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WOOD HEATING OPTIONS

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There are several different types of wood-heating appliances to choose from. Each type is intended for a particular use, and each has its own set of advantages and disadvantages. Among the range of options, there are two general categories: space heaters and central systems.

Space Heaters

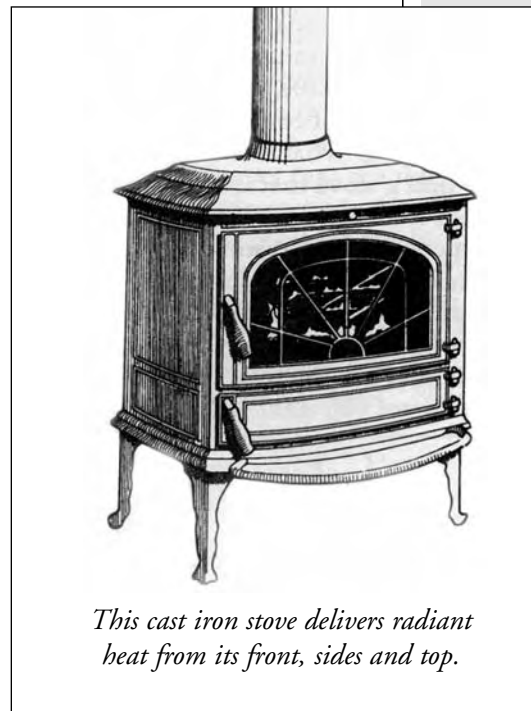
The space heater category is by far the largest and most popular, and includes wood stoves, cook stoves, pellet stoves, fireplaces, fireplace inserts and masonry heaters.

A space heater is defined as an appliance intended to heat a space directly, as distinct from a central heating furnace or boiler, which supplies its heat to the house through a system of ducts or water pipes. In the past, when houses were poorly insulated and drafty, a space heater could be expected only to heat the room it was installed in and perhaps an adjacent area. Modern houses conserve energy more effectively and need much less heat to stay warm. It is now possible for a single space heater to provide the total heat requirements for an average-size modern home.

Like any effective heating system, a space heater installation takes careful planning to be successful. If you intend to provide a major part of your home heating needs with a space heater, you should consider two important matters. First, the heater should be located in the area where the family spends most of its time, and second, a means to distribute heat to other parts of the house may be necessary. These conditions are not usually difficult to meet, but they do need planning.

Wood Stoves

A wood stove is the most common, flexible and inexpensive space heating option. A wood stove can be located almost anywhere there is enough space and where its chimney can be properly routed. The ideal wood stove installation has the unit located centrally in the main floor living area of the house, with the flue pipe running straight up from the stove flue collar into the chimney. This installation design provides the best performance and needs the least maintenance.



This cast iron stove delivers radiant heat from its front, sides and top.

Rules for Single-Wall Flue Pipe Assemblies

- Minimum clearance from combustible material: 450 mm (18 in.).
- The minimum clearance may be reduced by 50 per cent to 225 mm (9 in.) if suitable shielding is installed either on the pipe or on the combustible surface.
- Maximum overall length of straight pipe: 3 m (10 ft.).
- Maximum unsupported horizontal length: 1 m (3 ft.).
- Maximum number of 90-degree elbows: 2
- Minimum upward slope towards the chimney: 20 mm/m (1/4 in/ft.).
- The crimped ends (male) of the sections must be oriented towards the appliance.
- Each joint in the assembly must be fastened with at least three screws, including the connections at the appliance flue collar and chimney.

Heat Output: Wood stoves range in output from small ones designed to heat a single room, to large stoves able to heat whole houses. Large stoves can be used most effectively in houses of open plan design where the heat readily circulates to other areas. Selecting the right stove to match your needs can be tricky because its performance is not necessarily related to the way it looks. The best guide to heating capacity is firebox size rather than the overall size of the stove. A stove that is too small for the space it must heat will have to be loaded often and may deteriorate from being fired constantly at full output. A stove that is too large will overheat the space and be turned down too low much of the time, producing smoky, polluting fires. Note that, because of their higher efficiency, advanced stoves can usually have slightly smaller fireboxes than equivalent conventional stoves. The best way to choose a stove that is sized correctly for your needs is to get advice from an experienced wood stove retailer. Since experienced dealers know the performance of each of their stoves, they can help you match a stove to your heating goals.

Design: Some aspects of the design of wood stoves are related more to personal preference than to performance. For example, there are no clear performance differences between cast iron or plate steel construction or between painted or enamelled finishes. However, there is a difference between stoves that deliver their heat to the room mainly by direct radiation compared to those that deliver heat mainly by the convection flow of warm air.

Radiant stoves send their heat out in all directions. The surface of objects, such as walls, floors, ceilings, furniture and people that face the appliance, are warmed.

Cast iron stoves and those with heavy steel plate surfaces are often of the radiant type. Convection stoves heat air that flows between the stove body and a sheet metal shield or casing.

When you shop for a new stove, you will notice that most modern stoves have a blend of both radiant and convection characteristics.

That is, the back and sides may have shields behind which air flows, whereas the front and top have radiant surfaces. In operation, these stoves produce both radiant and convective heat and can be suitable for most installations.

While the heating efficiency of radiant and convection stoves is about the same, there are advantages in using one or the other type depending on the details of the installation. For example, a stove with mainly radiant surfaces is effective in a relatively open area where the radiant warmth is dispersed. A radiant stove in a small room can make people feel uncomfortably warm. The heat from a radiant stove is somewhat more difficult to distribute to other areas of the home.

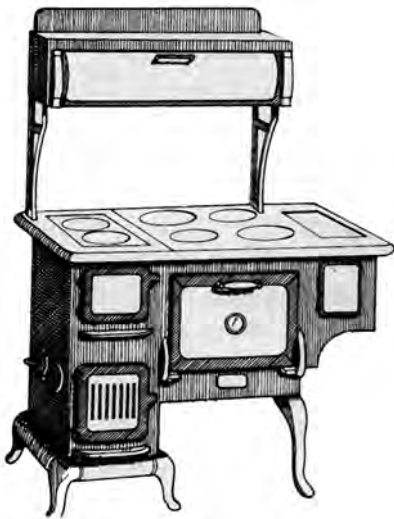
The shielded surfaces of a more convective stove don't get as hot as radiant surfaces and this can make a stove with shielded sides a better choice for a small room where furniture must be close to the installation.

Installation: A typical wood stove installation consists of the following components, starting from the floor level:

- a floor pad to protect flooring or carpets from embers which might fall from the stove during loading or ash removal;
- the stove itself;
- the flue pipe that connects the flue collar of the stove to the chimney; and expels the exhaust gases to the outdoors.

Each part of the space heater system deserves careful attention during installation to produce an effective heating system.





Wood-fired cook stoves are great for cooking food, but are not as effective as wood stoves for space heating.



Pellet appliances have some advantages over firewood burning appliances and also some disadvantages. In general, householders looking for convenience, automatic operation and neatness may find a pellet appliance desirable. Those who highly value low cost, self-sufficiency and heating security would find a regular wood stove more suitable.

Cook Stoves

Wood-fired stoves are designed for both surface cooking and oven baking, and may also have a low-temperature warming oven and a way to heat wash water. Cook stoves can also be used to heat limited areas, but space heating is not their main function. There are no advanced technology cook stoves, so their smoke emissions are higher and efficiency is lower than advanced wood stoves. Despite their limitations, cook stoves can be used successfully as space heaters for small, very well insulated houses.

Pellet Stoves

Although pellet-burning fireplace inserts, furnaces and boilers are available, by far the most common form of pellet appliance is space heating stoves. Pellet appliances are more complicated internally than wood stoves. They usually have three motorized systems. An auger moves the fuel from the storage hopper to the combustion chamber. An exhaust fan forces the exhaust gases into the venting system and draws in combustion air. Finally, a circulating fan forces air through the heat exchanger and into the room. Battery backup systems can be used to run pellet appliances during electrical power failures, but only for relatively short periods.

Pellet burners have several advantages over appliances that burn natural firewood:

- Their automatic operation is convenient. One hopper load of fuel can last 24 hours or more.
- Pellet stoves can produce a steady heat output and some are controlled with a wall thermostat.
- The fuel is supplied in bags, which store neatly.
- The fuel is always dry and ready to burn when purchased.
- Pellet appliances use a special vent that costs less to install than wood stove chimneys.
- Their smoke emissions are usually lower than those of advanced wood stoves.

Balancing these advantages are some limitations that you may wish to consider:

- Pellet appliances tend to cost more than firewood burners.
- Pellet fuel is more expensive than firewood in many areas.
- Pellet fuel cannot be made by householders so it must be purchased.
- Pellet stoves need electricity to operate auger motors and fans.
- The fire produced by a pellet stove does not have the natural appearance of a wood fire.

Conventional Fireplaces

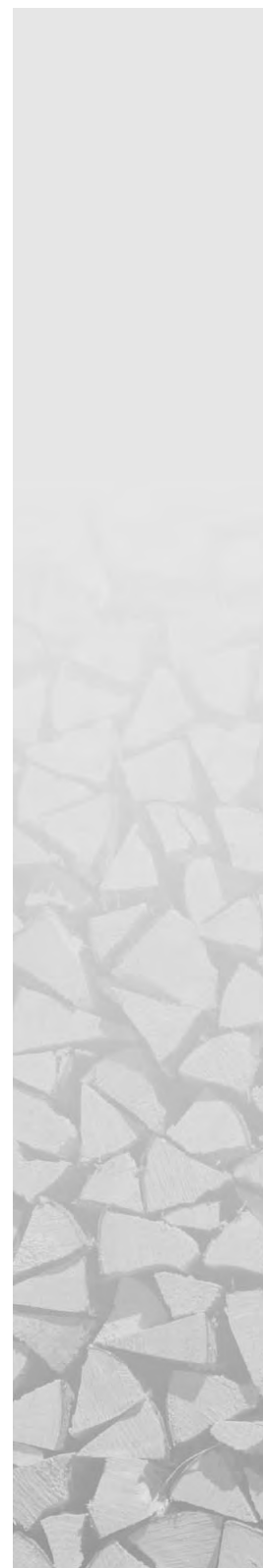
Most fireplaces are built into the structure of the house and, in modern times, have been used mainly for fire viewing rather than heating. They are either site-built using masonry materials like brick or stone, or are factory-built from steel. Traditional fireplaces are ineffective for home heating and tests have shown that they can actually produce a negative energy efficiency by drawing a large amount of warm air out of the house while delivering little heat. This poor performance is because they are intended only for fire viewing and do not include the features needed to convert the fuel to useful heat, such as gasketed doors, carefully designed combustion chambers and heat exchangers. Conventional fireplaces also pollute the indoor and outdoor air more than advanced wood heating appliances.

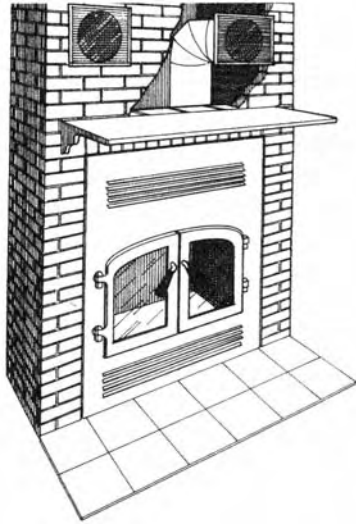
If you already have a conventional masonry fireplace that you want to upgrade, you have some options, but only the third one in the list is truly effective:

- You could install a glass door assembly. The door will not improve energy efficiency, but might reduce the leakage of air when the fireplace is not in use.
- You could install a tubular grate or special firebox liner in an attempt to improve the fireplace's heating efficiency. These options are not usually effective because the improvement would be minor, and are not recommended because continuous use could cause dangerous overheating.
- You could install an advanced technology fireplace insert or hearthmount stove. These units are effective heaters that many Canadians use to reduce home heating costs. Modern inserts provide an excellent view of the fire, so the fireplace can still serve its original purpose.

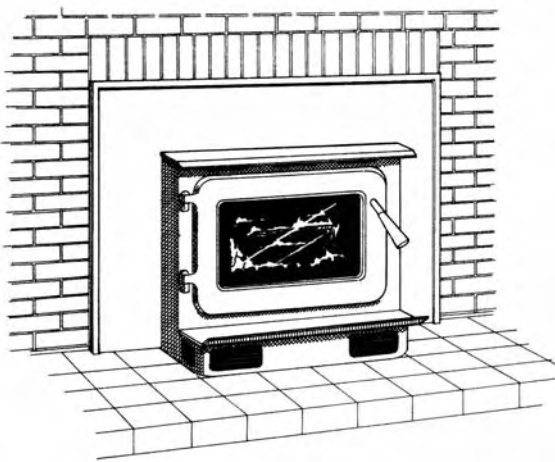
Advanced Fireplaces

If you are planning to install a new fireplace, you can combine the beauty of a fireplace with the heating power of a wood stove by choosing an advanced technology fireplace. The same technologies used in wood stoves to meet regulated smoke emission limits





Advanced technology fireplaces combine the decorative flexibility of traditional fireplaces with the clean burning and high efficiency of advanced wood stoves.



An insert can be installed in an existing masonry fireplace to improve its efficiency and reduce the chances of cold air, odors and smoke spilling into the room.

are also used in these specialized factory-built fireplaces. The best examples of these fireplaces can be as effective for home heating as a good wood stove and are certified for low emissions.

The firebox and heat exchanger of these fireplaces is surrounded by an insulated sheet metal casing, allowing installation against combustible construction. A wood or steel stud frame sheathed with drywall or other materials is built to enclose the sides and rear. The front of the fireplace can be trimmed with ceramic tiles, brick or stone slices and a decorative mantel can be added. In most cases these fireplaces can be installed on a normal house floor without the need of a foundation or reinforcement.

Room air is drawn in through a grill under the firebox, passed through a heat exchanger and returned to the room either through a wide grill at the top of the fireplace body or through ducts which can be routed to grills above the fireplace or into other rooms beside, behind or even below the fireplace. These fireplaces offer features that can meet both esthetic and heating objectives, but their installation is complicated and should be left to trained professionals.

Fireplace Inserts

A fireplace insert is a specially designed wood stove intended for installation within the firebox of a masonry fireplace. Inserts are used to convert conventional masonry fireplaces into effective heating systems. An insert firebox is surrounded by an outer shell. Room air flows between the insert body and the outer shell where it is heated before being returned to the room. Most of the heat is delivered to the room instead of being trapped behind the insert in the masonry structure. A decorative face plate covers the space between the insert and the fireplace opening.

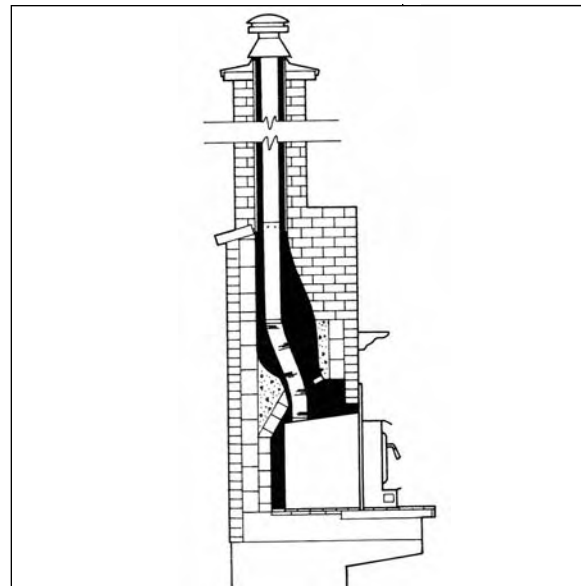
Installation codes require that a stainless steel chimney liner be installed from the insert flue collar to the top of the chimney. Correctly installed, an advanced fireplace insert can be almost as efficient as a free-standing wood stove.

There are a few special inserts that can be installed in factory-built fireplaces. If you want to improve the performance of your conventional factory-built fireplace, ask a wood heating dealer if any inserts are certified for use with your fireplace.

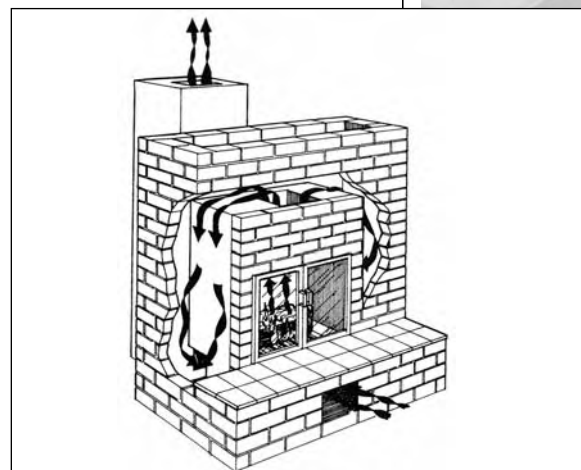
A hearthmount stove is an option for upgrading the performance of a masonry fireplace. Hearthmounts are wood stoves mounted in front of or inside the fireplace and vented through the fireplace throat. They must also be vented through a stainless steel liner that is continuous to the top of the chimney. Only certain wood stoves can be used as hearthmounts. The certification label and installation instructions indicate if the unit can be vented through a fireplace.

Masonry Heaters

Masonry heaters have a long history in Northern Europe and have been shown to be efficient and effective for home heating. They operate on a different principle than the other advanced technology appliances. Masonry heaters use tonnes of mass in the form of bricks or stone to store and later release the heat they produce. The core of the heater is built from high-temperature firebrick and pre-cast components that form the firebox and heat transfer passages. To complete the heater, the core is then surrounded by brick or stone. With a masonry heater, one or two fires per day are built to provide the heat needed for the home. The wood is burned quickly and the fire is allowed to go out while the heat stored in the masonry continues to radiate warmth for many hours. Masonry heaters are more costly than other wood heating systems and are best suited to heating energy-efficient houses of moderate size. The Masonry Heater Association has developed a professional certification program for heater masons. The use of a certified mason is the best way to ensure a successful heater installation.



Installation codes now require that a stainless steel liner be installed from the insert flue collar to the top of the chimney. The result is better performance and a safer system



Masonry heaters are specialized and expensive, but used correctly, they can be efficient and effective. Heat from an intense fire is transferred to the mass of the masonry before being radiated to the room.

CENTRAL HEATING SYSTEMS

Furnaces and Boilers

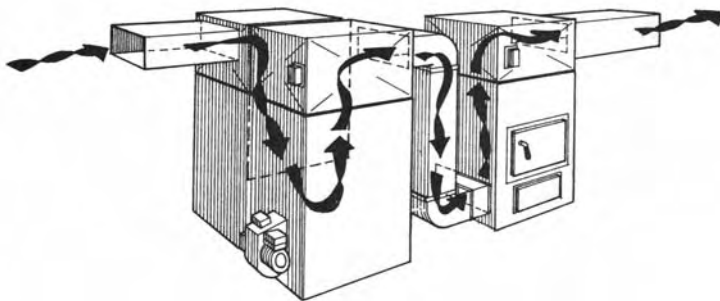
A central heating system uses a network of air ducts or water pipes to distribute heat to all rooms of the house. Furnaces heat air, which is forced through ducts with a fan. Boilers heat water that is pumped through pipes to heat floors or radiators.

Central heating with wood-fired furnaces and boilers is not as common as it once was. Part of the reason is that our houses are more energy efficient and easier to heat with stoves and fireplaces that also provide a view of the fire. Another reason is that advanced technologies were not used in furnaces and boilers until recently so their efficiency was low. Even today, only a few central wood burning systems have proven advanced technologies.

Central heating may be a good option for your house if:

- the house is old, large and not very energy efficient;
- the house is made up of many small rooms with no large open areas;
- there is no suitable place to install a fireplace or wood stove;
- fire viewing is not a high priority; or
- you wish to confine wood fuel to the basement area.

The increased popularity of in-floor radiant heating with a network of pipes installed below the floor surface has led to an increase in the use of wood-fired boilers. Both indoor and outdoor boilers have been used for this purpose. One big advantage of boilers is that they can readily be used to heat domestic wash water, as well as provide heating for the house.



The add-on is placed beside the existing furnace and special ducts are installed to connect the two units. Note that the air passes through the original furnace, then through the add-on and into the ducts for distribution to the house.

Wood furnaces and boilers can be installed to work in conjunction with systems using other fuels such as oil, natural gas and electricity. Combination wood-oil or wood-electric furnaces can use both energy sources in a single-packaged unit. Add-on furnaces and boilers can be installed beside existing furnaces and boilers using other fuels. All such units must be safety tested and certified for this purpose.

Outdoor Boilers

Looking like metal garden sheds with short chimneys, outdoor boilers have gained popularity in rural Canada. Outdoor boilers are usually constructed with a large firebox surrounded by a water jacket, and can be located up to 40 m (130 ft.) from the house or building they heat. Heated water is pumped through an insulated underground pipe to a heat exchanger where heat is transferred to the building. A second pipe returns the cooled water to the boiler to be reheated. These pipes must be carefully insulated or much of the heat will be lost to the ground.

Outdoor boilers appeal to people in rural areas because of their ability to heat a house, its domestic wash water and, if necessary, another building such as a workshop. Other features considered desirable are their location outside the house and the idea that larger pieces of less processed firewood could be used. However, problems arose because the simple fireboxes of almost all brands could not burn the wood effectively. The result was large plumes of smoke and efficiency as low as 40 per cent. The smoking problem is so serious that many municipalities across Canada have restricted the locations where outdoor boilers can be installed.

In response to the problems, an emission test standard was recently developed and advanced-technology outdoor boilers are becoming available. If you are considering an outdoor boiler, choose an advanced-technology model, one with low smoke emissions and high efficiency. Also, by burning only clean, seasoned firewood you will improve efficiency and reduce the smoke emissions from your boiler. An outdoor boiler installation is costly so protect your investment by getting good advice and the services of an experienced installer.

