Heat Recovery and Energy Recovery Ventilators

A GUIDE FOR PROPERTY MANAGERS

The heating, cooling and air-conditioning (HVAC) systems of multi-unit residential buildings have changed over the years, and designs vary from building to building, which means that the new property manager usually has to learn about new system components. Two of these components—the heat recovery ventilator (HRV) and energy recovery ventilator (ERV)—are growing in popularity, especially in Canada's colder areas.

This is a basic guide to understanding your building's HRV or ERV, how to make it run efficiently, and how to keep it in good condition. Though many maintenance steps and adjustments can be done by a property manager, any major work on an HRV or ERV should involve a qualified engineer, building science consultant or qualified installer. These professionals will know the most recent codes and standards that apply to your building.

What are heat recovery ventilators and energy recovery ventilators?

Your building's HVAC system has both intake and exhaust air ducts. In colder temperatures, the intake air has to be heated to a comfortable temperature, which costs money. Also, the exhaust air is still warm when it leaves the building—which is a waste of energy and money. In warm temperatures, the reverse process takes place.

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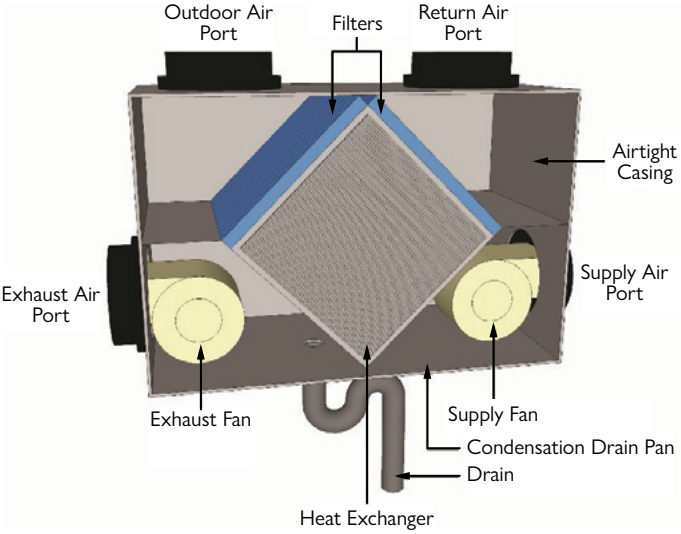
A **heat recovery ventilator** is a way to transfer heat between the two airstreams without actually mixing the air. This reduces the energy consumption of heating or cooling air, while increasing indoor air quality and comfort. HRVs can be either a central unit for the whole building or individual units in each suite, but the general workings are the same: intake and exhaust ducts lead into an airtight case. In the HRV core, these airstreams pass through a series of parallel plates, allowing heat to flow from the warmer air to the cooler air. Then, fans vent the exhaust air outdoors, while the intake air enters the apartments. Filters help to improve air quality. Because cooling air causes condensation, the unit also has a drain pan. In very cold temperatures, the core can freeze, so the unit might also include motorized dampers to aid in defrosting. It may also have controls for fan speed, humidity level or operation modes.



Parts of a heat recovery ventilator

An **energy recovery ventilator** is similar to an HRV. However, instead of the metal or plastic plates in an HRV, the ERV core has proprietary materials that transfer both moisture and heat. Because ERVs recover moisture, condensation does not typically form in their cores. So, many do not have drains, but it's still possible for the cores to gather moisture or freeze in extreme weather. Another type of ERV core consists of a perforated wheel or drum (called an enthalpy wheel) that rotates between the exhaust and supply airstreams.

Used properly, HRVs and ERVs can save both energy and money, but they have other benefits. They improve indoor air quality by removing pollutants and operate more quietly than most exhaust systems do. They also reduce deterioration of the building envelope and systems, because they balance the pressure of the intake and exhaust systems, and lower indoor humidity levels and the associated risks of condensation and mould.

Smooth operation

As part of your building's overall HVAC system, an HRV or ERV works best when that system is working well too. When the building's intake and exhaust airflows are balanced, the HRV or ERV consumes less energy. Some techniques, such as adjusting balancing dampers, are fairly straightforward. However, understanding your building's overall flow rates might require a mechanical engineer or building science consultant. Airtightness of the building is also a factor in the unit's performance and can be a special concern in older buildings. The standard way of testing for airtightness is a blower door test, which usually requires specialized professional help.

Maintenance

Once properly installed, most HRVs and ERVs run continuously without much need for additional attention. However, regular maintenance can prevent larger problems from arising. Some of the most commonly needed maintenance tasks are listed below:

MAINTENANCE TASK	RECOMMENDED FREQUENCY
Clean the exterior intake hood, as the screen may become blocked with debris.	3 months
Clean or replace the internal and external filters.	3 months
Inspect the drain tube.	3 months
Clean the fan blades, removing dirt with a brush or soft cloth when the unit is off.	6 months
Clean the drain pan, as dirt and insects can accumulate.	6 months
Clean exhaust and supply grilles and diffusers, where dirt can accumulate.	12 months
Lubricate fans, if required. Most HRV/ERV fans are designed to run continuously without lubrication, but some require occasional attention.	12 months

Occasional problems may still arise: the unit's core might freeze, a duct may become damaged and start to leak, or the unit might give off excessive noise. In most cases, it's possible to repair these issues through the regular maintenance tasks or replacement of the unit core. However, excessive damage may require a service contractor. Annual servicing by a mechanical contractor accredited by the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) or the Thermal Environmental Comfort Association (TECA) is recommended for all systems.

Education

Getting the most out of an HRV or ERV depends on knowing how to run it—and new tenants might not understand how it works. So, it is important to educate your tenants, especially if they have individual HRVs or ERVs in their suites.

Tenants should understand that the HRV or ERV improves air quality and saves on energy costs. The unit is intended to operate continuously, and shutting it off for a long time can lead to a buildup of pollutants and humidity. Also, though tenants can open their windows, that will not necessarily improve air quality in their suites, and it could increase heating and cooling costs. If the HRVs or ERVs are located in each suite, tenants should learn how to set the unit to run automatically or manually, how to set the humidity and how to program scheduling. This programming is similar to that found on most programmable thermostats, but it varies from model to model.

One question that occupants often raise is whether the system clears moisture from bathrooms too slowly after showering. While some HRV or ERV systems do not clear moisture as quickly as an exhaust fan would, the continuous ventilation provided by an HRV or ERV will dry the bathroom more effectively over time.

Learn more

Canada Mortgage and Housing Corporation (CMHC) has also published the **HRV and ERV Guide for Multi-Unit Residential Buildings**, which covers each of these topics in more detail—along with background on ventilation systems, HRV/ERV installation strategies, and diagrams and maintenance checklists. You can order this publication from CMHC's website at www.cmhc.ca (publication no. 68974).

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