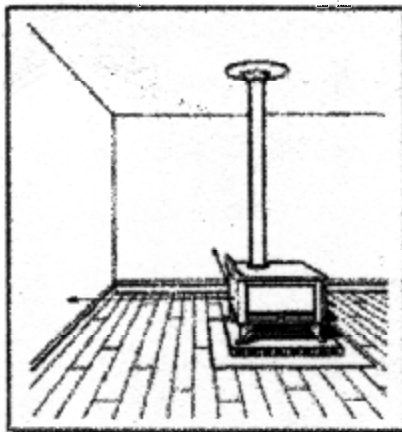


Proper Wood Stove Installation

The guidelines for installing wood stoves can be grouped into two categories. The first category is for stoves that have been tested and certified as meeting Canadian safety standards. The tests determined the lowest clearances and other installation guidelines for the specific appliance. You can find this information in the manufacturer's instructions. All new advanced wood stoves for sale in Canada today have been safety certified, and most insurance companies will accept only certified appliances.



Side and Rear Wall Clearance for an Uncertified Stove – The manufacturer's installation instructions specify the right clearances for the appliance. The clearances for certified appliances vary, but are less than those shown in the following table (from CSA B365) for uncertified appliances. Many of the new, certified appliances have heat shields on the sides and rear, reducing clearances by as much as 90 percent.

The second category is for appliances that haven't been tested and certified. These include used or antique stoves, most stoves built before the early 1980s and stoves built by small, informal welding shops. There are several good reasons to avoid uncertified appliances.

- They are less efficient than new, certified appliances, so you will burn more wood to get the same amount of heat, which will produce high levels of smoke and creosote.
- They require larger installation clearances than new certified stoves, making them more difficult and expensive to install.
- Installation rules for uncertified stoves are so complicated that you will need an experienced professional to interpret them or to install your stove.
- The construction quality and convenience features of new certified stoves are superior to older, uncertified stoves.
- Uncertified stoves may constitute a serious fire hazard.
- You may not be able to get insurance, even at a high rate.

You can find guidelines for installing these uncertified stoves in the solid-fuel-burning installation code, CSA B365. The lowest clearances to combustible materials for uncertified stoves are large – 1200 mm (48 in.) for radiant stoves and 900 mm (36 in.) for stoves surrounded by jackets behind which convection air can flow.

Clearances to Combustible Material for Appliances Using Solid Fuel
Source: CSA International B365-01, Table 2

Application	Minimum clearance, mm (in.)		
	Top	Sides, rear and corner	Fuelling and ash removal side(s)
Appliances with no shielding*	1500 (60)	1200 (48)	1200 (48)
Appliances with shielding*	1500 (60)	900 (36)	1200 (48)

* Shielding consists of protection such as external jacketing or a metal heat shield attached to the sides and rear of the appliance and spaced out at least 50 mm (2 in.) by non-combustible spacers, with provision for air circulation at bottom and top.

Note: Clearances shall be measured from the outer surface of the appliance to the combustible material; a non-combustible covering applied over the combustible material shall be disregarded.

Reduce Minimum Clearances Safely

Like most homeowners, you probably want your wood stove to take up as little floor space as possible. As a result, heat shields are often used to reduce clearances and protect walls and ceilings. Some stove manufacturers offer certified accessory shields with their products to provide reduced wall clearance. If you aren't offered accessory shields for your stove or if you want to reduce the clearance even further, you can buy effective wall and ceiling shields or have them built.

You can safely reduce the clearances for both **certified** and **uncertified** stoves by following the rules set out in standard CSA B365. The common feature of the clearance reduction rules is air space behind the shield material. This space sets up a convection flow of air when the stove is operating and prevents the stove's heat from reaching the wall. (The percentage shown in the following table is the amount by which you can reduce the lowest clearance with the particular shield system listed.) By using heat shields, you can reduce wall and ceiling clearances.

Clearance-reducing shields are made from various materials, from simple sheet metal to more decorative brick, stone slices or ceramic tiles. Although CSA B365 allows you to make shields from solid brick, this isn't practical because they are expensive and hard to build. You can achieve the same visual effect for less money by using brick slices, rather than full bricks. In addition, shields must be permanently mounted to walls – freestanding panels aren't acceptable as clearance-reducing shields.

Rules for constructing heat shields

- Minimum space between shield and combustible material: 21 mm (7/8 in.).
- Minimum clearance along bottom of shield: 25 mm (1 in.).
- Maximum clearance along bottom of shield: 75 mm (3 in.).
- Minimum clearance along top of shield at ceiling: 75 mm (3 in.).
- Shield extension beyond each side of appliance: 45 cm (18 in.).
- Shield extension above appliance: 50 cm (20 in.).
- Edge clearance for ceiling shields: 75 mm (3 in.).
- Glues used in shield construction must not ignite or lose adhesive qualities at temperatures likely to be reached.
- Mounting hardware must allow full vertical ventilation.
- Mounting hardware must not be located closer than 200 mm (8 in.) from the vertical centre line of the appliance.
- Mounting hardware that extends from the shield surface into combustibles may be used only at the lateral extremities of the shield.

Reducing Clearances with Shielding

Source: CSA 365-01, Table 3, Reduction in Appliance and Ductwork Clearance from Combustible Material with Specified Forms of Protection

Type of protection (shield)	Clearances may be reduced by these percentages	
	Sides and rear %	Top %
Sheet metal, a minimum of 29 gauge in thickness spaced out at least 21 mm (7/8 in.) by non-combustible spacers	67	50
Ceramic tiles or equivalent non-combustible material on non-combustible supports spaced out at least 21 mm (7/8 in.) by non-combustible spacers	50	33
Ceramic tiles or equivalent non-combustible material on non-combustible supports with a minimum of 29 gauge sheet metal backing spaced out at least 21 mm (7/8 in.) by non-combustible spacers	67	50
Brick spaced out at least 21 mm (7/8 in.) by non-combustible spacers	50	n/a

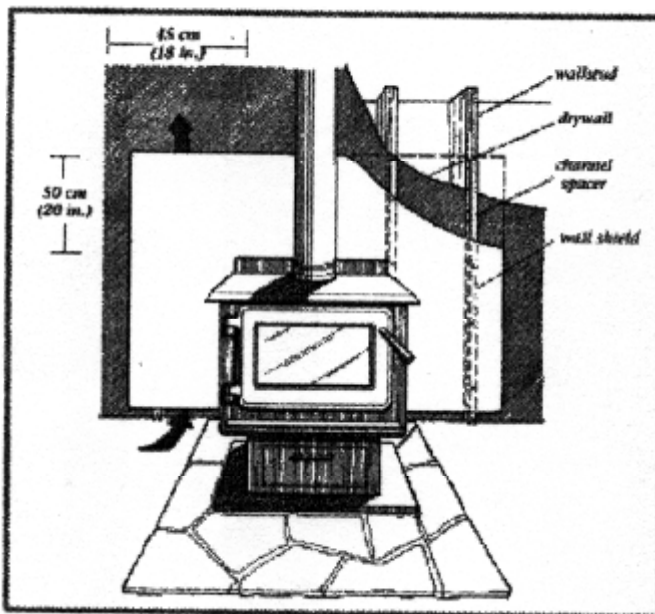
Brick with a minimum of 29 gauge sheet metal backing spaced out at least 21 mm (7/8 in.) by non-combustible spacers

67

n/a

You can also reduce minimum clearances by using commercial shields. They are tested to determine how effectively they can reduce clearances. The shields are certified and carry a label that confirms they have passed the tests and provides details on clearance reduction. Some commercial shields can be attached directly to combustible walls without needing an air space.

The first step in reducing clearances is to determine the lowest clearance, from either the stove label or the Table of Clearances for Uncertified Stoves (from the CSA B365 installation code). Then calculate the amount the clearance will be reduced with the type of shield you plan to use (from the table on clearance reduction).



Cut-away of Wall Shield Assembly – By allowing air to flow between the shield and the combustible surface, a wall shielding assembly can safely reduce minimum clearances. The shield must extend at least 50 cm (20 in.) above the top of the appliance and 45 cm (18 in.) beyond each edge of the appliance.

Channel spacers are the most effective type because they give good support to the shield and don't transmit heat through the mounting hardware to the combustible wall. Metal wall strapping, available from most building supply stores, is made of light steel channels that work well as shield spacers. Note that the bottom of the channel is notched to allow cooling air to enter. The shield must extend 45 cm (18 in.) beyond each edge of the appliance and 50 cm (20 in.) above the top of the appliance.

Parts of the Wood Stove Installation

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

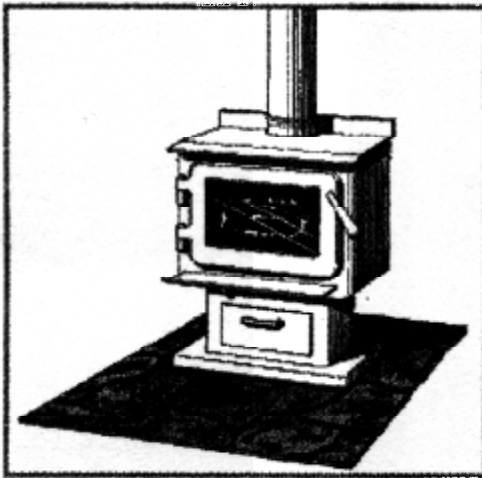
- a non-combustible floor pad to protect flooring or carpets from embers that might fall from the stove during loading or ash removal;
- a wood stove;

- a flue pipe that connects the flue collar of the stove to the chimney; and
- a chimney system that produces the draft that draws combustion air into the stove and expels the exhaust gases to the outside.

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

Protect the floor

Certified wood stoves will not overheat a combustible floor. During safety testing, the floor temperature is checked and must not exceed safe limits. Although the floor won't overheat during normal operation, you still need to protect it from live embers that might fall from the stove as you tend the fire or remove ashes. The floor pad must be a durable, non-combustible material, such as sheet metal, grouted ceramic tile or mortared brick. Floor pads must normally extend **not less** than 45 cm (18 in.) in front of the loading door and 20 cm (8 in.) beyond the other sides and the back. Don't install the floor pad on a carpet unless the pad is structurally supported so that it doesn't move, crack or distort.



Non-combustible Floor Pad Size and Type – The floor pad protects flooring from hot embers or ashes that might fall from the stove as you fill it or tend the fire. The pad must extend at least 20 cm (8 in.) beyond the sides and rear, and 45 cm (18 in.) in front of the loading door. Also, the floor pad must be a continuous, non-combustible surface. Do not mount the floor pad on carpet, unless the pad is strong enough to resist bending or cracking.

Uncertified stoves haven't passed safety tests, so heat from the bottom may overheat floors or cause a fire. These appliances have different rules for floor protection, depending on the height of the stove legs and any bottom protection the stove might have. If you are installing an uncertified appliance, contact a qualified professional for details. Better yet, choose a new, certified stove – especially a highly efficient model.

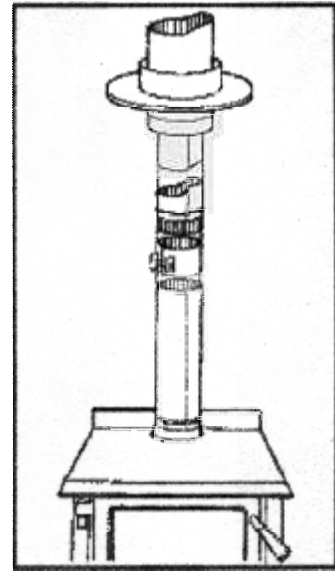
Installing flue pipes

Flue pipes carry the exhaust gases from the stove flue collar to the base of the chimney. They have been called the weak link in the wood-burning system, because they are often improperly installed. As you will see from the list below, several rules exist for safely installing flue pipe assemblies. They apply to flue pipes connected to all wood-burning appliances, including central heating systems.

Flue pipe assemblies should be as short and as direct as possible between the stove and the entrance to the chimney. This reduces heat loss and promotes a strong and reliable chimney draft. The ideal assembly rises straight up from the stove flue collar and fits directly into the chimney without elbows or curves. A straight flue pipe assembly allows the most gas flow and results in a stronger draft. Straight assemblies also need less maintenance because there are no corners where creosote deposits can accumulate.

Rules for single-wall flue pipe assemblies

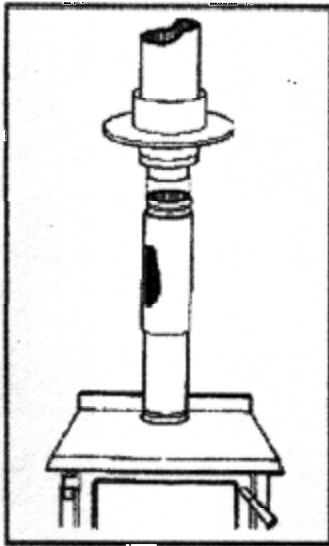
- Minimum clearance from combustible material: 45 cm (18 in.).
- The minimum clearance may be cut in half to 22.5 cm (9 in.) if suitable shielding is installed either on the pipe or the combustible surface.
- Maximum overall length of straight pipe: 3 m (10 ft.).
- Maximum unsupported horizontal length: 1 m (3 ft.).
- Maximum combined change in direction: 180 degrees (i.e. not more than two 90-degree elbows).
- Minimum upward slope towards the chimney: 2 cm/m (1/4 in. per ft.).
- The crimped ends (male) of the sections must be oriented toward 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.
- Flue pipes that are 15, 17.5 and 20 cm (6, 7 and 8 in.) in diameter must have at least 24gauge thickness.
- Don't use galvanized flue pipes – the coatings vaporize at high temperatures and release dangerous gases. Use black-painted flue pipes.
- The assembly, including the elbows, must have allowance for expansion: straight assemblies should include either an inspection wrap with one end unfastened or a telescopic section.



The Ideal Single-wall Flue Pipe Assembly –

When the flue gas path is straight, the system produces a stronger draft and needs less maintenance than an assembly with elbows. The ideal flue pipe assembly rises straight from the appliance flue collar into the chimney. A straight single-wall flue pipe assembly needs an inspection wrap or telescopic section so that you can install and remove it without having to move the appliance. The wrap also allows some movement for expansion when the flue pipe gets hot.

Certified double-wall flue pipe systems are also available. These systems are tested to determine the minimum clearance at which they can be installed. You will find the clearance information on the labels attached to the pipe and in the manufacturer's installation instructions.



Double-wall Flue Pipe Assemblies – Certified double-wall flue pipes have a stainless-steel inner liner and a sealed or ventilated outer shell. They cost more than single-wall pipes, but last longer and produce a more stable assembly. You can place double-wall pipes closer to combustible materials than single-wall pipes.

The lowest clearances for installing certified double-wall flue pipes are less than those for single-wall pipes. Also, the maximum length of a double-wall pipe assembly may be greater than is permitted for a single-wall pipe. This extra length is useful for installations in rooms with cathedral ceilings, because the distance to the base of the chimney may exceed 3 m (10 ft.).

The two general types of double-wall flue pipes are sealed and vented. A **sealed double-wall flue pipe** retains heat in the flue gases because the air space between the inner liner and outer shell acts as an insulator. A sealed pipe is a good choice for most installations, particularly if the assembly must be long or if the appliance is expected to produce low flue gas temperatures. These pipes can improve the draft and reduce creosote deposits.

Vented double-wall flue pipes release more heat into the room as the gases flow through, by allowing cooling air to pass between the inner and outer layers, removing heat from the inner surface. This can cause too much creosote to form and create a poor draft. You may need to put the flue pipe a bit closer to a combustible surface. Partially shielded flue pipes, which have a curved shield at the back towards the wall and expose the single-wall liner to the room, are a simple solution.

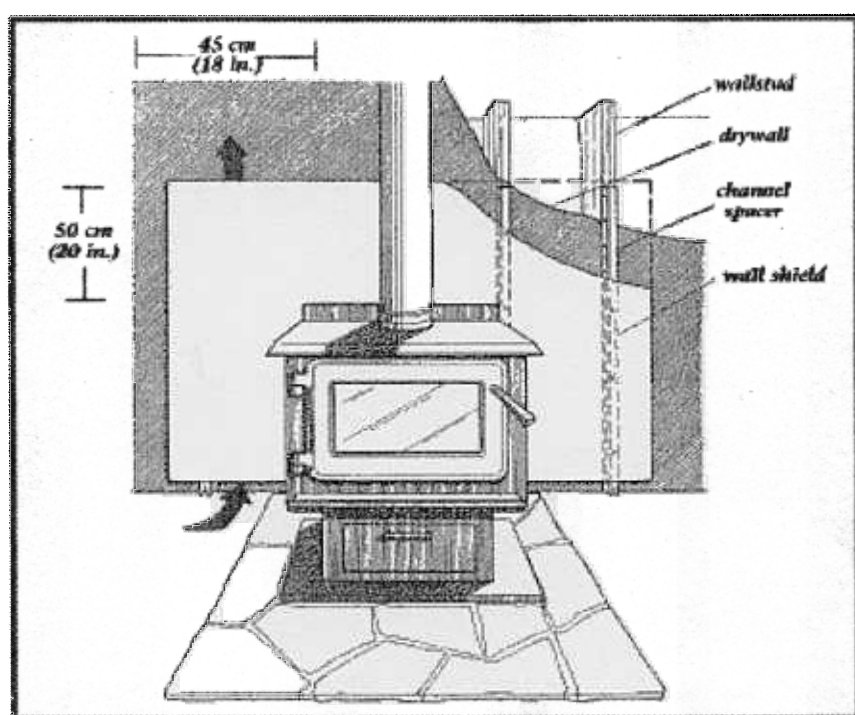
Installing Advanced Combustion, High-Efficiency Fireplaces

Advanced combustion fireplaces are installed within the structure of the house and surrounded by combustible building materials. The fireplace and its heating flow paths, chimney and other components are safety tested together as a unit. Therefore, you can install only the chimney and the other components that the fireplace was tested with. No general instructions exist for installing such fireplaces; each fireplace design has its own installation guidelines, which you can find in the manufacturer's instruction manual.

Once you find an advanced fireplace you like, ask the retailer for a copy of the installation instructions. Study them at home so you can become familiar with the fireplace before making your decision. The manual will tell you about safe clearances, mantel heights, and limitations on decorative finishing materials and guidelines for routing and installing remote heating ducts. Spending some time getting to know the product is worthwhile, even if you plan to hire professional technicians to install the fireplace.

The back of the fireplace and its heating paths and chimney will be enclosed and out of sight once the installation is completed. So it is important to follow the manufacturer's instructions exactly to ensure that clearances are adequate. Installing an advanced factory-built fireplace is complicated and not a do-it-yourself job – unless you have plenty of carpentry experience and are willing to invest the time to ensure you get every part of the installation just right. A better option is to contract an experienced wood-heat technician to install the unit for you.

Installation Diagram



¹ Woodstove Information and Diagrams courtesy Natural Resources Canada