



The I-ENG-A Report

*Investigative engineering – property damage – cause and origin – biological growth analysis
fire & arson investigation – accident reconstruction – subrogation – expert witness testimony – construction defects – product failure analysis*

Investigative Engineers Association

Nationwide Investigative Engineering Expertise: (800) 523-3680

Fireplaces & Chimneys Operation of Masonry Fireplaces

Article by: Professional Investigative Engineers, I-ENG-A Colorado

You are in front of your fireplace, melting into your favorite chair, enjoying the feeling of radiant heat warming up the bottom of your feet. You tip your head back and close your eyes. You slowly drift off, soothed by the sound of the crackling fire. It's almost like you can smell the smoke. You open your eyes, and not only can you smell the smoke, it's filling the room! Paint on the wall above the fireplace begins to discolor and peel off. You spring to your feet. Grabbing the phone, you call 911. Minutes later the fire department arrives and goes to work. The fire races through the attic. The fire department cuts holes in the roof and fire belches out. A few quick bursts from the hose and the fire retreats. The firefighters take a saw and cut away your wall to finish the job. Steam fills your home and you start to think, how did this occur? What could I have done to prevent this?

The answer is understanding how a fireplace operates, what kind of care and maintenance does it require and whom do I trust to work on the most important fixture in my home?

Fireplaces have been around for hundreds, if not thousands of years. Trial and error is likely what determined what worked and what didn't. If it worked that was great. If it did not work, property was damaged and people were injured. Today we know what will work, but due to neglect or just lack of education we still have unintended fires starting from use of our fireplaces. The

National Fire Protection Association (NFPA) produced a document called the NFPA 211. The document is intended to show manufacturers, installers and chimney sweeps the best way to install and service fireplaces and chimneys. Still today, people discount this document and manufacturer's installation instructions when installing and servicing fireplaces and chimneys.

Solid fuel burning fireplaces can be divided into two types. **Pre-fab (zero clearance) and solid masonry construction.** Both have their advantages and disadvantages. If property installed and maintained both have an excellent safety history associated with them. Improper installation and a lack of proper maintenance may result in disaster. Often fires involving fireplaces and chimneys result in large losses. Case in point is the hotel fire mentioned in the Volume 7 Issue 1 from January 2003.

Let us begin by looking at one type of fireplace common across the country and how to use it properly. Solid masonry fireplaces are constructed of brick, block or stone. Occasionally the firebox (the area where the fire is built) has an insert of cast iron. Typically it is refractory firebrick, laid in a bed of refractory mortar. A firebrick floor supports a cast iron grate. These fireplaces are connected to a masonry chimney. This chimney is lined with a refractory clay liner. Some units have a gas burner running inside the firebox to

Fireplaces and Chimneys continued...

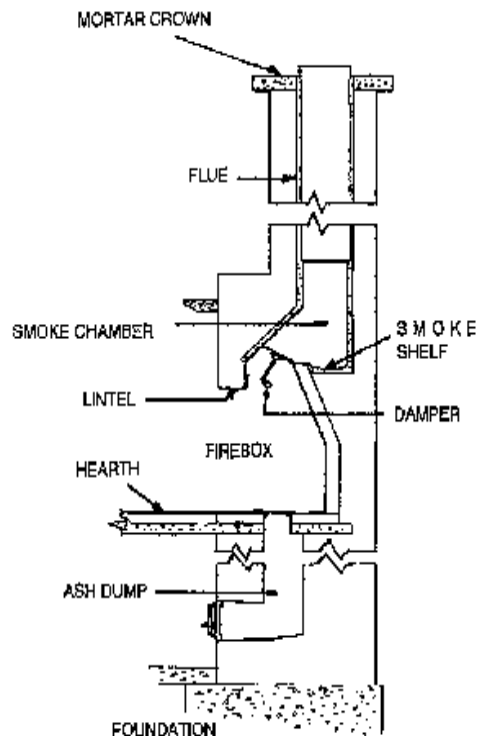
Operation of Masonry Fireplaces

assist in igniting the wood. Wood is piled up on this grate and ignited. With the screen closed, you can sit back and enjoy the warmth of your creation.

The fire you construct may have 3-5 average sized pieces of wood. Once the fire is reduced to coals, more wood may be added. Keeping the screen closed will assist in keeping sparks inside the firebox where they belong. A fireproof rug kept in front of this type of fireplace is suggested to protect the floor area from the sparks that escape and land in front of the hearth. Combustible material such as magazines, newspapers and decorative objects, should be kept away from the opening of the fireplace. One elusive spark coming to rest in the wrong spot could be the end of a good evening.

Also important is how we start a fire in our fireplaces. Chimneys and fireplaces need to be warmed up slowly. Rapid temperature changes in the unit may cause serious damage. As you produce heat inside of the unit, the fireplace components start to expand. With the exterior of the chimney still cool if the interior is heated too rapidly it will fracture and split. This can allow the products of combustion to enter the chimney chase. This damage usually occurs from three different scenarios. The first is the person who stuffs newspapers and cardboard into the fireplace, places wood on the pile and then ignites it. In no time the temperature near 70° F to over 600° F. The next scenario is Christmas morning. The presents are opened and the wrapping paper is stuffed into the firebox. One properly placed match and 20 minutes of cleanup is averted. Once again the chimney is heated dramatically and the flue tiles are split and separated. The third scenario is when you have a creosote fed chimney fire. Creosote is a byproduct associated with burning wood. Smoke cools and adheres to the cooler walls of the chimney. This, if allowed to build up, will thicken to the point that it covers the walls of the smoke chamber and chimney. One hot spark or flame that is allowed to rise into the damper area may ignite this material. The result is a rapid fire that burns out all of the material stuck inside of the chimney. Temperatures from this event have been measured at over 2000°F, more than enough to destroy your chimney, liner, and possibly your home. All of these scenarios may have been averted with proper knowledge and maintenance.

© Copyright 2003
Professional Investigative Engineers, Inc.
Investigative Engineers Association, Inc.



Claims Support Professional
Association



www.claimssupport.com

*Investigative engineering ■ property damage ■ cause and origin ■ biological growth analysis ■ fire & arson investigation
accident reconstruction ■ subrogation ■ expert witness testimony ■ construction defects ■ product failure analysis*

COMPANY NAME

Address Line 1
Address Line 2
City, ST 11111

COMPANY NAME
STREET ADDRESS
CITY, STATE 00000