



# CHIMNEY INSTALLATION

A chimney performs two functions: it removes smoke and flue gases from the furnace, and it provides “draft” for the fire. Draft is the term used to describe the suction that occurs when hot air rises and creates a vacuum in the firebox. That vacuum draws fresh air into the firebox and feeds combustion of the wood. No furnace can operate properly without adequate draft.

**IMPORTANT NOTE:** The Greenwood Furnace requires draft measuring between .05” and .07” WC (water column) (12.45 – 17.44 Pascals), measured with a manometer or similar device. Draft less than .05” will starve the fire of oxygen and cause it to burn dirty (i.e., produce smoke and creosote). Draft more than .07” will feed too much oxygen to the fire, causing it to over-fire and burn at less than optimum efficiency.

**IMPORTANT NOTE:** The following instructions are guidelines only. A qualified HVAC contractor should determine the specific chimney requirements for your furnace installation and insure that it complies with local building codes and ordinances.

## Flue Size

The chimney flue is a vital part of your furnace installation. A properly built and maintained masonry chimney or factory-built flue will assure a consistent draft under a variety of weather conditions.

**IMPORTANT NOTE:** The furnace must connect to a code-approved masonry chimney with a flue liner or an appropriately sized factory-built chimney, which complies with requirements for Type HT, all fuel chimneys in the standard UL 103 or CAN/ULC-S629.

## Flue Diameter

The outlet collar on all Greenwood furnace models is 8 inches. The model number of your Greenwood furnace determines the minimum size of the connect pipe and flue. For the Model 100 and 200 a flue reducer is required to connect the 8-inch outlet collar to the appropriately sized connector pipe.

Furnace	Min Flue Diameter
Model 100	6 inches (150mm)
Model 200	7 inches (180mm)
Model 300	8 inches (200mm)

## Flue Height

The flue must be tall enough to draw, which typically means at least 12-15 feet tall (3.66m) [Note: Add one foot (0.3m) to this minimum for each 1000 feet above sea level]. If you cannot control the height of the flue, it may be necessary to install a draft inducer fan (see “Measuring and Adjusting the Draft” later in this section).

## Connecting to an Existing Chimney Flue

You may connect the Greenwood furnace to an existing flue or chimney subject to the following conditions.

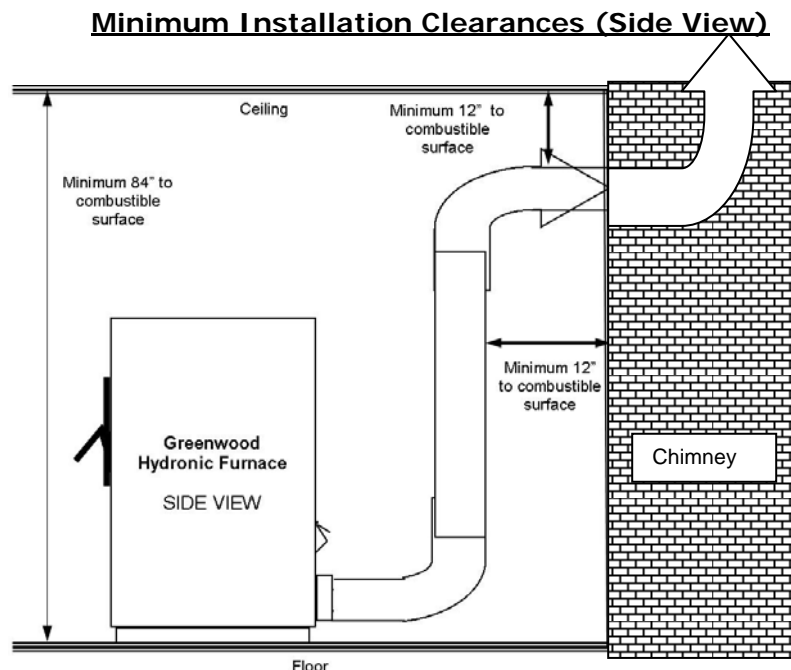
1. A qualified professional has inspected, repaired (if necessary), thoroughly cleaned the chimney and determined it is suitable for use with a residential heating appliance that burns solid fuel.
2. If possible, avoid using exterior chimneys (i.e., a chimney with one or more walls exposed to the outside below the roofline). If it is necessary to use an **exterior** chimney, the chimney flue size area must not exceed two times the minimum flue area for the furnace. If an **internal** chimney is used, the chimney flue size area must not exceed three times the minimum flue area for the furnace.

Furnace	Min Flue Diameter	Max Flue Area Internal Chimney	Max Flue Area External Chimney
Model 100	6 inches (15 cm)	85 in <sup>2</sup> (177 cm <sup>2</sup> )	56 in <sup>2</sup> (116 cm <sup>2</sup> )
Model 200	7 inches (18 cm)	116 in <sup>2</sup> (241 cm <sup>2</sup> )	77 in <sup>2</sup> (160 cm <sup>2</sup> )
Model 300	8 inches (20 cm)	151 in <sup>2</sup> (314 cm <sup>2</sup> )	101 in <sup>2</sup> (208 cm <sup>2</sup> )

3. If your chimney flue exceeds the maximum area allowed, it must be lined with a suitable flue liner that complies with the requirements of Chapter 11 of NFPA 211 3-1.2 -- Standards for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances.
4. The chimney or flue should be at least 12 feet tall and sized correctly for the Greenwood Furnace model installed.
5. Do not share a flue with another furnace, appliance or fireplace. Do not use a flue that already provides make-up air to the cellar or basement.
6. Tightly close the cleanout opening in the base of the chimney.

### Connector Flue Pipe

The connection between the furnace and the chimney must be at least 24-gauge stovepipe and elbows (not included with furnace). Maintain a clearance of at least 12 inches between the connector and combustible surfaces as shown on the following illustration.



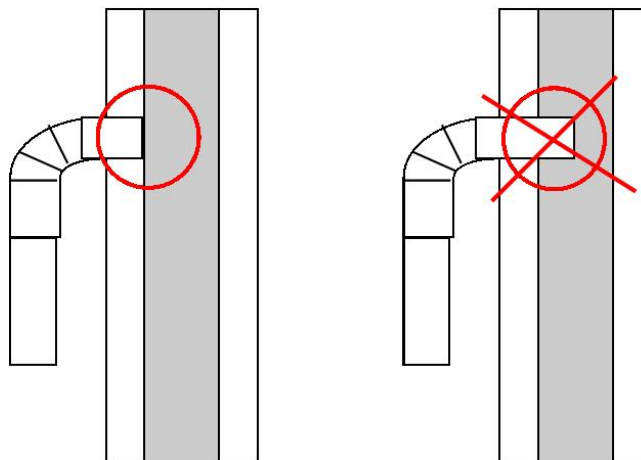
**NOTE:** Installation of this furnace must comply with the latest edition of NFPA 211 for reduced clearances and/or your local building code rulings -- use whichever minimum dimensions are LARGEST.

Observe the following rules when installing the connector pipe.

1. Where possible, use only corrugated (non-adjustable) elbows. These are more airtight and less likely to break. Use 90-degree elbows only as required and never more than two (they reduce the draft of the chimney).
2. Make sure all horizontal runs of connector pipe have a minimum outward rise of 1/4" per horizontal foot (this allows any condensation or creosote buildup to drain back toward the furnace).
3. If the connector stovepipe must go through a combustible wall before entering the masonry chimney, consult a qualified mason or chimney dealer. The installation must conform to local building and fire codes and latest edition of NFPA 211.
4. Insert the crimped end of the stovepipe inside the furnace outlet collar. Install additional pipe and elbows with the crimped end towards the furnace. This will allow any condensation in the flue to run back into the furnace.
5. Seal the connector pipe to the chimney with furnace cement.
6. Securely support the connector pipe and fasten joints with a minimum of three sheet metal screws or rivets per joint.
7. In all cases, follow the chimney manufacturer's instructions for installation.

When attaching the connector pipe to the chimney, do not push it into the chimney (it may plug the chimney and impede the draft). The following illustration shows proper installation.

### **Installation of the Connector Pipe into an Existing Chimney**



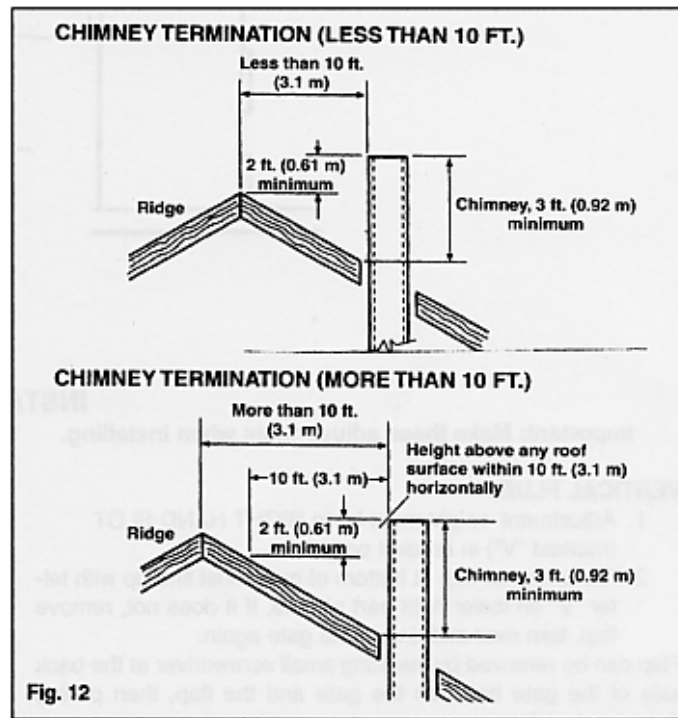
## Using a New Factory-made Chimney

A properly sized and installed chimney flue will ensure adequate draft at all times for optimum performance of the furnace. For a new chimney, use an insulated stainless steel system that conforms to type HT (High Temperature) requirements of UL 103 and ULC S629 and complies with the requirements of Chapter 11 of NFPA 211, Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances.

**The chimney must be at least 12-15 feet tall (add 1 foot for each 1000 feet above sea level) and correctly sized for the Greenwood Furnace model installed.**

Furnace	Min Flue Diameter
Model 100	6 inches (150mm)
Model 200	7 inches (180mm)
Model 300	8 inches (200mm)

When installing a new chimney flue, be sure to observe local building codes and the National Fire Protection Association rule: The top of the chimney must extend at least 3.0 feet (0.9m) above the highest point where it exits the roof and be at least 2.0 feet (0.6m) taller than any point of the roof within 10.0 feet (3.04m).



## **Side-Venting**

Greenwood does not recommend side venting. Though our furnaces have been certified for use in side vent applications, we have found that too often these installations do not provide adequate draft, are subject to back drafting under windy conditions, and can result in a build up of soot and creosote on the exterior of the structure.

If you have determined that a side vent is required for your installation, we recommend side-venting only to a full-height vertical flue on the exterior. The vertical flue should be an insulated stainless steel system that conforms to type HT (High Temperature) requirements of UL 103 and ULC S629 and complies with the requirements of Chapter 11 of NFPA 211, Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances.

**IMPORTANT NOTE:** In the U.S., installations of side-vent flues must conform to standards outlined in Chapter 11 of NFPA 211, Standard for Chimneys, Fireplaces, Vents and Solid Fuel-Burning Appliances. In Canada, installations must conform to CSA B139-04.

## **Supplying Make-up Air**

Fireplaces, other furnaces, clothes dryers, exhaust fans, and other appliances, all draw air from the room in which they are located. The Greenwood Furnace adds to that draw, and so it is important to make sure there is an adequate source of fresh air to offset these demands. Otherwise, you may create negative pressure in the room and starve combustion in the furnace.

1. Determine the volume of space (cubic feet) in the room. Include in the calculation adjacent rooms and areas not closed-off by doors.

$$\text{Volume (CF)} = \text{Length (ft)} \times \text{Width (ft)} \times \text{Height (ft)}$$

2. Determine the air input requirements of all appliances in the space. Add them and round the total to the nearest 1000 BTU per hour.
3. Determine whether the space is “confined” or “unconfined” by dividing the total volume of the room by the total input requirement for all appliances in the room.
  - a. If the result is greater than or equal to 50 CF/1000 BTU per hour, then consider the space “unconfined.”
  - b. If the result is less than 50 CF/1000 BTU per hour, then consider the space “confined.”
4. For an “unconfined” space in a conventionally constructed building, the fresh air infiltration through cracks around windows and doors **NORMALLY** provides adequate air for combustion and ventilation, and so no additional make-up air is required.
5. For a “confined” space or an “unconfined” space in a building with unusually tight construction, an additional source of make-up is required. Please consult an HVAC professional to determine the best way to supply make-up air for your installation.

## **Measuring and Adjusting the Draft of the Flue**

Draft is a function of the chimney flue, not the furnace. The natural draft generated through a chimney is dependent on several factors including chimney height, temperature of flue gases, cross-sectional area of the chimney, chimney wall insulation value, dilution air, and total volume of flue gases.

To operate properly, **the Greenwood furnace requires a draft of .05” to .07” WC** (water column) (12.45 – 17.44 Pa). Symptoms of an improperly designed or installed flue include visible smoke out the chimney, smoke escaping into the room, creosote buildup in the flue, and/or poor heating performance.

The following procedure describes how to measure draft using a manometer. (You can usually rent a manometer from a local stove and hearth retailer or local equipment rental shop.)

1. Close all windows and doors in the building and turn on all appliances that remove air from the home (e.g., heat pump, air conditioner, exhaust fan, clothes dryer, fireplaces, etc.).
2. Drill a hole in the connector pipe (just large enough for the tube of the manometer) at least 1 foot above the furnace outlet collar.
3. After all chimney connections are made, build a fire and allow the furnace to settle into stable operation (20-25 minutes).
4. Using the manometer, measure the draft in the flue.
  - a. If the draft measurement is below .05" WC (12.45 Pa), there is too little draft and a draft inducer or other corrective measures are required to avoid air-starvation of the furnace. A draft inducer fan (see picture) mounts in the connector duct and adjusts to increase the draft of the flue. These devices can be purchased on-line or at a local HVAC supply center.
  - b. If the draft measurement is above .07" WC (17.44 Pa), there is too much draft and a barometric damper is need to avoid over-firing of the furnace. This device (see picture) also mounts in the connector duct and adjusts to reduce the draft.
5. Once needed adjustments are complete, seal the hole made for the manometer tube with furnace cement or a screw.

**IMPORTANT NOTE:** To avoid over-firing the furnace, do not set a draft inducer fan to pull a draft of more than .07" WC (17.44 Pa).

**Draft Inducer Fan (Model AD-1)**  
(Available on-line or at a local HVAC supply center)



**Barometric Damper**  
(Available on-line or at a local HVAC supply center)



## **Other References**

### More Information

1. Chimney Safety Institute of America ([www.csia.org](http://www.csia.org))
2. All About Chimneys ([www.chimneys.com](http://www.chimneys.com))
3. National Fire Protection Association ([www.nfpa.org](http://www.nfpa.org))
4. American Society of Mechanical Engineers ([www.asme.org](http://www.asme.org))

### Sources of Equipment\*

1. Chimney flue components: local building supply store or <http://www.ventingsystems.com>
2. Draft Inducer (Model AD-1): local building supply store or <http://www.draftinducers.com/index.htm>
3. Other Chimney products: <http://www.chimneys.com/index.html> and <http://www.jacksonsystems.com>

\*Note – Greenwood Technologies provides these supplier references for your convenience only. We do not endorse the vendor, the equipment they sell, or their prices. Other suppliers may offer similar or identical components and we encourage you to comparison shop.