



residential air conditioners

overview

In many areas of British Columbia, summer heat makes home air conditioning a welcome addition. This tip sheet helps you select an air conditioning system that is right for your home, and provides tips to make your system energy-efficient and cost-effective.

Assessing comfort

Although individuals react differently to the same temperature setting and humidity level, most people will be reasonably comfortable in the summer with an indoor temperature of 23° to 25°C (73° to 77°F) and relative humidity between 35 and 60 per cent. An air conditioning system also controls air movement, ventilation and cleanliness of the air.

Cooling load

The key to selecting the right air conditioner lies in correctly analyzing the cooling load, or the amount of heat that needs to be removed. If you underestimate the load and install a system that's too small, it won't be able to keep the space cool. Overestimating, on the other hand, will result in a higher capital cost, and inefficient operation such as frequent cycling on and off.

Most people rely on an air conditioning contractor to determine the cooling load and to size the system. For a central air conditioning system, ensure that your contractor uses one of the industry-recognized methods for estimating cooling loads, rather than a simple "rule of thumb." Approved methods have been developed by the Heating, Refrigerating and Air-conditioning Institute of Canada (HRAI)

and the Air Conditioning Contractors of America (ACCA). Cooling load is generally expressed in terms of British thermal units (Btu)/hour.

Minimizing cooling load

About 75 per cent of cooling load comes from external sources such as the sun shining on windows, glass doors, skylights, walls and roof, and the outside air temperature. If possible, take steps to reduce heat gain in your home before calculating the cooling load. This enables you to buy a smaller system, saving you money on both the capital cost of the system and the operating costs. Here are some efficient ways to minimize the heat gain in your home:

- Reduce solar heat gains through glass by installing shading devices such as exterior awnings or screens. Venetian blinds and open weave drapes are not as effective as exterior shades.
- Use low-emissivity (low-E) coated glass in the interior surface of the outside pane of double-glazed windows. While keeping the heat in during the winter, low-E windows keep out the heat radiated from the sun and pavement in the summer.
- Install a thermostatically-controlled fan in a hot attic to reduce transmission of heat. It exhausts the warm air and

lowers the attic temperature.

- If you're building a new home, talk to your architect or builder to determine the best orientation. As the outdoor temperature and solar heat gains peak in the summer afternoons, the west-facing glass contributes greatly to the cooling load.

Equipment sizing

In order to maintain comfort, the capacity of the cooling equipment should be equal to or slightly larger than the cooling load, but not much larger. For instance, if your cooling load is 33,000 Btu/hour, an appropriate system would be rated at 36,000 Btu/hour.

Most window and through-the-wall air conditioners are rated in Btu/hour, but central air conditioners may have their capacity listed in tons of cooling where one ton equals 12,000 Btu/hour or 3.52 kilowatts (kW). As a general rule, the system should provide one ton of cooling for every 50 square metres (540 square feet) of air conditioned floor space, excluding the below grade basement, in your house.

If you're building a new home, your calculated cooling load may not exactly correspond to the rated capacity listed in the manufacturers' catalogues. For example, your house plans may call for a 4.5-ton central air conditioning unit, but the next available size may be 5 tons. In that case, try to reduce the load by changing the type of glazing or adding awnings

to existing windows. This will enable you to purchase a 4-ton unit rather than moving up to the larger size.

Room air conditioners

Room air conditioners offer the advantage of individual room control, and make the most sense for small homes and those with modest cooling needs. They can be mounted either in a window or through an opening in the wall.

Selection

You should operate and listen to the unit before you buy, as some are considerably quieter than others. It should have a two-speed fan, deflector blades to direct the air stream and a fresh air switch to allow a certain amount of outside air to enter the room for ventilation. The filters should be readily accessible for cleaning and replacement. If the unit is to be wall-mounted, check that it is a suitable model; side vents, if any, shouldn't be obstructed by wall thickness.

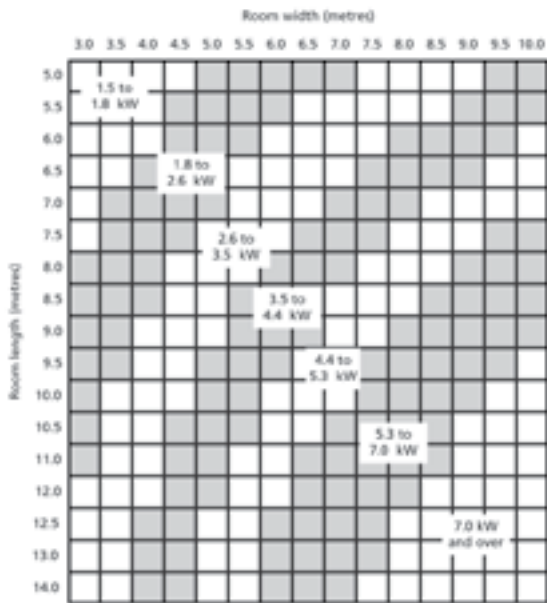
How to use the selection guide

To calculate the unit size you need, expressed in kilowatts (kW), measure the width and length of the room to be cooled. Then, across the top of the chart, find the numbered column that matches the room's width. At the left side of the chart, find the numbered line that matches the room's length. Where the two intersect is the kW capacity range you need to cool the room in question. The chart only applies to rooms with two walls—or less—exposed to the outdoors.

Unit Size kW (tons)	Lower Mainland & Vancouver Island	South Interior	North Interior
1.8 (0.5)	\$35	\$53	\$29
2.6 (0.8)	\$53	\$76	\$41
3.5 (1.0)	\$70	\$105	\$58
5.3 (1.5)	\$105	\$152	\$76
7.0 (2.0)	\$117	\$175	\$88
10.5 (3.0)	\$175	\$263	\$128
14.0 (4.0)	\$239	\$362	\$181
17.5 (5.0)	\$315	\$467	\$233

Costs based on BC Hydro rate of 7¢/kWh and no demand charges. GST is not included in the above costs.

Guide for selecting unit size



Example: a room 5.5 m (18 ft) wide by 8.5 m (28 ft) long will require a unit with a cooling capacity of between 3.5 and 4.4 kW. A room with a big window facing bright sunlight will need a larger capacity unit (closer to 4.4 kW) while a room with small windows in the shade will need a smaller capacity unit (closer to 3.5 kW).

Installation

Double-hung windows, the type that slide up and down, are relatively simple to install a unit in as long as you follow the manufacturer's detailed instructions. Mounting brackets may make installation easier. Some units have sliding wings to fill the side space; to ensure against intrusion, the windows should be locked down in position over the unit.

Casement windows, the type of windows that swing in and out, may be a problem as the window space can often be narrower than the available air conditioning unit.

Horizontal sliding windows present similar problems. If you aren't a do-it-yourselfer, this should be left to a qualified carpenter. Rather than attempting to make changes to your windows, it's often easier to have a hole cut through the wall, a sleeve installed and the unit mounted.

Wall installations have a key advantage — you can install the unit close to the ceiling. This position diffuses the cooler air at ceiling level and it drifts down, cooling the whole room without the possibility of a cold draft. Up there, it's also out

of the way, doesn't interfere with furniture location and prevents children from playing with the controls.

After installation, simply plug into the power outlet, adjust the air deflectors to direct the air towards the ceiling and set the thermostat to about 24°C (75°F). You can now sit down and relax in cool comfort.

Wiring

Room air conditioners with a capacity of 3.5 kW (12,000 Btu/hr) and less usually operate on 120 volts and are often plugged into a standard wall outlet. The wiring should be checked to ensure that the outlet is supplied by a separate circuit with surge protection in accordance with the manufacturer's specifications. The requirements are the same with 240-volt units, except that outlets and plugs with special configurations to match the voltage and current are required to prevent their accidental use for other purposes.

Central air conditioners

Central air conditioners are quieter than room conditioners, and offer the benefit of cooling the whole house with a single unit. Central air conditioners are available as single package units or split units. Single package units are mounted outdoors. In a split system, the cooling coil is installed in the plenum of an existing furnace and the condensing unit is located outdoors with refrigerant tubing connecting the two components.

Energy efficiency ratings

The most common measure of the energy efficiency of residential air conditioning units is the Seasonal Energy Efficiency Ratio (SEER). Basically, it compares the cooling output of the unit to the amount of energy consumed over the cooling season. The higher the SEER, the more efficient the unit. Select an air conditioner with a SEER rating of 10.0 or higher (9.0 is sufficient if it's a room air conditioner).

Temperature control

There's a wide selection of thermostats for central air conditioners. Simple low-voltage, heating/cooling thermostats are low in cost and provide good performance, but their accuracy needs to be checked from time to time. Programmable electronic thermostats, on the other hand,

provide automatic temperature adjustment at multiple settings seven days a week. Choose a model that doesn't lose its program in the event of a power failure. Programmable thermostats cost between \$100 and \$200, depending on the features and the quality desired.

Equipment maintenance

Here are some tips that will keep your central air conditioning system in good working order and save on operating costs.

- During the cooling season, replace or clean the fibrous media filters every three months. Electronic filters should be serviced when the unit doesn't arc (makes a crackling sound) or arcs all the time, when trouble lights remain on, or when you smell a strong odour of ozone (an unmistakable smell somewhat like bleach). Follow the manufacturer's directions for cleaning.
- Clean the blower once a year and lubricate the motor and fan bearings twice a year. Inspect fan belts annually and replace them if glazed or cracked. At the same time check the belt tension.
- The condensing (outdoor) unit needs to be cleaned annually by blowing or vacuuming it clear of any leaves or other debris to maintain good air flow. If the fins on the coil are bent, straighten them so the coil can transfer the heat to outdoor air efficiently.
- Check the condensate drainage pan under the evaporator coil and unplug the drain if necessary. If the drain is plugged, the condensate will overflow and drip on the furnace heat exchanger and corrode it.

Installation

This is a general guide only. Please ensure that installations meet your requirements, manufacturers' instructions and all applicable codes, standards and regulations. BC Hydro is not responsible for installations.

For more information call:

Lower Mainland..... 604 431-9463

Elsewhere in B.C..... 1 877 431-9463

www.bchydro.com

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