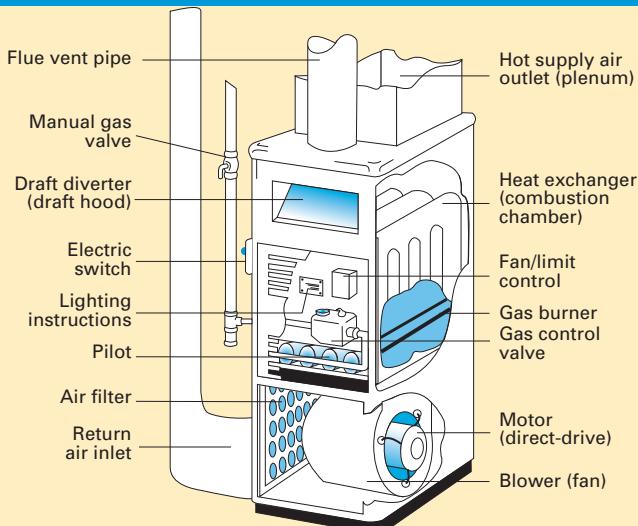
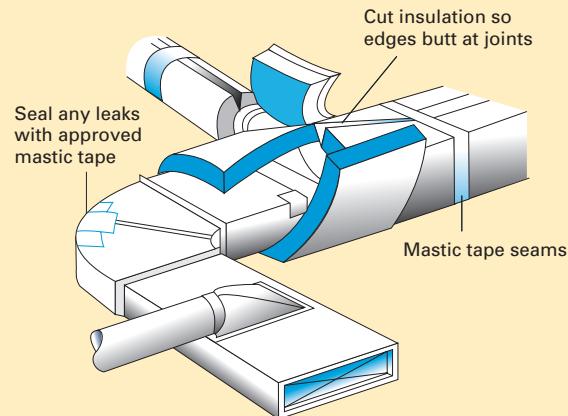




# Home heating systems



Forced air heating



Warm air duct

Your heating system is usually the largest energy user in your home, so choosing an energy-efficient unit is especially important. When shopping for a new gas heating system, compare efficiencies and installation costs of various models. Look for models that are "Design Certified" by CSA America to ensure safety, reliability and efficiency.

Most homes have central heating systems which generate heat at a central point and distribute it, usually by air, to each room in the house. With attractive, energy-efficient natural gas space heaters, logs and fireplaces available, many homeowners have gone to zone heating where individual heaters only heat the rooms being occupied while the central system maintains a reduced, minimal temperature throughout the house.

## Warm air heating systems (furnaces)

### Gravity

Heated air rises from the furnace through large supply ducts. Cool air returns to the furnace through cold air return ducts. The weight difference between warm and cool air keeps the air circulating.

### Forced air

Warm air is forced through supply ducts by a blower; it enters a room through registers or diffusers, then returns via a cold air duct to the furnace where it is filtered of dust and dirt particles, reheated and recirculated.

### Tips on ducts

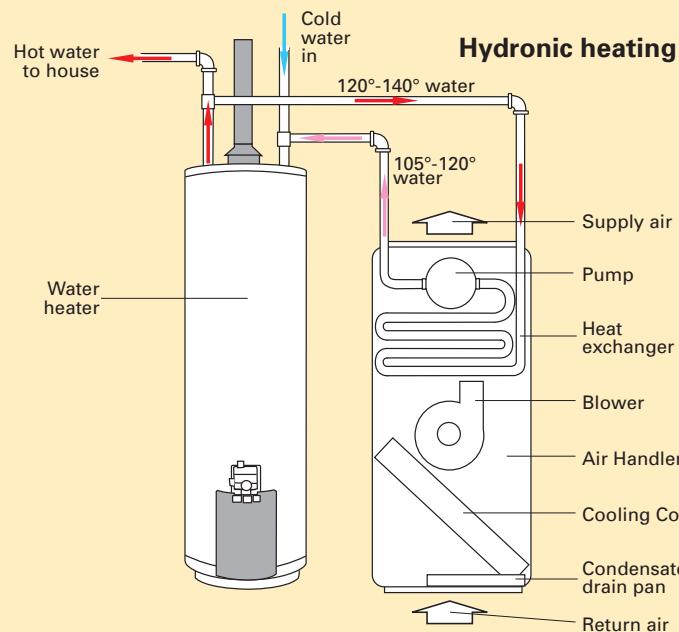
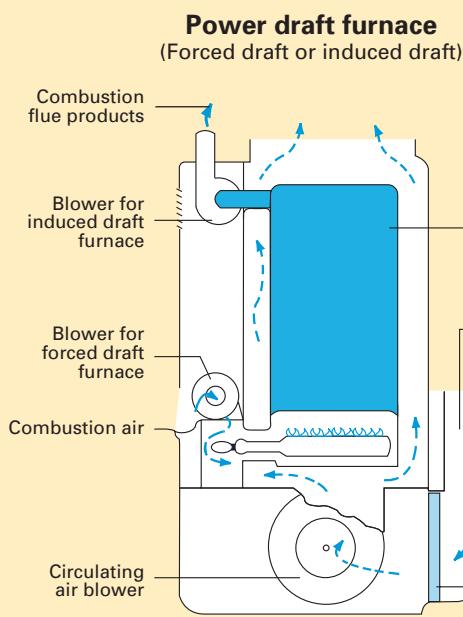
Warm air ducts and cold air returns that pass through cold areas (such as an attic, unheated basement, crawl space, garage or unheated areas of your home) must be insulated. Before you insulate ducts, use mastic tape to repair any holes or cracks in seams.

## AFUE – Annual Fuel Utilization Efficiency

The Federal Energy Agency requires all furnaces be given an Annual Fuel Utilization Efficiency (AFUE). The AFUE tells how much heat the system extracts from the fuel it burns during a single heating season. The higher the AFUE, the more efficient the equipment. The minimum efficiency standard for new furnaces is 78 percent AFUE.

A high efficiency furnace has special features which raise the AFUE. These may include an electronic ignition, a power draft system, an improved burner, a vent damper, modulating or multiple-stage gas valves, variable speed blower motors, high efficiency heat exchangers, and secondary heat exchangers in the highest efficiency models.





## Types of natural gas heating systems

### Atmospherically vented furnaces

This type of furnace has atmospheric gas burners and a gravity venting system. Some also use a vent damper, which closes when the furnace shuts off so less heat escapes up the chimney.

### Power draft furnaces

While a conventional furnace draws air into the combustion chamber by natural draft, power draft furnaces use a motor-driven fan to push (forced draft) or pull (induced draft) air into the combustion chamber. Some forced draft and induced draft furnaces allow for a Type B vent or metal-lined chimney and can be from 80 to 83 percent efficient (see illustration).

### Condensing furnaces

An enlarged heat exchanger surface lowers the temperature of the exhaust gases, making this furnace more efficient. The exhaust gas temperature drops to the dew point of the water vapor in the gas, causing the vapor to condense to water and release 970 Btus per pound of water condensed. Natural gas can yield more than 1 gallon (8 lbs) of water per 100,000 Btus (one therm)

burned, giving up about 7,760 Btus. Condensing furnaces achieve AFUEs up to 96 percent. Most manufacturers use electronic ignition, two-stage or modulating gas valves, and variable-speed blowers to increase comfort and efficiency.

### Hydronic heating systems

A very efficient form of heating is called hydro heat. This type of heating system uses a natural gas water heater to provide space heating as well as domestic hot water (e.g. laundry, showers, dishwasher, etc.). A simple loop circulates hot water through a finned tube heat exchanger in an air handler that furnishes warmed air to the space. The cooled water (140°F cooled to about 120°F) is then returned to the water heater.

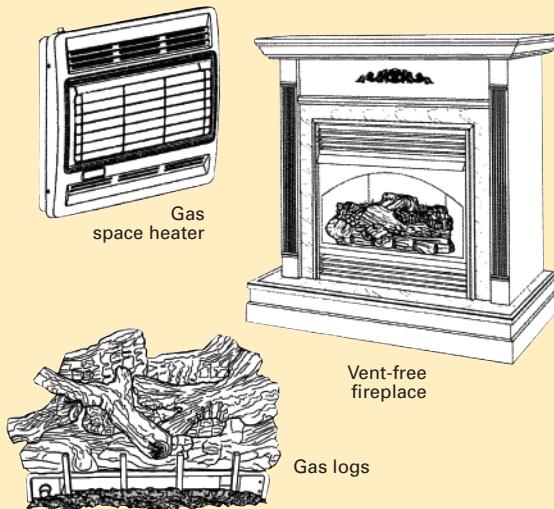
Hydro heat systems are similar to furnaces but the burner in the furnace is replaced with a finned tube heat exchanger (similar to the radiator in a car). Unlike a furnace, a hydro heat air handler does not require a natural gas connection or a flue vent because it receives its heat from the water heater. Most hydro heat air handlers include a circulating pump and controls.

The control of the hydro heat system is simple. A conventional heating or heating/cooling thermostat is used. On a call for heat, the pump is energized through a relay, as is the blower motor. Hot water immediately begins circulating through the heat exchanger

and heats the air. Typical leaving air temperatures are 100 - 105°F. When the thermostat is satisfied, the pump and blower both stop.

Hydro heat systems are a simple concept. Just think about it, a tank-type water heater is normally in use 1 to 2 hours each day. The rest of the time, the hot water is idle. The hydro heat system recruits the "unemployed" hot water for the important job of heating the home.





### Zone heating

## Zone heating system

Zone heating systems are extremely efficient because they enable you to turn down the thermostat on a central furnace and only heat occupied areas. Space heaters, logs, and fireplaces are some of the natural gas vent-free products that are often used in zone heating applications. Natural gas vent-free products are nearly 100% efficient and provide tremendous comfort to occupied rooms. Vent-free products are not recommended by the manufacturers as a sole source of heat because of the water vapor that they create during the combustion process. In homes without central heating, vented and direct-vented natural gas space heaters are available.

## Care of your heating system

- Home heating systems need periodic care to extend operating life, save energy and increase efficiency. Follow manufacturer's recommendations.
- Cleaning or adjusting natural gas burners should be done by a qualified service person. If your heating system is not working properly, contact a professional. The following conditions indicate the system could be operating inefficiently or unsafely:
  - Soot and carbon deposits on the burner, in the combustion chamber, on the floor near the furnace or below the draft hood opening.

- Buildup of dust, dirt or scale on burners and/or burner components.
- A yellow flame rather than a blue flame.
- Flame backing up and burning outside the combustion chamber.
- Excessive humidity or frost on windows or walls.
- Nose or eye irritation, headaches or listlessness.
- Visually inspect the flue vent for rust holes or corrosion which may allow hazardous flue products to enter your home. Replace any defective vent pipe.
- Maintain pumps, blowers, motors and filters. Before working on your heating system, turn off the electric power to the furnace. Some pump and fan motors require periodic oiling but some are permanently lubricated. See manufacturer's instructions on oiling. If instructions are unavailable, look for a tube or hole on both ends of the motor, directly above the motor shaft. Oil twice during the heating season, using nondetergent #20 oil, two or three drops per location. Do not over-lubricate; too much oil will soak into the motor's insulation and shorten its life.
- Blower blades require occasional cleaning; dust and dirt reduce their air capacity, causing overheating of fan motor and heat exchanger, and fuel waste. To do this, remove the blower



assembly from the furnace and use a brush to clean the blades. Be careful not to bend the blades or remove small clips attached to them. These clips are balance weights that ensure vibration-free operation.

- If you have a belt-driven forced air furnace, check the V-belt that connects the motor and blower pulley and replace if worn or cracked.
- Check filters monthly and replace or clean when dirty to prevent damage to blower or fan motor and maintain efficiency.

## Controls

- The main gas valve turns the burner on and off. It is electrically controlled by the room thermostat, pilot safety device and the maximum temperature limit control.
- The limit control keeps your heating unit from overheating.



- Lower your thermostat at night and when there will be no one home for at least 4 hours; a 10° setback can give you significant savings. Programmable thermostats save energy by automatically turning the thermostat down and up on a preset schedule.
- If you turn off the pilot during summer to save energy, you should know how to safely relight it. It might not be economical to hire a serviceperson to relight the pilot.

## Safety

- Keep furnace area clear of flammable liquids (gasoline, paint products, solvents or cleaners) and all combustible materials (newspaper, cardboard boxes or rags).
- Furnaces run longer during very cold weather to maintain the thermostat setting, so duct and register surfaces may be hot. Keep children away.
- If the pilot goes out, look for relighting instructions printed on the furnace. If it goes out repeatedly, call a qualified heating contractor.
- All fuel-burning appliances need sufficient air for proper combustion. If a natural gas, propane, oil, coal, kerosene or wood heating appliance does not receive adequate intake air, it will not burn the fuel completely and may operate inefficiently. Under certain conditions, carbon monoxide could be produced and enter the home if the vent is defective or adequate combustion air is not supplied.

## Common furnace terms

**Automatic vent damper:** A device attached in the venting system after the draft hood. Automatically closes the flue vent when the furnace is off, keeping heated air from going up the chimney.

**Intermittent Ignition Device (IID)/**

**electronic ignition:** Uses a spark or other heat source to ignite the pilot when the thermostat calls for heat. Replaces a continuously burning pilot flame.

**Heat exchanger:** A section of the furnace where heat generated by the combustion process is transferred to circulating air.

**Flue gases:** The products of combustion (carbon dioxide and water vapor) which are vented to the outdoors.

## Using energy wisely

Check registers. Look for and correct the following:

- Closed supply dampers.
- Drapes, furniture or carpet obstructing the supply and/or return registers or grilles.
- Leaks in warm air ducts and cold air returns.
- Dust plugging the supply and/or return registers or grilles.
- Piles of clothes, towels, etc., that block heat or air flow.

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