

Energy King

SOLID FUEL FURNACE **OWNER MANUAL**



For Models: 365 and 480

325 S Park Street
Reedsburg, WI 53959
608-768-8508
www.royallproducts.com
info@royallproducts.com

NOTICE

Please Consult
with your local HVAC company
for local city and state codes
prior to installing this system

Rev. 06/24/26

**EnergyKing Furnace
User Manual
For Models: EK365/EK385/EK480**

Congratulations on your purchase of an EnergyKing solid fuel heating appliance! Your EnergyKing Furnace is designed for a lifetime of durable, reliable performance and easy operation. this manual describes some installation instructions, operation, and maintenance of your furnace. With proper installation and maintenance, your EnergyKing furnace will give you a lifetime of trouble free service.

**The Installation Of This Furnace
IS NOT A 'DO IT YOURSELF PROJECT'**

NOTICE

To ensure proper safety, operation and warranty coverage, the installation must be performed by a qualified Installer with specific knowledge of central heating systems

Royall Products will not be held liable for
catastrophic damages due to neglect

Royall Products

325 South Park Street, Reedsburg, WI 53959, 608-768-8508

WEBSITE

energyking.com

EMAIL

info@royallproducts.com

PARTS/SALES

shoproyall.com

SAFETY INSTRUCTIONS

- Read this entire manual before operating or maintaining this furnace.
- Save these instructions for later review.

THIS FURNACE MUST BE INSTALLED IN ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS

NOTICE

FAILURE TO FOLLOW THESE SAFETY INSTRUCTIONS MAY RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH

CAUTION - HOT SURFACES

Keep Children Away! Do Not Touch The Furnace During Operation.

This furnace is designed to burn air-dried wood or anthracite or bituminous coal only. Burning any other type of fuel will void your warranty.

Install in an area with adequate air circulation for combustion and ventilation. The use of outside air may be required for safe operation.

Contact your local building or fire officials about combustion air requirements or installation requirements in your area.

All minimum clearances to combustible materials must be strictly followed

DO NOT

... install the furnace in a mobile or manufactured home, this can be dangerous and will void your warranty. This furnace has not been tested to meet the strict requirements for installation into a mobile or manufactured home.

... connect the furnace to any chimney flue that services any other appliance.

... use petroleum based cleaning or sealing compounds within the furnace system.

... store wood within the minimum clearance to the furnace

... use chemicals, kerosene or other flammable liquids to start the fire, severe burns could result

... store combustible liquids or materials near the furnace.

... start a fire if flammable vapors or dust are present. An explosion can result.

... burn garbage, gasoline, naptha, or engine oil for any reason

... burn tires, telephone poles, railroad ties, treated wood, colored paper, garbage, cardboard or yard waste. In many areas this is illegal and will damage the furnace. Burning anything other than approved fuels will void the warranty.

DO

... install this furnace on a non-combusible floor or 3/8" thick fireproof millboard or equivalent.

... disconnect all power to the furnace at the breaker box or service panel before performing maintennce or service. Always allow the furnace to cool before servicing.

... keep the fuel and ash doors tightly closed during operation. All seals must be maintained in good condition.

... dispose of ashes with care. Ashes should be placed in a metal container with a tight fitting lid. All coal contains small amounts or dangerous elements. It is essential that all coal ash be disposed of in a municipally designed area.

... use caution when opening the fuel loading door during operation. Opening the fuel loading door rapidly can cause smoke or flashback to occur.

... install a working smoke detector in the same room as the furnace, Royall Products also recommends installing a carbon monoxide detector in the living area of the home.

... keep a working fire extinguisher on hand in the event of a fire

TABLE OF CONTENTS

Furnace Safety Instructions	01
Preinstallation Considerations	04
Furnace Specifications	08
Component Identification	09
Furnace Clearances	10
Firebrick Placement	11
Chimney Clearances	14
Operation	15
Maintenance	17
Troubleshooting	20
Wiring	22
Filter Box Assembly	25
Parts List	27
Warranty	28

The Best Residential Wood Furnace Heating Solution

Wood furnaces that are designed for years of quality, maintenance free service.

We're committed to building the best performing, longest lasting wood furnace available. The tradition that started in 1968 continues today with our efficient series of indoor wood furnaces designed with a forced draft system that directs air below the furnace grates efficiently burning wood from the bottom. The systems connect easily to any existing conventional air heating system you already have in place, or as a supplement to an existing heating system.

Each indoor wood furnace we build is hand crafted with state of the art equipment and built to code for use in any location. With a heat output of 95,000 to 150,000 btu, Royall can help you heat your home or business to almost any temperature for a fraction of what you're heating costs are now.

PREINSTALLATION CONSIDERATIONS

Always check with local authorities and obtain the necessary permits prior to having the furnace installed. This furnace must be installed in accordance with local, state, and national codes and regulations

Before the position of the furnace can be decided, a few things need to be considered

Most Important, Do You Have A Reliable, Consistent Source Of Fuel For Your Furnace?

- ☑ Will this furnace be used as a primary (central) furnace, or will it be installed as an add-on to an existing central heating system?
- ☑ Can the furnace be properly vented?
- ☑ Is the chimney appropriate for the application? (This furnace requires installation into a UL103 Type HT all-fuel chimney. Do not connect this furnace to a chimney flue that is serving another appliance.)
- ☑ Has the chimney been inspected? It's important that the chimney be clean and free from defects or damage prior to having the installation performed by a qualified installer.
- ☑ This furnace may require an outside source of air for combustion. Can this be easily accessed in the desired furnace installation location?
- ☑ Are there any local, state or national codes or regulations governing the usage and placement of the furnace?
- ☑ How close is the electrical source that is required for the furnace installation? The electrical connection must conform to any local, state or national codes or regulations.
- ☑ Can the furnace be installed safely?
- ☑ The furnace should not be installed in a location where it could come into contact with curtains, drapes, walls, carpeting, or other combustible surfaces. The furnace must not be installed in a room that is slept in.
- ☑ The clearances in the manual are minimum clearances. Any reduction in furnace clearances must be approved by the regulatory authority and is not recommended by Royall Products.
- ☑ Will the furnace location require floor protection?
- ☑ Will the furnace location be easily accessible for all refueling, maintenance, repair, and cleaning?
- ☑ Are there any structural reasons that may prevent furnace placement?

You have the perfect combination of comfort and energy efficiency

PREINSTALLATION CONSIDERATIONS

BURN ONLY AIR-DRIED WOOD, OR ANTHRACITE OR BITUMINOUS COAL ONLY

WARNING! Risk Of Fire: Do not store fuel or other combustible material within the minimum installation clearances.

It is important to utilize wood based fuel that is clean, dry and consistent. Solid fuel furnaces naturally produce ash as a byproduct of the burning process. Even with the furnaces highly efficient design it will produce some amount of ash that will need to be cleaned out diligently to avoid creating extreme heat below the grating system that would lead to premature grate failure.

WOOD

The EnergyKing furnace has been tested for operation with air-dried wood.

Wood should be seasoned (dried) for at least 12 months prior to burning. Properly seasoned wood should only contain about 20%-25% moisture content. Properly seasoned wood should be split as soon as possible and loosely stacked in a dry spot for at least 12 months.

You should never burn wet or 'green' wood in the furnace. Burning wet or 'green' wood not only reduces the efficiency of the furnace, but will also increase dangerous creosote build up in the furnace and the chimney.

Softwoods, such as Pine and Fir, are easily ignited and burn rapidly with high heat flames. Utilizing softwoods means you spend more time reloading the furnace and more difficulty achieving an overnight burn.

It's best to use dense hardwoods for a longer lasting fire. Ideally, you should burn a mixture of hardwoods and softwoods. Use the hotter, faster burning softwoods to start the fire, and denser hardwoods to maintain a longer lasting fire.

COAL

The EnergyKing furnace has been tested for operation with anthracite (hard) or bituminous (soft) coal

Anthracite: Also known as Hard Coal, anthracite is a hard, lustrous coal with a high carbon content that burns with a clean blue, nearly smokeless flame

Bituminous: Also known as Soft Coal, bituminous coal is a soft type of coal that has a high sulfur content that burns with a yellow, smoky flame.

Bituminous coal tends to contain more impurities and sulfur than anthracite coal, which may decrease the expected lifespan of your Royall furnace and it's components. If you choose to utilize bituminous coal, be sure to select only high-grade bituminous coal.

Coal Size: Your EnergyKing furnace is designed to utilize coal that is nut size or larger.

PREINSTALLATION CONSIDERATIONS

The installation of the EnergyKing Furnace is not a do-it-yourself project. The furnace should be installed by a qualified installer with specific knowledge of central heating systems

Solid-fuel furnace related fires are caused almost exclusively by installation, operation, or maintenance errors. A working smoke detector must be part of every furnace installation, this is the most cheapest insurance you can buy. For additional safety Royall Products recommends installing smoke detectors and carbon monoxide detectors in the living areas of the house.

The EnergyKing furnace is designed to be used in conjunction with a gas or oil fired furnace, or as a single furnace.

FOUNDATION

The furnace must be located on a level 2" minimum thickness concrete foundation pad. At a minimum, there must be a non-combustible pad (concrete, brick, or paver) 6" wider than the furnace, extending out 48" from the front of the furnace.

A non-combustible pad must be installed in front of the furnace to contain any sparks or coals falling out of the loading door or the ash door. Fire can result causing severe personal injury, death or substantial property damage.

Do not install in an area where flammables are kept

INSTALLED AS A PRIMARY FURNACE

Locate the furnace as close to the existing chimney as possible, and as central to the heat distribution as practical.

SIDES: The furnace must have a clearance of 18" from the sidewall of the furnace to combustibles.

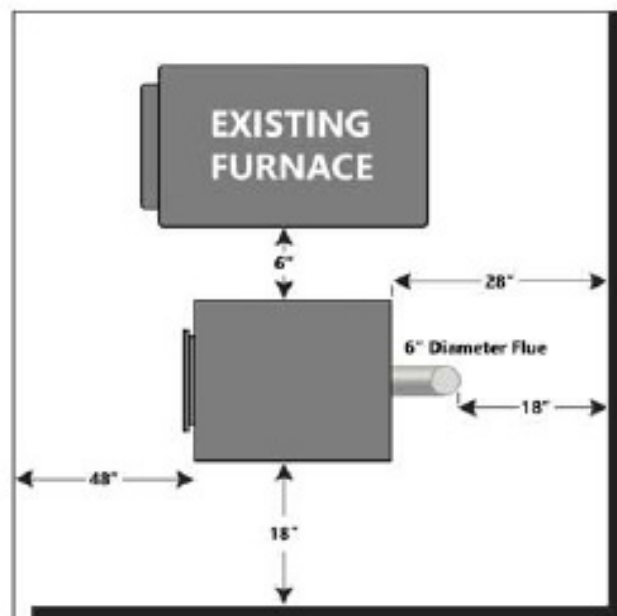
FRONT: A minimum clearance of 48" from the front of the furnace to combustibles.

REAR: A minimum clearance of 28" from the rear of the furnace to combustibles.

TOP: A minimum clearance of 18" from the top of the furnace to combustibles.

STOVEPIPE: A minimum clearance of 18" from the rear of the stovepipe, and 20" from the sides of the stovepipe to combustibles.

If the furnace is utilized as an add-on to your current system, a minimum clearance of 6" is required.



INSTALLATION CONSIDERATIONS

AIR DUCT INSTALLATION

The duct or air distribution system circulates heated and or cooled air to all the conditioned rooms in the building. They must be properly designed and installed to be efficient, maintain a uniform temperature thruout the building, and not adversely affect comfort or indoor air quality.

Every EnergyKing furnace must be installed with a cold air return. Return air must be equal in size to the heated air outlets, and preferably 10% larger. The plenum must be constructed of a minimum 28 guage galvanized metal, and installed in accordance with NFPA guidelines. The plenum should be 18" for all Royall furnace models.

The plenum must be no closer than 2 inches form the ceiling or any combustible material. This clearance is critical during a power outage since excessive heat buildup in the plenum top can be dangerous.

When connecting the plenum to your warm air supply duct system, never supply less than 150 square inches of constant heated air outlet area.

The warm air supply duct system must be constructed of materials with a minimum temperature rating of 250 degrees farenheit.

The ducts, fiting and registers should be sized so that the total external static pressure does not exceed 0.2 pa.

Ductwork clearance requirements vary, contact your local building inspector, or fire officials concerning installation restrictions and inspection requirements in your area.

Ductwork installation must confirm to local, state and national codes and regulations.

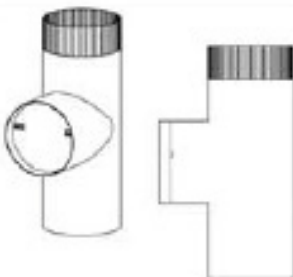
BAROMETRIC DRAFT CONTROL

A barometric draft regulator must be installed into the chimney connector of the furnace.

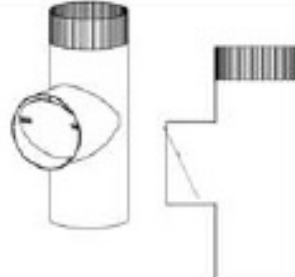
The barometric draft regulator limits the draft (the suction pulling air into the furnace burn chamber). A pivoting counterbalanced flap is pulled open by the draft when the draft reaches a crital amount. This permits air to enter the chimney, preventing the draft in the furnace from rising any higher.

The amount fo draft in your chimney depends upon the length, local geography, nearby obstructions along with other factors. Too much draft can cause the fire to burn too fast, while inadequate draft may cause smoke to back up into the furnace causing a possible hazard. After installation of the Furnace is completed and a fire has been built, the chimney draft should be established and maintained from .04" to .06" water column of draft. If this setting is exceeded, it can cause the furnace fire to burn out of control.

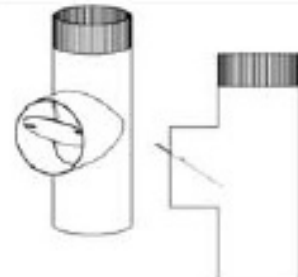
With no draft in the chimney the draft control remains closed allowing no air to enter



Moderate draft in the chimney will pull the damper control open just enough to maintain the correct draft



Excessive draft in the chimney will pull the draft control further open allowing more air into the chimney



FURNACE SPECIFICATIONS



MANUAL DRAFT



AUTO DRAFT



FORCED DRAFT

Long Lasting High Efficiency Easy To Use

You can expect outstanding wintertime comfort and savings from your EnergyKing wood furnace.

These systems offer comfortable consistent warmth all winter long. Winters are not going to get any warmer any time soon, so we provide wood furnace systems from 125,000 btu up to 160,000 btu with the ability to withstand everything nature can throw at you.

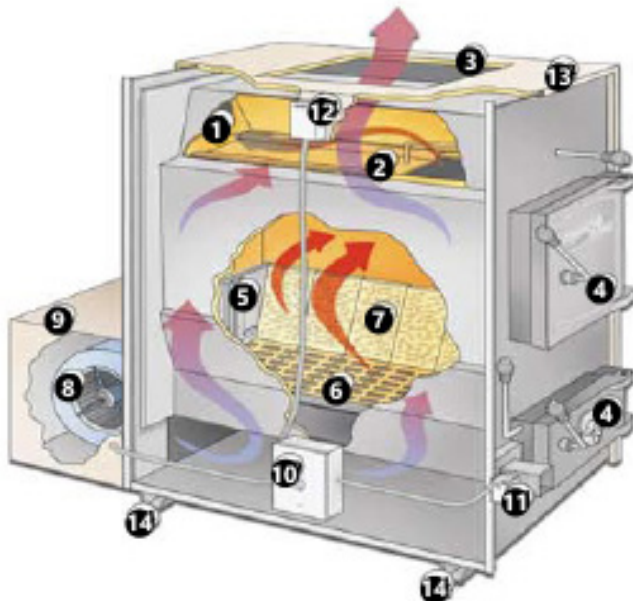
Description

EK365

EK480

Overall Furnace Dimensions (HxWxD)	48"x29"x32"	51"x29"x37"
Steel Construction	7g and 10g	7g and 10g
Shipping Weight (Estimated)	650 lbs	725 lbs
Heating Capacity - BTU's	125,000	160,000
Efficiency	78%	78%
Maximum Log Length	22"	26"
Firebox Capacity	5.6 Cu Ft	7.4 Cu Ft
Fuel Loading Door Size (HxW)	15.5"x13.5"	15.5"x13.5"
Ash Removal Door Size (HxW)	7.25"x11.5"	7.25"x11.5"
Sliding Smoke Baffle	Standard	Standard
Collar Size / Flue Size (Rear Vent)	8" / 6"	8" / 6"
Draft Control, Forced Draft	50 cfm	50 cfm
Steel Shaker Grates	Standard	Standard
Steel Stationary Grates	Optional	Optional
Insulated Cabinet	Standard	Standard
Full Firebrick Lining	Standard	Standard
Circulation Blower	Optional	Optional
Circulation Blower Filter Box	Optional	Optional

COMPONENT IDENTIFICATION



(1) 6" Chimney Outlet Venting must be provided using a lined masonry chimney or a listed UL103 type HT chimney. The chimney exhausts smoke and flue gases that are a natural result of combustion and provides 'draft' to the furnace.

(2) Sliding Smoke Baffle When open, the sliding smoke baffle allows smoke and gasses to flow into the chimney connector without restriction. When closed, smoke and flue gases are diverted around the baffle, creating a longer path for the heated air and allowing the furnace to extract the maximum amount of heat from the fire.

(3) Plenum Opening Allows you to connect the furnace into your home's warm air supply duct.

(4) Heavy Steel Doors The fuel loading and ash removal doors are secured to the furnace utilizing a safety latch and door pins. The door gaskets provide an airtight seal and should be inspected regularly. The gasket must be replaced if it becomes damaged or worn. Do not operate the furnace with the fuel loading or ash doors open.

(5) Hearth Plates These plates help ensure the precise amount of combustion air required to promote efficient combustion. Two hearth plates are utilized, one at the front of the burn chamber, and one at the rear.

(6) Shaker Grates This is where you build your fire. The handle to control the grates is located at the front of the furnace, on the left side of the ash removal door.

(7) Firebrick 2000 degree heat retentive firebrick protects the sides of the furnace burn chamber.

(8) Circulation Blower The three speed circulation blower, operated by the fan limit switch, forces air on all sides of the burn chamber, then into the building duct system.

(9) Filter Box Provides air filtration for the cold air return system. A non combustible filter is required when using a filter box.

(10) Control Box Controls the furnace's electrical system. The control box is pre-wired for your preferred draft system.

(11) Draft Options The furnace has three draft options, Forced Air works by forcing air into the burn chamber by utilizing a small draft fan. Damper Motor Control works by automatically opening a draft damper door. Draft Dial allows you to spin a dial that regulates the airflow.

(12) Fan Limit Control This automatically starts and stops the circulation blower. It also controls the draft fan on systems that utilize forced draft.

(13) Insulated Cabinet Foil backed insulation inside the side panels allows maximum heat to be circulated.

(14) Legs These raise the furnace off the floor to prevent accumulation of moisture underneath

FURNACE CLEARANCES

The installation of the eENERGYking Furnace is not a do-it-yourself project. The furnace should be installed by a qualified installer with specific knowledge of central heating systems.

Solid-fuel furnace related fires are caused almost exclusively by installation, operation, or maintenance errors. A working smoke detector must be part of every furnace installation, this is the most cheapest insurance you can buy. For additional safety EnergyKing recommends installing smoke detectors and carbon monoxide detectors in the living areas of the house.

The Energyking furnace is designed to be used in conjunction with a gas or oil fired furnace, or as a single furnace.

FOUNDATION

The furnace must be located on a level 2" minimum thickness concrete foundation pad. At a minimum, there must be a non-combustible pad (concrete, brick, or paver) 6" wider than the furnace, extending out 48" from the front of the furnace.

A non-combustible pad must be installed in front of the furnace to contain any sparks or coals falling out of the loading door or the ash door. Fire can result causing severe personal injury, death or substantial property damage.

Do not install in an area where flammables are kept

INSTALLED AS A PRIMARY FURNACE

Locate the furnace as close to the existing chimney as possible, and as central to the heat distribution as practical.

SIDES: The furnace must have a clearance of 18" from the sidewall of the furnace to combustibles.

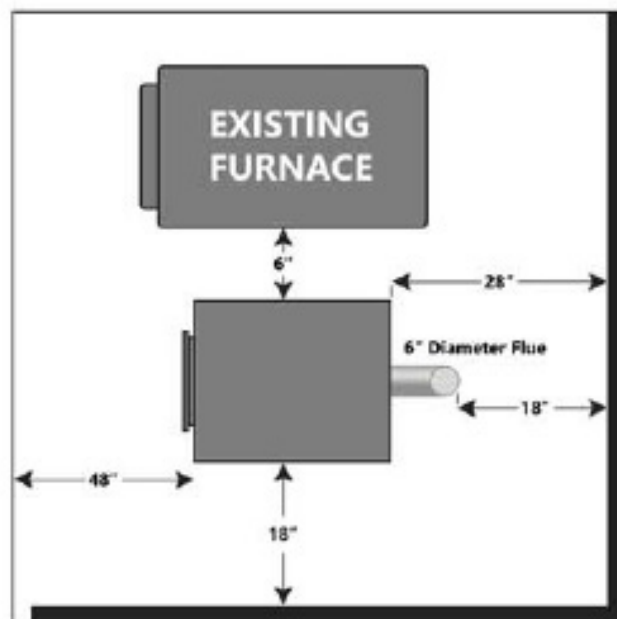
FRONT: A minimum clearance of 48" from the front of the furnace to combustibles.

REAR: A minimum clearance of 28" from the rear of the furnace to combustibles.

TOP: A minimum clearance of 18" from the top of the furnace to combustibles.

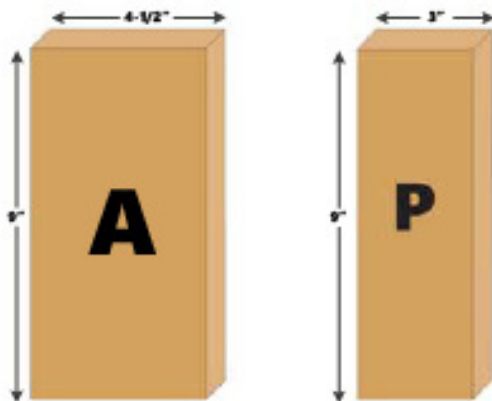
STOVEPIPE: A minimum clearance of 18" from the rear of the stovepipe, and 20" from the sides of the stovepipe to combustibles.

If the furnace is utilized as an add-on to your current system, a minimum clearance of 6" is required.



EK365 FIREBRICK PLACEMENT

VERIFY THE CORRECT FIREBRICK SIZE IS USED



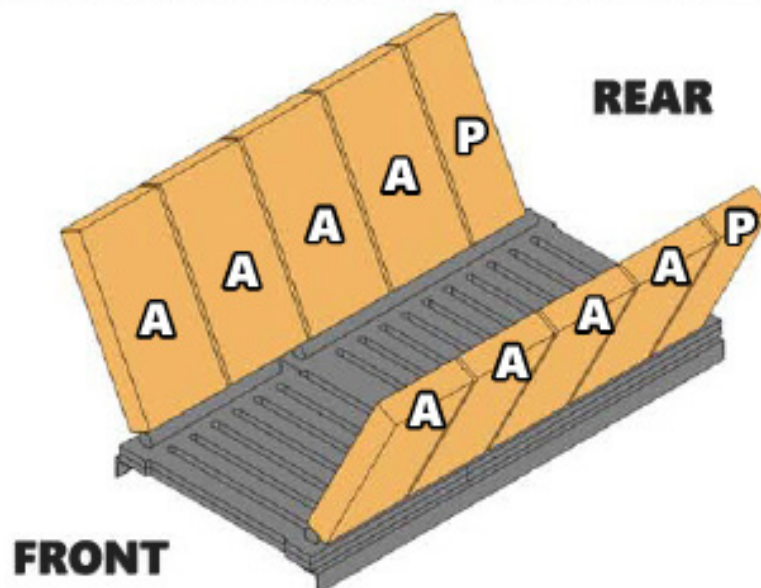
THIS FIREBRICK IS 1-1/4" THICK

ENERGYKING 365 FIREBRICK REQUIREMENTS

(8) 9" X 4-1/2" X 1-1/4"
(BRICK A, #BRI71519)

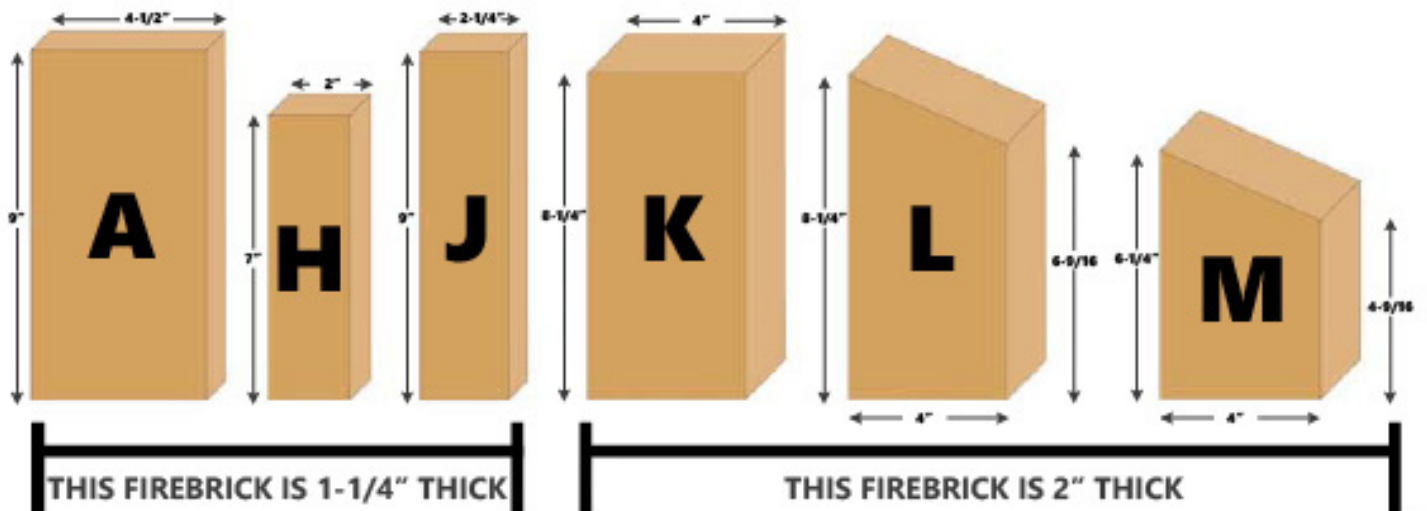
(2) 9" X 3" X 1-1/4"
(BRICK P, #71504)

CORRECT FIREBRICK PLACEMENT FOR EK365 FURNACE ONLY



EK385 FIREBRICK PLACEMENT

VERIFY THE CORRECT FIREBRICK SIZE IS USED



ENERGYKING 385 FIREBRICK REQUIREMENTS

(28) 9" X 4-1/2" X 1-1/4"
(BRICK A, #BRI71519)

(2) 7" X 2" X 1-1/4"
(BRICK H, #BRI71500)

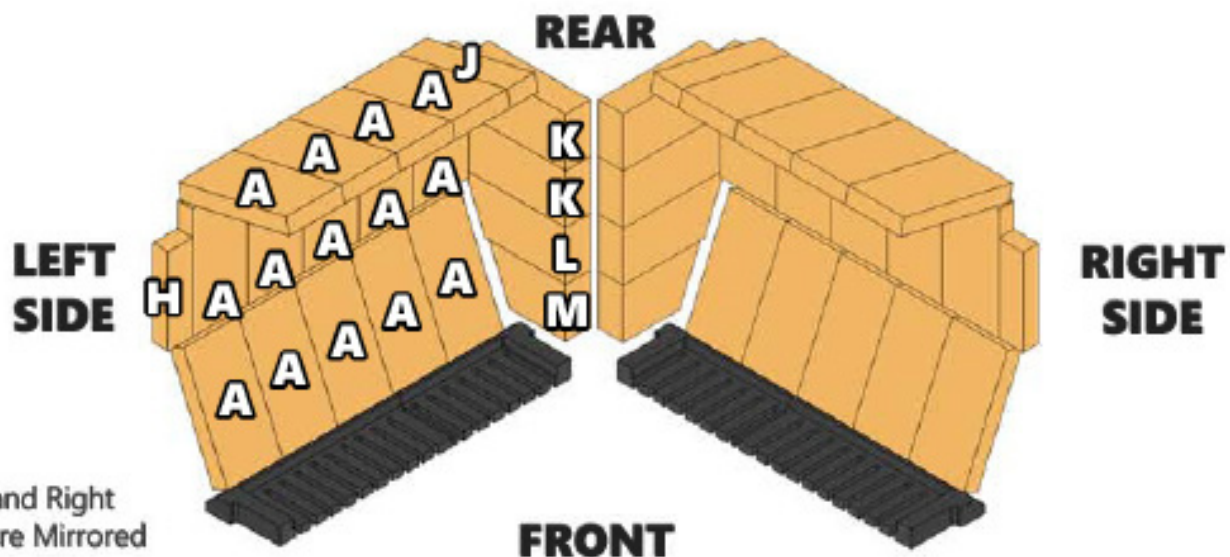
(2) 9" X 2" X 1-1/4"
(BRICK J, #BRI70900)

(2) 8-1/4" X 4" X 2"
(BRICK K, #BRI71501)

(2) 8-1/4" X 4" X 6-9/16"
(BRICK L, #BRI71502)

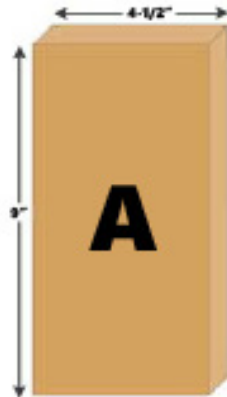
(2) 6-1/4" X 4" X 4-9/16"
(BRICK M, #BRI71503)

CORRECT FIREBRICK PLACEMENT FOR EK385 FURNACE ONLY



EK480 FIREBRICK PLACEMENT

VERIFY THE CORRECT FIREBRICK SIZE IS USED

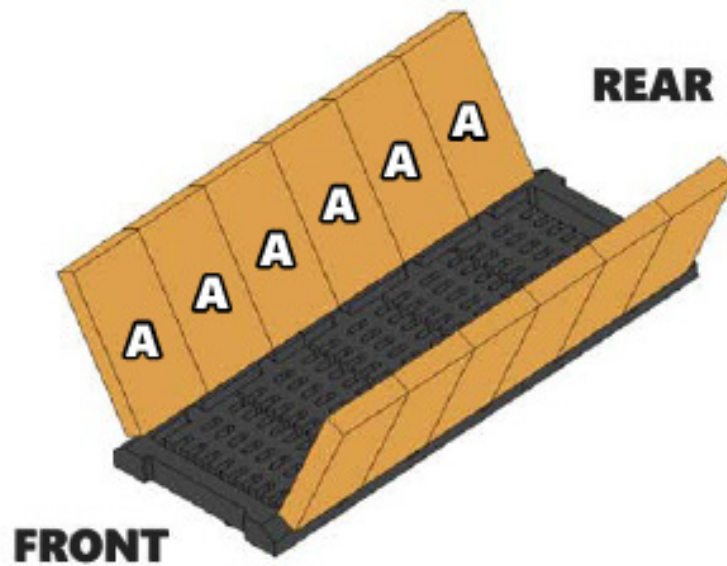


THIS FIREBRICK IS 1-1/4" THICK

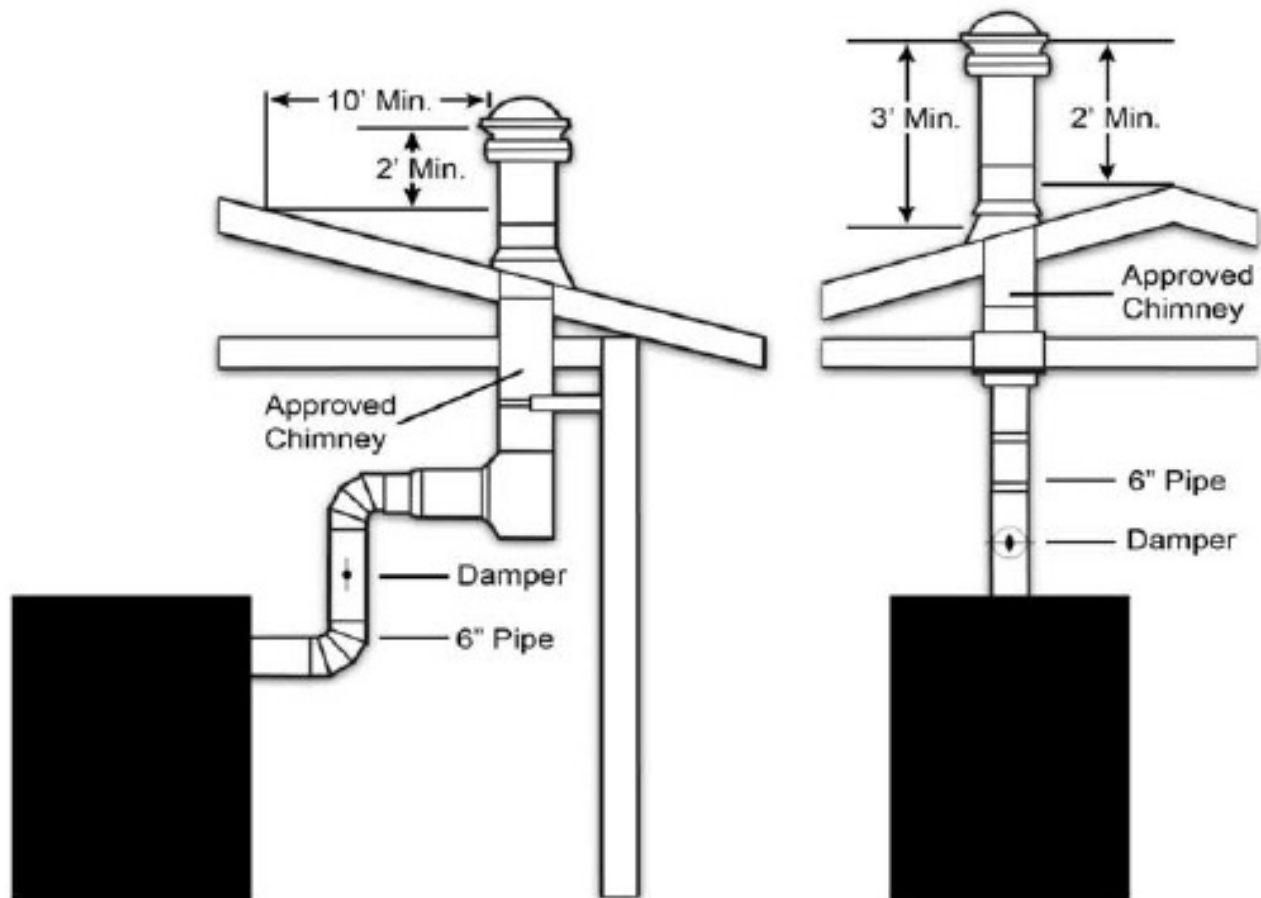
ENERGYKING 480 FIREBRICK REQUIREMENTS

(12) 9" X 4-1/2" X 1-1/4"
(BRICK A, #BRI71519)

CORRECT FIREBRICK PLACEMENT FOR EK480 FURNACE ONLY



CHIMNEY CLEARANCES



MASONRY CHIMNEY

When connecting to an existing masonry chimney, an approved liner must be used in the chimney. An unlined chimney could remain cold causing a downward pressure that creates a poor burning environment, incomplete combustion, or backdraft.

CHIMNEY CONNECTOR

Furnace to chimney connections must be made with 6" black steel material with a minimum 24 gauge. Do not use galvanized steel. For proper operation, the connector should be as short as possible. Horizontal lengths of chimney connector should have an upward slope of 1/2 inch per foot. Extra support hangers or brackets should be located every three feet. Connector lengths of more than 6 feet are not recommended.

Chimney connector sections must be attached to the heating appliance and to each other with the crimped end toward the furnace. Secure all connector pipe joints with at least 3 sheet metal screws. Avoid using more than two elbows when connecting the furnace to the chimney. Never use the chimney pipe as a chimney.

Do not pass the chimney connector through a combustible wall or ceiling.

FURNACE OPERATION

Please read the section in its entirety prior to the first firing of the EnergyKing furnace. It's very important that you follow these suggestions and limitations in order to maintain your warranty and to guarantee a long life of your EnergyKing furnace.

The EnergyKing furnace is designed to burn for about 6-8 hours per load of wood. If the furnace is constantly fired with full flames and only running for a 2-4 hour burn cycle, it is being overfired. Your building requirements may be too great for the size of the furnace purchased. Forced firing or abuse can be detected upon inspection and will void your warranty.

During the warm season between Spring and Fall, you should control the heat output by limiting the amount of fuel, rather than the air supply. Shorter hotter fires will allow your furnace to operate at maximum efficiency with minimum emissions.

For best combustion efficiency, chimney temperature should be 350 degrees F to 450 degrees F. EnergyKing recommends that you monitor chimney temperature.

FIRST FIRE

Before lighting the first fire, inspect the furnace to ensure that it has been properly installed and that all safety requirements have been met. During the inspection, pay particular attention to the clearances around the furnace to combustibles, venting, and thermostat installation.

Check Draft fan and Circulation Blower Operation: To check the circulation blower, use the 'manual' switch on the fan limit switch. If you selected forced draft you can check the operation by turning the wall thermostat to a high temperature. If the draft blower turns on, you can set the thermostat to the desired setting.

Make sure the burn chamber and ash removal area are clear of all objects. Do not fully load the furnace or open all draft controls completely until you become familiar with the operation of your furnace.

Some odors may be given off from a new furnace during the initial few hours of burning while the steel and paint are being cured. Ventilating the room until the odor disappears is recommended.

TYPICAL OPERATION CYCLE

After the fire is established and the operating temperature has been reached, only the thermostat needs to be set to maintain the desired temperature. As the room cools, the thermostat of the building activates the draft control system.

When the thermostat is satisfied, it will turn off the forced air draft fan allowing the fire to die down until the next time the thermostat calls for heat.

The EnergyKing furnace can run efficiently over extended periods of time and at different output levels as long as the fuel supply is uninterrupted and furnace cleaning and maintenance are routinely performed.

FURNACE OPERATION

When your home cools, the thermostat of the building activates the draft control system.

- If you selected 'Automatic Draft', the automatic draft damper will open, allowing the chimney's natural draft to pull combustion air into the burn chamber.
- If you selected 'Forced Air Draft', the combustion fan turns on, forcing combustion air into the burn chamber.
- If you selected 'Manual Draft', there is not a thermostat that will regulate the amount of combustion air in the furnace.
 - For a higher burn rate, turn the manual draft spin dial to the left.
 - For a lower burn rate, turn the manual draft spin dial to the right
 - The manual draft spin dial can be set to any position between high and low to achieve the desired burn rate for your building.

DURING A POWER FAILURE

Always closely monitor the operation of the EnergyKing furnace during a power failure

To operate your furnace in the event of a power failure:

- Close the sliding smoke baffle
- Remove the air filter
- Open all registers
- Do not load the furnace more than 1/4 full

Use extreme caution when operating the furnace during a power failure. Over firing can damage the furnace and it's components along with voiding your warranty. This may result in property damage, bodily injury or even death.

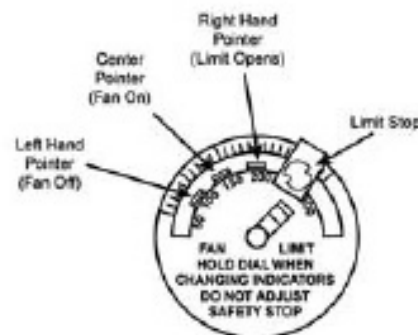
SETTING THE FAN LIMIT SWITCH

The fan limit switch utilizes three indicator locations: Fan Off / Fan On / Limit

Normally we recommend that these indicators are set at:

- Fan Off - 160 degrees
- Fan On - 180 degrees
- Limit - 200 degrees

These settings directly control draft fan operations. If the furnace detects a temperature below 160 degrees the draft fan will start. When the temperature reaches 180 degrees the draft fan will turn off. If the temperature reaches 200 degrees the furnace will turn off. If the ON/Off settings are too close the furnace will cycle on and off constantly. If the settings are too far way it will take longer for your furnace to get up to temperature. This simply keeps the furnace hot so it can provide warm air when the thermostat calls for heat,



FURNACE MAINTENANCE

The EnergyKing furnace requires periodic maintenance in order to continue providing optimum performance. As with any solid fuel furnace, the frequency of cleaning will depend upon the amount and quality of the fuel that is burned. The quality of the fire, and the length of time since the last cleaning are also factors to consider. Weekly cleaning may be required in warmer weather, whereas monthly cleaning may be enough in colder weather.

Before the first fire of each new season, check all installations and accessories to ensure a safe burning process

Risk of electric shock. Disconnect power at the service panel or breaker box before servicing the furnace

CREOSOTE FORMATION AND 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 firebox and the chimney flue of a slow burning fire. Over time creosote residue accumulates and can be ignited creating an extremely hot fire, the results of which can turn tragic.

Check for creosote buildup daily until experience shows how often cleaning is necessary. The chimney connector and chimney should be inspected at least twice monthly during the heating season to determine if creosote buildup has occurred. If accumulations are noticeable it should be removed to reduce the risk of a chimney fire.

Be aware the hotter the fire, the less creosote is deposited. Creosote normally only forms with damp wood and/or low temperature fires. You may have cut wood standing outside for year or two, but it's still picking up some moisture from rain, snow, and humidity.

Have a clear understandable plan in place to handle a chimney fire

DISPOSAL OF FURNACE ASHES

Do not keep the ash removal tray stored inside of the furnace during operation

Ashes should be placed in a metal container with a tight fitting metal lid. The closed container of ashes should be stored on a non-combustible floor well away from any combustible materials prior to final disposal.

The furnace ash should be retained in the closed container until all ash and cinders have thoroughly cooled. Do not place any other waste material into this container.

Embers can remain hot for many days. Always store in a safe place away from combustibles.

Never use a conventional vacuum cleaner or a shop vacuum to remove the ashes from the furnace. Ashes can remain hot for many days, and when trapped inside a conventional vacuum can cause a fire hazard.

Failure to remove the ashes will result in damage to the grate system over time.

FURNACE MAINTENANCE

GASKET ROPE MAINTENANCE

The fuel loading door and ash removal door are equipped with rope gasket to ensure safe operation and an airtight seal. When these gaskets become worn or damaged they need to be replaced.

REPLACEMENT OF GASKET ROPE (Requirements)

DOOR SIZE	MODEL	DOOR PART NUMBER	GASKET ROPE REQUIRED	PART NUMBER
12"x14" Fuel	EK365/EK480	CAS70796	4'-5" of 1" Gasket Rope	GAS71086
13"x14" Fuel	EK385	CAS70787	4'-5" of 3/4" Gasket Rope	GAS71088
12"x14" Fuel	EK365/EK480	CAS70796	3' of 3/4" Gasket Rope	GAS71088
These products are available on ShopRoyall.com			High Temperature Adhesive Caulk	GAS71083

- Remove the door from the furnace by opening the door and then lifting it up off of the door pins.
- Locate the ends of the old gasket material and pull it off of the door.
- Using a flat screwdriver, remove any excess gasket cement and obstructions from the gasket channel
- Lay a 1/2" bead of the high temperature adhesive caulk around the entire gasket channel
- Starting between the door hinge ears, place the new gasket rope into the gasket channel bunching it tightly together forming a hard base and an airtight seal.
- When completed, replace the door back on the hinge pins. Prepare the gasket rope by rubbing some of the soot from inside the furnace onto the new gasket rope. This will prevent the new gasket rope from sticking to the furnace.
- Allow roughly 24 hours for the high temperature caulk to cure, use caution during this period when opening the door(s) to avoid pulling the gasket rope out of the gasket rope channel.



GET REPLACEMENT PARTS ONLINE - SHOPROYALL.COM

FURNACE MAINTENANCE

ROUTINE MAINTENANCE

Please use the following timeline as a guide to determine maintenance frequency in order to keep your boiler operating correctly at peak performance. Failure to clean and maintain the boiler as indicated can result in poor performance and safety hazards.

Inspect flue pipes, joints and seals regularly to ensure that smoke and flue gases are not drawing into the building.

Until a pattern of cleaning requirements is established inspect the following components:

DAILY

- ▶ Fuel Supply, refilling as necessary
- ▶ Ash Removal, emptied and cleaned. Ash buildup under the grates cooks the grates leading to premature failure
- ▶ Grates, level the wood distribution on the grates prior to each loading. There should be very little ash on top of the grates. Ash buildup will restrict the airflow moving thru the grates, promoting incomplete combustion and creosote formation.

Once a pattern of cleaning requirements is established, these components should still be monitored on a regular basis.

MONTHLY

- ▶ Examine all door gaskets and the draft fan auto damper seal to ensure an airtight seal. Replace as required.

EVERY THREE MONTHS

Until you are familiar with how the ash and creosote accumulate with your operating practices, we recommend that you inspect the boiler at least once per ton of fuel burned. Particular attention should be given to:

- ▶ Draft Control Systems (blowers, etc)
- ▶ Door Gaskets
- ▶ Fresh Air Intake

Clean the heat exchanger and baseboard radiators. Dust and dirt reduce heat transfer.

END OF SEASON

Cleaning the flue pipe and chimney is especially important at the end of the heating season to minimize corrosion during the summer months caused by accumulated ash deposits.

The venting system should be inspected and cleaned annually. Clean and remove fly ash from chimney connector, flue pipes and chimney. Scoop out any unburned fuel from the burn chamber, and clean the burn chamber. Remove any ash deposits from the ash collection area inside the ash door.

Failure to clean and maintain the furnace as indicated can result in poor performance and safety hazards

FURNACE TROUBLESHOOTING

Be sure to maintain your furnace's cleanliness at all times, by emptying the accumulated ash regularly. We recommend establishing a routine inspection of the door gaskets and replacing when necessary.

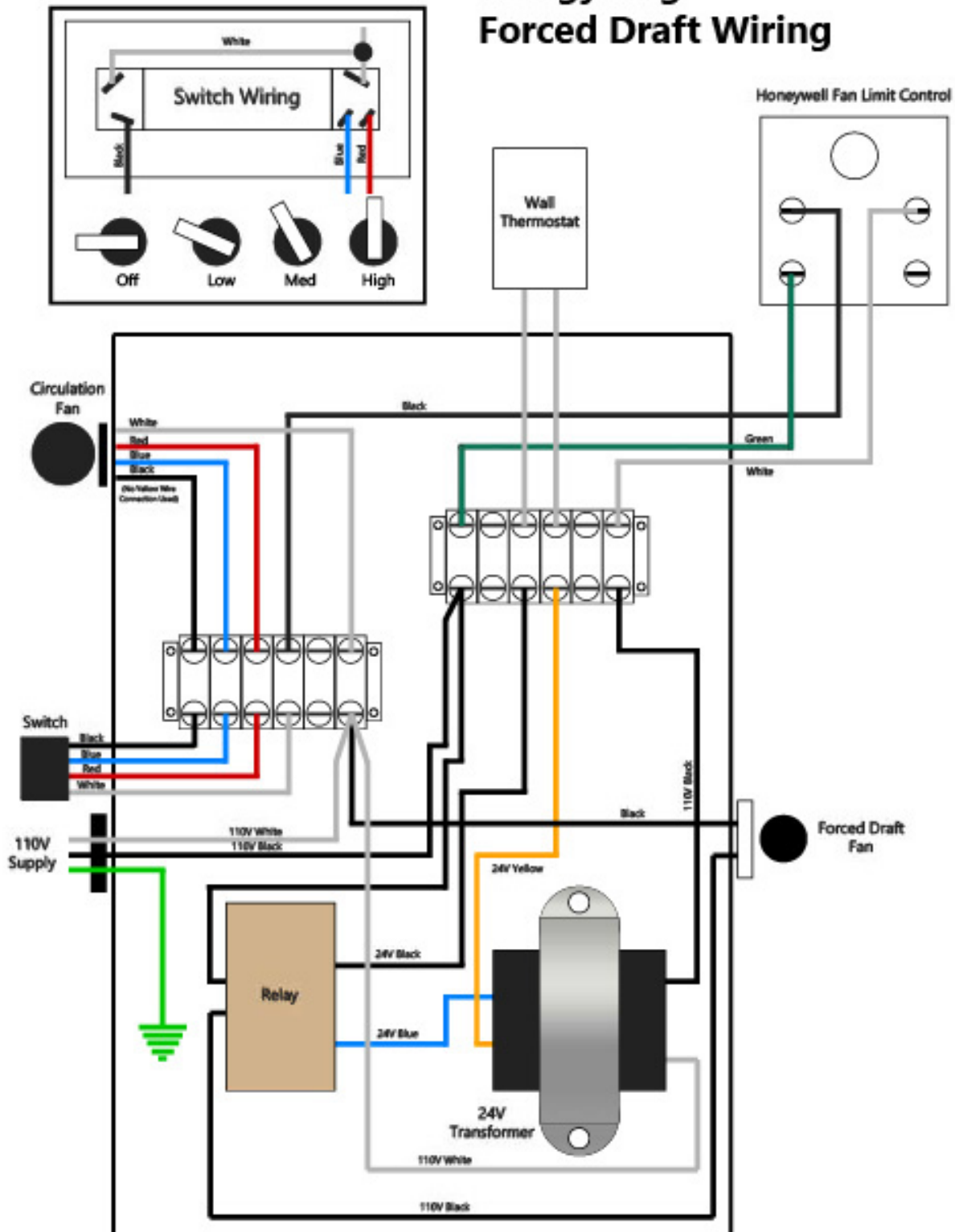
PROBLEM	CAUSE / SOLUTION
Fire is difficult to start, smokey, or starts but will not stay lit	Make sure all furnace doors are tightly closed and the gaskets are in good condition. If ashes are allowed to accumulate in the furnace it will block the flow of forced air. Never allow the ashes to build up under the grates this will cause premature failure of the grates. Your exhaust or combustion system may be blocked. Verify all vents and pipes are free from obstruction and draft controls are operating correctly. Check the chimney for possible downdraft caused by taller surrounding trees or any buildings. The chimney may need to be extended or a chimney cap installed.
Overall poor combustion or difficulty maintaining a 'pilot' fire.	Check the quality of your fuel! Your building may have negative pressure. If the building is too airtight the furnace cannot get enough air for proper combustion. Outside air may need to be provided to the furnace.
Smoke is visible or you smell fumes in the building	Ensure that all doors are tightly closed and all door gaskets are in good condition. Check your exhaust or combustion system for blockage. Verify that all vents and pipes are free from obstruction and that the draft control is operating correctly. The venting may have been improperly installed. If the furnace is smoking from vents, ducts, or from the draft controls, immediately shut down the furnace, ventilate the area, and contact your heating contractor.
Excessive Combustion (fire)	The chimney draft may be excessive, adjust the barometric damper to maintain the flue draft setting from .04" to .06" (14.95 pa) water column.
Excessive Creosote Formation	Excessive creosote is normally only formed when using wet/damp wood or maintaining a low burn temperature. During warmer weather, you may need to adjust your firing practices. For maximum efficiency and minimum emissions, try shorter, hotter fires rather than large, slow burning fires. The venting may be improperly installed resulting in a decrease of air flow.
Excessive Ash	Check the quality of your fuel. Utilize good quality hardwoods with your furnace.

FURNACE TROUBLESHOOTING

PROBLEM	CAUSE / SOLUTION
Partially burned or unburned fuel in the combustion area	More air for proper combustion may be needed. Verify that your draft controls are working properly and that your exhaust and combustion air systems are clean and free from obstruction.
The furnace is burning too much fuel, or the fuel burns off too quickly	The chimney draft may be excessive. Adjust the barometric damper to maintain flue draft settings from .04" to .06" of water column. Do not operate with a flue draft exceeding .06" (14.95 Pa) water column.
The circulation blower runs continuously, cycles on and off too much, or won't run at all	Make sure the fan limit control is set to Auto and not Manual The fan limit control On/Off temperature setting may need to be adjusted. The On/Off settings may be set too close together. The fan limit control default settings are 160°/180°/200°. This means if the furnace is below 160° it will turn on the draft fan until the temperature reaches 180° then turn off the draft fan. The 200° setting is a safety measure that turns off the furnace when the temperature is reached. The furnace may have a faulty fan limit control, fan control center, or draft fan. Replacement parts are available at ShopRoyall.com
The furnace has power but is not responding	Verify the power supply for adequate voltage. The furnace may not have been installed correctly. Contact your installer.
Getting shocked when touching the furnace	The furnace may not be properly grounded, or may have a loose wire. Disconnect power and verify all connections. The furnace may have experienced a power surge. Contact your installer.

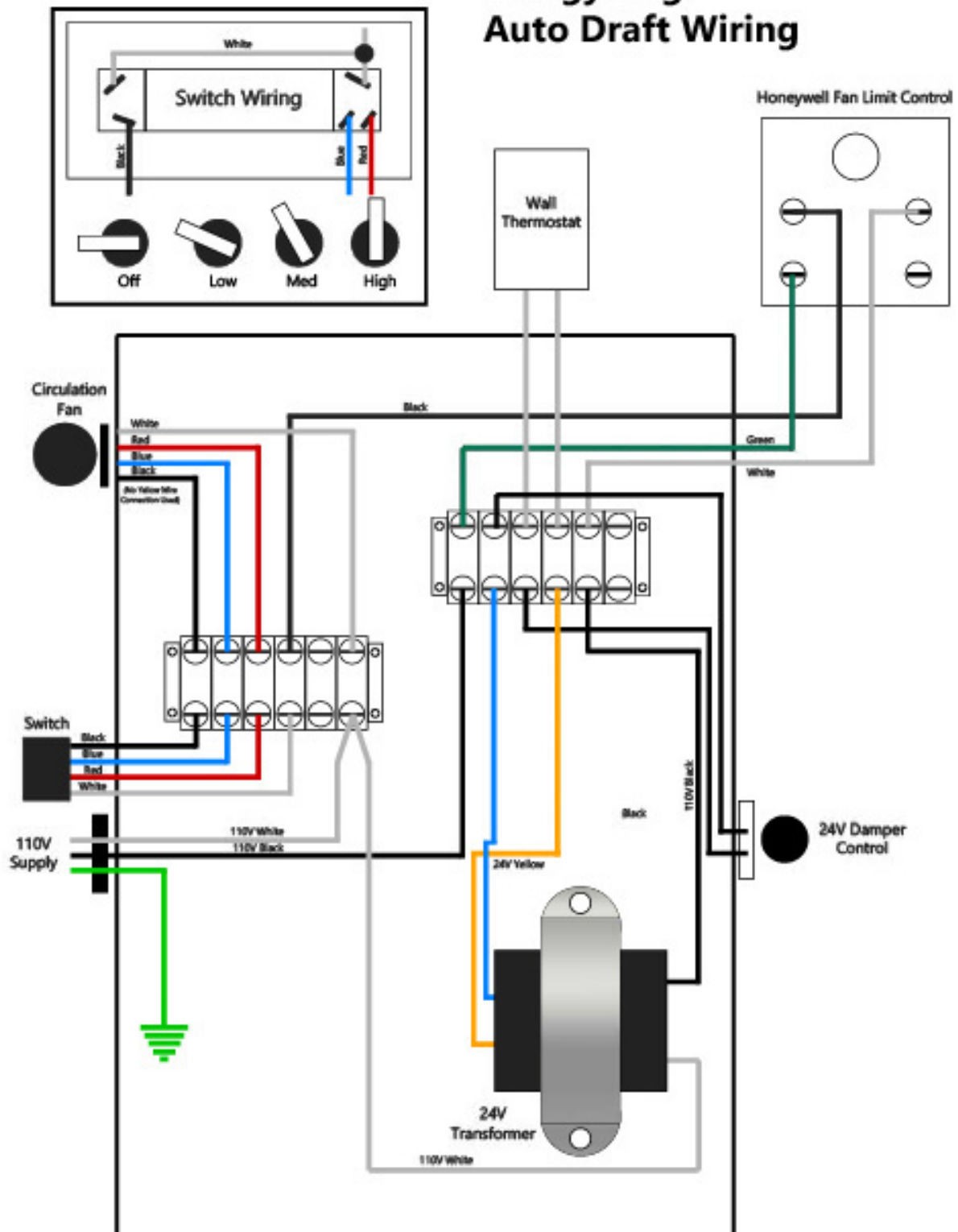
FURNACE WIRING

EnergyKing Forced Draft Wiring



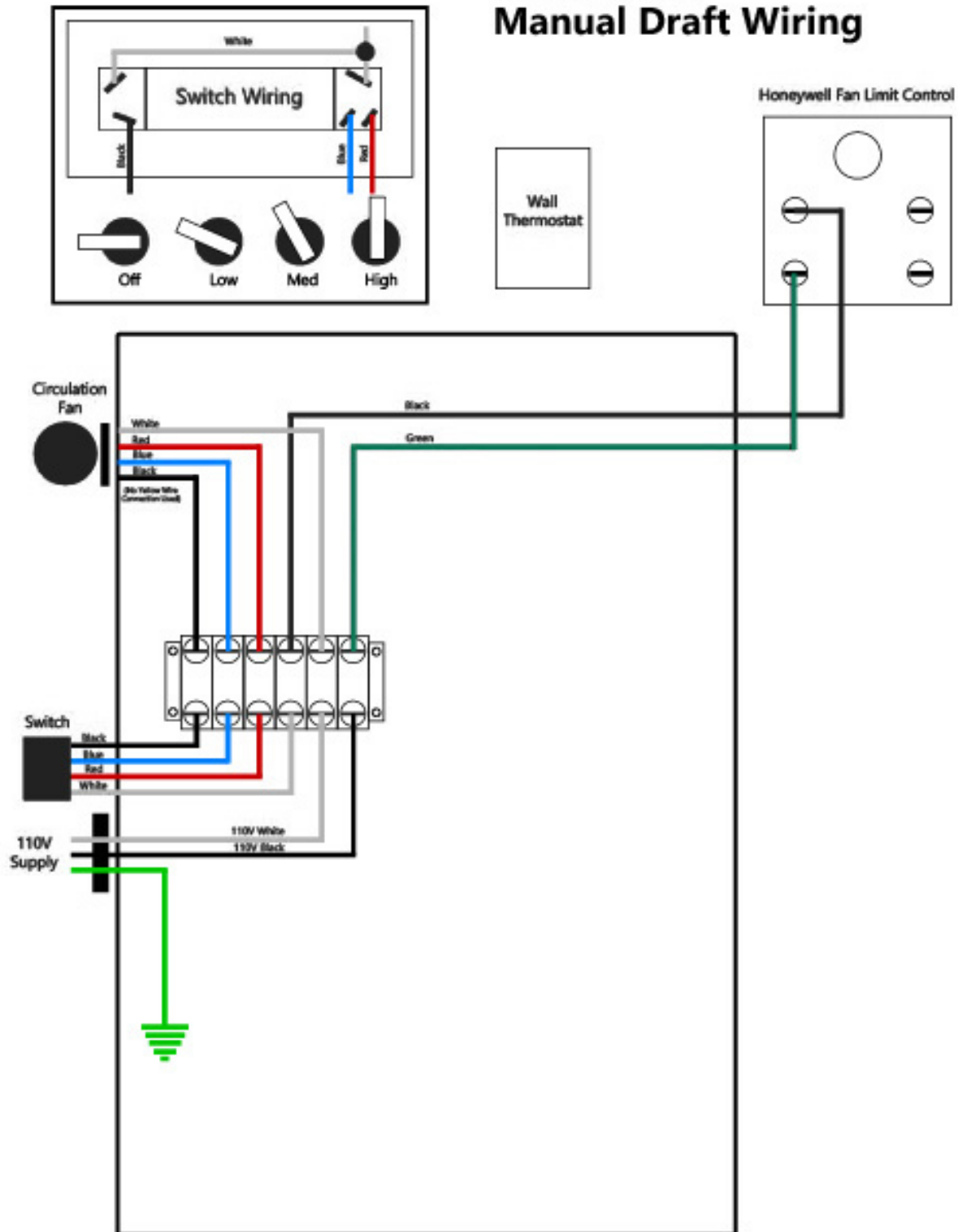
FURNACE WIRING

EnergyKing Auto Draft Wiring



FURNACE WIRING

EnergyKing Manual Draft Wiring



FILTER BOX ASSEMBLY

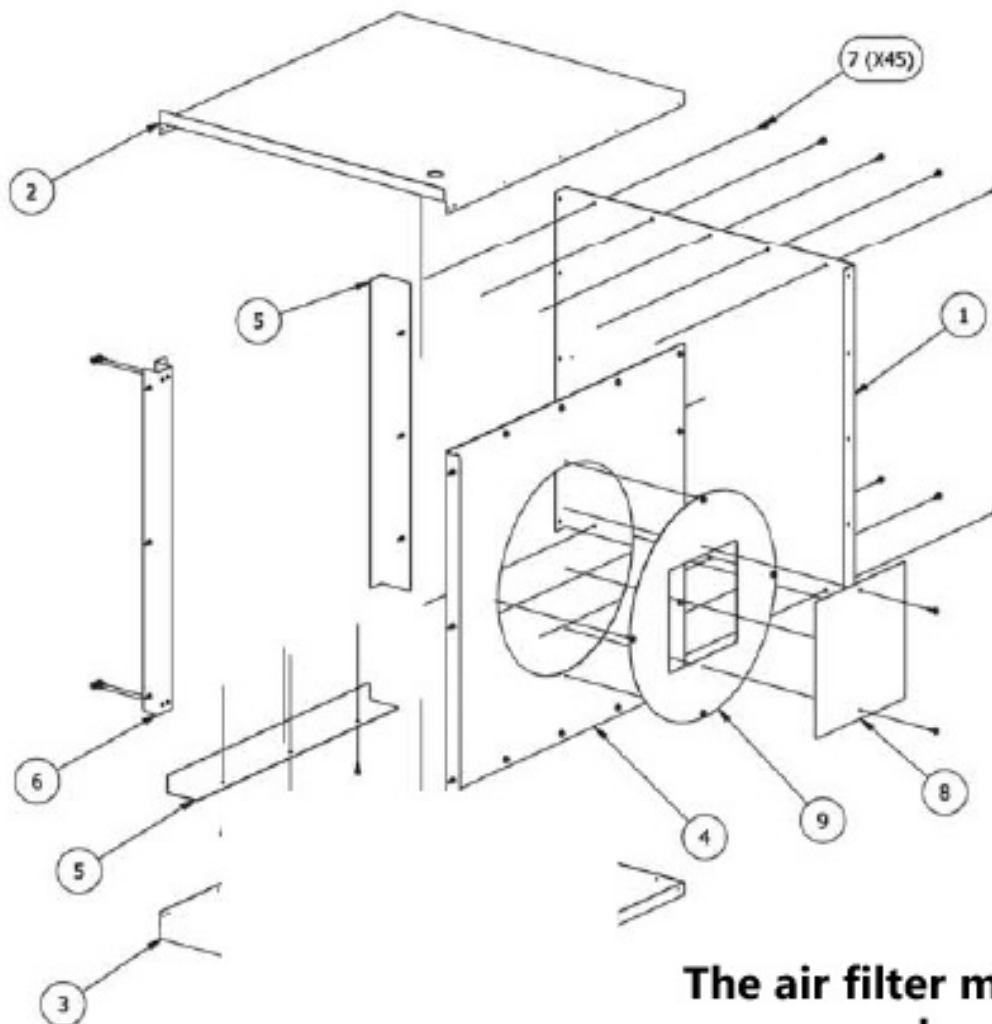
FILTER BOX ASSEMBLY

The optional Royall furnace filter box would need to be assembled before use with the optional circulation fan

- 1 - Filter Box Back
- 2 - Filter Box Top
- 3 - Filter Box Bottom
- 4 - Filter Box Side
- 5 - Filter Box 'L' Bracket
- 6 - Filter Box 'Z' Bracket
- 7 - Hex Head #8-18x1/2"
- 8 - Filter Box Cover
- 9 - Filter Box Cover 2

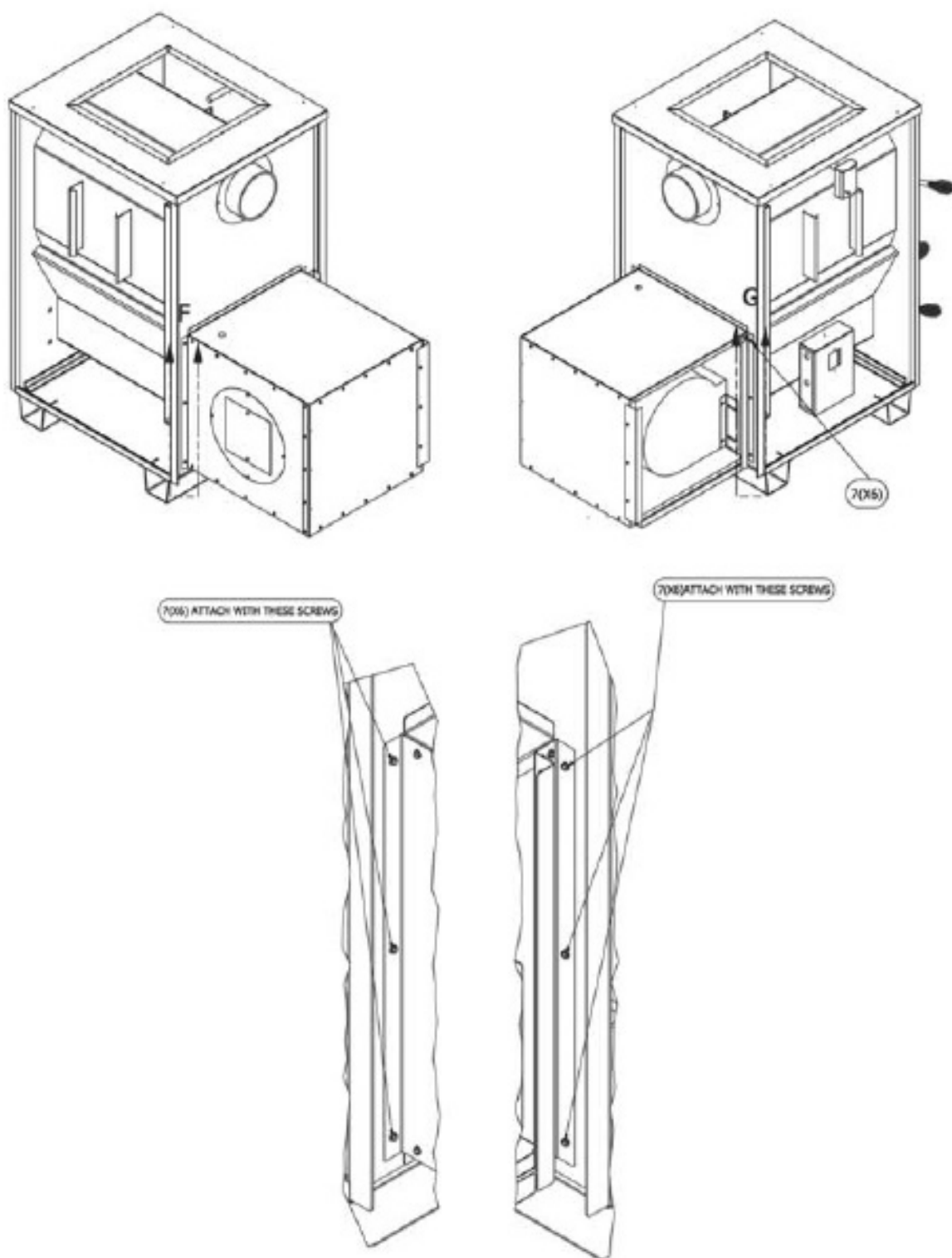
CAUTION

The filter must be removed if the fan is inoperable for any reason, including power failure. This will prevent overheating of the motor



**The air filter must be
non-combustible**

FILTER BOX ASSEMBLY



FURNACE PARTS LIST

DESCRIPTION	PART NUMBER
Firebrick, 9"x4-1/2"x1-1/4"	BRI71519
Firebrick, 9"x3"x1-1/4"	BRI71504
Firebrick, 7"x2"x1-1/4"	BRI71500
Firebrick, 9"x2"x1-1/4"	BRI70900
Firebrick, 8-1/4"x4"x2"	BRI71501
Firebrick, 1-1/4"x4"x6-9/16"	BRI71502
Firebrick, 6-1/4"x4"x4-9/16"	BRI71503
Frame Grate, 360 Shaker Frame (11-1/2"x11-1/8", EK365/EK385)	CAS70768
Frame Grate, 480 Shaker Frame (17"x11-1/8", EK365/EK385/EK480)	CAS70769
Frame Grate, 360 Stationary Grate (9"x11", EK365/EK385)	CAS70766
Frame Grate, 480 Stationary Grate (14-3/4"x11-1/8", EK365/EK385/EK480)	CAS70767
Rocker Grate, (9-3/4"x4-3/4")	CAS70770
Fuel Door, (12"x14", EK365/EK480)	CAS70796
Fuel Door, (13"x14", EK385)	CAS70787
Damper Plate, (EK365)	FUR50921
Damper Plate, (EK385)	FUR50920
Damper Plate, (EK480)	FUR50922
Damper Rod, (26", EK365)	FUR50919
Damper Rod, (15-3/4", EK385)	FUR50918
Damper Rod, (15", EK480)	FUR50197
Shaker Rod Extension Linkage	FUR50927
Replacement Glass, (8"x4"x3/8", EK385)	FUR71093
Draft Fan, (50cfm, EK365/EK385/EK480)	BLO70532
Circulation Fan, (3 Speed, 1/2hp)	BLO71901
Filter Box, (20"x20"x17")	FUR80281
Forced Draft Tube, (EK385)	FUR70462
Forced Draft Tube, (EK365/EK480)	FUR70466
Auto Draft Tube, (EK385)	FUR70465
Auto Draft Tube, (EK365/EK480)	FUR70464
Manual Draft Knob	CAS70794
Foil Backed Insulation, (28"x48"- EK365/EK385, 36"x48"- EK480)	FUR70807
Fan Limit Switch	ELE71095

FURNACE PARTS LIST

DESCRIPTION	PART NUMBER
Damper Actuator Motor	ELE70784
Manual Draft Control Box	FUR80271
Auto Draft Control Box	FUR80272
Forced Draft Control Box	FUR80273
3 Speed Switch, (No Plate)	ELE70813
3 Speed Switch, (With Plate)	ELE70813
24v Relay	ELE71094
24v Transformer	ELE70450
Capacitor, (For Circulation Fan)	BLO70555
Gasket Rope, (3/4")	GAS71088
Gasket Rope, (1")	GAS71086
High Temperature Adhesive	GAS71083
Shroud, (EK365, Left Side)	FUR51837
Shroud, (EK365, Right Side)	FUR51839
Shroud, (EK365, Top)	FUR51838
Shroud, (EK385, Left Side)	FUR51840
Shroud, (EK385, Right Side)	FUR51842
Shroud, (EK385, Top)	FUR51841
Shroud, (EK480, Left Side)	FUR51843
Shroud, (EK480, Right Side)	FUR51845
Shroud, (EK480, Top)	FUR51844

THESE PARTS ARE
AVAILABLE ONLINE AT **sh p**
ROYALL
WWW.SHOPROYALL.COM

IF YOU NEED ADDITIONAL
ASSISTANCE, CALL...

MON-FRI 8AM-4PM CST
608-768-8508

SUPPORT (MON-FRI) 8AM-4PM CST - 608-768-8508

FURNACE WARRANTY

We make every effort to ensure that all EnergyKing furnaces and components adhere to our strict safety standards. However, should you receive a product or component that doesn't function as intended, please follow the instructions below for making a warranty claim. We will replace or repair the part, as outlined in the applicable warranty as soon as possible to keep your EnergyKing furnace functioning safely and efficiently as intended.

FURNACE UNITS ONLY

To make a warranty claim for a faulty EnergyKing furnace, contact us at 608-768-8508

When contacting us for a warranty claim on a furnace, please have the following information available:

- Model Number
- Serial Number
- Purchase Date
- Purchaser Name, Address, and Telephone

All transportation charges are to be paid by the purchaser.

COMPONENT PARTS ONLY

To make a warranty claim for faulty furnace parts

Please complete a warranty claim form and return it to us. All warranty claim requests must be made in writing. A verbal warranty claim request will not be processed.

When contacting us for a warranty claim on a furnace, please have the following information available:

- Model Number
- Serial Number
- Purchase Date
- Purchaser Name, Address, and Telephone

Once we receive your completed warranty claim form, we will ship a replacement for the faulty part(s). All Transportation charges are to be paid for by the purchaser. However, if the faulty part is returned to us, we will provide return shipping via a UPS call tag.

EnergyKing reserves the the right to refuse any warranty claim, subject to the terms, conditions and restrictions of the warranty agreement found in this EnergyKing operation manual.

FURNACE WARRANTY

LIMITED WARRANTY

Who is covered?

You are covered under this warranty if you the original purchaser of a new EnergyKing furnace and your purchase was made through an authorized distributor or dealer of the EnergyKing furnace.

How long does the coverage last?

The term of the warranty begins on the date of the original purchase as evidenced by your purchase receipt, subject to the terms, conditions and restrictions of this agreement. Coverage is extended to you for the following time periods:

Burn chamber: The burn chamber is warranted for six (6) years on a prorated basis. The replacement value will decrease each year until the maximum life of the warranty exhausts any replacement value. Replacement value is reduced according to the following schedule and will be calculated on the cost of the burn chamber at the time the part is repaired or replaced. We will provide you with a credit to be applied towards the cost of the repair or replacement part.

Year 1	Full Warranty
Year 2	80% Credit
Year 3	60% Credit
Year 4	40% Credit
Year 5	25% Credit
Year 6	15% Credit

Grating and Doors: The grating and doors are warranted for one (1) year and include the fuel loading door, ash removal door, and grating system.

Electrical Components: The electrical components are warranted for one (1) year and include, but not limited to, the circulation fan, combustion fan, fan limit switch, and fan control box.

What is covered by this warranty?

The warranty covers defects in materials or workmanship in your new EnergyKing furnace

What is not covered by this warranty?

If your furnace has not been installed, operated and maintained in strict accordance with the instructions provided in this manual

If any part has been damaged in shipment, modified, altered, tampered with, abused, or has been subject to accident or misuse.

If your furnace has been altered or repaired in a manner which, in our sole judgement, affects it's performance, stability, or reliability.

If parts not made or supplied by us have been used in connection with the furnace. If in our sole judgement, affects it's performance, stability, or reliability.

Transportation charges on furnaces and furnace parts submitted for repair or replacement.

FURNACE WARRANTY

What is not covered by this warranty (continued)

Expendible, replaceable or wear items, such as firebrick, gaskets, paint, handles, and other items that in our judgement are expendable, replaceable or wear items.

Any other heating system or systems to which the furnace may be attached.

Any other smoke pipes, heat pipes, chimney, hardware, ducting, vents, or other accessories used for the installation and venting or ducting of the appliance.

We are not responsible for installation and will not be liable in any respect under the terms of the warranty for injury or damage to the building structure in which the furnace has been installed, or to the person or persons and property therein, arising out of the use, or installation of the EnergyKing furnace. The furnace must be installed in compliance with the state, local, and national building and fire codes and regulations of the area and in strict adherence to the manufacturers recommendations.

What will we do to correct problems?

We will repair, or at our option, replace any EnergyKing furnace or furnace part, which upon inspection shows a defect in materials or workmanship.

How can you get service?

If warranty service is needed during the warranty period, notify your installation company. If they are unavailable contact EnergyKing directly. Provide your name, address, phone number, serial number, model number of the furnace, date of purchase, name and address of the installer and a description of the problem.

Disclaimer of Implied Warranties and Consequential Damages

Our obligation in this limit warranty, to the extent allowed by law, is in lieu of all warranties, implied or expressed, including implied warranties of merchantability and fitness for a particular purpose and any liability for incidental and consequential damages shall include but not limited to: transportation / freight charges, cost of installation, duty, taxes, charges for service or adjustment, loss of income, rental or substitute equipment, and expenses due to loss, damage, detention or delay in the delivery of equipment or parts resulting from acts beyond our control.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or limitation of implied warranties, so the limitations or exclusions in this limited warranty may not apply to you.

No employee or representative of Royall Proucts, LLC. is authorized to change this limited warranty in any way or grant any other warranty unless such change is made in writing by an officer of Royall Products, LLC., at its home office.

Your responsibility under the warranty

It is your responsibility to ensure that the furnace is installed in compliance with all local, state, and national building and fire codes regulating installation and inspection.

It is your responsibility to read the user manual, operate and maintain the furnace in accordance with all instructions and safety procedures. Failure to do so is a misuse of the furnace.

It is your responsibility to inspect the furnace and have any part(s) repaired or replaced when continued operation would damage or excessively wear other parts or cause a safety hazard.

