Cooling Options

November 2005

Air Conditioners & Refrigerants

CONSUMERS GUIDE

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Today air conditioning is an integral part of our lifestyle. It is important for the homeowner to understand how air conditioners work to get the most comfort for their energy dollar.

WHAT AIR CONDITIONERS DO

Air conditioning includes the cooling and heating of air, cleaning it and controlling its moisture level for comfort inside the home.

TYPES OF CENTRAL AIR CONDITIONERS

A **split-system** unit consists of both indoor and outdoor sections. The indoor heat exchanger, or coil, mounts above the furnace, inside the ducting. The outdoor section consists of the remaining components. Refrigerant lines connecting the indoor coil to the refrigeration components in the outdoor section join the two sections.

A **mini-split** unit is similar to a split-system, but may contain more than one indoor coil connected to one outdoor unit. Some mini-split units have multiple indoor units. The indoor section mounts on an inside wall, the ceiling, or the floor. A major advantage of a mini-split system is that it doesn't require ductwork, thus offering a solution for homes heated with radiators, electric baseboards, etc. They use a type of heat pump technology to efficiently cool your home.

Some systems are also designed to operate in reverse, supplying heat during cool weather. With multiple indoor units, a ductless system allows the homeowner to control one room or area exclusive of all others.

A **single-packaged** unit contains all the components and generally mounts through the wall or on the roof. Ducting to and from the unit conveys air to and from the rooms. This type is not commonly used in residential applications.

ENERGY EFFICIENCY

The operation of an air conditioning system is a lot like an automobile: efficiency depends on the way it is maintained and operated. Air conditioners last longer and operate more efficiently if they are maintained.

The seasonal energy-efficiency ratio (SEER) is a measurement of the cooling efficiency of the air conditioner over the entire cooling season. It is determined by dividing the total cooling provided over the cooling season, in British thermal units per hour, by the total energy used by the air conditioner during that time in watt/hours.

Central air conditioners are covered under Canada's federal Energy Efficiency Regulations, which came into effect in 1995. Under the regulations central air conditioners must meet a minimum of 10 SEER.

The higher the rating, the more efficient the unit. It is proposed that the minimum 10 SEER level in the regulation will be increased to 13 SEER by April 2006.

There is another rating system that is also sometimes used. The energy-efficiency ratio (EER) is a measure of how much cooling effect is provided by the air conditioner for each unit of electrical energy that it consumes. The higher the EER the more efficient the unit.

Reduce your summer energy bills

- Keep furniture, carpeting and draperies away from vents and grills in the home.
- Change or clean your system filter once per month (depending on the type of filter).
- Use a programmable thermostat, which allows you to cool your home only when you need to
- Keep west-facing drapes or shades drawn in the afternoon
- It is advisable to keep your ceiling fans turned on to keep air moving

REFRIGERANTS

All air conditioning units use a refrigerant that circulates through the equipment to provide cooling. In recent years governments and the industry have worked to reduce the harm that these chemicals may cause to the environment.

The Earth's ozone layer protects the planet from the harmful effects of ultraviolet radiation from the sun. A leading cause of ozone depletion has proven to be chlorofluorocarbons (CFCs), chemicals historically used in air conditioners and other products. Actions are being taken to reduce and ultimately eliminate the amount of ozone depleting substances (ODS) released into the atmosphere. Production and importation of CFCs in Canada and other developed countries was eliminated in 1995.

Hydro chlorofluorocarbons (HCFCs) are also ozone-depleting substances and the production and consumption of HCFCs will be phased out in developed countries over the next three decades. HCFCs are used extensively in the refrigeration and air conditioning industry.

As the 13 SEER deadline approaches we will be almost certain to see a change in refrigerants. Some experts say that R-22 refrigerant will continue with a strong presence in the industry, but R-410A will become more common.

The current refrigerant alternatives for residential air conditioning equipment are HFC blends. Some of these blends can be applied to existing equipment with modifications to the systems. Others can only be used with new

equipment designed for the specific refrigerant blend. Manufacturers have until 2010 to produce alternate refrigerant products.

SHOP SMART

The lifecycle of an air conditioner can be as little as 10 years and as long as 15 years. Owners of HCFC equipment or those contemplating the purchase of new air conditioning equipment should ask a qualified refrigeration and air conditioning contractor to assist them in choosing the proper equipment that meets their needs.

Look for references to EnerGuide and ENERGY STAR. They will guide the homeowner to the best energy saving air conditioners. EnerGuide is a Government of Canada system that rates the energy consumption and efficiency of air conditioners. The EnerGuide rating scale appears under the EnerGuide logo on the back of the manufacturers' product literature. For more information on EnerGuide, visit the Web site at oee.nrcan.gc.ca/energuide.

ENERGY STAR is an international symbol that is applied to products that meet or exceed high levels of energy efficiencies.

Air conditioners that feature the ENERGY STAR symbol label are among the top energy performers on the market.

ENERGY STAR qualified central air conditioners have a higher SEER than standard models. SEER, the Seasonal Energy Efficiency Ratio, measures energy efficiency. The higher the SEER, the greater the level of efficiency

ENERGY STAR qualified central air conditioners use 20 per cent less electricity than conventional units. Using less energy reduces greenhouse gas emissions and improves air quality, choosing an ENERGY STAR qualified air conditioner helps improve the environment.

Since sizing and proper installation of a central air conditioning system are critical to energy efficiency and home comfort, it is important to have the installation done by a qualified air conditioning technician.

CERTIFICATION

The central air conditioner efficiency level and cooling capacity are determined in accordance with the Canadian Standards Association performance standard for Split System Central Air Conditioners. The standard specifies the tests and calculation procedures to be used to determine SEER and capacity ratings.

When purchasing cooling products, the contractor or dealer must right-size the equipment for the home.

Bigger isn't always better. If the equipment is too large, the homeowner will experience increased costs and less comfort. Over-sized equipment will operate in short run times or cycles, not allowing the unit to reach efficient operation or deliver even temperatures throughout the home.

The contractor or dealer should not assume that the size of a new system must be the same as the old equipment. New technologies and more efficient equipment along with changes to the home such as an addition or added insulation will have an impact. And the original equipment may have been too large from the start. Ask the contractor to do a heat loss calculation to determine the correct size.

Your air conditioning system consists of two parts: an indoor coil unit and an outdoor condensing unit. These two parts are specifically designed to work together as a coordinated "team"to provide top performance and maximum efficiency and comfort. If the contractor installs a new, high efficiency outdoor unit, but doesn't include a new, equally efficient properly matched indoor unit, the results could be uncomfortable and expensive. The system will operate but it won't perform up to the promised efficiency. Operating costs will be higher and, in the worst case, it could create undue stress on the system, resulting in premature failure.

If you have a cooling system already installed and it is noisy you could have an undersized duct system or a problem with the indoor coil of your cooling equipment.

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The condenser should be located in an area that can be protected from rain, snow or vegetation. The contractor should confirm that the level of refrigerant charge and the airflow across the coils meets the manufacturer's recommendation.

A qualified technician should install the air conditioner to make sure the work is done properly, safely and according to all relevant building codes. Consider consulting a member of the Heating, Refrigeration and Air Conditioning Contractors of Canada (HRAC). HRAC members are required to carry relevant trade and municipal licenses as well as workers' compensation and liability insurance and must adhere to a code of ethics which includes developing and maintaining an understanding of proper equipment selection. For a list of HRAC members in good standing, visit www.hrac.ca or call toll free at 1-877-411-HRAC (4722).

MAINTENANCE

A qualified technician should be called to check the air conditioning system once a year. However, there are a few things the homeowner can do. In central air conditioning systems, the furnace filter should be inspected, cleaned, or changed once a month. A dirty filter causes energy costs to be greater than they should be and can damage your equipment, leading to early failure. Outside equipment should be covered during the winter to protect it from the snow and ice.

It is advisable to have your cooling system checked annually by a qualified technician who will perform the following tasks:

- Check and inspect the condensate drain. If plugged, the drain can cause water damage in the house, affect indoor humidity levels and breed bacteria.
- Clean evaporator and condenser air conditioning coils before the warm weather starts. Dirty coils reduce the system's ability to cool the home and cause the unit to run longer, costing the homeowner more energy dollars and decreasing the life of the equipment.
- Check your central air conditioner's refrigerant pressures and adjust the charge if necessary. Too much or too little refrigerant charge can damage the compressor, reducing the life of your equipment and increasing costs.
- Clean and adjust blower components to provide proper system airflow for greater comfort levels. Proper airflow over the coils will remove equipment efficiency and reliability. Airflow problems can reduce your system's efficiency by up to 15 percent.

UTILITY REBATES

With utility rebates, consumers can purchase units with higher efficiency ratings at a reduced price. The benefit to consumers is in lower operating costs over the lifetime of the unit. Utilities also benefit because more efficient equipment reduces the need to build costly power plants. Canada's Office of Energy Efficiency web site often posts utility rebates available to consumers. You can visit this site at www.oee.nrcan.gc.ca.