Solid-Fuel-Burning Appliance Chimneys

CHIMNEYS

Venting requirements for a solid-fuel-burning appliance detailed in the National Building Code, and the Canadian Standard – B365 – 01 "Installation Code for Solid-Fuel-Burning Appliances & Equipment".

The reference in the B365 states: 5.2.1 "*Except where certified for use with a specific chimney or venting system, a solid-fuel-burning appliance shall be connected to (a) a masonry chimney conforming to provincial regulations, or in absence of such regulations, to the requirements of the National Building Code of Canada; or (b) a certified factory-built chimney.*"

The National Building Code of Canada – 1995, Section 9.21 Chimneys and Flues states: 9.21.1.2 "*Factory-Built Chimneys, 1) Factory-built chimneys serving solid-fuel burning appliances, and their installation shall conform to CAN/ULC – S629-M: 650 °C Factory-Built Chimneys.*".

The CAN/ULC testing standard S629 is considered to be the toughest residential chimney standard in the world, requiring a chimney to withstand three 30-minute chimney fires at 1150°C (2100° F), have a continuous operating temperature of 650°C (1200°F) and is tested for 1 hour at 925°C (1700°F).

Class A chimneys, are a factory-built chimney commonly referred to as Selkirk chimneys. Selkirk Metalbestos is a manufacturer of chimneys and being the first to come out with a manufactured chimney, the public generally refers to all metal chimneys as a Selkirk. These types of chimneys are tested to a different standard – CAN/ULC S-604, have a 1 inch thick wall with solid insulation between stainless steel, and some with an exterior layer of mild steel with a polymer coating or galvanized steel. These chimneys are suitable for oil, gas and manufactured fireplaces, but not for airtight solid-fuel-burning stoves and furnaces. The best testing for a Class A chimney is a 30-minute chimney fire at 1150°C (2100° F), continuous operating temperature of 540°C (1000°F) and is tested for 1 hour at 925°C (1700°F). Creosote, when ignited, will burn at a temperature of 1150°C (2100° F). The Class A chimney is not capable of withstanding temperatures, which has lead to failures and ignition of nearby combustible materials.

A masonry chimney suitable for use with a solid-fuel-fired appliance must be built in accordance with provincial regulations, which are modelled on the National Building Code of Canada, and the standard CAN/CSA-A405, "Design and Construction of Masonry Chimneys and Fireplaces." There are several requirements for a masonry chimney including; footings, liners, flues, height of chimney, lateral stability, caps, cleanouts, wall thickness and clearance to combustible materials. A concern with this type of chimney is that they are extremely difficult for the homeowner/user to inspect for verification of safe conditions. With the introduction of metal liners for masonry chimneys, the majority of concerns have been reduced, however if the clearances required to combustible materials have not been maintained, the problem is still present.

PYROLYSIS

Pyrolysis, by definition, is the chemical decomposition of wood or coal by the application of heat alone, in the absence of oxygen. When wood is heated quickly for a short time, it may not ignite until perhaps 480°C (920°F). But if a surface is heated steadily for a long time, it can ignite at a surprisingly low temperature. When heated continuously to levels just over the boiling point of water, wood undergoes the process called pyrolysis, during which heat breaks down the wood, releasing some of the chemical compounds into the air and leaving a darker, more carbon-rich fuel. The chemical changes, which occur during pyrolysis, tend to lower the ignition temperature of the wood. Field tests have shown that wood exposed to temperatures as low as 120°C (250°F) will begin to char and may ignite over time.

CREOSOTE

Every piece of wood contains the chemical compounds that when burned will create creosote. The amount deposited in your heating system will depend on the type of wood, the moisture content chimney draft, burning temperature, type of chimney and style of appliance.

If creosote is allowed to build up in your chimney or appliance, the high temperatures at which it burns can cause irreparable damage to your chimney.

To assist in the prevention of creosote development, the flue gases should remain as hot as possible while trying to escape the chimney. The following tips will help prevent the creosote producing gases from cooling off and sticking to the interior of your solid-fuel-burning system:

1. Use seasoned, dry wood – at least one-year old.

2. Burn your wood at high temperature, keeping door damper partially or fully open depending on your need. Smouldering wood generates creosote.

3. Reduce or eliminate all obstacles that could slow down the natural draft. A flue pipe assembly should have no more than 180 degrees change in direction (2 – 90 degree elbows), heat reclaimers and key dampers should not be used.

4. An approved insulated chimney installed in the interior of the building will help keep the temperature of the unburned gases as hot as possible through to the exterior of the chimney. Unburned gases at a low temperature will condense and allow creosote to be deposited in the system.

CLEANING YOUR CHIMNEY

The National Fire Code states that "*Every chimney, flue and flue pipe shall be inspected to identify any dangerous condition annually, at the time of addition of any appliance, and after any chimney fires*". The chimney and flue pipe assemblies on the appliance should be checked regularly until the rate of creosote buildup is determined. After a chimney fire, the user is usually surprised how fast the creosote accumulated in the chimney.

As wood-burning systems operate under varied conditions during the year, and by user, this creates the need for a number of maintenance tasks. For example, the slower burning practices in the fall and spring, when heat demand is low, tends to result in more rapid creosote formation in the flue pipe and chimney. Chimney cleaning is usually needed more often in spring and fall. During the winter months, appliances operate closer to their maximum heat output, creating a more efficient burn, but also more stress on internal components. Many of the modern appliances have internal components that can wear out because of the exposure to high temperature, but can most likely be readily replaced.

Important maintenance tasks to consider:

- Check flue pipe and chimney regularly until rate of buildup is determined.
- Clean your chimney when deposits have built-up to 4mm (1/8").
- Check condition of chimney and flue pipe for any signs of deterioration.
- The most thorough cleaning and inspection of the system should be done in the spring after the heating season. Deposits left in the system – flue pipe, chimney or appliance, will corrode steel parts in the warm, humid summer air.

If you notice any problems or concerns during your cleaning or maintenance, have the system thoroughly checked by a qualified person.

For any additional information on safe solid fuel heating, contact your agent or The Co-operators – Loss Control Department for assistance.