WE ALL NEED
COMBUSTION AIR

The fuel-burning appliances in your home need a reliable supply of outside air to work properly. Your furnace, water heater, gas range, clothes dryer and other flame producing devices such as fireplaces and wood stoves use large amounts of air in the combustion process. To ensure safe and efficient operation, combustion air must constantly be replaced while the appliances are operating.

This replacement air is called "combustion air" and its importance cannot be overemphasized. Without enough combustion air, your house can quickly become polluted with unhealthy gases, including deadly carbon monoxide (CO). Carbon monoxide is odorless, colorless, and highly poisonous.

No special means of supplying combustion air is provided in older homes. The needed air was simply assumed to flow in through leaks in the structure. We realize now that the air in our homes is affected by factors such as temperature difference between indoors and outdoors and the outdoor wind speeds. Therefore, it is not safe to rely on building air leakage to provide sufficient combustion air for all fuel-burning appliances.

The Michigan Residential Code, the Michigan Mechanical Code and the International Fuel Gas code all require that new homes be built with a special duct that brings outside air directly into the home for the fuel-burning appliances. This requirement makes it less likely that there will be a shortage of combustion air, but it does not guarantee it. Other factors, such as bath and kitchen exhaust fans can affect the availability of combustion air.

What causes dangerous combustion air problems?

Most furnaces, wood stoves, fireplaces and water heaters use a natural draft system to remove the hot gases produced by the fire to rise up the chimney without mechanical assistance.

Some furnaces have a small blower motor to help draw the heat through the furnace heat exchanger. These furnaces still produce a natural draft to vent the hot gases or products of combustion out of the house.

This natural draft up the chimney causes a slight vacuum or negative pressure within the house, which draws in air through small holes and cracks in the house or through the combustion air duct. Serious problems occur when this natural flow of combustion air and exhaust gases is disrupted.

In general, combustion air problems such as back drafting of the flue gases occur when fuel-burning appliances demand more air than the house can supply through normal air leakage.

Here is one example

A fire is burning in the fireplace, which uses room air for combustion. The strong natural draft of the fireplace sends the products of combustion up the chimney. Because air is going up the chimney a vacuum is created in the house. It is cold outside so the windows and doors are shut.

Eventually the furnace or water heater comes on. The natural tendency of the hot flue gases is to rise, but the strong suction or negative pressure caused by the fireplace draft pulls air down the furnace flue and the combustion gases spill out of the draft hood and into the house. This is called "backdrafting".

The backdraft hinders the furnace venting and the combustion gases can produce increasing amounts of carbon monoxide and other potentially dangerous gases.

Wood fires are not the only cause of backdrafting.

Although combustion air problems are more likely to occur when there is wood fire, they are not limited to situations in which there is a wood fire. Clothes dryers, gas stoves, water heaters as wall as bathroom and kitchen exhaust fans all make considerable demands on the air supply.

Combustion air problems can occur in any home. Any number of home improvement or weatherization measures may increase the potential for backdrafting. Insufficient combustion air occurs when making your home more comfortable and energy efficient by tightening up air leaks, adding insulation or replacing windows. So, does the installation of professional type cooking appliances with high volume exhaust fans. These fans are powerful and often remove more air from the home than can be supplied through leaks or passive openings. It is extremely important to remember that any time we take these or other measures that affect air pressure in the home, you must provide replacement air.

Outside combustion air supplies for your furnace.

Whether or not you identify a problem, it is wise to provide an outside combustion air supply duct. There are several approved methods of supplying combustion air into you home. The Michigan fuel Gas & Mechanical Code require a minimum of one metal duct, open to the outdoors without dampers, that is equal to one square inch for every 3,000 input Btu of all fuel-burning appliances.

Some new furnaces, boiler and water heater models use sealed combustion chambers. Combustion air from outdoors is brought directly into the combustion chamber. Do not confuse sealed combustion with induced draft or forced draft equipment. These provide for mechanical exhaust of flue gases but not for bringing in outside combustion air. If you install a sealed combustion furnace, you must still supply outside combustion air for the other fuel-burning appliances in your home.

Warning Signs of Insufficient Combustion Air.

Any of the following warning signs may indicate insufficient combustion air:

Frequent headaches, reddening skin color and a burning feeling in the nose and eyes. Especially, if these signs disappear when you leave the home for a time.

Oil furnace or heater: Black chimney smoke; fuel smell in the house; soot accumulation; outward leaking from doors or ports; popping, banging, rumbling or delayed ignition.

Natural gas appliances: Excessive moisture collecting on windows and walls. The gas flames in your furnace or water heater burning yellow instead of blue.

Wood-burning appliances: Smoking fire and improper drafting, even when the flue has warmed.

These problems could also be caused by clogged combustion air intakes on the furnace, problems in the fuel-burning appliances or an inadequate or damaged flue. If you notice any of these signs, you should have your fuel-burning appliances checked by a licensed heating contractor. Remember, to have your furnace, water heater and any other fuel-burning appliances checked each year by a professional technician with the proper testing equipment.

If you suspect a problem with combustion air, open doors and windows to air out the entire house. Then crack open a window in the furnace or fireplace room and leave it open until you can get professional advice and install an outside air duct to your furnace room, fireplace or wood stove.