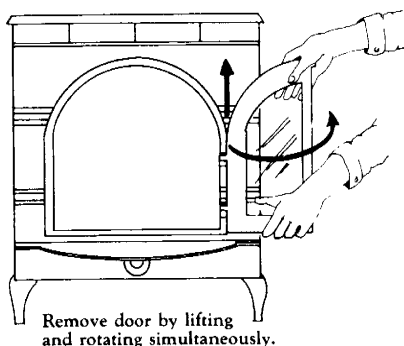
The bypass gate should be closed after starting a fire when the catalytic combustor has been activated and the temperature on the probe thermometer reaches about 500 degrees F.

**Maintaining Door Locks In Adjustment:** Precision control over firing through use of the air supplies requires your stove to be airtight. From time to time your door locks may come out of adjustment. Your door locks have been threaded through the doors. Your doors actually tighten/loosen as they are turned. If the lock is not providing a positive 'tight' seal, rotate the lock shaft 1 turn counter-clockwise to tighten. If still not tight, continue to rotate additional turns as necessary. If the lock is too tight, turn clockwise as many turns as necessary to obtain the right fit. Maintenance of a tight seal on the doors ensures precision control over firing. Very occasionally, it may be necessary to reset the position of the catch on the stem. An allen wrench has been provided for loosening and retightening the catch mechanism. When retightening the set screw with the allen wrench, be sure it lines up against the flat side of the door lock bolt.

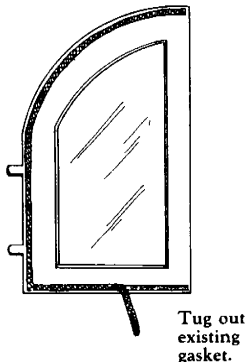
**Maintaining Airtightness:** Each Consolidated Dutchwest stove is airtight. However, over time, cemented seams may deteriorate. Occasionally, some cement may loosen when the stove is in transit. If your stove is running too fast, taking the following measures may remedy the problem:

1. To find low spots in door gasketing, close each door on a slip of paper and attempt to pull the paper free. If the paper is freed without tearing, the gasket isn't snug enough at that spot. Try adjusting the latch (see above). If the door is already as tight as it will comfortably go, either replace the gasketing (see figures 28 thru 30 below) or tug out the existing gasket and pack more cement into the channel behind it. This will push the gasket outward and bring it into contact with the door frame.

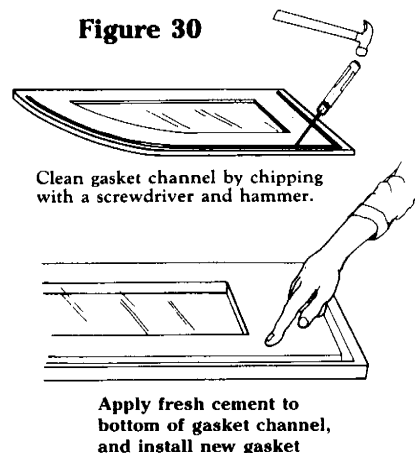
**Figure 28**



**Figure 29**



**Figure 30**



**Gasket Dimensions**

Should you need to replace any gasketing, the following chart shows the amount and diameter that is needed. Use only Consolidated Dutchwest replacement gaskets, available in kit #GK99 (see main catalogue for current pricing).

**Table 11**

Stove Model	Side Door	L. Main Door	R. Main Door	Front Door	Ash Door	Cook Top	Window Opening	Catalytic Bypass
<b>FA207CL</b>	—	—	—	½" x 39"	½" x 28"	¼" x 31"	⅝" x 20"	⅜" x 25"
<b>FA209CL</b>	—	—	—	½" x 39"	½" x 28"	¼" x 31"	⅝" x 20"	⅜" x 25"
<b>FA211CL</b>	—	—	—	½" x 44"	½" x 36"	¼" x 31"	⅝" x 26"	⅜" x 25"
<b>FA224ACL</b>	½" x 39"	½" x 35"	½" x 22"	—	½" x 32"	¼" x 31"	⅝" x 43"	⅜" x 25"
<b>FA224CCL</b>	½" x 39"	½" x 35"	½" x 22"	—	½" x 32"	¼" x 31"	⅝" x 43"	⅜" x 25"
<b>FA264CCL</b>	½" x 39"	½" x 36"	½" x 24"	—	½" x 36"	¼" x 31"	⅝" x 53"	⅜" x 25"
<b>FA267CL</b>	½" x 39"	½" x 36"	½" x 24"	—	—	¼" x 31"	⅝" x 53"	⅜" x 25"
<b>FA288CCL</b>	½" x 46"	½" x 40"	½" x 28"	—	½" x 43"	¼" x 31"	⅜" x 60"	⅜" x 37"
<b>FA455</b>	½" x 42"	—	—	½" x 60"	½" x 40"	¼" x 40"	⅞" x 51"	⅜" x 37"

\* (total)

**The cook top frame on the FA211CL is sealed with a ⅞" x 42" section of gasketing.**

**Glass panels are sealed into their frames with ¾" flat fiberglass rope gasketing. Length is same as specified in "Window Opening" column above.**

**All rope-type gasketing used in Consolidated Dutchwest stoves is made of fiberglass.**

2. To find leaks in external stationary seams, build a medium sized fire with the flue damper and bypass gate open. Then close all air intake dampers. Trace each seam with a candle, cigarette, incense, etc. and note any spots where smoke is drawn in. When the stove has cooled, patch these spots with stove cement. Allow 24 hours for the fresh cement to dry. On convection models, smoke coming from the convection ports indicates an internal seam leak which can be located and repaired as follows: Remove the rear and side half walls inside the firebox (refer to the stove's assembly instructions parts diagram for part identification). Lift the grate frame from the firebox bottom. Block or tape over the convection inlet and outlet ports and turn on the blower (if there is no blower, substitute a hair dryer blowing in through the blower port). This raises the air pressure in the convection chambers. Next, trace the seams inside the firebox with a cigarette, etc., and note any spots where the higher pressure in the convection chambers leaks into the firebox. Clean any loose material off these spots with a wire brush and patch with stove cement. Allow the fresh cement to dry for 24 hours before firing the stove.

**Care and Maintenance of Your Blower:** The blower sold with Federal Airtight convection models has been designed to provide many years of trouble-free service. In order to obtain the maximum life we suggest that you perform the following maintenance procedures at the beginning of each heating season:

1. Unplug the blower and remove from the stove.
2. Carefully vacuum the accumulated dust from the blower.
3. Permanent sintered bronze sleeve bearings with lubricant oil reservoirs are built into motor, therefore there is no need to add oil.
4. Re-attach the blower to the stove and plug in.

## “CURING” YOUR STOVE

Your first few fires should be small to medium in size and wood should be your fuel. Cast iron needs a few milder fires to ‘cure’ (reach its maximum strength), so you should not build an intense fire the first few times out. This could crack a casting. Build up each succeeding fire a little hotter. After 4 or 5 fires your stove will be ‘cured’.

The paint and cement in our stoves also have a curing cycle. There will be a slight odor at the time of curing which is normal. We suggest you burn the stove in a well ventilated area in your home or outdoors with a few sections of pipe on the stove. If you choose to burn the stove outdoors, consult local officials for applicable burning regulations.

The following are recommended probe thermometer temperatures and times involved to reach these temperatures while curing your stove. The dial dampers will have to be adjusted to reach and maintain these temperatures. Remember, the more air that is fed to the fuel, the more heat generated. If the temperature is too low or too high, adjust the dial dampers as necessary.

**First Fire:** Allow 1 hour to achieve 300 degrees. Maintain 300 degrees for 1 hour and allow fire to burn out.

**Second Fire:** Allow 1 hour to achieve 500 degrees. Maintain 500 degrees for 2 hours.

**Third Fire:** Allow 45 minutes to achieve 500 degrees. Close bypass gate so gasses are routed through the combustor. Allow 15 minutes to achieve 800 degrees. Maintain 800 degrees for 3 hours.

**Fourth Fire:** Allow ½ hour to achieve 500 degrees. Close bypass gate. Allow 20 minutes to achieve 1200 degrees. Maintain 1200 degrees for 4 hours.

## LOADING, STARTING , AND MAINTAINING A COAL FIRE

Wood fires and coal fires are loaded, started, and maintained in different ways. The following section is divided into two parts. The first deals with coal fires, the second with wood fires. Read these instructions carefully for a complete understanding of how to run your stove. Failure to follow these operating instructions may result in damage to your stove, void the warranty, or even result in a serious chimney or house fire.

**Coal:** Each Federal Airtight Stove loads coal through the front door(s). A deep coal bed is required. When possible, you should try to maintain a depth of 6" of coal in the coal bed. To maintain a coal fire, shaking the coal is required every 5-12 hours, depending on the size of your stove and the level of firing.

**Note about coal burning:** Successful coal burning requires a 30-40 degree F difference between your house temperature and the outside temperature. A substantial difference in temperature enhances draft. A small difference reduces draft. All Consolidated Dutchwest stoves that burn coal also burn wood. If you have trouble maintaining a coal fire, and the weather is still relatively mild (40 or 50 degrees F), wait for a very cold day to burn coal. We suggest as a rule of thumb, that wood be burned early and late in the season and coal, if you choose to burn it, be burned November to March, depending on your location.

**Sizes of Coal:** There are three sizes of coal commonly used in coal stoves. They are (1) pea coal - very small (3/8" - 3/4"), (2) nut coal - medium sized (¾" - 1½"), and (3) stove coal - larger coal (1½" - 2¾"). We suggest you either use nut or stove coal, and in general have found that stove sized coal delivers the best performance in our stoves once a fire is established. It's often easier to start a fire with nut coal. Anthracite (hard) coal is preferable to bituminous (soft) coal. **Do not burn cannel coal. It gives off gasses which are potentially explosive and is therefore very unsafe.**

**To Start A Coal Fire:** All coal fires are started with wood, preferably hardwood. Customers who try to start coal fires with coal are in for a frustrating time.

**Step 1.** Remove the grate covers from their position on top of the shaker grates. These should be kept in case you want to use them for wood burning in the future. Set all necessary coal grate parts in place. In the case of the FA207CL, FA209CL, and FA211CL you need only set the drop-in coal grate front in place. For all 224, 264, 288, and 455 series stoves, you have two coal grate sides and a coal grate front to set in place. Model FA267CL is not designed to burn coal. In every case, this takes only a few moments. Do not try to set any of these parts in place once the fire is underway! **If your catalytic combustor is in place, remove it. It's located just below the polished cooktop. Simply lift it out (remove only when stove is cold). We have provided a cast iron strainer with some models to set in place of your combustor. This strainer will become very hot during firing and will enhance secondary combustion of any unburnt byproducts of coal combustion. It is important to remove your combustor, as smoke from coal fires contains chemicals which can coat the combustor and make it inoperative. Do not run coal fires in your stove while the combustor is in place. In some installations, because of poor draft, you'll need to omit the strainer.**

**Step 2.** Open the bypass gate (turn clockwise on stoves with the rod exiting the left side. Turn counter-clockwise on stoves with the rod exiting the right side). This is essential. This minimizes draft resistance and ensures your stove will not smoke when the doors are opened. If you attempt to open the doors while the fire is going and the bypass is closed, your stove is almost certain to smoke. This is dangerous. The enhanced draft experienced when the bypass is open makes fire starting very easy.

**Step 3.** With the coal grate parts in place, go about organizing a normal wood fire. Use paper, kindling, and larger pieces of wood to create a combustible mass.

**Step 4.** Before lighting the fire make sure the side door (if you have one) is closed. Close the overfire air supply as well. Be certain the bypass gate is open. If you have a stove pipe damper or an adapter/damper make sure this is open. Close the third air inlet damper. Open the underfire air supply approximately 4 full turns. Light the fire and immediately close the main door(s). With the bypass gate open and the stove sealed except for the underfire air which is approximately 4 turns open, a bellows effect is created which will very quickly bring your fuel to a full burn. Permit it to burn for 5-10 minutes, then add additional larger wood. Within 10-30 minutes of starting you should be able to add coal.

## LOADING, STARTING, AND MAINTAINING A COAL FIRE (continued)

**Step 5.** Once all fuel is well engaged, begin to add coal through the front door(s). At first add a layer of about 1-2 inches. Wait 5-10 minutes or until the coal is fully engaged and repeat the process. After adding coal three times then add as much more coal as the coal basket will hold but being careful not to smother the fire. **Close the bypass gate at this point. This will reduce the draft pressure, but will begin to circulate smoke, flame, and heat up through the extended baffling system.**

**Step 6.** If you have installed a stove pipe damper - at this point you may want to partially or completely close it. The effect of a partially closed pipe damper is to reduce the rate of flue exhaust. With the damper at least partially closed, heat tends to be retained in the stove longer while at the same time secondary combustion tends to be more complete. Note that even when the stove pipe damper is fully closed the pipe remains 30% open, because of the openings provided in the face of the damper and space around it. **DO NOT EVER OPEN THE STOVE DOORS WHEN THE PIPE DAMPER OR BYPASS GATE ARE CLOSED. SMOKE WILL COME OUT OF THE DOORS IF THE FLUEPATH IS RESTRICTED WHEN THE DOORS ARE OPENED.**

**Step 7.** Once the coal fire is well engaged, reduce the underfire air supply from four turns back to about 1-2 turns open. Now open the overfire air  $\frac{1}{4}$ - $\frac{1}{2}$  turn. After reducing the underfire air it will take about 30-45 minutes for the stove to assume its mature operating temperature. The temperature can be increased/decreased by further opening/closing of the underfire air. During a mature coal fire the temperature showing on the probe thermometer will range from 450 to 750 degrees. Temperatures (with coal only) above 900 degrees are an indication of over-firing. Be careful if reducing the underfire air opening below  $\frac{1}{2}$  turn as this may lead to putting the fire out. Opening the overfire air damper too much can have the same effect.

**Step 8.** When burning coal it will periodically be necessary to shake the coal bed down. Because coal has a high ash content (higher than wood) the coal ash must be shaken out or else the fire will suffocate in its own ash. In general, if convenient, the fire should be shaken every 4-6 hours. However, it is possible to go 8, even 12 hours without shaking without detriment to the fire. Maximum time between "shakes" will vary among installations. **Before shaking, be certain the ash door is closed as hot coals may fall out.** The main doors should also be closed because of dust raised during shaking.

**About Rotating:** When shaking, shake gently. Too vigorous shaking may needlessly disrupt the coal bed. If, when shaking, a rotating section jams, wait an hour or so. Normally the jammed pieces will be consumed (burned) during that time and the grate will be freed up. **Do not use excessive force to free a jammed grate. You will break it.** When rotating the grate sections, their range of motion is 90 degrees. However, for ordinary shaking during an ongoing fire the rotating sections should be rotated no more than 45 degrees. Rotate a full 90 degrees only when you wish to dump the coal bed. Otherwise, you will dump (and waste) coal. Rotating grates are rotated by using a grate handle provided with your stove. Simply slip the grate handle onto the ends of the grate protruding from the side of your stove, then turn them back and forth. Do not shake down all the ashes. Stop shaking after a few red embers are shaken into the ashdrawer. This will protect the grates and provide a hot bed for refueling.

**Step 9.** To reload a continuing coal fire, first reopen the underfire air supply to 3 turns open. Wait a few minutes for the temperature of the coal bed to increase. Shake gently. Open the bypass gate and any flue or chimney damper(s). Immediately add 1-2 inches of coal and repeat steps 5 and 6. If the fire has burned too far down, and you think that you may lose it, add coal after heating the bed but BEFORE shaking.

**Removing Coal Ash:** Coal ash will accumulate rather quickly. It will be necessary when burning coal to empty your ashdrawer at least once a day. Coal ash may contain hot coals and should be treated with extreme care. Therefore we suggest emptying the ashdrawer before shaking and reloading. New ash may then cool before the next shake. Coal ash must be placed in a fireproof container or disposed of in another safe manner. Coals can remain hot for a very long time—sometimes as long as a day, so you must be **certain** that they are **completely** cold before you transfer them to an ordinary container. Consolidated Dutchwest offers an ash or coal container (ACI) which is ideal for the purpose. **Coal ash may not be used as fertilizer. It contains minerals that will kill plants.**

## LOADING WOOD, STARTING & MAINTAINING A WOOD FIRE

Be sure to follow the operating instructions carefully. Failure to follow instructions may result in damage to your stove, void the warranty, or even result in a serious chimney or house fire.

**Wood:** Most Federal Airtight Stoves load wood from both front and side. Those stoves that have both front and side door loading are usually easier and more convenient to load from the side. Experience can be your guide. Loading through either door works fine although longer logs can be loaded through a side door if your unit has one. Models FA207CL, FA209CL, and FA211CL are deeper than they are wide and thus load quite easily from the front.

**To Start a Wood Fire:** Most of us have experience starting a wood fire. Starting a fire in a wood stove is not so different from a fireplace or a campfire.

**Step 1.** Make sure your stove is set up for wood burning. Your catalytic combustor should be set into the top of the stove in the round space provided just beneath the removable polished top. **Remove the cast iron strainer sitting in the combustor space.** That's only for coal burning (it will interfere with the catalytic combustor). If your stove is an FA207CL, FA209CL, or FA211CL you also need to remove the drop-in coal grate front. If your stove is from the 224, 264, or 288 or 455 series then you need to be sure all coal burning grate parts have been removed. There are 2 coal grate sides and the grate front. The grate front may be left in place to keep the logs away from the front doors (load from the side). The FA267CL also has a front grate which is useful in keeping wood off the front doors. All stoves, except 267, come with grate covers which were found to marginally improve stove efficiency (by about 2-3%). Please see the assembly instructions that came with your stove for more information about these grate covers.

Use small pieces of wood—preferably soft woods—as kindling, with your main fire to be hardwood—oak, ash, hickory, etc. Do not burn anything but real wood in your stove. Things like plywood, pressed board, waferboard, chipboard, masonite, etc., contain glues which form toxic gasses when burned. Your combustor is not meant to deal with these gasses. Never burn pressure treated lumber under any circumstances, as it contains copper chromium arsenate, a form of arsenic, which is extremely toxic.

## LOADING WOOD, STARTING & MAINTAINING A WOOD FIRE (continued)

**Step 2.** Open the bypass gate, and any flue damper(s). This is very important. It minimizes draft resistance and ensures your stove will not smoke when the doors are opened. If you attempt to open the doors while firing is underway and the dampers are closed, your stove is almost certain to smoke. This is dangerous. The enhanced draft experienced when the dampers are open makes fire starting easier.

**Step 3.** Using paper, kindling, and large pieces of wood, go about organizing a normal wood fire. Be sure to use sufficient quantities of all materials so the fire has the opportunity to 'catch'.

**Step 4.** Before lighting the fire, be sure the side door (if you have one) is closed. Close the overfire air supply as well. Check again to see if the bypass gate is open (see step 2 under starting a coal fire). If you have a fluepipe damper, be sure that it is open as well. Open the underfire air supply 3 turns. Light the fire and immediately close the main door(s). With only the underfire air open a bellows effect will immediately be created which very quickly will bring your fuel to a full burn. Permit it to burn 3-7 minutes, then add additional larger wood. Within 10-15 minutes the fire will be well established.

Sometimes, when a chimney is cold, it will take a little time to warm up sufficiently to draw. Unfortunately, this can lead your stove to "smoke" until it starts drawing. To alleviate this problem, we suggest you roll up a couple of pieces of newspaper, place them on top of the fuel in your stove, and push them toward the stove back. Light these pieces first and close the front door(s). These will heat the chimney sufficiently to start it drawing. Through the glass window(s), you will be able to see when the chimney starts drawing the smoke away. Once it does, open the main door(s) and light the rest of the fuel from the bottom. Do not light the main bed of fuel until the chimney begins drawing, and if the rolled paper goes out without creating a strong draw, repeat the procedure.

**Step 5.** Once the temperature on the probe thermometer (inset in the finished cooktop) has reached at least 600 degrees, close the bypass gate. This will activate the catalytic combustor and force the heat through the stove's baffling system. To ensure the combustor's continued operation, let the temperature approach 800 degrees before changing your air settings.

**Step 6.** Open the overfire air supply to about one turn open (2 turns open for model FA455). Close the underfire air completely. The volume of fire will be immediately reduced, but the stove will continue to warm up. Continue to control the fire using only the overfire air. For a smaller fire, reduce the overfire air setting. For a larger fire increase the damper setting. If this does not produce a sufficiently hot fire, then reopen the underfire damper a small amount until the fire becomes hotter.

**Step 7.** If you have installed a stove pipe damper - at this point you may want to partially or completely close it. The effect of a partially or completely closed pipe damper is to reduce the volume and pace of the flue exhaust. With the damper at least partially closed, heat tends to be retained in the stove longer while at the same time secondary combustion tends to be more complete. Note that even when the stove pipe damper is "fully closed" the pipe remains 30% open because of openings provided in the face of the damper and space around it. **DO NOT EVER OPEN THE STOVE WHEN EITHER THE PIPE DAMPER OR THE BY-PASS IS CLOSED. SMOKE WILL COME OUT OF THE DOORS IF THE DAMPERS ARE CLOSED WHEN THE DOORS ARE OPENED.**

**Note about operating temperatures:** Wood smoke activates the catalytic combustor causing the smoke, creosote, and other by-products of wood burning to ignite. The results are very high temperatures in the combustor. Though operating temperatures of 1400 and 1600 degrees are common, the recommended operating temperature range is 1000 to 1400 degrees to prevent damage to the combustor. Temperatures of 1700 degrees or higher may damage the combustor. High combustor temperatures will frequently be experienced even during slow burning, cooler fires since this kind of burning actually produces more by-products, which are fuel for the combustor. Further note that although the combustor probe set into the cooktop will be registering very high temperatures, the actual temperature of the stove body itself will be much lower. Typically the stove body will be 350-600 degrees.

## RELOADING WITH WOOD

**Step 8.** When you wish to add fuel, follow these steps (1) open the bypass gate (and the stove pipe damper if you have one) and wait 15 seconds; (2) open the door slowly; (3) add fuel. Note that split wood will more completely fill the firebox and hence reduce the frequency of reloading. In the event your wood is not seasoned (dry), it will burn more readily if split.

**Step 9.** After closing the loading door, check to see if the thermometer is continuing to register at least 500 degrees, the minimum temperature required for catalytic activity. Frequently, the temperature will drop below 500 degrees, particularly if the loading door is open a long time. You may wish to increase the overfire air setting to prompt the fire. If the fire is very weak, you may wish to open the underfire air and/or the by-pass gate to increase the draft. However, this should be done only for very brief periods as the stove may over-fire, sending significant amounts of lost heat up the chimney while wasting fuel.

**Removing wood ash:** A natural residue of wood burning is wood ash. Such ash may be left to accumulate in the stove without risk to the stove. Ash should be removed, however, if its accumulation is causing a mess. Accumulations of wood ash seem to enhance catalytic activity. This is because wood ash is mainly charcoal and charcoal provides a large percentage of the gasses that the combustor burns most readily. Typically, during wood burning, the ash drawer needs to be emptied once every 1-3 days. **WOOD ASH SHOULD ALWAYS BE DISPOSED OF IN A SAFE MANNER** Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until cinders have thoroughly cooled. Consolidated Dutchwest offers an ash & coal container (AC1) which is ideal for the disposal of wood ash. **Wood ash may be used as fertilizer.**

## BURN TIMES & LONG BURNS

When firing your stove, the volume of heat and the length of your burn time will vary according to the (1) size of your stove, (2) damper settings, (3) volume of fuel loaded, (4) the quality of your fuel, and (5) draft and infiltration rates. In general, the

## BURN TIMES & LONG BURNS (continued)

average operating temperatures of a stove will be about 350-600 degrees (temperatures on the front and side of your stove). The probe thermometer on the stove top, however, during catalytic combustion, will register about twice the temperature of the stove body. During coal burning the temperatures recorded on the top will approximate the temperature of the entire stove body.

**Here is a guide to your stove's output:**

**Table 12**

Stove	Capacity Wood	Burn Times (hours)	
	Log length	Low	High
FA207CL	13"	5:50	1:15
FA209CL	18"	5:00	1:40
FA211CL	18"	8:25	2:00
FA224ACL	19"	7:45	1:50
FA224CCL	19"	8:25	1:55
FA267CL	22"	11:45	2:25
FA264CCL	22"	9:45	2:30
FA288CCL	25"	13:30	2:45
FA455	23"	9:50	1:24

**Note:** All burn times are approximate. Installations circumstances and heating requirements will cause burn times to vary widely.

## MAXIMIZING YOUR STOVE'S OUTPUT

We have undertaken extensive testing of our stoves to establish combustion efficiency, heat transfer efficiency, overall efficiency, estimated fuel consumption, and BTU ratings with a variety of air inlet and stove pipe damper settings. Here are some conclusions we have reached:

- (1) With a catalytic combustor and a stove pipe damper in place, our stoves can be expected to provide 70-85% overall efficiency (see table 13-Oregon Test Results) — (overall efficiency is computed by multiplying combustion efficiency — 90%-95% — by transfer efficiency — approximately 80%-85%). By this we mean 70%-85% of the heating value of the wood consumed becomes usable heat transferred to the room. This compares with a 40-50% overall efficiency for typical airtight, non catalytic woodburning, and with 0-15% overall efficiency in a fireplace.
- (2) A stove pipe damper increases control over firing, extended long burning, and increases overall efficiency in strong drafting chimneys.
- (3) The presence of a catalytic combustor tends to equalize overall efficiency so that the variation in efficiency between high and low fires is minimized. With non-catalytic airtight woodburning, high fires tend to have high combustion efficiency but poor heat transfer while low fires tend to have very poor combustion efficiency but better heat transfer. It's poor combustion efficiency during low firing in a non-catalytic stove that causes the build-up of creosote in the chimney. This problem is almost entirely eliminated when a combustor is introduced.

## EFFICIENCY TESTING RESULTS WITH WOOD

Consolidated Dutchwest has undertaken substantial efficiency tests to provide its customers with the most efficient, clean burning stoves on the market today. Testing was done by Shelton Research, Inc. of Santa Fe, New Mexico in accordance with Oregon Department of Environmental Quality standards to establish combustion efficiency, heat transfer efficiency, overall efficiency, estimated fuel consumption, and BTU ratings with a variety of air inlet and stove pipe damper settings.

A stove's efficiency is measured by how much of the heat energy stored in the wood is transferred into the room. It is computed by multiplying combustion efficiency (the amount of energy produced from the wood) by transfer efficiency (the amount of heat produced from the wood that the stove transfers to the living area).

The following numbers are based on Oregon testing which requires grids of specified fuel be used and testing undertaken at four burn rates. Separate testing (not using Oregon standards) with a full load of typical hardwood at many burn rates indicates substantially higher outputs can be achieved in actual usage. However, most people's heating needs range from about 10,000 to 20,000 BTUs/hour, numbers within the Oregon testing range. Highest efficiencies, frequently over 80% with most models, are almost always achieved with slower-burning fires. Conversely, roaring fires will usually have efficiency levels below the average overall efficiencies shown here.

**Table 13**

STOVE	AVERAGE OVERALL EFFICIENCY
FA207CL	76.00%
FA209CL	74.00%
FA211CL	76.40%
FA224ACL	79.80%
FA224CCL	78.90%
FA264CCL	78.80%
FA267CL	78.70%
FA288CCL	75.50%
FA455	82.20%

## CATALYTIC COMBUSTION

When burning wood, use of the catalytic combustor is essential for high efficiency and clean burning as is required by the new EPA (Federal) regulations. When wood is burned, only a fraction of its energy is turned into heat. The rest goes up the chimney in the form of smoke. It takes a very high temperature of 1100 degrees F to burn the smoke and turn it into productive heat. In non-catalytic airtight stoves, some of this smoke burns during high burns and where additional combustion air is provided. This process is ineffective during medium and low burns, however, because firebox temperatures are not high enough to reach the necessary combustion temperature. These stoves also produce large amounts of creosote during long burns.

The catalytic combustor is coated with precious metals that cause the smoke to burn at only 500-600 degrees fahrenheit, meaning a more complete combustion process that gives you more heat and a cleaner burn. Even during long burns, when the firebox temperature decreases, the combustor feeds on the smoke to maintain the 500-600 degree combustion temperature. The result is longer burns, more heat per pound of wood, and less creosote if properly used.

**Combustor usage:** In order to activate the combustor, the bypass gate must be closed to force the smoke up through the combustion chamber. Because this reduces the draft, you should be careful not to close the bypass gate too soon. When starting a fire, even if the temperature probe reaches 600 degrees F within a few minutes, you should let a strong fire run about 15-20 minutes before closing the bypass gate and activating the combustor. If you close the bypass gate too early, you may put out the fire or deactivate the combustor. Thus, a cold stove should be warmed up well before closing the bypass gate.

**Remember:** The combustor air supply feeds air to the area just below the combustor (between the combustor and the baffle). The combustor's efficiency will be enhanced by fully opening the combustor air dial damper high on the side of the stove during MEDIUM and HIGH burns. It is necessary that the combustor receive additional air during these burn rates, as there is not enough left over from initial combustion (of the wood in the firebox) to aid the combustor in burning off gasses. The dial damper should be closed during low burns (8 hours or more), and during the later part of a burn cycle, because additional air is not needed to create secondary combustion of gasses in the combustor.

**Combustor maintenance:** The ceramic combustor will enhance your stove's performance, but there are certain characteristics which you should be aware of, and certain precautions you will want to take as follows:

(1) Burning fuels other than natural wood will shorten the combustor's life substantially. If you burn coal or wood that has been treated in any way, the combustor should be removed from the stove. Otherwise, ash, and other chemicals will plug up the combustor and cause its precious metal coating to deteriorate. Colored or coated papers, or papers printed with colored inks, will have the same effect, if burned in large quantities. If you forget to remove the combustor when burning coal, and ash has built up, you can try burning a few high wood fires with the combustor in position to get the ash coating off.

(2) The stove should be operated at probe temperatures between 800-1200 degrees. Temperatures over 1700 degrees may damage the combustor.

(3) If you notice creosote building up in your chimney or pipe, you may be operating your stove in a way that produces creosote (see section on creosote below), or your combustor may be plugged up. Certain woods leave an ash film on the combustor, plugging it up. Periodic inspection of the combustor (at least three times during the heating season) will solve this problem. Remove ash by blowing air through the combustor. Do not push a brush or other object through the cells to clean it as this will scratch off the metallic plating which forms the catalyst.

**Catalyst should be removed for inspection as shown in figures 31 through 33.**

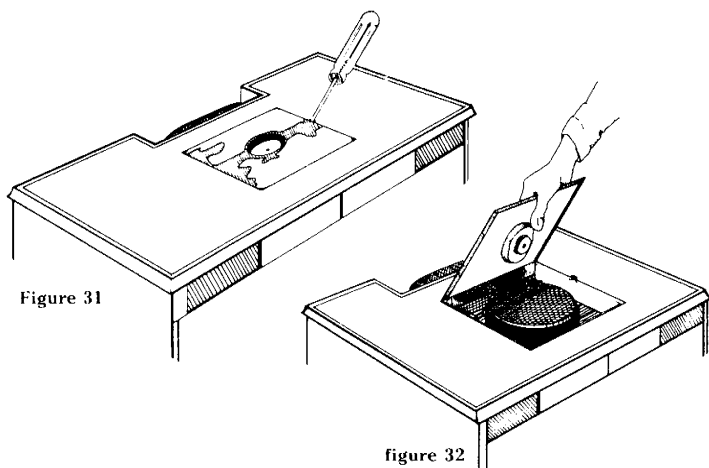
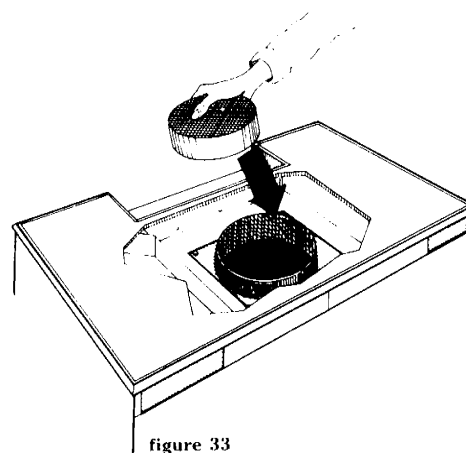


figure 32



(4) The combustor may glow during the first 1/4 to 1/3 of the burn cycle, but it does not have to be glowing for it to be working. The ceramic substrate begins to glow at temperatures starting at 1200°F. The glowing is not caused by the combustor firing, it is simply a result of it reaching temperatures of over 1200°, just as metal glows when it reaches certain temperatures. During most fires (that is, slow to medium burn rates), the combustor is operating at temperatures between 800° and 1100° and does not glow. Therefore, to determine whether your catalytic combustor is operating, check the reading on your probe thermometer (inset in the cooking top) which measures catalytic temperatures. If it reads 500° or higher, your catalytic combustor is hot enough to operate. If temperatures are lower than this, you should increase the intensity of the fire or reload the stove to keep the combustor functioning.

(5) Catalytic combustors can be defective in two ways. The most obvious is deterioration of the ceramic substrate. This is evidenced by crumbling of the catalytic combustor. Cracks or minor chipping of the combustor will not affect its performance,



## CATALYTIC COMBUSTION (continued)

but if sizable portions of it break off, you will need to replace it. The other way a catalytic combustor can be defective is that it does not assist in the burning of gasses. This is a rare occurrence since all are manufactured the same way, so we suggest you call our Technical Service Department first if you believe your combustor is experiencing this problem. Sometimes other factors, such as failure to first heat the stove up sufficiently to achieve 'light-off', will be the problem. Call or write our Technical Department if you have any questions regarding combustor operation and we will provide the guidance necessary to solve the problem. You may feel the combustor is defective, but in actuality the stove is not being operated properly. If we are unable to resolve your problem, we will see that your combustor is shipped to Corning Glass Works for testing and replacement if defective. See page 21 for more information on potential combustor problems.

**(6) Combustor Failures:** As your combustor nears the end of its expected lifespan of 12,000 operating hours (3 to 6 years for the average user), probe thermometer temperatures during normal firing will gradually decrease. If the combustor is clean and its temperatures no longer rise to 700° after 'lighting off', the combustor is no longer effective and should be replaced.

---

### Warranty Information for Corning 'Long-Life' Catalytic Combustor

Each Consolidated Dutchwest catalytic stove sold in the United States now comes with the new Corning 'Long-Life' catalytic combustor. The 'Long-Life' combustor has twice the expected lifetime of Corning's earlier models, approximately 12,000 hours of use before replacement is needed.

The lifespan of your combustor will be affected by its use. Large fires will consume the catalyst at an increased rate, shortening the effectiveness of the combustor. Original combustor or replacement will be replaced at no cost to stove purchaser for two years from original purchase date if it proves to be defective or fails to maintain 70% of its particulate reduction activity as measured by an approved testing procedure. To report a defective catalytic combustor, please call Team Fireside at **1-800-22-STOVE (1-800-227-8683)**. You may also report a defective catalytic combustor by writing **Consolidated Dutchwest, a Division of V. C. I., Prince Street, Randolph, Vermont 05060**. If you wish to receive a replacement at the time you write, please send us the defective combustor, (catalytic combustors are extremely fragile, and should be packaged and marked for shipment accordingly) plus information as to when, from whom, and which model stove you purchased, plus information as to in what manner it is defective. If you purchased directly from Consolidated Dutchwest and have available a copy of the original paperwork showing your order number, we would appreciate your including that as well. It is necessary to send us the defective combustor as the manufacturer (Corning) requires this under their warranty. We will take care of sending it to Corning and providing them with the information necessary to secure your replacement, if the combustor is found to be defective. Note: To determine if the combustor is defective, read combustor maintenance, page 19 & 20, combustor related problems, page 21 or call Team Fireside.

---

## CREOSOTE

When wood is burned slowly, it produces tar and other organic vapors which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney of a slow burning fire. As a result, creosote accumulates on the flue lining. When ignited, this creosote can cause an extremely hot and dangerous fire.

With the catalytic combustor and combustor air to burn off wood smoke and by-products, creosote build-up can be reduced by as much as 90%. Many customers have gone through a number of seasons with very little creosote build-up.

Nonetheless, creosote may build-up, depending on your installation and firing habits. Installations with poor drafts are more likely to create creosote because wood smoke moves very slowly up the chimney and is more likely to cool and condense there.

Stoves set for long burn times (especially those with a poor draft) may also contribute to creosote build-up if the temperature falls below 500 degrees Fahrenheit. In that case you should re-build the fire and temporarily open the by-pass gate to create a stronger draft.

Even when using a catalytic combustor, your chimney and chimney connector must be inspected regularly, at least once every two months in the heating season (more often if experience dictates) to determine if creosote build-up has occurred. If creosote has accumulated, it should be removed to reduce the risk of a chimney fire. Our catalogue includes a selection of chimney brushes which will make cleaning easy.

# Combustor Related Problems

## PROBLEM

## POSSIBLE CAUSE

## SOLUTION

### PLUGGING (photo 2)

1. Burning materials that produce a lot of char and fly ash.
2. Burning wet, pitchy woods or burning large loads of small diameter wood with the combustor in the operating position without light-off taking place.
3. Combustor not functioning. If proper burning procedures have been followed to no avail, the combustor is not functioning.

1. Do not burn materials such as garbage, gift wrap, or cardboard.
- 2a. Burn dry, seasoned wood
- 2b. Don't place the combustor in operating position until temperatures are high enough to initiate light-off.
3. Replace combustor.

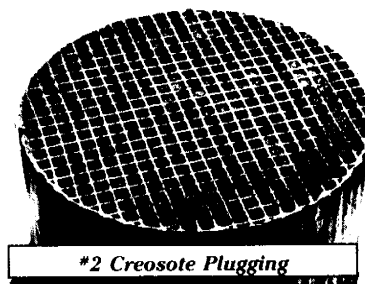


#1 Healthy Combustor

### CATALYST PEELING (photo 3)

1. Extreme temperatures (above 1800° F or 1000° C.) at combustor surface can cause the catalyst to peel. Overfiring and flame impingement are primary causes.

- 1a. If peeling is severe, remove and replace combustor.
- 1b. Avoid extreme temperatures and flame impingement.



#2 Creosote Plugging

### CATALYST DEACTIVATION

1. Burning large quantities of trash, pressure treated lumber, or painted woods.

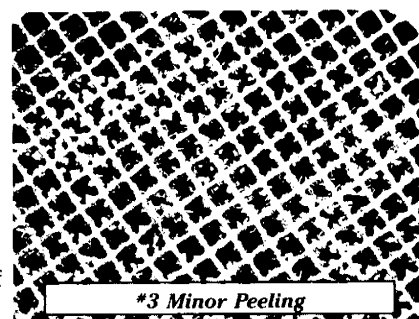
- 1a. Burn quality woods available in your area.
- 1b. If you decide the catalyst has been deactivated, replace combustor.

### CATALYST ASKING

The catalyst is coated with a layer of fly ash or soot which prevents catalytic activity.

1. Accumulation of fly ash.
2. Burning coal causes a sulfur-based compound to coat the catalyst.

1. Brush cooled combustor with a soft-bristled brush or vacuum lightly. At least once per burning season, carefully remove combustor and brush off trailing or downstream face.
2. Revert to burning wood and fire the combustor at elevated temperatures for a period of one hour. (Five-20 minute high-fire start-ups would do it).

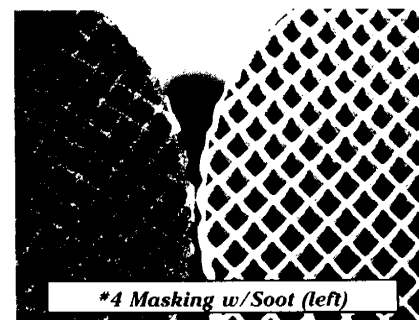


#3 Minor Peeling

### SUBSTRATE CRACKING— THERMAL (photo 5)

1. Some minor cracks can result from normal operation, as long as the combustor remains intact.

1. If cracking causes large pieces to fall out, replace combustor.



#4 Masking w/Soot (left)

### SUBSTRATE CRACKING— MECHANICAL (photo 6)

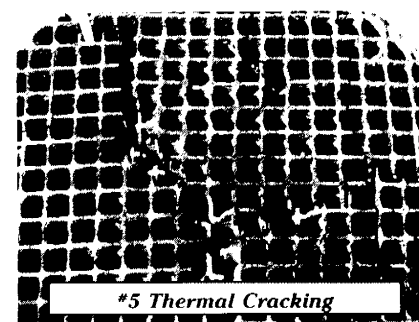
1. Mishandling or abuse.
2. Distortion of holding collar.

1. Handle with care.
2. Combustor should be held firmly in its can. It should slide easily into and out of the holding collar of the stove. If severe cracking has resulted in loss of large chunks of combustor, replace combustor. Also replace any warped stove parts.

### SUBSTRATE DUMBLING

1. Extreme thermal shock. (Combustor being worked too hard).
2. High draft.

1. Bypass combustor when stove is run in high-fire mode.
2. Do not exceed .06" of water draft. Install a manual damper and draft gauge, or a barometric damper.



#5 Thermal Cracking

### COLOR VARIATIONS

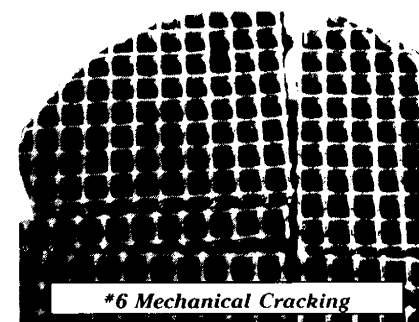
1. Variation in color from combustor to combustor or within a combustion can occur. (New combustors)

1. These color variations are normal and do not affect combustor performance.

### CATALYST ABRASION

1. High draft can cause fly ash to grit-blast the surface of the combustor.

- 1a. If more than 1/2" of catalyst (as measured along length of cell) is abraded, replace combustor.
- 1b. Measure chimney draft and control to .06" of water or less.



#6 Mechanical Cracking

# Trouble-shooting Guide

Each installation is different. From time to time problems may occur. This section is intended to help you self-diagnose any problem you encounter. If you are unable to resolve a problem that arises, you may write or call the Technical Service Department.

**The following are problems which may arise, and helpful explanations and/or solutions for them.**

**1. White spots on stove.** The furnace cement we use is manufactured by Rutland. Over time and in moist conditions the furnace cement will bloom (turn white). Any area that turns white should be thoroughly brushed and repainted. Wire brushing will remove the cement so that the spots will not reappear. If you paint over them without first brushing, they will probably reappear later on.

**2. Dirty Glass.** When burning coal your ceramic glass windows will remain clear. However, when burning wood, particularly during slow firing, creosote may coat the window with a blackish film. This film can be scraped off with a putty knife, cleaned with a chemical solvent (recommended for ceramic glass), or burned off during a high firing.

**3. Paint develops a bleached look on sides.** Stove paint will lose its pigment at about 1000 degrees F. If the pigment is burning out you are probably over-firing. Repaint and rein in on your heating ambitions.

**4. Shaker grate jams.** The rocker grates will occasionally jam when coal gets caught between the rocker grate and the fixed center grate section. If one section locks up during shaking, do not try to force it. To do so may break the grate. Rather, wait 45 minutes to an hour and the piece causing the jam will be consumed by the fire, and the grate will be freed up. When shaking, the grate can rotate 90 degrees. However, for ordinary shaking during an ongoing coal fire the rotating grates should only be rotated 45 degrees. A full 90 degree shake will cause the grate to dump the coal into the ash pan and may cause the grate to jam.

**5. Low draft.** Many problems result from bad draft, including shorter burn times, low heat output, inability to maintain a fire, condensation, and smoking. Here are some of the causes and solution:

**a.** Your chimney or stove pipe is blocked up either with creosote or some other kind of blockage. You should inspect your pipe or chimney periodically to avoid this problem.

**b.** A connection between two sections of stove pipe may have come loose. The connections should be sealed with anchor screws to avoid this problem. You can isolate leaking joints with the cigarette test described in paragraph 'g' below.

**c.** Your pipe installation has too many turns or runs horizontally for too great a distance. Any turn creates resistance to the smoke's path. You should avoid more than two 90 degree turns in any one installation, and any level sections of pipe should be no longer than two feet. It is better to make 90 degree turns in two steps, with two 45 degree elbows to minimize the draft resistance. If you want to increase your draft, and you are stuck with more turns in your pipe than desirable, you can consider extending the height of your chimney.

**d.** Short stack. Even in installations with a correct pipe configuration, you might still have draft problems if your stack is too short. The minimum height should be at least 18 feet. Also, your chimney should be at least 3 feet above the roof line and 2 feet higher than anything else within a 10 foot radius horizontally.

**e.** Oversized Chimney. If the area inside a chimney is too large the smoke will disperse and rise slowly, limiting the draft. As a rule, chimney volumes should not exceed twice or 2½ times that of the stoves flue outlet. For a 6" (flue size) stove, the chimney area should be approximately 30 to 65 square inches. For an 8" stove, the chimney area should be approximately 50 to 96 square inches. If the chimney is too large, you can reduce the chimney's interior size by adding chimney liner or help the draft by extending the pipe from your stove well up into the chimney.

**f.** More than one heating device is vented into the stack. **ONLY ONE HEATING DEVICE SHOULD BE USED PER FLUE.** The draft may be bypassing your stove and drawing through the other device.

**g.** Your installation and positive connection may be poorly sealed. Particularly if venting into a fireplace, an improperly sealed connection from stove to stack may be permitting the draft to skip the stove and draw through the other openings. Therefore, make sure all connections are sealed tightly. If you're convinced your installation is properly sealed, then look for leaks in the stack itself. In a masonry chimney, look for a poorly fitting ash door in the basement or on an outside wall. Placing a lighted cigarette near connections in your chimney or block-off plate when your stove is in operation can help reveal a leaky connection (the smoke will be drawn in).

**h.** Undersized chimney. The chimney must have an interior square at least equal to the stoves flue pipe. See section 'e' above. It is a violation of safety regulations to reduce a stove's flue size unless specifically approved by the manufacturer.

**i.** Tightly sealed house. A stove depends on a house's natural leakage to replace the air it burns and sends up the chimney. If your house is especially well sealed it may prevent this leakage. Test for this condition by cracking open the door or window closest to the stove and noting if this makes a difference in the stove's operation. If it does, you should install an outside air intake to bring the combustion air for the stove from outside the house.

**6. Can't get the long burn time.** Besides a poor draft, airtightness is also a factor in getting a long burn. **See page 13 "Maintaining Airtightness".** The wood you burn will also influence your burn time. Softwoods tend to burn relatively quickly. For the best burn times, you should stick to seasoned hardwoods. You may also be trying to get more heat from a 'long burn' than the stove is capable of delivering. One load of wood has a fixed and limited amount of energy stored in it. There will be a big difference in heat output if that energy is consumed over one hour or ten hours. A slow overnight burn should not be expected to maintain a high indoor temperature.

**7. Can't maintain a coal fire.** In some cases, your stove will burn wood very well but still have trouble maintaining a coal fire. In most cases, this indicates that you still have one of the draft problems mentioned in #5. But there are two other possibilities:

- a. You need at least a 30-40 degree difference between the indoor and outdoor temperature in order to maintain a sufficient draft for coal burning. On warm days, it will be very difficult to maintain a coal fire. It's best to burn wood early and late in the season and coal from November to March.
- b. There are various grades and qualities of coal. If you don't know your supplier well, try a bag of high-grade coal from another supplier. You may have coal with a high percentage of impurities.

**8. Not getting enough heat.** This situation may be indicative of several things. (1) The area you are trying to heat may be poorly insulated or drafty and may not be retaining heat properly; (2) you may have a draft problem as discussed in #5 which is limiting your maximum firing level; (3) the stove may be undersized for the job at hand.

**9. Smoke coming from the surface of a new stove.** During the first few burns, the stove paint and furnace cement 'cure' and let off smoke. You'll be able to differentiate this smoke from leakage because paint and wood smoke have distinctly different odors. Some people run their first few fires outdoors to avoid these odors.

**10. Stove or stove area is smoking.** You should first determine exactly where the smoke is coming from. If smoke is consistently coming out of one part of the stove, one of the seams or the doors (see #12) may be leaking. You can apply fresh stove cement to the seams to patch the leak. However, the fact that smoke is leaking out (instead of leaking in), is also a sign of a draft problem which needs to be corrected (see #5). If the smoke is coming from the pipe area, your pipe connections or block-off plate are probably not sealed or have come apart. These should be resealed or reconnected. When opening the front or side doors, the bypass gate must be opened first. Otherwise the stove will smoke. If the bypass gate is open and the stove is still smoking, then you should check the problems mentioned in #5 regarding bad draft.

**11. Downdraft.** If you frequently experience downdraft, you probably have a draft or installation problem (see #5). One possible solution is to increase the chimney height. If nearby trees or other obstructions are interfering with your draft, you may need to remove them, or get a regulating device such as the 'Vacu-Stack' downdraft preventer offered in our main catalogue. Smoking related to wind direction or wind speed can usually be solved by a downdraft preventor, while other types of smoking are a sign of an obstruction or other problem described in #5.

**12. Doors don't seal properly.** Each door is fitted with a threaded door lock. When turned clockwise, the mechanism tightens. Using the removable door handles, rotate the locks 360 degrees to tighten or loosen the latches as necessary. This will keep the door well-sealed. It may be necessary to reset the catch on the threaded stem. An allen wrench is provided for this purpose. In certain situations, the gasketing may also lose its original shape and prevent the door from closing tightly, in which case you should replace the gasketing. Use only Consolidated Dutchwest replacement gaskets, available in kit #GK99 (see main catalogue for current pricing).

**13. Can't get enough wood into the firebox.** In loading our stoves we suggest you use split wood. It permits the loading of substantially more wood. The AX-1, a heavy-duty maul, is available through Consolidated Dutchwest.

**14. Ash overflow in ashbin.** If you forget to empty the ashdrawer periodically the ashbin itself will fill with ash. It can be difficult to clean the ash accumulation in the back of the ashbin. We have specifically designed the TS930 and TS940 wrought-iron firesets for this purpose. Included in the set is a hoe which will do the job.

**15. Brass dial damper changes color.** The brass dials are covered with an anti-tarnish coating, which typically darkens in response to heat. You can use acetone (or nail polish remover, which is mostly acetone) to remove the coating. If neither of these works, try a very fine steel wool, as the coating may come off with this.

**16. The cooktop changes color.** The cooktop is a solid cast-iron plate that undergoes finishing. It's normal for it to darken in response to heat. Metal polish will keep it clean, but it won't prevent the darkening.

**Water formation in the stack.** Water vapor is a by-product of wood combustion which condenses at roughly 212 degrees. When the smoke moves slowly up the chimney or during a slow burn when the vapor's temperature out of the stove was already fairly low, the water vapor will lose heat and condense. Dry wood is clearly better in this type of situation than green wood, but even dry wood still gives off some moisture as it burns. If water condensation is still a problem during slow burns with dry wood, you can try to speed up the draft by opening your flue damper more or by introducing more combustion air. This will also serve to keep the chimney warmer. Also, the stove pipe and chimney should be as straight as possible, because turns in the smoke path accelerate the cooling process. Heating up the stack when you start a fire, by running a hot fire for awhile, will help prevent this condition. You can also increase the speed of the draft and dilute the water vapor by opening up the third air source (the one that directs air to the combustor).