



**FORGE**<sup>™</sup>  
OUTDOOR COAL FURNACE

## OWNER'S MANUAL



FORGE 1500  
TITANIUM SERIES

FORGE 3500  
TITANIUM SERIES

**WARNING:** If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS**
  - Do not try to light any appliance.
  - Do not touch any electrical switch.
  - Immediately call your gas supplier. Follow the supplier's instructions.
  - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

Tested &  
Listed By  Portland  
Oregon USA  
OMNI-Test Laboratories, Inc.  
0117CB037S



**SAVE THESE  
INSTRUCTIONS**

p/n 9000812 - REV. A



# CENTRAL BOILER® **FORGE**™ OUTDOOR COAL FURNACE

Central Boiler, Inc. • 20502 160th Street • Greenbush, MN 56726  
www.CentralBoiler.com

The Forge outdoor hydronic heater by Central Boiler is listed by OMNI-Test Laboratories to the applicable portions of the following standards: UL 2523-2013 Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters, and Boilers, CAN/CSA-B366.1-11 (R2015) Solid Fuel-Fired Central Heating Appliance. Certified to add to an existing heating system.

The Forge includes two 4-foot stainless steel insulated chimney sections (6" in diameter, p/n 6500004). Use only stainless steel solid fuel chimneys specified by Central Boiler.

Adjust for flue draft between -0.05 and -0.08 in. WC (-12.45 Pa and -19.91 Pa). Maximum draft is marked on nameplate.

Forge 1500 - Water Capacity: 150 gal. - Weight: 1,750 lbs

Forge 3500 - Water Capacity: 210 gal. - Weight: 2,110 lbs

French Owner's Manual and decal set available upon request from your dealer  
(Manuel d'installation en français et décalcomanies disponible sur demande auprès de votre revendeur)

- Any person(s) operating a hydronic heater must comply with all applicable laws, including but not limited to local ordinances.
- Improper use or failure to maintain the hydronic heater may cause nuisance conditions. The person(s) operating a hydronic heater is/are responsible for operation in a manner that does not create a nuisance condition. Meeting the setback distance and stack height recommendations from the manufacturer and requirements in applicable State and local regulations may not always be adequate to prevent nuisance conditions in some areas due to terrain or other factors.
- Operating an outdoor furnace may not be suitable to some individuals' abilities or lifestyles. Be sure to review the Owner's Manual for the appliance with your dealer.

For parts and accessories, service or repairs, call your authorized Central Boiler dealer or heating contractor. Record the information below for future reference.

Model	Serial Number	Installation Date
Dealership Name		Phone Number
Owner Name		

# Contents

## How to Use This Guide

The guide is divided into sections to help with the operation and maintenance of the outdoor furnace. If questions arise that are not answered with this manual, consult with your authorized Central Boiler dealer.

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## CENTRAL BOILER ONLINE RESOURCES

Enter **CentralBoiler.com** in your browser or scan the code using any QR code reader app on your smartphone to access Central Boiler's library of information to help with installation, operation and maintenance of your Central Boiler outdoor furnace.

Detailed Furnace Installation Variations - <http://www.CentralBoiler.com> - go to Explore > Furnace Installation

View and/or download PDFs to assist in installation of your outdoor furnace. Information and examples regarding pumps, foundations, chimneys and support structures, ThermoPEX piping, and example configurations for a variety of heating configurations.

Product Service Videos - <http://www.CentralBoiler.com> - go to Explore > Videos



### Push-fit Fittings

Central Boiler's push-fit fittings make configuring and connecting your heating system easy and quick.



### Performing a Water Test

Testing and maintaining the water in your system is critical for the operation and longevity of your heating system.



Videos to supplement the Owner's Manual are available at

[www.youtube.com/centralboilerinc](http://www.youtube.com/centralboilerinc)

Watch tips on initial startup, testing system water and more.

### INSTALLATIONS IN MASSACHUSETTS:

1. All installation components must be products approved in the Commonwealth of Massachusetts by the Gas and Plumbing Board.
2. The maximum run of tubing from the water heater to a fan coil is 50 linear feet.
3. Persons operating this hydronic heater are responsible for operation of the hydronic heater so as not to cause a condition of air pollution as defined in 310 CMR 7.01(1).

## Terms and Symbols

The outdoor furnace and this installation guide use the following terms and symbols to bring attention to the presence of hazards of various risk levels and important information concerning the use and maintenance of the outdoor furnace.

### **⚠ DANGER**

This symbol and text indicate an imminently hazardous situation which, if ignored, will result in death or serious injury.

### **⚠ WARNING**

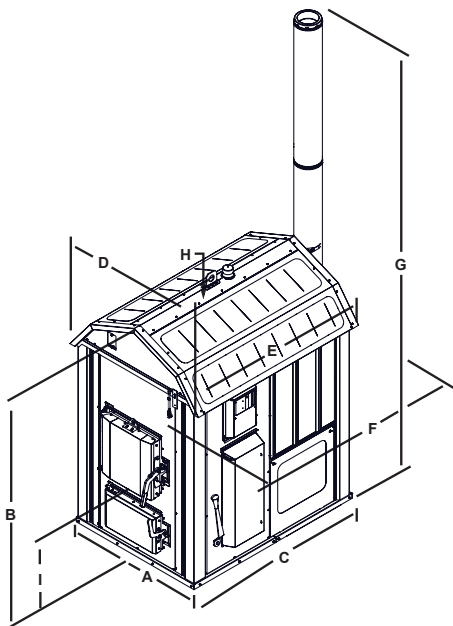
This symbol and text indicate the presence of a hazard which can cause severe personal injury or death to an operator or bystander, or substantial property damage if ignored.

### **⚠ CAUTION**

This symbol and text indicate the presence of a hazard which can cause minor personal injury or property damage if ignored.

**NOTE:** Indicates supplementary information worthy of particular attention relating to installation, operation, or maintenance of the outdoor furnace but is not related to a hazardous condition.

Be sure to follow all instructions and related precautions as they are meant for your safety and protection. Store this manual in a readily accessible location for future reference.



### Forge 1500 Measurements

	A	B	C	D	E	F	G	H	I
in.	43	72	53	49	53	69	144	3	26
cm	109	183	135	124	135	175	366	8	66

### Forge 3500 Measurements

	A	B	C	D	E	F	G	H	I
in.	47	79	63	51	64	79	151	3	26
cm	119	201	160	130	163	201	384	8	66

- Measurement (F) is from firebox door to chimney inspection cover.
- Measurement (G) includes two 4 ft (1.2 m) chimney sections.
- All measurements are approximate

## Glossary and Industry Terminology

Several terms and words used throughout this owner's manual are unique to the coal-burning industry:

### **Clinker**

A mass of fused ash. A clinker is typically very hard and may have the appearance of lava rock or melted glass (see About Clinkers section for more).

**NOTE: Coke can sometimes look like a clinker and vice versa. The coke will typically be less dense and will burn over time (a clinker will not).**

### **Coke**

Coal that has had all its volatiles burned off with only carbon remaining.

### **Fines**

Coal that is typically smaller than barley size (see the anthracite size chart in the General Information section).

### **Flashback**

A sudden ignition of combustible gases. Flashback typically happens when combustible gases, already at the temperature of ignition but starved of oxygen, are suddenly introduced to an oxygen-rich environment. For this owner's manual, it refers to an instance with the firebox door or ash door being opened when combustible gases are present, or when breaking up a burning coal bed.

### **Under Air**

The main combustion air supply. Under air is the air that is introduced under the burn grates and forced through the fuel load.

### **Puff Back**

Puff back is similar to flashback, but sometimes happens when the outdoor furnace starts up after being idle. The gases ignite and a large plume of smoke is emitted out of the chimney. Puff back typically happens when the outdoor furnace is loaded with fresh coal when there is little or no call for heat, allowing volatile gases to build up.

### **Run of Mine**

Coal that has been extracted from the earth but has not been sorted and sized in any way.

### **Over Air**

Over air is additional air that is introduced into the firebox above the burning coals. Its purpose is to provide supplementary air to allow the volatiles and smoke to be burned off. This feature is especially useful when burning coal such as bituminous that smokes a lot or has a higher concentrations of volatiles.

### **Volatiles**

Combustible gases released when coal is heated.

## Foundation

The outdoor furnace may be installed directly on stable, level ground without the necessity of a foundation, although installing the outdoor furnace on a foundation offers many advantages. The outdoor furnace is less likely to move due to frost heaving. A foundation keeps the area directly around the outdoor furnace free of standing water and can help to keep unwanted pests out. It can also raise the furnace up to provide a more comfortable height of the firebox door opening.

If the ground is unstable, one option is to use patio blocks under the perimeter of the base. Another option is to pour a concrete foundation.

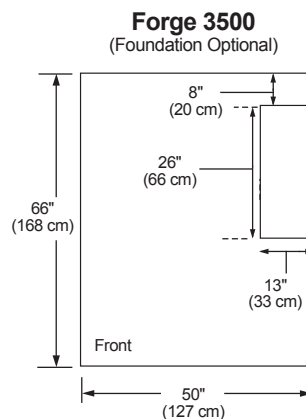
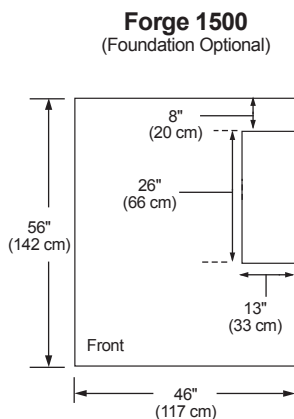
To install the outdoor furnace on a concrete foundation, refer to the illustration for dimensions and for the location of the hollowed-out area for each model. A 4" to 6" (10 to 15 cm) thick concrete slab works well; however, a thicker slab may be used to obtain the desired door opening height.

If the area for the concrete slab is unstable and/or affected by frost heaving, consider installing 2" closed-cell insulation beneath the front portion of the slab and under the area of the ground used for walking.

### ⚠ CAUTION

**Do not use any combustible materials for the foundation.**

**NOTE: The installation surface or foundation must be noncombustible. The hot supply and return lines must also be protected from possible exposure to sunlight, fire or physical damage that may be caused by an occurrence outside the outdoor furnace enclosure. Foundations may consist of concrete, crushed rock or patio blocks.**



#### Installation Clearances to Combustibles

- 44 in. (1.12 m) from the back
- 48 in. (1.22 m) from the front
- 12 in. (0.3 m) from the sides
- 18 in. (0.46 m) from the chimney inspection cover

**Do not store wood or other combustible material within installation clearances.**

**⚠ CAUTION**  
Do not use any combustible materials for the foundation.

Outdoor furnace must be installed on a noncombustible surface or foundation that incorporates an enclosure that will prevent supply and return lines from possible exposure to sunlight, fire, or physical damage that may be caused by an occurrence outside the outdoor furnace enclosure. Foundation may consist of concrete, crushed rock, or patio blocks.

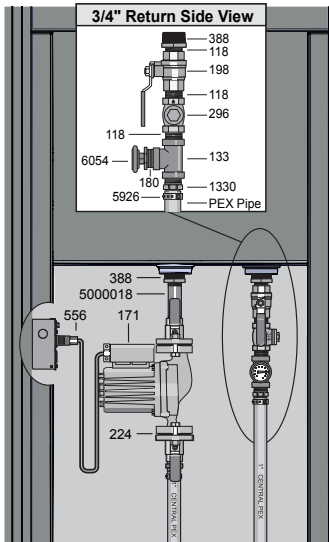
### Access to Ports on Outdoor Furnace

Ports are provided that allow mounting circulation pumps on the outdoor furnace. Refer to the illustrations in this section for proper supply and return line and pump installations for your model.

**NOTE:** The Installation Guide provides more information on pump selection. For even more detailed information, see the Hydronic Component Selection Guide (p/n 2482), available from your Central Boiler dealer.

#### Forge 1500 Models – 1-Pump Configuration\*

1 - Pump Parts Lists* For 3/4" (1" PEX) system		
3	118	Close Nipple, 3/4"
1	133	Tee NPT, 3/4"
1	388	Hex Bushing, 1-1/4" x 3/4"
1	171	007 Pump
1	180	Bushing, 3/4" x 1/8"
1	198	Ball Valve, 3/4"
2	224	Isolation Flange, 3/4"
1	296	Swing Check Valve, 3/4"
1	556	Power Supply Cord
1	1330	MPT to PEX, 3/4" x 1"
2	5926	Stainless Steel Clamp Crimp Ring, 1"
1	6054	Temperature Gauge
1	6593	Grounding Rod Kit
1	5000018	Nipple, 3/4" x 3"

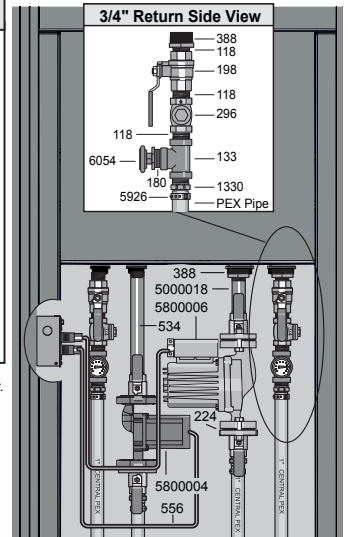


\*Parts and accessories sold separately. Pump size may vary.

**NOTE**  
Pump(s) may be installed on the outdoor furnace or inside the building.  
For illustration purposes only

#### Forge 3500 Models – 2-Pump Configuration\*

2 - Pump Parts Lists* For 3/4" (1" PEX) system		
6	118	Close Nipple, 3/4"
2	133	Tee NPT, 3/4"
2	388	Hex Bushing, 1-1/4" x 3/4"
1	5800004	007 Pump
2	180	Bushing, 3/4" x 1/8"
2	198	Ball Valve, 3/4"
2	224	Isolation Flange Kit, 3/4"
2	296	Swing Check Valve, 3/4"
2	556	Power Supply Cord
4	1330	MPT to PEX, 3/4" x 1"
4	5926	Stainless Steel Clamp Crimp Ring, 1"
2	6054	Temperature Gauge
1	6593	Grounding Rod Kit
1	5000018	Nipple, 3/4" x 3"
1	534	Nipple, 3/4" x 7"
1	5800006	009 Pump



\*Parts and accessories sold separately. Pump size may vary.

**NOTE**  
Pump(s) may be installed on the outdoor furnace or inside the building.  
For illustration purposes only



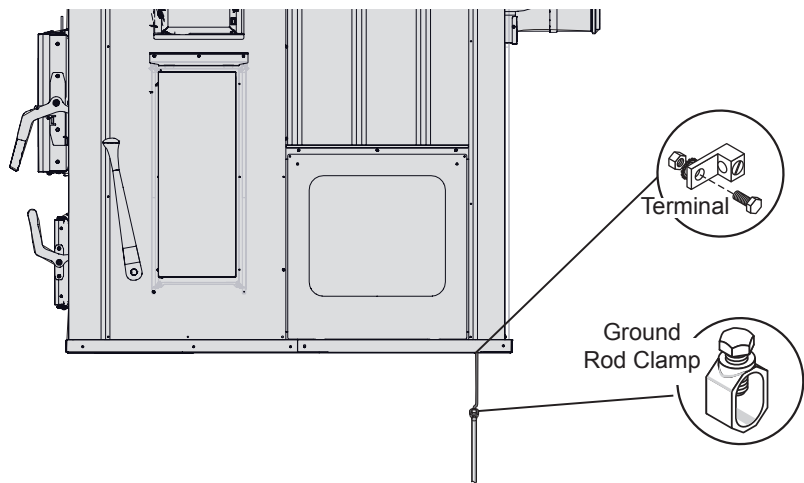
## Ground Rod Kit

The outdoor furnace must be electrically bonded to ground in accordance with the requirements of the authority having jurisdiction or, in absence of such requirements, with the National Electrical Code, ANSI/NFPA 70 and/or the Canadian Electrical Code Part 1, CSA C22.1 Electrical Code.

Install a Ground Rod Kit (p/n 6593) and connect it to the outdoor furnace.

1. In the water line trench near the outdoor furnace, drive the ground rod into the ground until the top of the ground rod is below the ground surface.
2. Route the ground wire from the ground rod under the outdoor furnace base and over to the frame of the outdoor furnace.
3. Secure the ground terminal with a cap screw (1/4" x 3/4"), star washer and nut. Secure the ground wire to the terminal; then secure the ground wire to the ground rod with the clamp. Tighten all hardware securely.

**NOTE: A hole for the ground terminal has been pre-punched in the outdoor furnace base near the pumps.**



### Detailed Furnace Installation Variations

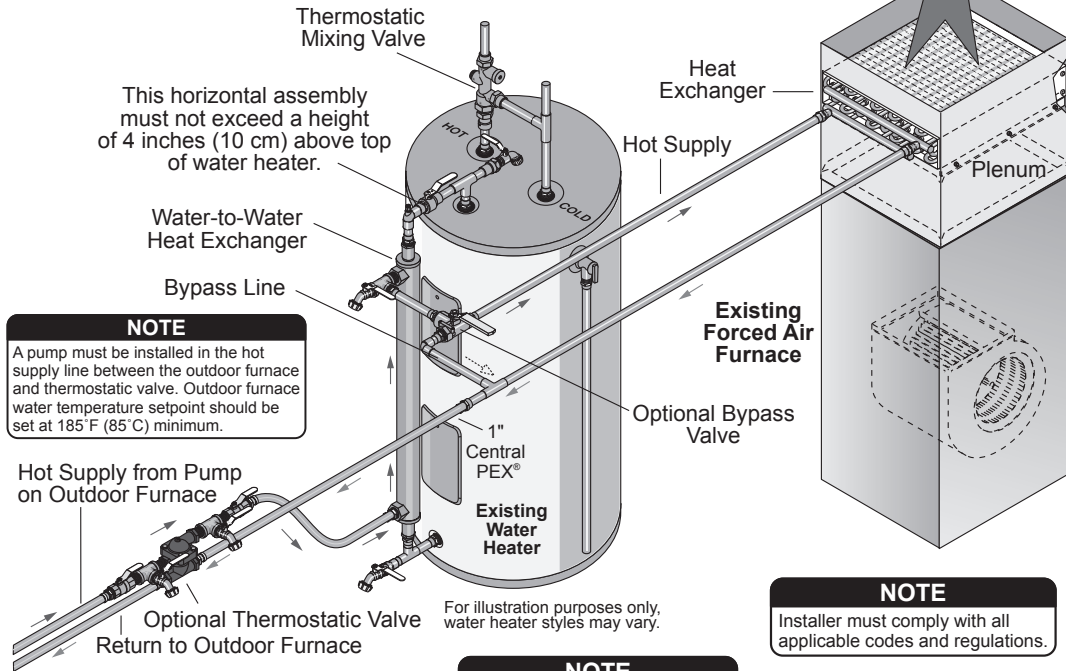
Visit [CentralBoiler.com](http://CentralBoiler.com) to access a library of detailed illustrations for connecting to a wide variety of existing heating systems and for other heating options.

### Furnace Installation - Connecting to Your Existing System

A common installation is to connect the outdoor furnace to an existing water heater and then to an existing forced air system. A water-to-air heat exchanger is mounted in the plenum or duct work of the existing furnace. Heated water from the outdoor furnace either continuously flows through the water-to-air heat exchanger or is diverted through a 3-way zone valve. When the thermostat senses the need for heat, the fan on the existing furnace forces air through the heat exchanger, transferring heat throughout the existing ductwork.

**NOTE: There are numerous ways to connect to your heating system. Refer to the Central Boiler Outdoor Furnace Installation Guide for other installations.**

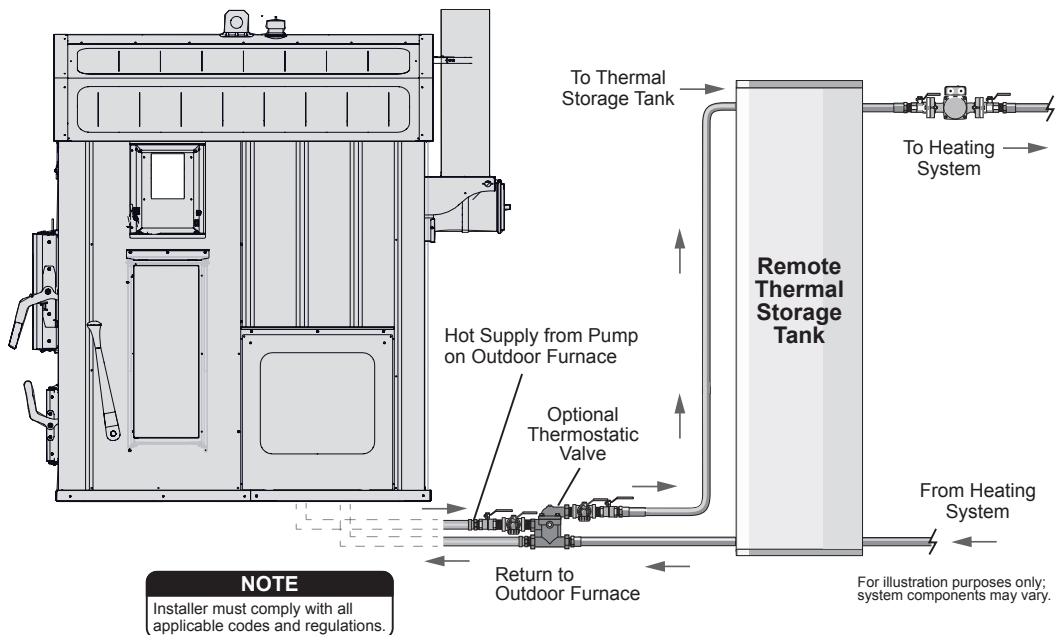
## Typical Installation Connecting to Water Heater and Forced Air Furnace



**NOTE: A certified electrician must do the electrical installation.**

**NOTE**  
Any electrical installation should be done by a qualified installer in accordance with applicable codes.

## Remote Thermal Storage Installation Connecting to Remote Thermal Storage Tank



**NOTE**  
Installer must comply with all applicable codes and regulations.

For illustration purposes only; system components may vary.

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## **OUTDOOR COAL FURNACE BEST BURN PRACTICES**

1. Read and follow all operating instructions supplied by the manufacturer.
2. **FUEL USED:** Only those listed fuels recommended by the manufacturer of your unit. Never use the following: trash, plastics, gasoline, rubber, naphtha, household garbage, material treated with petroleum products (particle board, railroad ties and pressure treated wood), leaves, paper products, and cardboard.
3. **LOADING FUEL:** For a more efficient burn, pay careful attention to loading times and amounts. Follow the manufacturer's written instructions for recommended loading times and amounts.
4. **STARTERS:** Do not use lighter fluids, gasoline, or chemicals.
5. **CHIMNEY RECOMMENDATIONS:** In higher populated areas, extend the chimney to a height above the roofs of surrounding buildings.
6. Always remember to comply with all applicable state and local codes.

Be considerate of neighbors when operating your furnace. If you use your furnace in the summer months, be certain your chimney exhaust is not adversely affecting neighbors with open windows.

## Chimney Recommendations

In higher populated areas, extend the chimney to a height above the roofs of surrounding buildings. Use Central Boiler Chimney Extensions when extending the chimney. When only the standard eight feet (2.4 m) of chimney are used, the sections must be secured at the connection joint with four (4) screws to stabilize the extension.

If extensions are added to the standard eight feet (2.4 m) of chimney, the chimney should be reinforced appropriately. The illustration shows chimney support recommendations when three or more sections are used. When adding sections of chimney, make sure that there is nothing within the fall zone of the chimney that could be damaged. If something is located within the fall zone and cannot be removed, guy wires or braces may need to be installed to prevent a falling chimney from causing damage.

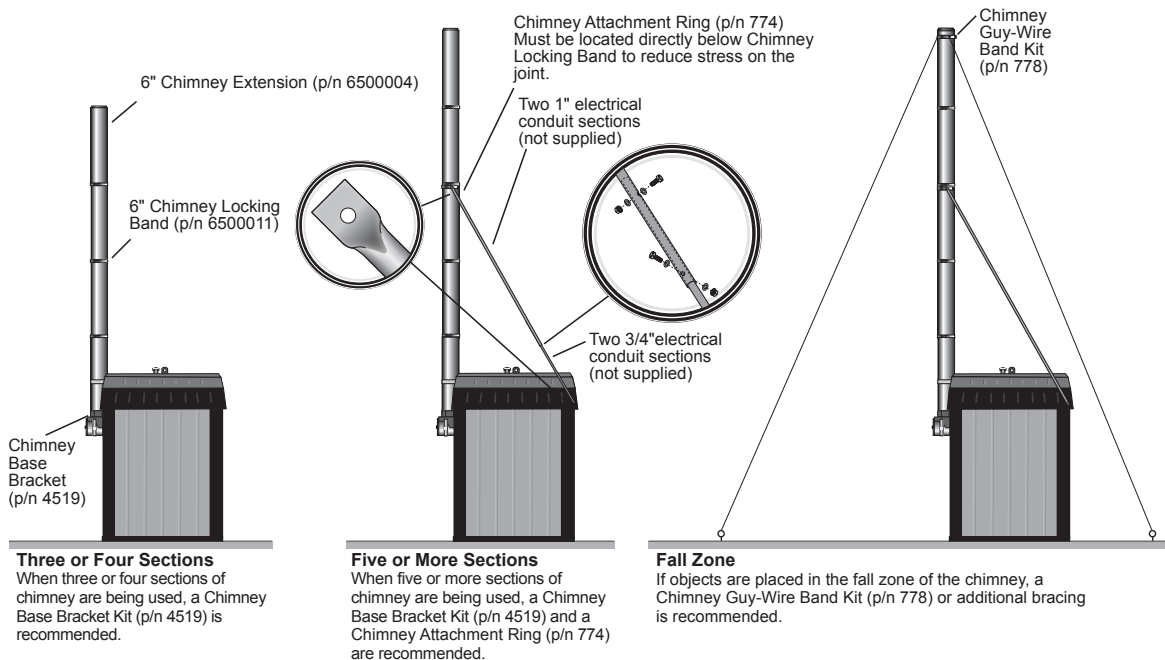
**NOTE: If more than three 4-foot (1.2-m) sections of chimney are used, a support (e.g., a pole, pipe or other structural support) may be installed from the ground that can withstand wind. Other reinforcement recommendations are shown.**

**NOTE: For chimney extensions or chimney replacement, use only genuine Central Boiler chimney components. Parts are available from an authorized Central Boiler dealer.**

The installation of a spark arrester is recommended, particularly where there are dry conditions or where there is combustible material near the unit, unless the installation of a spark arrester is prohibited by local requirements. Use common sense to avoid potential fires, including exercising caution when disposing of ash, cleaning and refueling. Keep all highly combustible materials (e.g., gasoline, propane, leaves, pine needles, etc.) away from an operating unit at all times. Take special precautions in windy conditions.

**NOTE: You may need to increase the chimney height if conditions occur that force exhaust to low levels.**

## Chimney Reinforcement Recommendations



### NOTE

- Additional bracing may be necessary in certain areas such as those subject to severe weather, winds, freezing rain, etc.
- Inspect all bracing bi-annually for integrity.

## Important Precautionary Information

Be sure to read carefully and understand these precautions before, during and after the installation, operation and maintenance of the furnace.

**NOTE:** All operations must be in accordance with local and state codes which may differ from the information in this manual.

**NOTE:** Be considerate of your neighbors. Some types of coal will smoke quite a bit and emit a pungent odor. Try different types of coal, adjusting your settings, and learning different load techniques to minimize the amount of smoke generated.

**NOTE:** Some types of coal (in particular, coal with very high sulfur and impurity content) will always produce visible smoke. With this coal, there will always be some smoke present regardless of the settings used with the outdoor furnace.

### ⚠ CAUTION

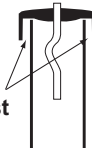
This outdoor furnace is not intended to be the only source of heat. In the event of a prolonged power failure, a generator may be used to prevent lines from freezing. Should the outdoor furnace be left unattended, run out of fuel or require service, an alternate heating source in the building being heated should be in place to prevent damage caused by freezing.

### ⚠ WARNING

The outdoor furnace vent cap must fit loosely on the vent opening. Do not force the cap down or try to seal it tightly onto the vent pipe. Do not extend or restrict the vent pipe or opening. **DO NOT ALLOW THE OUTDOOR FURNACE TO BE PRESSURIZED.**



Vent Cap Must Fit Loosely



### ⚠ WARNING

Be sure the outdoor furnace is filled with water before firing. Never fire the outdoor furnace when the water level is more than 1" (2.5 cm) below the FULL mark on the sight gauge. Corrosion Inhibitor Plus™ must be added before the initial fill (see Water Quality and Maintenance).

### ⚠ WARNING

Disconnect the electrical power to the outdoor furnace before replacing an electrical component.

### ⚠ WARNING

Do not attempt service inside the electrical control panel without first disconnecting the electrical power at the main power source.

**NOTE:** Any electrical installation should be done by a qualified installer in accordance with applicable codes.

### ⚠ WARNING

Allow the outdoor furnace to thoroughly cool and completely clean out the firebox before draining water from the outdoor furnace. If the water in the outdoor furnace ever boils, be sure to check the water level and restore to full. If water is added, the proper level of MolyArmor 350 must be maintained.

### ⚠ WARNING

When cleaning the outdoor furnace, be careful not to spill any coals.

### ⚠ WARNING

**ALWAYS** store ash in a covered non-combustible container.

### ⚠ WARNING

Do not allow combustible materials (straw, hay or wood) near the outdoor furnace. Keep the perimeter of the outdoor furnace clear and clean.

### ⚠ WARNING

Keep children away from the outdoor furnace.

**⚠ WARNING**

DO NOT touch the outdoor furnace during operation.

**⚠ WARNING**

For fire safety, keep all combustible materials at least six feet (two meters) away from the outdoor furnace, especially around the door area. Debris of wood chips and other combustibles in the area may be easily ignited if a hot coal is spilled out of the firebox and left unnoticed.

**⚠ WARNING**

To reduce the risk of flashback, the door opening procedure outlined in this owner's manual should be followed whenever the firebox door or ash removal door is opened, even if the outdoor furnace has been shut down for an extended period of time.

**⚠ WARNING**

The firebox door must be closed and latched at all times except when filling the firebox. Leaving the firebox door open may lead to a runaway fire. In the event of a runaway fire, close the firebox door. In the event of a chimney or soot fire, close the firebox door and make sure power is off to the outdoor furnace.

**⚠ WARNING**

The ash removal door must be closed and secured at all times except when removing ash or a runaway fire may result. The ash removal door should never be opened when the outdoor furnace is in idle or standby mode. Combustible gases can collect and ignite when exposed to air, causing a flashback.

**⚠ WARNING**

All covers must be maintained at all times except during maintenance, inspection and service.

**⚠ WARNING**

Do not burn trash, plastics, gasoline, rubber, naphtha, household garbage, material treated with petroleum products (particle board, railroad ties and pressure treated wood), leaves, paper products or cardboard.

**NOTE:** Do not use chemicals or fluids to start the fire. Use kindling and seasoned wood to start an initial fire.

**NOTE:** The use of wood in this outdoor furnace, except for the purpose of igniting the coal, is prohibited by law.

**NOTE:** The sight gauge valve should always be closed, except when checking water level. Water will automatically drain from the sight gauge tube when the valve is closed. Remember that this type of valve requires only 1/4 turn to open or close.

**⚠ WARNING**

This heater is designed to burn coal. **DO NOT BURN:** any wood that is not clean wood, unseasoned wood, garbage, tires, lawn clippings, leaves, brush trimmings or general yard waste, materials containing asbestos, materials containing lead, mercury or other heavy toxic metals, materials containing plastic, materials containing rubber, waste petroleum products, paints and paint thinners, asphalt products, chemicals, glossy or colored paper, construction and demolition debris, plywood, particleboard, salt water driftwood and other previously salt water saturated materials, manure, animal carcasses and asphalt products. Burning these materials may result in release of toxic fumes or render the heater ineffective and cause smoke.

**NOTE:** This outdoor furnace is not to be used with an automatic stoker.

**NOTE:** Store coal properly. Keep coal where it will stay dry. Some types of coal will soak up moisture which can affect burn performance, create excessive smoke, and add moisture to the exhaust which can create potential for corrosion.

**NOTE:** Do not store coal within the outdoor furnace installation clearances or within the spaces required for fueling, ash removal and other routine maintenance operations.

**⚠ CAUTION**

This outdoor furnace is not to be connected to a chimney flue serving another appliance.

## Helpful Tips

- Unlike anthracite, which is fairly consistent in its composition, bituminous coal can vary greatly not just from one mine to another, but from different portions of the same mine. Whenever getting a new load of coal, pay close attention to the outdoor furnace when first burning it to determine whether or not adjustments can be made to the outdoor furnace settings.
- Have a proper disposal plan for ash. If you have not burned coal before, you might be surprised by the amount of ash. Some coal has an ash content greater than 10% by weight. Have a proper disposal plan in place and check with your local jurisdiction about proper disposal procedures.
- Coal ash is more corrosive than wood ash so moisture in the firebox and ash collection areas should be kept to an absolute minimum. Use only coal that has been kept out of the elements and is dry. Any wood burned in the outdoor furnace should also be well-seasoned and dry.
- Do not allow ash to get clumped together in the firebox or in the ash collection chamber.
- Record your load times, quantity of coal added, type of coal, coal size, loading techniques and controller settings. These can be helpful when fine-tuning your outdoor furnace to achieve the most efficient and cleanest possible burns.
- Perform the recommended preventative maintenance following the service intervals. Regular maintenance and inspections can help extend the life of your outdoor furnace and prevent high-cost repairs.
- An important part of outdoor furnace maintenance is controlling the quality of the water in the outdoor furnace. Follow the recommended procedures in the Water Quality and Maintenance section carefully. Guidelines are provided for testing supply water, initial water treatment and testing the water in the system once the outdoor furnace has been operated.
- Contact the mine where you purchase coal and see if they have a coal analysis available. Some mines will provide a coal analysis for free. From a coal analysis you can learn percentages of moisture, Btu per pound, ash content per pound, sulfur content, volatile percentages, and other useful information which can help when adjusting the settings on your outdoor furnace.
- Adjust the over air so there is just enough available in both duration and volume to help burn the volatiles and smoke. Too much over air can dilute the smoke instead of burn it. This will be evident by a significantly lower flue gas temperature.

### Before You Start Operating Your Forge Outdoor Coal Furnace

Be sure to read carefully and observe all of the information in the entire Owner's Manual.

If any questions arise that cannot be answered by the information in this manual, be sure to contact your dealer.



Cleaned anthracite has a shiny black appearance similar to volcanic glass.

## Understanding Coal

Burning coal is a completely different experience than if you are used to burning wood. First and foremost, there are many different types of coal. While wood contains essentially the same Btu content per pound regardless of species, coal varies greatly from type to type, not just in energy content per pound, but also in volatile and sulfur content. Volatile content is used to describe the combustible gases that are released when coal is heated up.

Because each type of coal burns differently, each requires special attention when handling and burning. There are many types of coal available, but for heating purposes, the most common types are: Anthracite, Bituminous (or Sub-Bituminous), and Lignite.

### Anthracite

Anthracite, sometimes referred to as *hard coal*, is the highest grade of coal. When cleaned, it has a shiny black appearance similar to volcanic glass. It is extremely hard, being very difficult to break by hand. When clean, anthracite will not typically make marks if rubbed on paper.

If burning anthracite in the Central Boiler Forge Outdoor Coal Furnace, nut sized coal is preferred.

### Advantages of Anthracite

- Anthracite, by its nature, retains consistently similar characteristics, even between different mines.
- The *swell factor* (the property of coal to swell and bind to other pieces when heated) is almost nonexistent, so even when glowing red in a outdoor furnace, anthracite coals can be easily stirred.
- Anthracite has the highest percentage of carbon content while having low volatile and sulfur contents. Because of this, it burns nearly smoke and odor free.

### Disadvantages of Anthracite

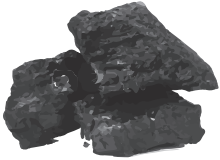
There are some unique characteristics of anthracite that make it not suitable for all applications.

- The most noticeable characteristic of anthracite is that it is difficult to light. Typically a deep bed of glowing wood coals has to be established before any anthracite coal can be added to the fire, and once burning, a thick bed of anthracite must be maintained. If not, air holes will form in the coal bed and the fire will quickly go out.
- Anthracite burns best when all of the combustion air is brought up through the coal bed. In comparison, bituminous coal requires some over fire air to burn the released volatiles.



- Anthracite does not idle very well; the more constant heat draw, the better. During warmer months, it may be impossible to maintain an anthracite fire simply due to the extended periods of standby between on and off cycles.
- Limited availability – anthracite is mostly mined in a few counties in Pennsylvania and thus may be difficult to obtain in certain locations.

## Bituminous



Bituminous, or soft coal, is generally dull in color and breaks apart easily.

Bituminous is the grade of coal just below anthracite and is sometimes referred to as *soft coal*. Like anthracite, bituminous coal is black but will have a more dull color (although it can be shiny at times). It is typically easier to break apart compared to anthracite and will make a mark like a charcoal pencil when rubbed on paper. Compared to other types of coal, it is the most plentiful and readily available in the United States. Because of its availability, bituminous is the most likely to be burned in an outdoor coal furnace.

If burning bituminous coal in the Central Boiler Forge Outdoor Coal Furnace, *run of mine* (to a degree) or *sorted coal* can be burned. The sizes of the largest pieces of coal present in each load must be smaller than *stove size*, with nothing larger than *nut size* preferred.

Unlike anthracite, bituminous coal can vary a lot in its Btu, moisture, sulfur, ash and volatile content per pound. Because of this, certain additional precautions need to be taken when burning bituminous.

- The higher volatile and sulfur content gives bituminous coal a distinct odor.
- Not only will there be a more pronounced acrid smell when burning bituminous, but there will also be greater amounts of smoke, especially immediately after loading new fuel.
- Once the volatiles have been burned off, the smoke will greatly reduce and may even disappear.

## Lignite



Because of its high moisture, low sulfur and low carbon content, lignite, or brown coal, is not recommended for use in the Forge Outdoor Coal Furnace.

Lignite is only one step above peat in the geological process. Lignite coal is the lowest grade of coal, and is sometime called *brown coal*. It is somewhat flaky, has high moisture, low sulfur, and the lowest carbon content of all grades of coal. In fact, partly because of the extremely high moisture content, many lignite coals will have a lower Btu per pound than wood. Lignite doesn't burn very well in a shaker-grate style outdoor furnace. Upon heating up, many types of lignite will flake apart and those pieces will either fall through the burn grates, or stack up on one another, preventing the flow of combustion air through the grate system. Because of this, lignite coal is **not recommended** for use in the Central Boiler Forge Outdoor Coal Furnace.

## Operating Instructions

### FireStar Combustion Controller

Refer to the FireStar Operator's Manual provided with your outdoor furnace for information about the controller.

### Firebox Door Opening Procedure

#### **⚠ WARNING**

**This firebox door opening procedure should be followed whenever the firebox door is opened *regardless of coal type*. Even if the outdoor furnace has been shut down for an extended period, there can be a concentration of combustible gases present. Following these instructions reduces the possibility of a flashback.**

1. Make sure the outdoor furnace has power and is turned on.
2. Press the Purge button.

**NOTE: Press the Purge button even if the combustion fan is running.**

3. Listen to make sure the combustion fan has started and is running.
4. The purge LED and over air LED will illuminate violet. The under air LED will illuminate violet 30 seconds into the purge cycle. After approximately one minute, once the purge cycle is complete, these three LEDs will turn green.
5. If there is no smoke, or only small wisps of smoke coming from the chimney, proceed to the next step. If there are large amounts of smoke, wait until it has subsided before continuing.
6. Standing off to the side away from the firebox door opening, gradually open the firebox door, stopping when the firebox door handle safety recess catches the latch roller. Wait for a **minimum of 15 seconds**.

**NOTE: During this time you should hear the combustion fan stop.**

7. If large amounts of smoke start billowing out from around the firebox door, close the firebox door immediately and wait at least 5 minutes before repeating steps 2 through 6.
8. If there is no smoke, or just small wisps, carefully open the firebox door all the way while standing to the side.

#### **⚠ WARNING**

**Always follow these steps, including standing off to the side of the firebox door, when opening the firebox door. Combustible gases could flashback.**



OPERATING  
TIP

For bituminous, maintaining a 3-4" ash bed on the shaker grate protects the shaker grate from damage caused by overheating. However, if

the ash bed is too thick, it will reduce and hinder performance.



OPERATING  
TIP

For anthracite, the ash bed that protects the shaker grate from damage caused by overheating will need to be much thinner.

### ⚠ CAUTION

Never keep the firebox door open longer than necessary. If at any time smoke or flames start increasing to the point where they are billowing out the door, quickly shut the firebox door and wait a few minutes before repeating the door opening procedure.

## Maintaining the Ash Bed

If burning bituminous, it is very important to establish and maintain a 3-4" ash bed on the shaker grate in order to protect the shaker grate from damage by overheating. If burning anthracite, the ash bed will be much thinner. In either case, the coal or wood fire must not burn directly on the grate.

### ⚠ CAUTION

For bituminous, maintain a 3-4" deep ash bed over the shaker grate to protect from overheating. For anthracite, the ash bed needs to be much thinner. In either case, the coal or wood fire must not burn directly on the grate. Damage to the shaker grate is not covered by warranty.

## Cold Start Firing

**NOTE:** These procedures apply to initial firing or refueling the outdoor furnace from a cold start (e.g., first firing of the season or after an extended period of down time).

Just like burning wood, burning coal can be more of an art than a science. You may need to vary techniques to achieve best results. Over time, you will learn the proper techniques required for a clean, consistent burn every time. This will allow you to identify cause and effect in a variety of circumstances and what works best for your conditions.

### ⚠ CAUTION

Do not burn plastic, garbage, treated wood or fuels not listed for this outdoor furnace.

### ⚠ CAUTION


If the water in the outdoor furnace boils, be sure to check the water level and restore to full. Add MolyArmor 350 as needed (see Water Quality and Maintenance).

**NOTE:** Before firing the outdoor furnace for the first time, make sure the proper amount of MolyArmor 350 has been added and the water level is 1" below the full mark on the sight gauge, as the water will expand when heated.

### Establish Initial Ash Bed

1. Disconnect the heat load draw by turning off the pump(s).
2. Set the under and over air levels on the FireStar Combustion Controller. See the FireStar Operating Manual for more information.

**NOTE: If burning anthracite, the over air setting should be set to 0. For bituminous, it will require over air settings that allows volatiles to burn off. These settings will require adjustment over time to fine-tune depending on the type of coal used and its composition.**

3. Place crumpled-up paper around the firebox over the grates with very small pieces of kindling on top. Light the paper and kindling.
4. Once the paper and kindling are lit, turn the controller on by pressing the Power  button.
5. Press the Ignition Assist button. The combustion blower will turn on and keep running for an amount of time determined either by factory preset or a setting you have specified (see FireStar Operating Manual). As the combustion blower runs, you'll be able to tend to the fire.
6. Gradually place pieces of wood on top of the burning kindling starting with very small pieces, increasing the size of the kindling as the fire grows. Once a large, hot fire is established, add a few larger pieces of wood and then close the firebox door.
7. Allow the fire to burn for at least 10-20 minutes.
8. Using the Firebox Door Opening procedure, open the firebox door.

### WARNING

**Always follow the Firebox Door Opening procedure, including standing off to the side of the firebox door, when opening the firebox door. Combustible gases could flashback.**

9. Wait for a few seconds and then look at the fire. If the fire has burned to a point where the wood is just starting to break apart, either add more wood or coal, depending on which type of coal will be used (see following sections for initial loading for coal types).

### Anthracite - Initial Loading

1. Continue to add wood, in increasing increments (size and quantity) until a coal bed that is at least 3" deep is established. This will require closing and opening the firebox door (using the Firebox Door Opening procedure) and may take up to a few hours.
2. Rake and gently agitate the wood coals to ensure that no large pieces of wood remain in the coal bed.

3. Grasp the shaker grate handle and quickly shake the grates three to four times to sift out some of the ash while not losing the hot coals through the grates.
4. Using a shovel, add a single layer of anthracite over the glowing coals. Make sure the layer of anthracite covers the entire grate area.
5. Close the firebox door. Wait long enough to allow the layer of anthracite to catch fire.
6. Using the Firebox Door Opening procedure as needed, repeat steps 4 and 5 until there is approximately 2-3 inches of anthracite burning and starting to glow (2 to 3 layers).
7. Add additional anthracite until the desired depth is achieved making sure not to load higher than the bottom of the door sill frame.
8. Close and latch the firebox door.
9. After the water temperature is above 150°F (66°C), proceed to Adding Heat Load.

**NOTE: When burning anthracite, an even layer of coal must be maintained over the entire coal bed or the fire will quickly die down.**

**NOTE: During initial start-up, a considerable amount of moisture from condensation will collect inside the firebox and may drip out. This is normal and the moisture will evaporate after the first couple of fuel loads.**

**NOTE: During initial start-up, it is normal for large amounts of smoke to be emitted from the chimney as the water heats up. This is normal and smoke will be reduced once the water around the firebox water jacket heats up.**

**NOTE: For regular reloading procedures, refer to the Loading Anthracite section.**

### **Bituminous - Initial Loading**

1. Rake the wood coals to even them out, covering the entire grate.

**NOTE: For bituminous, it is not essential that the entire grate is covered in wood coals, but it does help the combustion process.**

2. Grasp the shaker grate handle and quickly shake the grates to drop ash and allow for better airflow through the wood coals.
3. Add a few shovel scoops of nut-sized bituminous coal over the wood coals in single layer. Add only enough bituminous to cover approximately half of the wood coals.

**NOTE: Although the outdoor furnace is designed to burn run of mine coal up to a certain size, it is best to use nut-size bituminous when starting the initial fire to prevent smaller pieces from slipping through the grate into the ash collection chamber.**

4. Close the firebox door and press the Reset button.

**NOTE: Pressing the Reset button will decrease the under air slightly while increasing the over air for an adjustable duration of time (see FireStar Operating Manual). This allows more air into the firebox to aid in the proper combustion of volatiles.**

5. Watch the chimney for smoke. Because of the sulfur and volatile content, bituminous coal will emit a lot of smoke immediately after being added. Wait until the smoke has been reduced to proceed to step 6.
6. Using the Firebox Door Opening procedure, open the firebox door.
7. Once the bituminous coal has started to burn, add a few more scoops in a single layer on top of the fire.

**NOTE: Repeat steps 4-7 until there is an adequate mound of glowing coals before continuing.**

8. Using the rake, gently rake the coal level being careful not to break up too many pieces.

#### **⚠ CAUTION**

**If raking causes too many pieces to break up, large amounts of volatiles can be released which could result in heavy smoke billowing out the firebox door. If this happens, immediately shut the firebox door and wait for the smoke to die down by watching the chimney.**

9. After the coals have been raked level, add one to two layers of nut-size bituminous coal over the coal bed keeping an area of glowing coals about a half foot square exposed at the back of the firebox.
10. Close the firebox door and press the Reset button. Wait until the smoke from the chimney has diminished.
11. Using the Firebox Door Opening procedure, open the firebox door.
12. Once the coal bed is completely glowing, use the rake to gently agitate the coals. Push some of the coals toward the back of the firebox to form a small mound. Make sure to leave a flat layer of coals above the rest of the grates.
13. Using a shovel, add the desired amount of coal to create a mound that runs lengthwise from the small mound at the back of the firebox toward the firebox door. Don't fill with coal higher than halfway between the bottom of the flash shield and the firebox door sill. The flash guard will prevent you from loading higher than this.
14. Close the firebox door and press the Reset button.

15. Grasp the shaker grate handle and quickly shake the grates three to four times to sift out some of the ash while not losing the hot coals through the grates.
16. After the water temperature is above 150°F (66°C), proceed to Adding Heat Load.

**NOTE: During initial start-up, a considerable amount of moisture from condensation will collect inside the firebox and may drip out. This is normal and the moisture will evaporate after the first couple of fuel loads.**

**NOTE: During initial start-up, it is normal for large amounts of smoke to be emitted from the chimney as the water heats up. This is normal and smoke will be reduced once the water around the firebox water jacket heats up.**

**NOTE: For regular reloading procedures, refer to the Loading Bituminous section.**

### Adding Heat Load

**NOTE: During initial start-up, a considerable amount of moisture from condensation will collect inside the firebox and may drip out. This is normal and the moisture will evaporate after the first couple of fuel loads.**

1. With no heat load draw in the system, monitor the operation of the outdoor furnace until the water temperature reaches the water temperature setpoint.
2. Turn on the pump(s); then start a heat load draw in the system by turning up the thermostat in the house. Monitor the outdoor furnace for one hour or until another cycle occurs (i.e., outdoor furnace goes from combustion to idle mode). If the water temperature drops and does not recover to the water temperature setpoint within one hour of starting the heat load draw, the heat load draw should be shut off, allowing the outdoor furnace to cycle to the idle mode again.

**NOTE: The outdoor furnace will not operate satisfactorily if the heat load is higher than the output capacity of the outdoor furnace.**

### Loading Frequency

The frequency of loading will depend on many factors such as heat load, coal type, coal size, load quantity and others. To achieve the most efficient and cleanest burn, smaller, more frequent loadings are recommended. For example, if the outdoor furnace will be used to heat a shop where someone is present throughout the day, it would be better to load the outdoor furnace every two hours with a small amount of coal rather than a large amount every 12 hours. More frequent, smaller loads will allow more complete combustion of volatile gases. With larger loads and less frequent loadings, heat energy can be wasted out the chimney.



**More frequent and smaller loadings are recommended to achieve the most efficient and cleanest burn.**

**OPERATING  
TIP**

The recommended method is to develop a loading schedule that corresponds to when there is a call for heat. This will allow the outdoor furnace to run for an extended period of time after being loaded with new coal and allow time for the volatiles to be burned off. It also helps to reduce the buildup of flammable gases that can cause a flashback when the firebox door is opened or a puff back when the outdoor furnace starts.

### Loading Anthracite

**NOTE: Anthracite burns best when there is a demand for heat. If extended times with a low demand for heat are expected, it may be necessary to utilize the alternate method of heating.**

1. Using the Firebox Door Opening procedure, open the firebox door.
2. Run the ash bed maintenance rod under the ash bed to loosen it and break up clinkers.
3. Observe the coal bed to make sure all the coals are glowing. Dark spots in the coal bed indicate a blockage of air that needs to be cleared. Use the rake to gently stir the area and break up the ash. Hardened areas that will not break up are clinkers that should be removed. Use the rake to work the clinker to the top of the coal bed and remove it with the shovel.

#### **⚠ CAUTION**

**Always wear the appropriate personal protective gear when removing ash and clinkers from the firebox.**

#### **⚠ CAUTION**

**Dispose of ash and clinkers in a steel container with a tight-fitting lid. The container should be placed on a noncombustible floor or on the ground, well away from combustible materials, pending final disposal.**

#### **⚠ CAUTION**

**If ash and clinkers are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until thoroughly cooled. Other waste shall not be placed in this container.**

#### **⚠ WARNING**

**When removing ash or clinkers, be careful not to spill any outside of the noncombustible container.**

4. Use the rake to even out the coal bed.



5. Using a shovel, add the desired amount of coal evenly across the coal bed. **Don't fill with anthracite coal higher than the bottom of the firebox door sill.**
6. Standing off to the side away from the firebox door opening, grasp the shaker grate handle and quickly open and close the grates a couple of times. This will reduce the amount of fine ash that is blown up on top of the fresh coal load.
7. Observe the coal bed. It should have settled slightly. Add additional coal to raise the coal to the desired level. **Remember, don't fill with coal higher than the bottom of the firebox door sill.**
8. Close the firebox door and secure the latch.

### Loading Bituminous

1. Using the Firebox Door Opening procedure, open the firebox door.
2. Observe the coal bed. Refer to the Bituminous Loading Methods section for the suggested technique to use for loading bituminous, dependant on the condition of the coal bed.
3. Close the firebox door and secure the latch.
4. Press the Reset button.
5. Grasp the shaker grate handle and quickly open and close the grates a couple of times to sift the accumulated ash into the ash collection area.

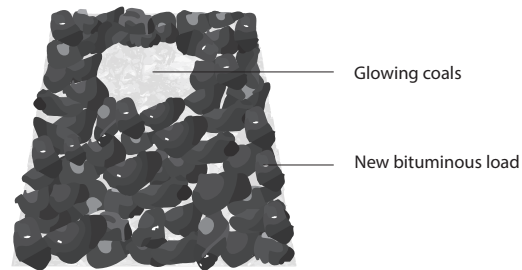
### Bituminous Loading Methods

Following are suggested methods for loading bituminous dependant on the condition of the coal bed. Over time, you will learn which method works best for your type of coal, heat load and operational factors.

#### CAUTION

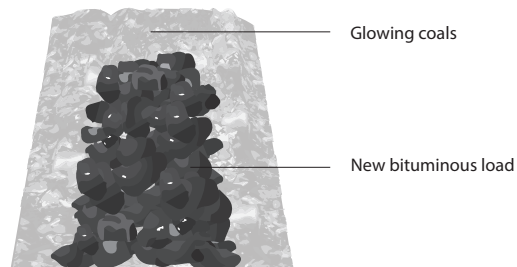
**Use care when raking or stirring hot or glowing bituminous coal. Large clumps or a glowing mass of coal can release smoke and volatiles when broken apart and can result in a flash fire. If this happens, immediately close the firebox door. Use the Firebox Door Opening procedure to open the firebox door.**

### Full Bed Coverage



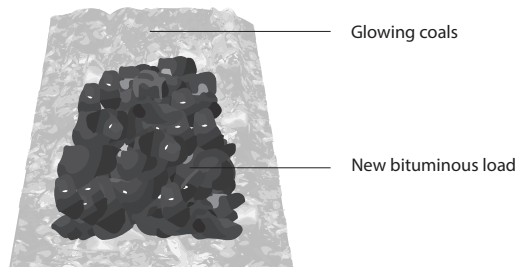
This method is ideal for small and frequent loading. For this method, the coals are first raked even and flat. A thin layer of bituminous coal is added over the whole coal bed, leaving a small area of glowing coals toward the back of the firebox exposed.

### Hill and Valley



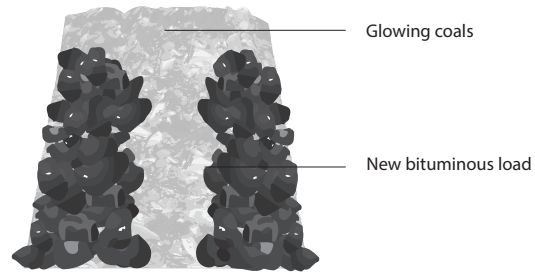
The hot coals are pushed toward the back of the firebox to form a small hill and a valley is created from the hill to the front of the firebox (make sure the valley still has a layer of hot, glowing coals). Bituminous coal is added to the valley making sure it is not too high above the hill at the back of the firebox.

### Cone Stack



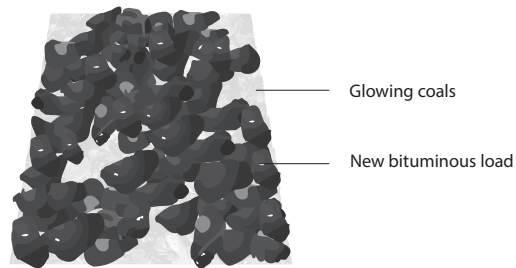
The hot coals are pushed toward the back of the firebox to form a small hill. The remaining hot coals are raked level. Bituminous coal is added in a cone shape on the level coals.

### Twin Peaks



The hot coals are pushed toward the back of the firebox to form a small hill. The remaining hot coals are raked level. Bituminous coal is added in two small strips running from the base of the small hill to the front of the firebox. A strip of hot coals is left exposed down the center. This method works very well when burning run of mine coal containing small fines.

### Strategic Scoop Placement Method #1



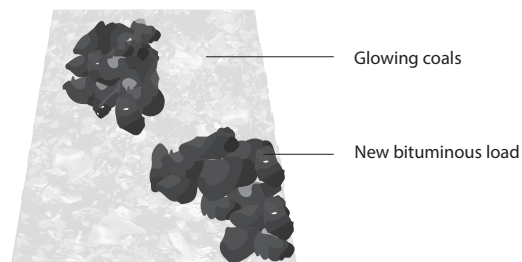
This method works very well when burning run of mine coal containing small fines, or to burn surplus coal fines. It takes advantage of the swell factor that is common with many types of bituminous coal.

For this method, the coal bed is either raked flat or with a slight rise toward the back of the firebox. Small piles of coal are added over the entire coal bed, leaving a few small areas of glowing coals exposed.

**NOTE: Because of the larger amount of fines, this method will result in a cleaner burn, but a slightly reduced heat input.**

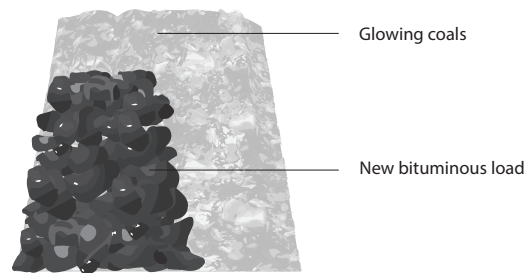
**NOTE: If the bituminous coal burned has little or no swell factor, this method may not be sufficient because when operating the shaker grate, the fines can fall through the grate into the ash collection chamber. If you notice a lot of unburned fines in the ash collection chamber, another loading method should be considered.**

### Strategic Scoop Placement Method #2



If the coal bed contains a fused, glowing mass of coal, or if there are still large amounts of unburned coal, this method allows you to add coal without disturbing the larger chunks. Use a shovel to add bituminous coal on any exposed cracks or openings in the coal bed. This method can be done with fines, run of mine coal or nut-size coal.

### Single-sided Hill and Valley

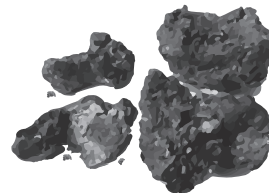


**OPERATING  
TIP**

The methods illustrated in this manual are by no means all-inclusive. For best results, start with these techniques and modify them based on your personal experience and some trial and error.

This method works very well with bituminous, especially if the Reset function is utilized. Similar to the Hill and Valley method, the newly added bituminous is added on the side opposite of where the over air enters. This method allows the over air to preheat before it comes into contact with the volatile gases.

### About Clinkers



Clinkers are chunks of fused ash that will collect in the firebox. They can range in size from as small as a grain of rice to as big as a softball, and sometimes larger.

Clinker formation depends on many factors that range from impurities to how the outdoor furnace is operated. Coal, especially bituminous, contains a number of different impurities, mostly minerals and chemicals that are contained within the coal. Over time, these will fuse together from the intense heat and eventually form clinkers.

Clinkers can also form on non-coal items that may work their way into the firebox. In the previous image, the clinker located on the left formed on a piece of slate rock that had been left in the coal during the mining process. Clinkers will grow over time if not removed as more and more ash and impurities fuse to them.

Smaller clinkers can work their way out of the firebox when the shaker grates are used and some of the larger ones can be broken up into smaller pieces. Eventually, the accumulation of clinkers can begin to affect performance by restricting airflow, and will need to be removed using one of these methods:

### Removing Clinkers

1. Use the rake to work the clinker up to the surface of the coal bed and then scoop it out with a shovel. This can be hard to do as they will be large by the time they are noticeable. If the clinker is flat, it can sometimes be broken up into smaller pieces using the rake and then be sifted through the shaker grates.
2. To remove larger clinkers, allow the outdoor furnace to burn through its fuel load completely; then scoop them out either from the firebox or from the ash collection area if the dump procedure was used.

### Dump to Empty Procedure

**NOTE: The dump to empty procedure should only be used when the coal has been completely burned, and when an inspection or shutdown will be performed. During the heating season, the 3-4" ash bed (when burning bituminous) must be maintained to protect the grates from the excessive heat of the coal fire.**

The outdoor furnace shaker grates can be rotated to a nearly vertical position for easier cleaning. To operate, pull the shaker grate handle fully forward, shake it quickly a couple of times, and then push it fully back and shake it quickly a couple more times. Repeat until all ash has fallen into the ash collection area.

**NOTE: It may be necessary to remove clinkers and large pieces of coal from between the grates before the grates will return to the horizontal closed position.**

### Dump and Reload Procedure

**NOTE: The dump and reload procedure can be used to clean a firebox of accumulated clinkers without losing the fire. This procedure is best performed when there is a call for heat to ensure the outdoor furnace runs without interruption.**

**NOTE: For the dump and reload procedure, you will need some pieces of very dry wood at least 24 inches long but short enough to fit inside the firebox. Ideally, the wood should be split with a rough cross-sectional area between 1.5" x 1.5" and 3" x 3". You will also need slightly larger pieces to help establish a coal bed.**

1. This procedure is best performed when only a thin layer of glowing coals remains in the firebox.
2. Using the Firebox Door Opening procedure, open the firebox door.
3. Use the rake to break up any large pieces of glowing coals and clinkers.
4. Add a couple of the split pieces of wood on top of the glowing coals.
5. Close the firebox door and wait for a few minutes.
6. Using the Firebox Door Opening procedure, open the firebox door. If the wood has started to burn, proceed to step 7. Otherwise repeat steps 5-6.
7. Close the firebox door. Pull the shaker grate handle fully forward, shake it quickly a couple of times, and then return the grates to the horizontal closed position.
8. Wait for at least a minute to allow the ash and dust to settle.
9. Using the Firebox Door Opening procedure, open the firebox door.
10. Done correctly, all the ash and clinkers will have fallen into the ash collection area while the pieces of burning wood remain. Remove any remaining clinkers.
11. Using the burning wood in the firebox, establish a new coal bed (see Cold Start Firing section).

## Ash Cleanout

**NOTE: The properties of the ash removed can help to identify how frequently the grates need to be shaken. If there are large amounts of unburned coal mixed in with the ash, the amount of grate shaking should be reduced. If there is very little ash but a lot of clinkers, more frequent grate shaking is likely needed during operation.**

### **⚠ WARNING**

**Never open the ash removal door when the outdoor furnace is in idle or standby mode. Combustible gases can collect in the ash collection chamber and if suddenly exposed to air can ignite, causing a flashback.**

### **⚠ CAUTION**

**Always wear the appropriate personal protective gear when removing ash and clinkers from the ash collection chamber.**

1. If the combustion fan is not running, press the Purge button.
2. Wait for the Purge cycle to run its course, allowing the combustion fan to run for a few minutes, and observe the chimney until little or no smoke is being emitted.
3. Open the ash door while staying clear of the opening.

**⚠ WARNING**

**Use caution and stay clear of the opening when opening the ash door. Combustible gases can cause a flashback.**

4. Use a flat shovel to quickly scoop out the ash and store in a metal container with a tight-fitting lid. Make sure all ash has been removed. Use the provided tools to stir and break apart any clumped ash.

**⚠ CAUTION**

**Remove as much ash as possible. Ash can trap moisture which can greatly increase the chance for corrosion.**

**⚠ CAUTION**

**Dispose of ash and clinkers in a steel container with a tight-fitting lid. The container should be placed on a noncombustible floor or on the ground, well away from combustible materials, pending final disposal.**

**⚠ CAUTION**

**If ash and clinkers are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until thoroughly cooled. Other waste shall not be placed in this container.**

**⚠ WARNING**

**When removing ash or clinkers, be careful not to spill any outside of the noncombustible container.**

# Maintenance

## PREVENTIVE MAINTENANCE SCHEDULE

Regular maintenance and inspections can help extend the life of your outdoor furnace and prevent high-cost repairs. This table is meant to serve as a general guideline until you become acquainted with how the outdoor furnace operates with your specific application.

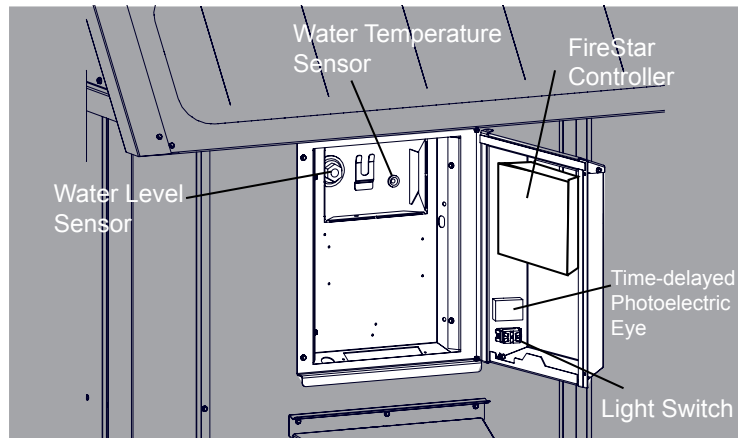
OPERATION	SERVICE INTERVAL							See Section Number
	Before first operation of season	Daily	Weekly	Monthly	Semi-Annually	Post-Season	Other	
Check water level.	●	●						3-1
Remove ash.		A				●		3-3
Scrape firebox door frame; use cleaning rod in ash.		A				●		3-3
Inspect firebox door seal.		A				●		3-4
Inspect and lubricate door latch bushings.						●	G	3-4
Inspect chimney.	●			F		●		3-5
Check vent cap.	●							3-2
Clean HeatLock Baffle and Ripple Top.	●			C		●	F	3-6
Inspect ash collection chamber.	●			C		●		3-7
Inspect over and under air actuators and elbows.						G		3-10
Inspect firebox and shaker grates.	●	A				●		3-8
Inspect and clean under and over air outlets.	●			C		●	B	3-10
Inspect and clean the combustion fan and inlet screen.						D		3-9
Oil the combustion fan (if required).						●		3-9
Check pH and nitrite levels of water.	●					D	●	E
Perform a complete firebox cleaning.				F		●		3-11

**NOTE: Check daily for build-up of creosote in the lower corners and around the air outlets until experience shows how often cleaning is necessary.**

- A Daily, or as needed.
- B Twice a week.
- C Weekly until interval for your application can be determined.
- D When new, after three months, then every six months thereafter.
- E Refer to **Testing Treated Water in the Outdoor Furnace.**
- F Frequency will vary depending on heat load requirements and type of coal used.
- G Or as needed.



## Control Locations



## ROUTINE MAINTENANCE

### ⚠ CAUTION

**Use only genuine Central Boiler Parts and Accessories if it ever becomes necessary to replace any component of the outdoor furnace.**

Routine inspections and maintenance are essential to the proper operation and longevity of the outdoor furnace. The items indicated in the preventive maintenance schedule are intended to serve as a guideline. Actual intervals between inspections and maintenance may vary depending on a number of factors, including your heat load requirements, type of coal used, and outdoor temperatures.

**NOTE: Proper maintenance of the firebox, ash collection chamber, heat exchanger, chimney transition box and chimney tee are essential for the outdoor furnace to function properly and for longevity.**

### ⚠ CAUTION

**Do not burn plastic, garbage, treated wood or fuels not listed for this outdoor furnace.**

**NOTE: Chloride or sulfurous gases can be generated if plastic or rubber is burned and will mix with moisture to form hydrochloric or sulfuric acids in the firebox, creating corrosion.**

*Creosote - Formation and Need for Removal.* 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 flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited this creosote makes an extremely hot fire.

When coal is burned, it will produce soot, a black, ash-like coating on the inside of the firebox and chimney.

The chimney connector and chimney should be inspected at least twice monthly during the heating season to determine if creosote or soot buildup has occurred, and to check for corrosion or condensation. If creosote has accumulated it should be removed to reduce the risk of a chimney fire. If soot has accumulated it should be removed to prevent air flow blockage.

### **⚠ WARNING**

**The chimney and chimney connector must be clean and in good condition.**

## **MAINTENANCE SECTIONS**

Refer to the Preventive Maintenance Schedule for the recommended intervals with which to perform these maintenance items.

### **3-1. Water Level**

Open the sight gauge valve. The sight gauge tube will fill to indicate the level of water in the outdoor furnace. Be sure to close the sight gauge valve after checking water level. The sight gauge valve and tube will drain when the valve is closed.

### **3-2. Vent Cap**

Check that the vent cap fits loosely on the vent opening.

### **⚠ WARNING**

**The outdoor furnace vent cap must fit loosely on the vent opening (Fig. 1). Do not force the cap down or try to seal it tightly onto the vent pipe. Do not extend or restrict the vent pipe or opening. DO NOT ALLOW THE OUTDOOR FURNACE TO BE PRESSURIZED.**

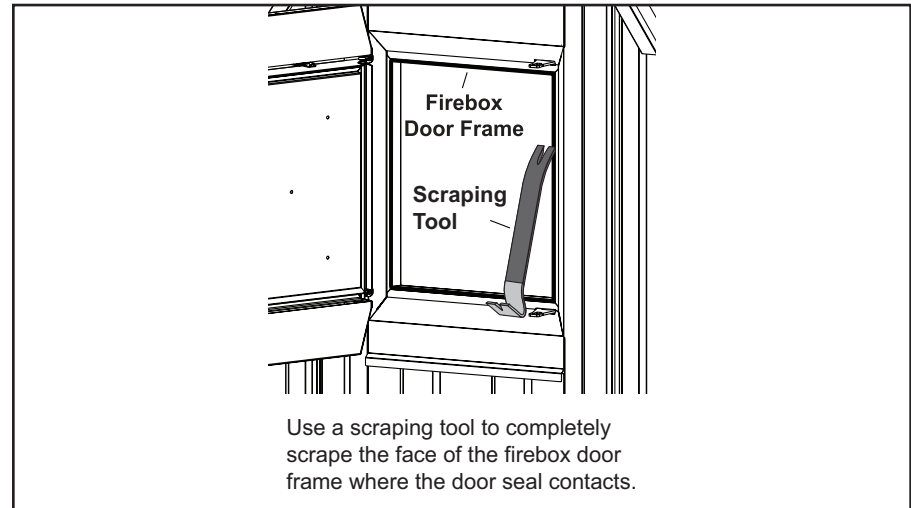
### **3-3. Ash**

If burning bituminous, a 3-4" bed of ash on the shaker grates must be maintained to protect the grates from the excessive heat of the coal fire.

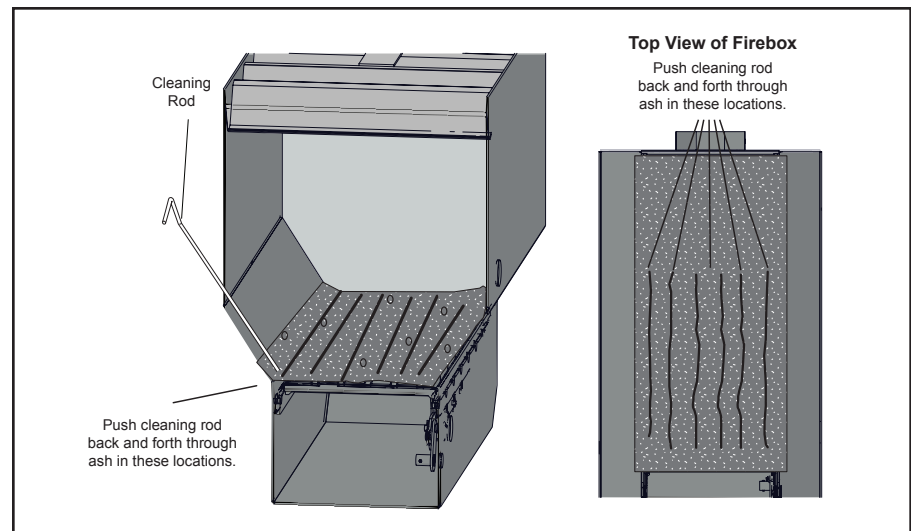
If burning anthracite, the ash bed should be thinner.

Monitor the ash during removal from the ash collection chamber to determine if the proper amount of shaker grate operation is being performed (see Ash Cleanout section for proper procedures).

1. Each time ash is cleaned out, inspect the firebox door seal and/or covers to make sure they are sealing properly.
2. Every other day (or as needed), completely scrape the face of the firebox door frame where the door seal contacts.



3. Using the illustration as a reference, push a cleaning rod or similar tool back and forth through the ash in the bottom of the firebox in the locations indicated by the lines. Feel for any clinkers, work them to the top of the ash bed, remove and dispose of them.



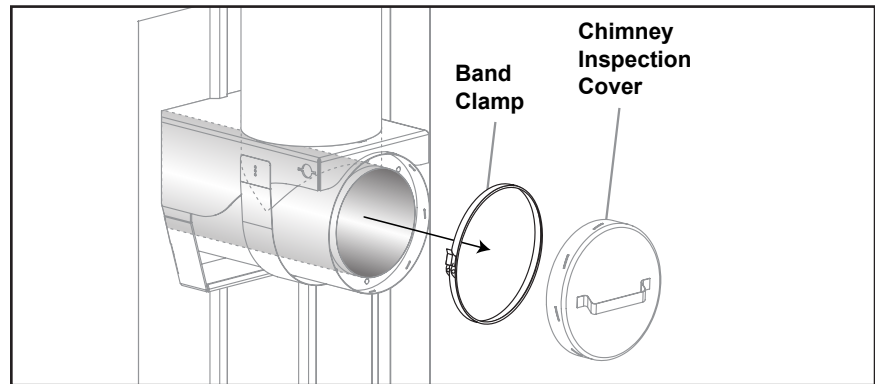
### 3-4. Firebox Door Seal and Bushings

Make sure the firebox door is properly latched and check the condition of the firebox door seal. If it is not sealing properly (indicated by a uniform indentation), replace the seal.

### 3-5. Chimney

Remove the chimney inspection cover. Inspect the chimney outlet and chimney for excessive creosote, soot, ash or deposits and clean as necessary.

**NOTE: The chimney inspection cover must fit tightly. Check and clean if necessary the groove for the cover to prevent air from leaking out. Leaking air caused by an improperly fitting cover can cause corrosion.**



### 3-6. Ripple Top and HeatLock Baffle

**NOTE: The Ripple Top and HeatLock Baffle require minimal maintenance; however, if any heavy deposits or soot have accumulated, allow the outdoor furnace to cool down and then remove with a brush.**

### 3-7. Ash Collection Chamber

**NOTE: The properties of the ash removed can help to identify how frequently the grates need to be shaken. If there are large amounts of unburned coal mixed in with the ash, the amount of grate shaking should be reduced. If there is very little ash but a lot of clinkers, more frequent grate shaking is likely needed during operation.**

#### **⚠ WARNING**

**Never open the ash removal door when the outdoor furnace is in idle or standby mode. Combustible gases can collect in the ash collection chamber and if suddenly exposed to air can ignite, causing a flashback.**

#### **⚠ CAUTION**

**Always wear the appropriate personal protective gear when removing ash and clinkers from the ash collection area.**

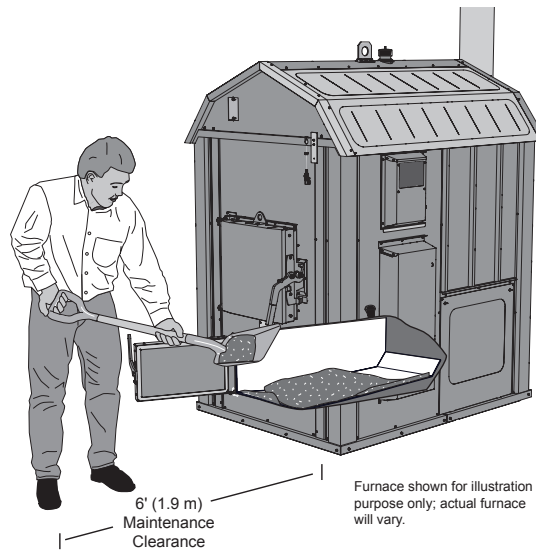
1. If the combustion fan is not running, press the Purge button.

2. Wait for the Purge cycle to run its course, allowing the combustion fan to run for a few minutes, and observe the chimney until little or no smoke is being emitted.
3. Open the ash door while staying clear of the opening.

### **⚠ WARNING**

**Use caution and stay clear of the opening when opening the ash removal door. Combustible gases can cause a flashback.**

4. Use a flat shovel to quickly scoop out the ash and store in a metal container with a tight-fitting lid. Make sure all ash has been removed. Use the provided tools to stir and break apart any clumped ash.



### **⚠ CAUTION**

**Remove as much ash as possible as ash can trap moisture which can greatly increase the chance for corrosion.**

### **⚠ CAUTION**

**Dispose of ash and clinkers in a steel container with a tight-fitting lid. The container should be placed on a noncombustible floor or on the ground, well away from combustible materials, pending final disposal.**

**⚠ CAUTION**

If ash and clinkers are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until thoroughly cooled. Other waste shall not be placed in this container.

**⚠ WARNING**

When removing ash or clinkers, be careful not to spill any outside of the noncombustible container.

5. Close and latch the ash removal door.

**3-8. Firebox****⚠ WARNING**

Remove all fuel, coals and ash from the firebox.

1. Scrape the top and sides of the firebox and around the door frame area to remove any deposits; then inspect the surfaces of the firebox for any signs of corrosion, paying particular attention to the ash level and below.

**NOTE: When scraping to clean inside the firebox, be sure to pay particular attention to the corners and to the seams.**

2. If signs of corrosion are present, determine the cause and correct it as soon as possible. Refer to *Corrosion is Present* in the Troubleshooting section.
3. A thin, tar-like creosote layer may form on the firebox walls and migrate toward the bottom of the firebox where it could collect into a thicker layer. Normally this layer will burn up as it collects on the bottom. If it migrates to the bottom of the firebox and does not burn up, it must be removed. Do not allow it to cover or restrict air flow. If larger, thick, dry deposits form on the walls in the firebox, they should be removed with a scraper.

Soot may also accumulate as a thick, black or brown powdery layer that is easily removed. Remove heavy deposits of soot as soot is a good insulator.

**NOTE: Soot deposits will vary depending on the amount and type of coal burned.**

**NOTE: Be aware that the hotter the fire, the less creosote is deposited, so weekly cleaning may be necessary in mild weather, even though monthly cleaning may be enough in coldest months.**

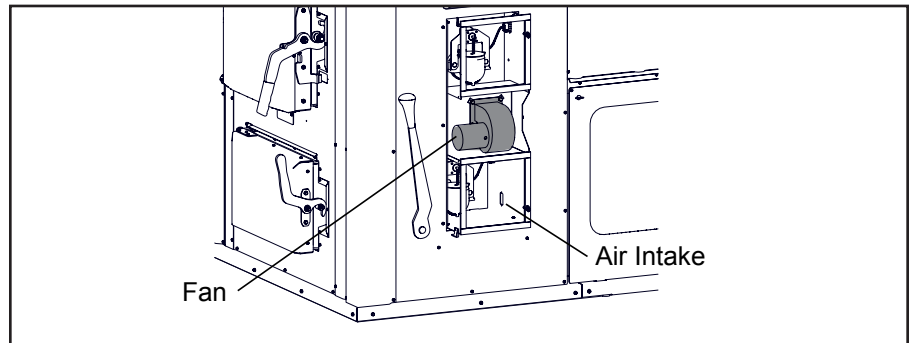
**3-9. Combustion Air Fan**

1. Disconnect power to the outdoor furnace.

## ⚠ WARNING

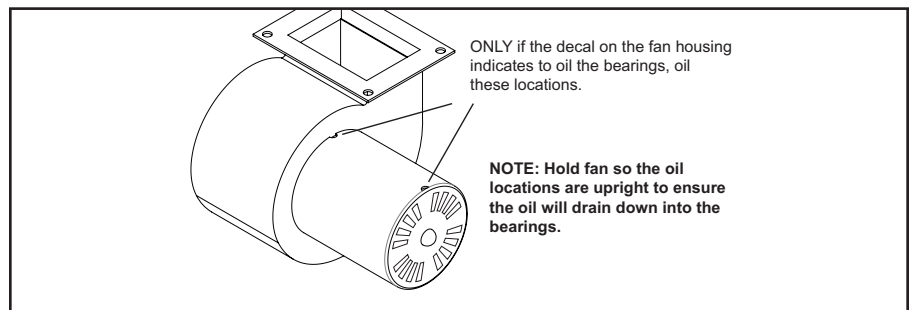
**Do not proceed without testing that power is disconnected.**

- Remove the outer airbox cover; then open the airbox cover. Inspect the combustion air fan inlet screen and fan wheel and clean if necessary. Make sure the air intake is clean and not obstructed.



**NOTE: Some furnaces use a permanently sealed fan and others use a fan with oil locations. If the fan in your furnace has oil locations, at the end of each heating season oil the combustion fan bearings using the following procedure.**

- Remove the bolts securing the combustion fan and remove the combustion fan.
- Hold fan so the oil locations are upright; then apply 10 drops of SAE 20 non-detergent oil (e.g., 3-IN-ONE® Oil) in each location, as shown.



- Install the combustion fan and secure with bolts.
- Close and secure the airbox cover. Install the outer airbox cover and secure with screws.

## ⚠ DANGER

**Do not connect power or operate the outdoor furnace with the outer airbox cover removed. The outer airbox cover must be installed and secured with screws.**

### 3-10. Over/Under Air Elbows

1. Disconnect the electrical power to the outdoor furnace at the main power source.

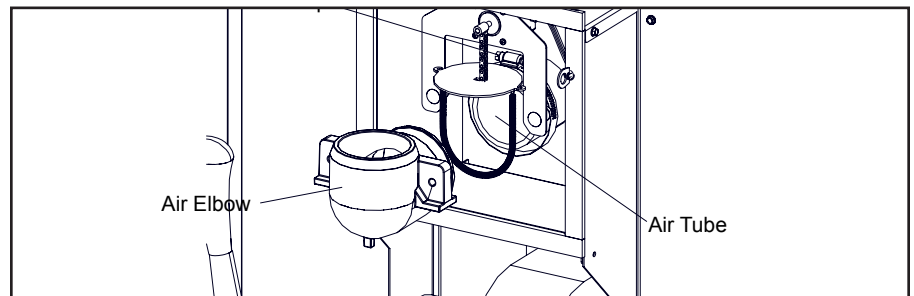
#### **⚠ WARNING**

**Do not proceed without testing that power is disconnected. Make sure the power cannot be reconnected while servicing the solenoids (i.e., use lock out, tag out).**

2. Remove the outer airbox cover; then open the airbox cover.

**NOTE: The following steps apply to both the over and under air supply elbows.**

3. Disconnect the actuator control harness plug from the receptacle in the airbox being careful not to damage the plug.
4. Loosen the clamp securing the over/under air elbow to the air tube; then remove the air elbow.



5. Inspect the elbow and clean out any build-up or blockage.

**NOTE: A *small* amount of material in the elbow is normal and is not an indication of improper operation.**

6. Inspect the air tube for blockage or obstructions. To remove blockage or obstructions in the air tube, a screwdriver and a shop vac may be useful.
7. Install the air elbow to the air tube; then tighten the clamp.
8. Connect the actuator control harness to the receptacle in the airbox being careful not to damage the plug.
9. Close and secure the airbox cover. Install the outer airbox cover and secure with screws.

#### **⚠ DANGER**

**Do not connect power or operate the outdoor furnace with the outer airbox cover removed. The outer airbox cover must be installed and secured with screws.**

10. Connect the electrical power to the outdoor furnace at the main power source.



### 3-11. Complete Firebox Cleaning Procedures

The procedures outlined here explain how to thoroughly clean the firebox, ash collection chamber and chimney tee. The frequency for performing this type of cleaning will vary depending on a number of factors, including your heat load requirements, type of coal used, and the moisture of the coal.

**NOTE: Proper maintenance of the firebox, ash collection chamber, chimney transition box and chimney tee are essential for the outdoor furnace to function properly and for longevity.**

**NOTE: Allow the coal to burn out completely before performing this type of cleaning.**

#### ⚠ CAUTION

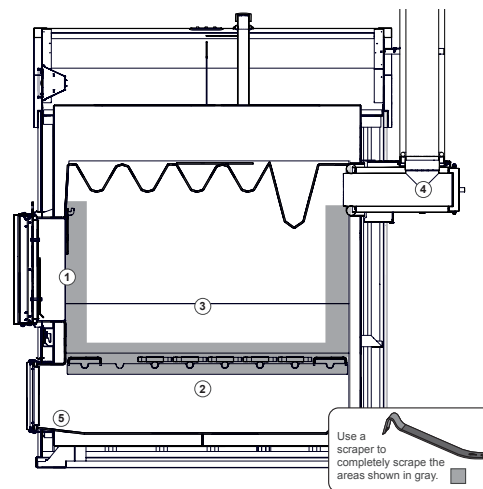
Always wear the appropriate personal protective gear (e.g., protective gloves, clothes, dust mask, etc.) when cleaning ash from the firebox and the ash collection chamber.

#### ⚠ CAUTION

Clear the entire area surrounding the outdoor furnace of any combustible materials before performing these cleaning procedures.

#### ⚠ WARNING

Be careful not to spill any coals or ash. Place coals and ash in a metal container with a tight-fitting metal lid.



Clean ash and deposits from the areas identified in the order shown. Refer to the corresponding sections for detailed procedures.


- ① Door Frame ② Ash Collection Chamber ③ Firebox ④ Chimney Tee  
⑤ Ash Collection Chamber

**NOTE: Refer to the illustration and clean the areas identified in the order shown. For each area in the illustration, refer to the following corresponding section.**

### ⚠ CAUTION

Be sure to turn off the FireStar controller before doing this procedure.

#### 1. Door Frame

1. Using the Firebox Door Opening procedure, open the firebox door.
2. Press the **Power**  button to turn the FireStar controller off.
3. Scrape the face and surface area of the door frame to remove any deposits.

#### 2. Ash Collection Chamber

1. Open the ash removal door.
2. Use a hoe to pull the ash to the front of the furnace; then use a small shovel to remove all of the ash and deposits from the ash collection chamber. Take care not to push any debris into the under air outlet.

**NOTE:** It is extremely important to clean all the way to the back of the ash collection chamber. To make sure ash is being completely removed, mark the hoe handle when the hoe is positioned all the way to the back of the ash collection chamber. Use the mark as a reference when removing ash.

### ⚠ CAUTION

Take care not to push ash or debris into the over/under air outlets when removing ash.



### 3. Firebox

1. Using a shovel, remove as much coal and ash as possible.
2. Use the Dump to Empty Procedure to dump the remaining coals and ash into the ash collection chamber. If necessary, remove ash and coal from the ash collection chamber to make room.

**NOTE: It can take many days before ash is completely cooled. Other waste should not be placed in the same container.**

#### **⚠ WARNING**

**When removing ash, be careful not to spill any coals or ash outside of the noncombustible container.**

3. Using a scraping tool, completely scrape the area inside the firebox. Pay special attention to scraping the front corners. Scrape any crusty deposits off the firebox walls. Scrape the shaker grates and make sure the shaker grate slots are free of ash. Remove all of this material by shoveling it out.
4. Inspect the surfaces of the firebox for any signs of corrosion. Use a wire brush to clean if needed.

### 4. Chimney Tee

1. Remove the chimney inspection cover. Clean the chimney outlet and chimney of excessive ash or deposits.

**NOTE: The chimney inspection cover must fit tightly. Check and clean if necessary the groove for the cover to prevent air from leaking out. Leaking air caused by an improperly fitting cover can cause corrosion.**

2. Use a small mirror to check that the chimney is clear.

## WATER QUALITY AND MAINTENANCE

### Test Supply Water

Test a sample of the supply water (makeup water) that will be used to fill the outdoor furnace (softened water is recommended). Test strips for testing pH are included in the water test kit which is provided with the outdoor furnace.

1. Collect a small sample of the water to be used to fill the outdoor furnace in a clean container.
2. Dip the pH test strip from the provided test kit in the water sample. Shake excess water off the test strip. Compare the color of the test strip to the chart provided to determine pH level.
3. If the pH level is between 6.5 and 8.0 and there are no other known water quality problems, then the outdoor furnace may be filled with this water.
4. Water that has a pH level of less than 6.5 or greater than 8.0, or that has other known water quality problems, should not be used to fill the furnace. Instead, water should be supplied from a different source.

### Adding Initial Water Treatment

#### ⚠ CAUTION

**Avoid damaging your furnace and voiding your warranty. Add water treatment BEFORE adding water to the system. Water treatment in your outdoor furnace is just as important as the oil in a car's engine.**

MolyArmor 350 Corrosion Inhibitor (p/n 2900630) gives optimum protection for the furnace water jacket and system parts when it is used to initially treat the water and is maintained at a minimum of 350 ppm of moly and pH level between 8.0 and 9.5. The recommended initial treatment rate for the outdoor furnace is specified by units. One unit of MolyArmor 350 is a 1-gallon (3.78-liter) container.

MOLYARMOR 350 TREATMENT AMOUNTS	
Forge 1500	1-1/2 gallons
Forge 3500	2 gallons

1. Add the recommended amount of MolyArmor 350 to the outdoor furnace.

**NOTE: If the system has a larger than normal water capacity, more MolyArmor 350 should be added at a recommended rate of 6.5 oz. (190 ml) per 10 gallons (37.8 liters) of system water. One unit (1 gallon or 3.78 liters) of MolyArmor 350 will treat 200 gallons (757 liters) of system water.**

2. Fill the furnace and system using the instructions to ensure air is purged from the system - refer to Installation Guide.

### Immediately Heat the System Water to 185°F (85°C)

1. Refer to Cold Start Firing to start the outdoor furnace. Bring the water temperature up to operating temperature (185°F or 85°C) for two hours with the system circulating; then add water to the full mark. Continue to run the pump and circulate the water for 24 hours.

**NOTE: It is important to bring the water in the system up to operating temperature (i.e., 185°F or 85°C) immediately after filling the system. This also applies any time water is added to the system.**

**NOTE: The sight gauge valve should always be closed except when checking water level. Water will automatically drain from the sight gauge tube. Remember that this type of valve requires only 1/4 turn to open or close.**

2. Check the system for leaks again. Inspect all fittings and hose ends for any signs of leakage; repair as necessary. If a screw-type clamp has been used, it may be possible to stop a very slow leak at a hose clamp by tightening the clamp after the system has warmed up and the poly becomes more pliable. It might also be necessary to install a second hose clamp with the screw positioned on the opposite side.

### Test the Treated System Water

After circulating the water in the system for 24 hours, test the treated system water for the recommended moly (at least 350 ppm) and pH level (between 8.0 and 9.5).

#### **⚠ CAUTION**

**The water in the sight gauge may be hot. Use caution when obtaining a sample.**

1. To obtain a system water sample, bend the sight gauge tube away from the outdoor furnace. Before collecting the sample, open the valve and drain about a quart of water from the sight gauge tube; then carefully fill the sample container without contaminating the sample. **Be sure to properly install the sight gauge tube and close the valve when finished.** The water in the sight gauge valve and tube will drain when the valve is closed.
2. Dip a pH test strip from the test kit in the water sample. Shake excess water off the test strip. Compare the color of the test strip to the chart provided to determine pH level. The pH of the treated water should be between 8.0 and 9.5.
3. Follow the instructions provided in the water test kit to test the moly level of the treated system water.

### Maintenance Levels

Test the pH and moly levels after the first three months and every six months thereafter, and after adding water to furnace.

**NOTE: It should not be necessary to add water to the outdoor furnace more frequently than once every twelve months. If it is more frequent, either there is a leak in the system or the outdoor furnace is boiling because of improper operation or maintenance (see Troubleshooting Section in the Owner's Manual). Be sure to locate and repair the problem immediately. Frequently adding water can cause deterioration in the water jacket. Each time water is added, refer to Water Quality and Maintenance in the Owner's Manual for water testing procedures. If indicated by test results, add MolyArmor 350 as required. Deterioration due to improper operation and/or maintenance is not covered by warranty.**

### Send in Initial Water Sample

Your owner's packet contains a Water Sample Kit for submitting an initial water test. Additional Water Samples Kits are available from your Central Boiler dealer.

**INITIAL WATER SAMPLE:** You are required to submit an initial water sample within 30 days of purchase of your outdoor furnace. **EXCEPTION:** if your outdoor furnace is not being installed within 30 days of purchase, you must email Central Boiler ([service@centralboiler.com](mailto:service@centralboiler.com)) with an estimated installation date, your name and your furnace serial number. When the furnace installation is complete, send the water sample **within 10 days of the initial fill**.

**TO CHECK STATUS OF YOUR WATER SAMPLE:** Check the status of your water sample at:

[CentralBoiler.com/w25](http://CentralBoiler.com/w25)

You will need your serial number and postal code. Please allow 2-3 weeks for results to be available.

### Annual Water Sample

**ANNUAL WATER SAMPLE:** You are required to submit a water sample yearly prior to the anniversary date of your initial installation. Record the anniversary date below:

\_\_\_\_\_   
DATE OF INSTALLATION

**Water Samples**

Maintaining the corrosion inhibitor at a proper level is imperative to preventing corrosion failures. To qualify for the 25 year warranty, you must follow the instructions in the Owner's Manual and the Installation and Initial Water Treatment Guide concerning initial water treatment and maintenance. When the outdoor furnace is initially put into service, and once a year after that, you are required to submit a water sample to confirm proper maintenance and water treatment. No warranty claim can be approved unless the outdoor furnace registration and the required water tests verifications are on file at Central Boiler.

**NOTE: It is your responsibility as owner to ensure that your water sample information is accurate and that you submit your samples on a timely basis as required by the warranty for your stainless steel outdoor furnace. Failure to do so will result in a one year warranty.**

**SYSTEM MAINTENANCE**

An important part of outdoor furnace maintenance is controlling the quality of the water in the outdoor furnace.

**Water Test Kits and Test Results**

DATE	pH LEVEL	MOLY LEVEL

Record the results of pH and Moly level tests in the table above. If additional space is needed, record on a separate sheet of paper.

It is very important to keep record of water test results (including the date, pH and Moly level). The pH and Moly test strips and indicator have a shelf life of approximately two years that can affect their accuracy. Test kits should be stored in a dry area at room temperature to obtain maximum accuracy over a longer period of time.

Biological contamination can occur if the furnace is not heated up to 185°F immediately after filling it with inhibitor and water as directed.

**NOTE: ANY time water is added to the system, it is extremely important to bring the water temperature up to operating temperature (185°F) as soon as possible, even if it is during the off-season. Failure to bring the water in the system up to operating temperature immediately after filling the system can allow bacteria present in the water to multiply and may increase the potential for corrosion in the system.**

If the test indicates a significantly lower-than-recommended pH level (below 8.0), add MolyArmor to increase the pH level.

## POST HEATING SEASON MAINTENANCE

The water should be left in the outdoor furnace if the outdoor furnace is not being used for an extended period of time.

1. Refer to the Preventive Maintenance Schedule for a list of operations to perform.
2. Shut off the power supply to the outdoor furnace.
3. Place a cover over the chimney to keep rain from entering the outdoor furnace. Clean and oil the chimney flue to the firebox.

### Flushing the System

If the system water is brown or orange, it is an indication that the corrosion inhibitor level has not been maintained correctly and corrosion is present in the water jacket. Sludge Conditioner (p/n 166 or 1660) can be used by circulating the recommended amount through the furnace **for one week** to help clean some of the corrosion from inside the water jacket before flushing, draining and refilling with water and the correct amount of MolyArmor 350.

**NOTE: Use one unit of Sludge Conditioner per 200 gallons of system water.**

1. De-energize the pump(s) and close the supply and return valves on the outdoor furnace. Remove the inspection panel and insulation covering the drain to gain access to the drain valve. Remove the cap and connect a hose to the drain.
2. Open the drain to drain the system; then flush the top of the firebox and bottom of the water jacket beneath the firebox using a wand placed in the vent.

### CAUTION

**Completely clean out the firebox before draining water from the outdoor furnace.**

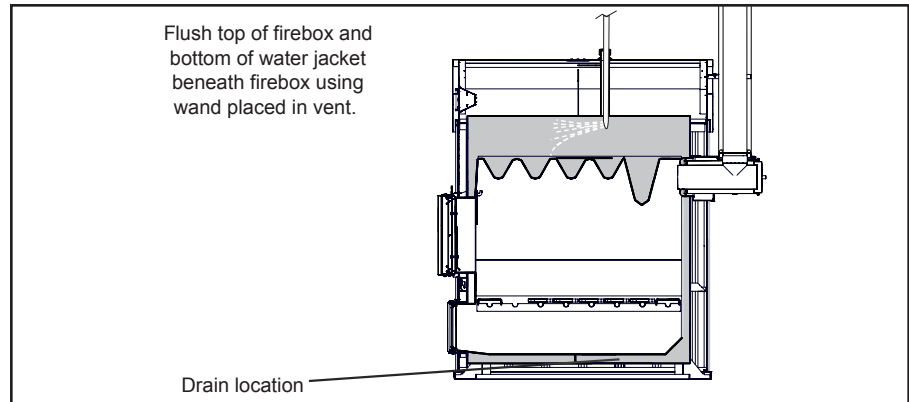


### Draining Treated System Water

MolyArmor 350 is composed of common materials. Molybdenum compounds characterized as nontoxic in US Public Health Bulletin 293, by the Federal Hazardous Substances Labeling Act, and by the Occupational Safety and Health Act. However, in keeping with good safety and environmental practices, dispose furnace water in accordance with federal, state and local regulation. Unless regulation prohibits, you may drain the outdoor furnace to a home septic system. If doing so, however, be careful not to overflow the septic system.

Do not drain the outdoor furnace in such a manner that the drain water could in any way contact surface water, stream, river, estuary (where a river meets a sea), lake, pond, ocean or other types of waters.

Do not drain to any location within 50 feet (15 meters) of any water well.



3. Close the drain valve securely and replace the cap on drain after flushing the outdoor furnace.
4. Add recommended amount of MolyArmor 350.
5. Fill the outdoor furnace following the procedure in Finalizing the Installation in the Installation Guide. Start the pump(s) and bring the water temperature up to operating temperature (185°F) for two hours with the system circulating to thoroughly mix the MolyArmor 350.

**NOTE: ANY time water is added to the system, it is extremely important to bring the water temperature up to operating temperature (185°F) as soon as possible, even if it is during the off-season. Failure to bring the water in the system up to operating temperature immediately after filling the system can allow bacteria present in the water to multiply, which may increase the potential for corrosion in the system.**

6. Replace insulation around drain valve.
7. Replace the inspection panel.

## Adding Antifreeze to Outdoor Furnace System

Most outdoor furnaces are installed **without** antifreeze when an existing heating system is in place and there is no anticipation of leaving the outdoor furnace unattended for extended periods of time (10 days or more). If the building being heated has an alternate heat source, system water may be kept from freezing by running the circulating pump(s) and drawing heat from the existing furnace or boiler in the home or building.

To prevent freezing if the outdoor furnace is not fired for extended time periods or if lengthy power outages are anticipated during cold weather, a nontoxic propylene glycol may be used in the system. Some types of antifreeze that contain various inhibitors have been known to create problems like coagulation and jelling. To prevent potential problems, **do not use propylene glycol that is premixed with inhibitors**. MolyArmor 350 is compatible with (raw) propylene glycol. It is important to use MolyArmor 350 with straight propylene glycol for corrosion protection. If adding antifreeze to the system, it is imperative that the entire system contain **at least 30% antifreeze concentration mixed with softened, reverse osmosis or deionized water** to prevent bacterial growth and minimize minerals in the system. Bacterial growth is likely to occur with low antifreeze concentrations and can cause corrosion in the furnace water jacket and/or clogging of heat exchangers. To confirm the antifreeze solution is adequate and to kill bacteria, immediately heat the system up to 185° F, allow the pumps to circulate for at least 24 hours and then obtain a sample of the system water. Using an antifreeze tester, the solution must be protected to 10° F (-12° C) or below.

**NOTE: If using antifreeze, test the pH and Moly levels once each month. If the bacterial issues occur, the pH will decrease.**

**NOTE: Be sure to adhere to all warnings and precautions on the antifreeze label.**

**NOTE: Do not use automotive or RV types of antifreeze.**

## SERVICEABLE ITEMS

**NOTE:** These procedures should be performed by a qualified individual and in accordance with any and all federal, state/provincial and local codes and regulations. When performing work on an appliance observe all precautions in the literature, tags and labels attached to the appliance and other safety precautions that may apply. When working with electricity and electrical components, failure to follow precautions could result in property damage, personal injury or death.

**NOTE:** If any of these items are under warranty, remember that the warranty covers only the cost of the replacement part. Labor is not covered.

**NOTE:** Use only genuine Central Boiler parts and accessories if it ever becomes necessary to replace any component on the outdoor furnace.

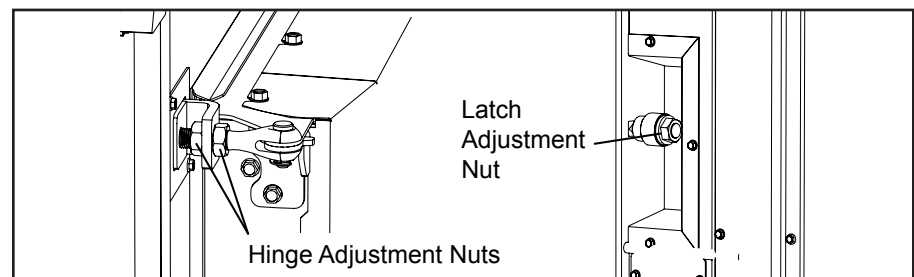
### ⚠ WARNING

Allow the outdoor furnace to thoroughly cool and completely clean out the firebox and ash collection chamber before servicing any item on the outdoor furnace. Always follow the Firebox Door Opening Procedure to reduce the possibility of a flashback, even if the outdoor furnace has been shut down for an extended period of time.

### FIREBOX DOOR HINGE / LATCH BEARING ADJUSTMENT

If the firebox door seal has been replaced and it is not sealing properly, the firebox door may need to be adjusted to close more tightly. When adjusting the firebox door, make sure it is not adjusted too tightly as damage to the firebox door, frame or door seal may result.

1. To tighten the hinges, loosen the inner adjustment nut and turn the outer nut in slightly; then tighten the inner adjustment nut securely. Adjust the top and bottom hinge for equal pressure when the door is latched.
2. To tighten the latch bearing, loosen the latch adjustment nut; then tap the latch bearing assembly in toward the firebox. Tighten the latch adjustment nut securely.



## FIREBOX DOOR SEAL

The firebox door seal must be in good condition to ensure an airtight seal. If the outdoor furnace is operated with the door open or ajar, the firebox door seal may become damaged or brittle due to excessive temperatures. If replacement is necessary, use the following procedure:

### ⚠ WARNING

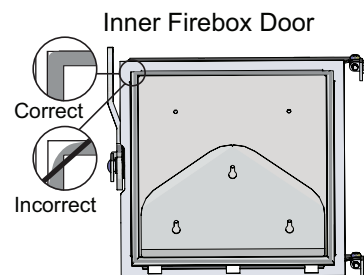
**Remove all coal and ash from the firebox.**

1. Disconnect power to the outdoor furnace.

### ⚠ WARNING

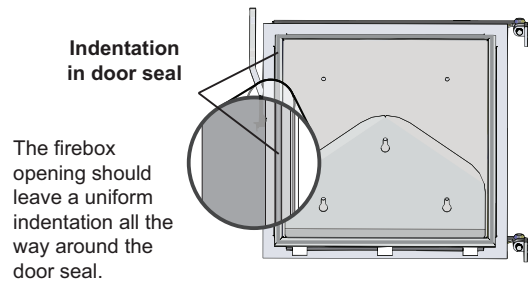
**Do not proceed without testing that power is disconnected. Make sure the power cannot be reconnected while testing components (i.e., use lock out, tag out).**

2. Using a scraper, remove the firebox door seal on the inner side of the firebox door and clean any remaining silicone adhesive from the groove. Any residue left in the groove will interfere with the new rope seal.
3. Apply a liberal amount of silicone sealant into the entire firebox door seal groove.
4. Starting at the center of the hinge side of the firebox door, insert the new door seal rope into the groove, pressing it firmly into the bead of silicone sealant. Make sure the firebox door seal rope is not stretched as it is pressed into the corners. Force the firebox door seal rope out to fill in the corners as shown.



5. When the seal has been pressed into the groove all the way around the firebox door, cut the end of the rope about one inch longer than required and press it tightly against the beginning end of the rope.
5. Scrape the face and surface area of the door frame to remove any deposits.
6. Close the firebox door. Make sure that pressure is felt as the latch is closed to ensure the seal is tight with the door frame.

- Open the firebox door and check that there is an impression in the seal from the door frame. This mark must extend, with no gaps, around the entire perimeter of the firebox door seal. If needed, adjust the hinges and latch assembly.



### **⚠ CAUTION**

**The firebox door seal will be damaged or destroyed if it is not installed properly.**

## **ASH REMOVAL DOOR SEAL**

The ash removal door seal must be in good condition to ensure an airtight seal. If replacement is necessary due to the ash collection chamber door seal becoming damaged or brittle, use the following procedure:

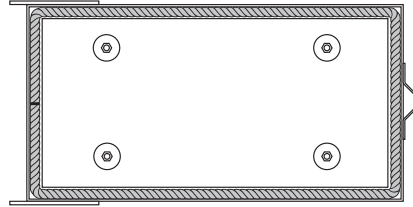
- Disconnect power to the furnace.
- Open the ash removal door.
- Use a flat shovel and hoe to remove all the ash from the ash collection chamber. Be careful not to push ash or debris into the under air outlet.

### **⚠ WARNING**

**Remove all ash from the ash collection chamber.**

- Using a scraper, remove the ash removal door seal rope and clean any remaining silicone adhesive from the groove. Any residue left in the groove will interfere with the new seal.
- Apply a liberal amount of silicone sealant into the entire ash removal door seal groove.
- Starting at the center of the hinge side of the ash removal door, insert the new door seal rope into the groove, pressing it firmly into the bead of silicone sealant. Make sure the ash removal door seal rope is not stretched as it is pressed into the corners. Force the door seal rope out to fill in the corners as shown.

### Ash Removal Door



6. When the seal has been pressed into the groove all the way around the door, cut the end of the rope about one inch longer than required and press it tightly against the beginning end of the rope.
7. Close the ash collection chamber door and securely latch.

### THERMOCOUPLE

Occasionally the thermocouple can become fouled with soot. When this occurs, the thermocouple can be cleaned using a flue brush. Push the flue brush past the end of the chimney tee until it drops down and then spin the brush while moving it back and forth. This should knock off any accumulated soot from the thermocouple. On the rare occasion the thermocouple needs replacement, follow these steps:

1. Disconnect power to the outdoor furnace.

#### **⚠ WARNING**

**Do not proceed without testing that power is disconnected. Make sure the power cannot be reconnected while replacing the thermocouple.**

2. Remove the chimney trim piece.
3. Disconnect the thermocouple connector; then, using a wrench, remove the jamb nut securing thermocouple.
4. Install new thermocouple and secure with jamb nut. Connect the thermocouple connector.
5. Install the chimney trim piece.
6. Connect power to the outdoor furnace.

**NOTE: This procedure can also be used to clean the thermocouple; however, you should always try to clean it using the procedure outlined in the first paragraph before disconnecting and removing the thermocouple.**

## TROUBLESHOOTING

### A. OUTDOOR FURNACE IS NOT OPERATING CORRECTLY

1. **Out of fuel** - Add fuel as necessary. Use properly sized, dry coal.
2. **Over/under air outlets obstructed** - Clean as required to prevent the air outlets from being obstructed.
3. **Combustion air fan obstructed or not running** - Check the screen over the fan inlet and the inside of the fan for any obstructions.
4. **Airbox leaking** - The airbox cover must be properly secured. Determine the cause and correct.
5. **Over/under air actuator closed** - If the over/under air actuators are not operating properly, determine the cause and correct.
7. **Ash collection chamber or the chimney plugged** - If the chimney is plugged, determine the cause and correct.
8. **Door open** - If the display on the controller indicates "door open," close the firebox door. Make sure the firebox door is properly latched and check the condition of the firebox door seal. If it is not sealing properly (indicated by a uniform indentation), replace the seal.
9. **Low water** - If the display on the controller indicates Low Water, the system senses a low water condition. Check the water level at the sight gauge and, if necessary, add water according to the Water Quality and Maintenance section. If adding water does not correct the problem, contact your Central Boiler dealer.
10. **Low water temperature for too long a period of time** - The display on the controller will indicate Fire Out and the controller will shut down the furnace if the water temperature has been too low for too long. Determine the cause of the water temperature being too low.
11. **Alarm condition** - Refer to FireStar Operating Instructions.
12. **Chimney not drafting properly** - Draft is the force which moves air from the appliance up through the chimney. The amount of draft in your chimney depends on the length of the chimney, local geography, nearby obstructions and other factors. Draft occurs when the temperature in the chimney is high enough to cause a negative pressure that "pulls" the exhaust up and out the chimney.

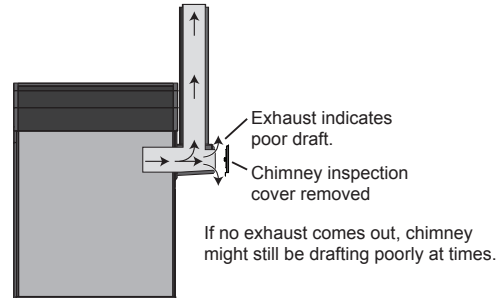
Proper draft is necessary for the outdoor furnace to operate optimally. Too much draft may cause excessive temperatures in the appliance. Inadequate draft may cause backpuffing and plugging of the chimney.

If poor draft is suspected, perform the following test: with the outdoor furnace and chimney at normal operating temperature, loosen the chimney inspection cover and pull it back about an inch. If exhaust comes out from around the cover, pressure in the chimney may be incorrect and adding more chimney sections may be required. However, due to many variables, even if exhaust does not come out from around the cover, the chimney might still not be drafting properly at all times. Due to a number of variables, poor draft can be an intermittent problem.

**NOTE: A qualified installer may perform the following test to check for proper draft. Before performing the test, the outdoor furnace should be completely cleaned to ensure nothing obstructs exhaust flow through the system. Fire the furnace and allow it to reach normal operating temperature before performing the test.**

- Drill a hole in the chimney inspection cover; then with the outdoor furnace and chimney at normal operating temperature, use a manometer to check draft. If flue draft is less than  $-0.05$  in. WC ( $-12.45$  Pa) add more chimney sections.
- After the test, fill the hole in the chimney inspection cover with high-temp silicone.

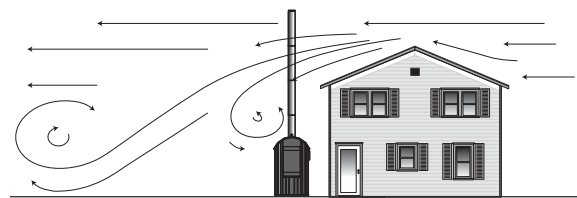
Perform test with bypass closed at normal operating temperature.



- If a spark arrestor is being used, make sure it is clean and unobstructed.
- Objects like buildings and trees in close proximity or nearby terrain (e.g., hills, valleys, etc.) can adversely affect air flow in the chimney. Adding chimney sections may overcome these factors.



May cause poor draft.



Allows for better draft.

## B. FIRE GOES OUT OR KEEPS GOING OUT

1. **Coal too wet** - Store coal in a dry location where it can be isolated from the elements.
2. **Coal is wrong size** - Nut-size coal works best for most applications; however, sizes ranging from fines up to stove size can be used. Note that if too many fines or pieces larger than stove-size are used, the fire may go out.
3. **Coal loaded improperly** - Refer to the Loading Frequency section and try a different loading method. It may take some trial and error to develop a method that works for your application and conditions.



4. **Coal bed not large enough to ignite new fuel** - An adequate bed of glowing coals is required to ignite new fuel. To re-establish a bed of coals, try to add small amounts of fuel until a thick bed of glowing coals is established before adding a full load.
5. **Water temperature setpoint too low** - Set the water temperature setpoint higher (see FireStar manual).
6. **Too much time between idle pulses of air** - Reduce the time between idle pulses of air (see FireStar manual).
7. **Length of pulse of air too short** - Increase the amount of time the pulse of air is provided (see FireStar manual).
8. **Water temperature differential too large** - Set the water temperature differential to a smaller value (see FireStar manual).
9. **Not enough ash in the firebox** - Some ash, approximately three inches, is necessary for the proper operation of the outdoor furnace. Ash acts as an insulator, keeping the glowing coals in the bottom of the firebox hot enough to restart the fire when needed after being in idle mode (bituminous coal only). Ash also helps protect the shaker grates.
10. **Too much ash (anthracite only)** - Anthracite requires a free flow of combustion air through the shaker grates and ash/coal bed. A thick layer of ash will prevent this. When burning anthracite, make sure the shaker grates are operated long enough so that just a thin layer of ash protects the shaker grates. This will help to ensure proper airflow through the coal bed.
11. **Shaker grates obstructed** - The opening in the shaker grates need to be free of obstructions so combustion air can flow properly. Check for clinkers and remove them. Refer to the About Clinkers section for more information.

### C. BUILDING IS LOSING TEMPERATURE

1. **Circulation valve(s) closed** - Be sure the proper valves in the system are open to allow circulation.
2. **Circuit breaker off** - If there is a circuit breaker that supplies power to the outdoor furnace, check that it is on.
3. **Circuit breaker off** - Check that the circuit breaker switch (located in the pump compartment) is on. If the circuit breaker has tripped, determine the cause before resetting it.
4. **Circulation pump(s) not operating** - Check that circulation pumps are operating. If not, disconnect power to the pump. Close valves at the pump. Disassemble the pump and try to turn the pump shaft. If the shaft is stuck, replace the pump cartridge. Replace only the cartridge whenever possible. If necessary, replace the pump. Follow instructions supplied with the pump.
5. **Air in system** - Check for air in the water lines or heat exchangers. If you hear a gurgling sound in a heat exchanger, air is present in the system. Shut off the pump, wait 15 seconds and start the pump. If it is necessary to force air from lines, refer to Initial Start-up Procedures.
6. **Building(s) poorly insulated or uninsulated** - Poorly insulated or uninsulated buildings, buildings with uninsulated or poorly insulated ceilings, or a lack of proper insulation under radiant flooring can cause excessive fuel consumption and or heating problems.
7. **Supply and return lines installed incorrectly** - Make sure the hot supply line is connected to the correct fitting on the outdoor furnace and heat exchanger.

8. **Circulation pump(s) installed backwards** - Check that pump flow direction is correct. If not, shut off power to pump. If the flow is not in the correct direction, disconnect pump from water line and reverse pump mounting to correct flow direction. If the pump is not mounted on the outdoor furnace, check for proper pump mounting location.
9. **Underground supply and return lines insulated poorly** - Heat loss from poorly insulated underground supply and return lines is often indicated by an unusually high amount of snow melting above the lines when the ground temperature is 10°F (-12°C) or colder.
10. **Supply and return lines uninsulated** - Uninsulated supply and return lines in areas that are not intended to be heated (unheated crawl spaces, under mobile homes, etc.) may cause excessive heat loss. Insulate the supply and return lines.
12. **Poor water quality** - Water with high amounts of solids, sand or dirt can create deposits inside the wall of heat exchanger components, reducing the amount of heat output. If this condition is suspected, contact your Central Boiler dealer.
13. **New construction with radiant in-floor heat** - Bringing a cold concrete slab up to temperature the first time will take a considerable amount of time and wood; once warm, wood consumption will be reduced if the concrete slab and building are insulated properly.
14. **Heat load too large** - Re-evaluate the system and match heat load to the outdoor furnace.

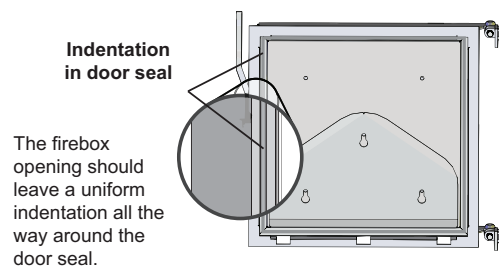
#### D. SMOKE COMING FROM BETWEEN FIREBOX DOOR AND FRONT OF THE DOOR FRAME

1. **Door seal faulty or door frame obstructed** - If there is smoke coming from between the firebox door and the front of the door frame for more than a short time after reloading, scrape the face and surface area of the door frame to remove any deposits. Check the condition of the firebox door seal and replace if necessary.
2. **Door hinges and/or latch need adjusting** - Adjust the hinges and/or latch bearing.

#### E. OUTDOOR FURNACE IS OVERHEATING

**NOTE: If the outdoor furnace overheats, it can damage the shaker grates. Damage from the furnace overheating is not covered under warranty.**

1. **Setpoint too high** - Coal can retain a large amount of heat. Lower the water temperature setpoint.
2. **Air entering through the firebox door or smoke coming out of the firebox door when the door is closed** - Make sure the firebox door is properly latched and check the condition of the firebox door seal. If it is not sealing properly (indicated by a uniform indentation), replace the seal. If firebox door does not close tightly, adjust using the appropriate procedure (see Owner Serviceable Items).



**NOTE: If the outdoor furnace is operated with the door open, the firebox door seal may be damaged.**

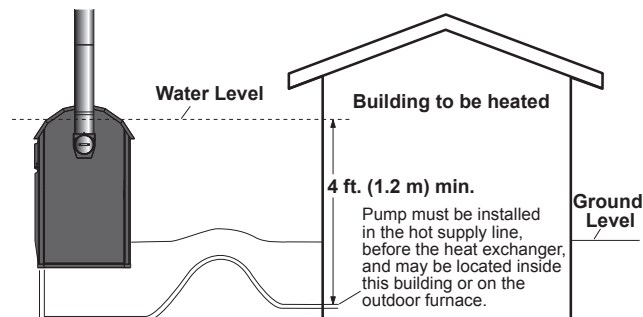
2. **Air entering through the ash removal door or smoke coming out of the ash removal door when the door is closed** - Make sure the ash removal door is properly latched and check the condition of the door seal. If it is not sealing properly (indicated by a uniform indentation), replace the seal. If the ash removal door does not close tightly, adjust using the appropriate procedure (see Owner Serviceable Items).
3. **Over/under air actuators stuck open or obstructed** - Remove any obstructions.

**NOTE: If the outdoor furnace loses water from boiling, the problem should be identified and repaired immediately. Under normal operation, little or no water needs to be added. Adding water to the furnace may cause corrosion if not immediately treated with MolyArmor 350 to the proper pH and moly levels. In addition, the amount of dissolved solids in the system (due to adding additional water) can cause problems.**

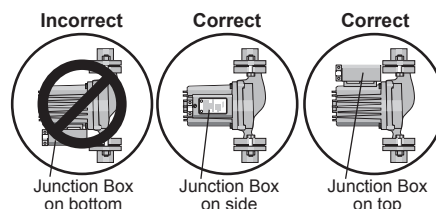
4. **Water is not circulating** - Check to make sure the pump is operating and water is circulating continuously through the supply and return lines to keep water temperature uniform in the outdoor furnace.
5. **Circulation valve(s) closed** - Be sure the proper valves in the system are open to allow circulation.
6. **Pulse set to run too long and/or too often in a low heat draw situation** - Increase the time between idle pulses of air and/or decrease the amount of time the pulse is provided (see FireStar operating instructions).
7. **FireStar combustion controller set incorrectly** - Refer to FireStar Operating Manual.

#### F. FREQUENT PUMP TROUBLE OR POOR WATER CIRCULATION

1. **Pump mounted incorrectly** - If the pump is not mounted on the outdoor furnace, it must be mounted at a minimum of four feet lower than the top water level in the outdoor furnace.



Make sure the pump motor is installed in a horizontal position. The junction box must not be located below the pump motor. If necessary, remove the four screws and rotate the pump body.



2. **Water will not circulate** - If the system has been drained and refilled, or if the system has been opened for any reason (e.g., replacement of pump, adding heat exchangers, repairing a leak), the system must be purged (see Initial Start-up Procedures).
3. **Poor water quality** - Water with high amounts of solids, sand or dirt can cause frequent pump failure. Use softened and/or filtered water.
4. **Deposits in water lines/heat exchanger walls** - If water high in silica or other mineral content has been used, material deposits may build up on the insides of the supply and return lines and on the heat exchanger walls. If this occurs, the system will need to be drained and then cleaned using Sludge Conditioner (p/n 166). The system must then be refilled with the proper amount of MolyArmor 350 and fresh water.

#### G. BURNING AN EXCESSIVE AMOUNT OF COAL

1. **High volume water heating** - High volume water heating (e.g., car wash, swimming pool, etc.) will require high coal consumption.
2. **Excessive heat loss** - See items 6-10 of Building is Losing Temperature.
3. **Supply and return line heat loss** - If not using ThermoPEX, supply and return lines buried in a wet, low-lying area may cause a large heat loss that will greatly increase coal consumption.
4. **High heat demand** - Concrete slabs (with radiant heat) that are poorly insulated or are exposed to water or cold outside temperatures will require increased coal consumption (see Hydronic Installations section). Bringing a cold concrete slab up to temperature the first time will take a considerable amount of time and coal; once warm, coal consumption will be reduced if the concrete slab and building are insulated properly. The following will also have a high heat demand: poorly insulated buildings, buildings with large amounts of glass windows/doors, buildings with overhead doors, greenhouses, uninsulated crawl spaces, outdoor air infiltration and air leaking through foundation.

#### H. VISIBLE EXHAUST COMING FROM CHIMNEY

There are conditions related to outside temperatures, humidity, fuel moisture, burn rate and other factors that can cause steam to be visible in the exhaust plume of combustion equipment, whether it is coal, wood, gas or oil.

Seeing a white exhaust plume with moisture present is normal under many conditions and is not suggestive of poor combustion or high emissions.

Opacity is the amount of light which is blocked in an exhaust plume. It is a measurement that is usually stated as a percentage. For example, an opacity of 0% means that all light passes through while an opacity of 100% means that no light can pass through. Opacity measurements give an indication of the concentration of particles in an exhaust plume.

To read opacity correctly, observations should be made only when:

- The sun is shining and behind you,
- You are at least three times the distance of the chimney height away from the furnace, and
- The plume is traveling perpendicular to your position.

The observation should be conducted looking at the point of the plume where condensed water vapor (steam) is not present. Do not observe the plume itself but rather look through it at a contrasting background (such as green leaves or trees). There are many other important factors as well.

The amount of visible emissions can be reduced by burning properly sized and dry coal, by making sure that your chimney meets the recommendations in this owner's manual and by loading the firebox to match your heat load. Once the volatile content of the coal has evaporated, the emissions become very transparent. Refer to the FireStar manual for settings and adjustments.

### I. CORROSION IS PRESENT

Corrosion in the firebox can occur when the outdoor furnace is being operated improperly. To maximize the life of your investment, it is important to identify signs of corrosion early (you can do this by performing the items in the Preventive Maintenance Schedule) and take measures to correct it as soon as possible. Some, but not all, causes of corrosion are listed below with possible solutions. If you are unsure how to proceed, contact your Central Boiler dealer.

1. **Water temperature is too low** - If the heat load in the system is too large, the water in the system will not reach high enough temperatures to dry the firebox and corrosion can occur. Re-evaluate the system and match heat load to the outdoor furnace.

**NOTE: To reduce condensation in the firebox, it is NOT recommended to set the temperature below 185°F (85°C).**

2. **Heat load is low** - If the heat load is low (during warm outdoor temperatures, for example), filling the firebox full with wood can lead to condensation in the firebox. When the demand for heat is low, add only enough wood to the firebox to last for about 12 hours.
3. **Optional thermostatic valve not installed** - An optional thermostatic valve can be installed on each set of supply and return lines in the system to maintain the outdoor furnace water temperature above 150°F (65°C).
5. **Coal is wet** - Store coal so it is not exposed to the elements.
6. **Burning garbage or plastic** - Do not burn garbage or plastic. It is likely unlawful and may damage the firebox in a very short period of time.

**NOTE: Chloride or sulfurous gases can be generated if plastic or rubber is burned and will mix with the moisture to form hydrochloric or sulfuric acids in the firebox, creating corrosion.**

7. **Firebox wasn't cleaned out at the end of the heating season** - Be sure to follow the post-heating season maintenance schedule which includes scraping out firebox and removing all ash.
8. **Ashes not being stirred prior to loading coal** - It is important that the ashes be stirred each time prior to loading to allow air flow and prevent the ashes from accumulating moisture. See Operating Instructions for more details.

## GENERAL INFORMATION

### Coal Sizes

	<b>Anthracite</b>			
	<b>inches</b>		<b>mm</b>	
<b>Stove</b>	<b>2-7/16</b>	<b>1-5/8</b>	<b>62</b>	<b>41</b>
<b>Chestnut</b>	<b>1-5/8</b>	<b>13/16</b>	<b>41</b>	<b>21</b>
<b>Pea</b>	<b>13/16</b>	<b>9/16</b>	<b>21</b>	<b>14</b>
<b>Buckwheat</b>	<b>9/16</b>	<b>5/16</b>	<b>14</b>	<b>8</b>
<b>Rice</b>	<b>5/16</b>	<b>3/16</b>	<b>8</b>	<b>5</b>
<b>Barley</b>	<b>3/16</b>	<b>3/32</b>	<b>5</b>	<b>2</b>

	<b>Bituminous</b>			
	<b>Sieve Size (inches)</b>		<b>Sieve Size (mm)</b>	
	<b>THROUGH</b>	<b>RETAINED</b>	<b>THROUGH</b>	<b>RETAINED</b>
<b>Run of Mine</b>	<b>8</b>	<b>-</b>	<b>203</b>	<b>-</b>
<b>Lump</b>	<b>5</b>	<b>-</b>	<b>127</b>	<b>-</b>
<b>Egg</b>	<b>5</b>	<b>2</b>	<b>127</b>	<b>51</b>
<b>Nut</b>	<b>2</b>	<b>1-1/4</b>	<b>51</b>	<b>32</b>
<b>Stoker Coal</b>	<b>1-1/4</b>	<b>3/4</b>	<b>32</b>	<b>19</b>
<b>Slack</b>	<b>3/4</b>	<b>-</b>	<b>19</b>	<b>-</b>

Make note of these precautionary statements, also found on the outdoor furnace.

**NOTICE**  
For use with aluminum or copper conductors.

**REMARQUE**  
Pour utilisation avec des conducteurs en aluminium ou en cuivre.

pin 7000247

**NOTICE**  
At the end of each heating season, oil the combustion fan bearings.

READ OWNER'S MANUAL FOR COMPLETE INSTRUCTIONS.

Central Boiler, 11/12 pin 7000098

Furnace Power Disconnect  
Coupeur électrique de la chaudière.

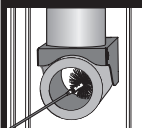
**NOTICE**  
To reset the circuit breaker turn the switch OFF and then ON.

pin 7000248

**AVIS**  
Pour réarmer le disjoncteur, amenez l'interrupteur sur ARRÊT puis sur MARCHÉ.

pin 7000239

**NOTICE**



Initially inspect the chimney transition weekly until you can determine the frequency of cleaning based on your application. Refer to the Owner's Manual for cleaning procedures.

1. Turn off the FireStar controller.
2. Remove the chimney inspection cover.
3. Use brush to loosen soot and ash.

© 2016 Central Boiler pin 7000266

**CAUTION**

- DO NOT start fire until water level is full.
- Keep face away from door area.
- Hot surfaces.
- Keep children away.
- DO NOT touch during operation.
- DO NOT burn wood, plastics or rubber in the furnace.
- Maximum draft marked on the nameplate.
- ALWAYS comply with all applicable codes and regulations.
- ALWAYS take care when adding coal to the furnace to prevent hot coals from spilling out.
- ALWAYS store ashes in a covered non-combustible container.

**ATTENTION**


- NE démarrez PAS le feu avant de faire le plein d'eau.
- Éloignez votre visage de la porte.
- Surfaces brûlantes.
- Éloignez les enfants.
- NE touchez PAS pendant l'utilisation.
- NE brûlez PAS de bois, de plastique ou de caoutchouc dans la chaudière.
- Le tirage maximal est indiqué sur la plaque signalétique.
- Respectez TOUJOURS l'ensemble des législations et réglementations applicables.
- Procédez TOUJOURS avec précaution vec précaution lorsque ajoutez de la charbon dans la chaudière pour éviter de faire tomber des braises à l'extérieur.
- Stockez TOUJOURS les cendres dans un récipient non combustible et couvert.

pin 7000496

**NOTICE**



Use the Wonder Bar to completely scrape the face of the firebox door frame where the door seal contacts.



Keep the over air and under air outlets open and clear of ash to allow the furnace to operate properly.

© 2016 Central Boiler pin 7000498

**WARNING**  
Disconnect power before removing this panel.

**AVERTISSEMENT**  
Coupez l'alimentation électrique avant d'enlever ce panneau.

pin 7000245

**NOTICE**  
Chimney pipe and all extensions must be insulated.

**CAUTION**  
HOT Surfaces  
Do NOT Touch During Operation

**REMARQUE**  
Coupez l'alimentation électrique avant d'enlever ce panneau.

**ATTENTION**  
Surfaces BRÛLANTES  
NE touchez PAS pendant le fonctionnement

pin 7000246

**WARNING**  
AVOID DAMAGE!  
BEFORE operating this appliance read manual and watch videos for proper operation and maintenance procedures.

Damage or decreased life expectancy of appliance could result if appliance is not properly operated or maintained.

pin 7000608

**CAUTION**

Failure to perform proper care and maintenance will reduce the life and performance of your furnace. For best results, always follow these guidelines:

1. Add water treatment before filling with water.
2. Only burn dry coal.
3. Do not burn anything other than the recommended fuels.
4. Clean and inspect the furnace regularly.
5. Do not operate with the water temperature below 150 F (66 C).
6. Maintain the recommended water treatment levels at all times.
7. Clean the firebox and ash collection chamber thoroughly and keep it dry when not in use.
8. See Owner's Manual for more information about regularly scheduled maintenance.

**ATTENTION**

The Owner's Manual is located behind the airbox cover. Remove and read it before operating furnace. If you have any questions, contact your dealer.

**NOTICE**

Inspect and clean the chimney transition weekly or as needed. READ OWNER'S MANUAL FOR COMPLETE INSTRUCTIONS.

**MAINTENANCE SCHEDULE**

**DAILY**  
Check water level. Remove ashes as needed.

**MONTHLY**  
Check door seal, chimney and vent cap. Remove ashes, soot, and clean the firebox and ash collection chamber. Inspect firebox and ash collection chamber.

**SEMIANNUALLY**  
Completely remove ashes from the firebox and ash collection chamber. This inspection should also be performed after the first and third months of operation. Use a wire brush and small scraper to clean firebox, side walls, back wall and ash collection chamber.

READ OWNER'S MANUAL FOR COMPLETE INSTRUCTIONS.

pin 7000509

**DANGER**  
Risk of fire or explosion.

**DANGER**  
Risque d'incendie ou d'explosion

**WARNING**

- Risk of fire.
- DO NOT operate with flue draft exceeding -0.100 in. water column (24.880 Pa).
- DO NOT use chemicals to start unit firing.
- DO NOT burn garbage, gasoline, fuel oils, or other flammable liquids or materials.
- DO NOT operate with fuel-loading or ash-removal doors open.
- DO NOT store fuel or other combustible materials within marked installation clearances.
- Inspect and clean flues and chimney regularly.
- Operating the furnace with the firebox door or ash removal door unlatched may lead to a runaway fire. In the event of a runaway fire or immediately after tending to the fire, latch the firebox door.
- DO NOT leave furnace unattended with the firebox door or ash removal door unlatched.
- DO NOT install or operate furnace before first reading and understanding the Owner's Manual.
- DO NOT allow others to install or operate furnace without first reading and understanding the Owner's Manual.

**AVERTISSEMENT**

- Risque d'incendie.
- N'UTILISEZ PAS l'appareil si le tirage dépasse de -0,100 pouce la colonne d'eau (24,880 Pa).
- N'utilisez PAS de produits chimiques pour allumer la machine.
- Ne brûlez PAS de déchets, d'essence, l'huile de vidange ni d'autres liquides ou matériaux inflammables.
- NE faites PAS fonctionner la chaudière avec la porte de chargement du combustible ou celle d'enlèvement des cendres ouverte.
- NE stockez PAS de carburant ou autres matériaux combustibles à l'intérieur du périmètre de sécurité indiqué.
- Inspectez et nettoyez périodiquement les carneaux et la cheminée.
- Si la chaudière fonctionne avec la porte du foyer ou celle d'enlèvement des cendres déverrouillée, un feu de cheminée risque de se déclarer. Si un feu de cheminée survient ou immédiatement après avoir éteint le feu, verrouillez la porte du foyer.
- Ne laissez PAS la chaudière sans surveillance lorsque la porte du foyer ou celle d'enlèvement des cendres est déverrouillée.
- N'installez PAS et N'utilisez PAS la chaudière avant de lire et de comprendre le manuel du propriétaire.
- N'autorisez PAS d'autres personnes à installer et utiliser la chaudière avant de lire et de comprendre le manuel du propriétaire.

pin 7000495

**DO NOT BURN GARBAGE**



Burning garbage causes damage to components of coal burning appliances.

Refer to your Owner's Manual.

**BURN RESPONSIBLY**

**Preserve Your Right to Burn Coal**

- Before installing, ALWAYS consider the direction that the chimney exhaust will travel with prevailing winds.
- BEFORE operating, the furnace must be installed with adequate chimney height. If there is a residence not served by the furnace within 100 feet (30.5 meters), the chimney must be 2 feet (0.6 meters) higher than the peak of the residence it serves. If there is a residence not served by the furnace within 300 feet (91.5 meters), the chimney must be 2 feet (0.6 meters) higher than the peak of the residence served or not served, whichever is higher. Proper chimney height will aid in dispersing the chimney exhaust. Chimney height may need to be greater than the above minimum requirements. The outdoor coal furnace must be installed in accordance with all applicable codes and regulations, whichever is more stringent. Refer to your Owner's Manual.
- ONLY burn the proper fuels specified.
- DO NOT create a nuisance. Be certain your chimney exhaust is not adversely affecting neighbors. Creating a nuisance may affect your right to burn coal. If any issue with chimney exhaust arises, take immediate action to solve the issue.
- Properly dispose of ashes into a metal container with a cover.
- It's been said that lighting a fire can be more of an art than a science. You may need to vary techniques to achieve best results. Many factors can have a significant effect such as size and type of coal, coal storage, etc. Over time, you will become familiar with your particular conditions. This will allow you to identify cause and effect in a variety of circumstances and what works best for your conditions.

Protect your right to heat with coal. Careless operation may result in a loss of your rights.

Rev. 1 pin 7000497

**CAUTION**  
DO NOT disable the door switch, as it serves as a safety and reset function.

**ATTENTION**  
NE désactivez PAS l'interrupteur de porte car il sert de fonction de sécurité et de réinitialisation.

pin 7000494

**CAUTION**  
Do not plug, block or seal vent opening. Sealing can result in a dangerous buildup of pressure.

pin 826

**ATTENTION**  
Ne pas bloquer, obturer ou sceller l'ouverture du conduit d'évacuation. Sceller l'ouverture pourrait entraîner une augmentation dangereuse de la pression.

pin 7000524

**WARNING**  
Risk of fire. Do not store fuel or other combustible materials within marked clearances to combustibles. Do not cover supply and return lines with combustible materials.

**AVERTISSEMENT**  
Risque d'incendie. Ne stockez pas de carburant ou autres matériaux combustibles à l'intérieur du périmètre de sécurité indiqué. Ne recouvrez pas les conduites d'alimentation et de retour avec des matériaux combustibles.

pin 7000243

**WARNING**  
Turn off Furnace Power Disconnect before opening this panel. Furnace Power Disconnect located on side of furnace under the pump panel. Do not operate furnace with this panel removed.

**AVERTISSEMENT**  
Avant d'ouvrir ce panneau, arrêtez le commutateur de coupeur électrique de la chaudière. Ce commutateur est situé sur le côté de la chaudière sous le panneau de la pompe. Ne pas faire fonctionner la chaudière à bois extérieure avec ce panneau retiré.

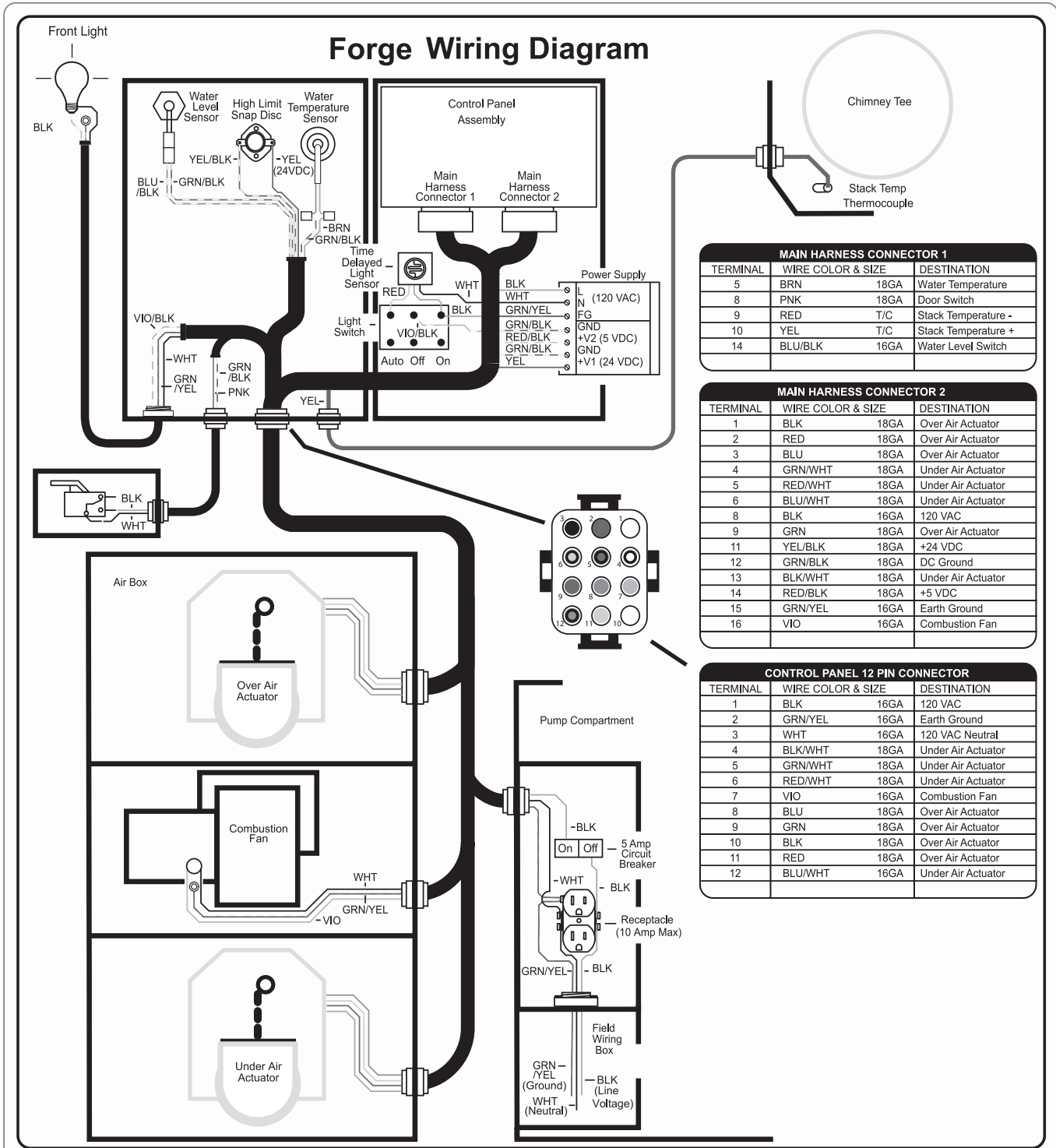
pin 7000441

**WARNING**  
Risk of fire or explosion. Follow proper opening instructions for ash removal and cleaning. Do not leave open unattended or runaway fire may result.

**AVERTISSEMENT**  
Risque d'incendie ou d'explosion. Suivez les instructions d'ouverture appropriées pour l'enlèvement des cendres et le nettoyage. Ne laissez pas la porte de l'enlèvement des cendres ouverte sans surveillance ou feu emballement peut résulter.

pin 7000590

# WIRING DIAGRAM





## WATER SAMPLE INFORMATION - TITANIUM SERIES MODELS

**NOTE:** It is your responsibility as owner to ensure that your water sample information is accurate and that you submit your samples on a timely basis as required by the warranty for your stainless steel outdoor furnace. Failure to do so will result in a one year warranty.

### WATER SAMPLE LABEL INFORMATION

Use the Water Sample Kit provided in your owner's packet or include the water sample label information below when mailing water samples to Central Boiler.

NAME: _____			
ADDRESS: _____			
CITY: _____		STATE: _____	ZIP: _____
EMAIL: _____			
PHONE: _____		FURNACE SERIAL # _____	
DEALER: _____			
DATE SAMPLE COLLECTED: _____			
<input type="checkbox"/> NO ANTIFREEZE ADDED		<input type="checkbox"/> ANTIFREEZE ADDED	
<i>Please check ONE box</i>			
FOR LAB USE ONLY:			
Moly	pH	Ni	Date

### MAILING LABEL

Use the Water Sample Kit provided in your owner's packet or send water samples to Central Boiler, Attn: Water Quality Department, 20502 160th Street, Greenbush, MN 56726.

FROM _____
_____
_____
<p>CENTRAL BOILER, INC.  ATTN: WATER QUALITY DEPARTMENT  20502 160th Street  Greenbush, MN 56726</p>

# NOTES

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## NOTES

