E-Notes

Energy Efficiency Notes

Regular Furnace Maintenance for Safe, Energy Efficient Operation

Background

Natural gas furnaces with natural draft chimneys are common in Saskatchewan. The cost of running a natural gas furnace usually makes up a significant portion of the utility costs for a building. Properly maintaining a furnace minimizes the amount of natural gas used and reduces the operating cost of running the equipment. In addition, a well maintained heating system is safer.

Warm air supply flow

Return air is drawn through the air filter by the blower and is forced around the outside surface of the heat exchanger which heats the air. The heated supply air then exits the furnace through the warm air supply duct which supplies the air registers distributed around the building. One of the most important causes of low furnace efficiency is inadequate warm air supply flow. Make sure supply air registers in rooms are open and not obstructed by furniture, boxes, etc.

Combustion air

Air for the gas burner is introduced through the burner's air shutters. The gas burns inside the combustion chamber, heating the heat exchanger surface. The exhaust gas is then vented through the exhaust vent with dilution air which enters through the draft hood. The diluted exhaust air then exits through the chimney.

Figure 1. Typical Natural Gas Furnace (Energy, Mines, and Resources Canada, 1985)

Save money and natural resources

Natural Resources Canada lists three ways to reduce your natural gas bill for space heating.

1. Proper Furnace Servicing: It is recommended to have a furnace inspected and serviced on a regular basis (once a year) to ensure it is running at peak efficiency.

2. Thermostat set back: Turn the thermostat back by a few degrees during the night and during hours the building is unoccupied. This energy saving measure can save over 10% on your annual heating bill. This can be accomplished by remembering to manually turn the thermostat back or by the use of a programmable thermostat.
3. Improved Building Insulation and Air Sealing: Improving a buildings insulation, installing high insulation value windows, and installing weather stripping on doors, windows, etc., will lower heating loads. (Note: It is costly to improve an existing building's insulation and windows, therefore an estimate of energy savings versus installation cost should be performed before making decisions.)

Annual servicing

A furnace should be inspected once a year by a qualified service person to ensure it is operating safely and efficiently. The following items should be checked:

- The combustion efficiency should be checked. A thorough combustion efficiency check involves measuring both the flue gas temperature and carbon dioxide concentration. High flue gas temperatures and low carbon dioxide levels mean poor efficiency.
- The vent connection allows combustion gases to be vented to the outside. The draft hood is a safety device that ensures combustion products can escape the furnace in case the chimney is obstructed, prevents back draft from entering the combustion chamber, and maintains the efficiency of the furnace by ensuring there is enough air for the chimney to draw from.
- The burner flame should be made up of little blue cones. If there is yellow streaking in the flames, the burner might need to be cleaned or the air controls might need adjustment.
- The heat exchanger should be inspected for corrosion or soot deposits on the surface of the exchanger and be cleaned if necessary.
- The drive motor should be inspected for worn bearings, improper belt tension, and bearings should be lubricated if necessary (some motor bearings are sealed and do not require lubrication).
- The air filter should be cleaned or replaced every three months or as specified. The fan blades should be cleaned if necessary.

Things you can do yourself

- Keep registers clean and free of obstructions to allow proper air flow. The furnace requires unobstructed flow for proper heat transfer from the combustion chamber to the supply air.
- Keep the furnace filter clean. A clogged filter decreases the furnace's overall efficiency and should be cleaned or replaced depending on the type of filter.
- Make on-going visual checks. If you notice a belt is bouncing or a bearing is squeaking or if the combustion flame is irregular or showing streaks of yellow, have the problem corrected by a qualified service person.

Reference

The Bill Payer's Guide To Furnace Servicing, Energy, Mines and Resources Canada, 1978
The Bill Payer's Guide To Heating Systems, Energy, Mines and Resources Canada, 1985