

## **TYPES OF RESIDENTIAL WOOD-BURNING APPLIANCES**

Common types of wood stoves and fireplaces are described below. It is important to distinguish between a conventional appliance and an advanced-combustion appliance that burns cleanly enough to be CSA/EPA-certified. Advanced-combustion appliances have dramatically lower emissions for a number of substances that can affect human health.

### **Wood Stoves**

Wood stoves, which are freestanding space heaters, can be divided into three categories; conventional wood stoves, CSA/EPA-certified wood stoves and masonry heaters.

Conventional wood stoves do not have the advanced-combustion technology required to meet CSA/EPA emission standards. Advanced-combustion wood stoves (CSA/EPA-certified wood stoves) meet the US EPA standard or the CSA B415 standard for emissions, meaning that the stoves' emissions of PM are below the required threshold. PM emissions are used as a surrogate for a variety of pollutants emitted by wood-burning appliances.

Advanced-combustion wood stoves can be non-catalytic or catalytic. Non-catalytic stoves employ a secondary combustion chamber and a system to pre-heat the air supply. This allows for more complete combustion of the gaseous and particulate pollutants emitted from the burning fuel/wood.

Catalytic stoves contain a ceramic combustor that is coated with a platinum or palladium catalyst, again to ensure more complete combustion of the emissions. The performance of catalytic and non-catalytic advanced-combustion wood stoves is similar (NEIPTG, 2000).

The third type of wood stove, the masonry heater, consists of a combustion chamber that releases exhaust gases into channels flowing through a large masonry structure, and then to a chimney. The hot gases heat the masonry structure which slowly releases heat to the room for up to 24 hours, and relatively complete combustion is achieved (NEIPTG, 2000).

### **Wood-burning Fireplaces**

A fireplace is generally considered to be a wood-burning device that is built into the structure of a living area and that allows one to view the fire as it burns. However, wood-burning stoves and fireplaces now have fewer distinctions between them. For example, advanced wood stoves have glass panels in their doors, making them look like fireplaces, and advanced fireplaces have a closed combustion chamber like that of a wood stove.

Conventional fireplaces are of two general types. Masonry fireplaces (made of materials such as brick or stone) are assembled in the home and are normally attached to a masonry chimney. Factory-built fireplaces, also called zero-clearance or prefabricated, are made of metal, installed as a package and attached to a metal chimney. Conventional masonry or factory-built fireplaces may or may not have glass doors, but they do not employ emission-reduction technologies.

Conventional fireplaces are generally not very effective for home heating because they require a lot of dilution air and have inadequate means of transferring heat to the home. The high requirements for dilution air mean that large quantities of heated household air are swept into the fireplace and up the chimney when the fire is burning. Consequently, conventional masonry fireplaces can be very inefficient and in some cases can even result in overall heat loss, or an efficiency less than zero (ERG, 2001).

Because large quantities of air flow through a conventional fireplace, the combustible gases emanating from the burning wood are swept out through the chimney before they are completely burned. The pollutants generated by this incomplete combustion process are released to the outdoor air. If a fireplace is inappropriately installed or operated, products of combustion can also contaminate indoor air through back drafting and leakage. Therefore, contrary to the common belief among members of the public that wood burning is an environmentally friendly practice, conventional wood-burning fireplaces generally result in high levels of pollutant emissions (US EPA, 1996).

Fireplace inserts are wood stoves that have been designed to fit within the firebox of a masonry fireplace. Some fireplace inserts are CSA/EPA-certified as having low emissions, allowing a homeowner to convert a conventional fireplace to a CSA/EPA-certified appliance.

### **Natural Gas Appliances**

Natural gas fireplaces are considered a convenient, low-emission alternative to wood-burning appliances. In Toronto, which is supplied with natural gas, they are becoming more popular.

Natural gas appliances are low in emissions. Total PM emissions from natural gas fireplaces are even lower than those from CSA/EPA-certified wood-burning fireplaces (Houck and Tiegs, 1998). However, as with wood-burning appliances, care must be taken so that they are vented correctly, and CO detectors are employed where required.

### **Ontario Government**

#### **6.2.1 Ministry of Municipal Affairs and Housing**

The Ontario Building Code offers another opportunity to ensure that all newly installed residential wood-burning appliances are CSA/EPA-certified. The current Code addresses the safety of wood-burning appliances and their installation, but it does not address their emissions.

### **6.3 Municipal Government**

Complaints related to residential properties are dealt with by the municipality.