Heat Recovery Ventilators

BY ALAN CARSON - CARSON DUNLOP & ASSOCIATES LTD.

THE HEAT RECOVERY VENTILATOR (HRV), energy recovery ventilator (ERV), heat exchanger or air-to-air heat exchanger have been around for several years. These devices are popular in some areas and,falling from favor in others. They use two simple concepts:

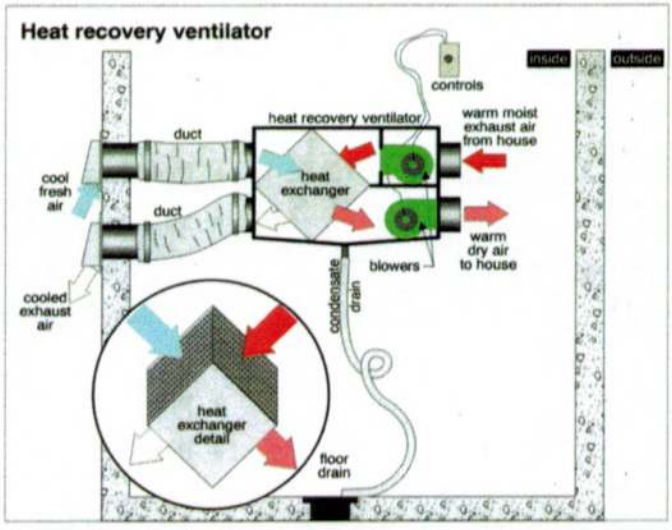
- Since we have to exhaust air anyway, let's remove some of the heat from the air before we exhaust it.
- Let's control the location and amount of fresh air drawn into the house.

How They Work

HRVs use one duct to throw warm, moist air outside and another duct to draw cool, dry air in. On the way through, some of the heat from the warm, moist exhaust air is transferred to the cool, dry air coming in through the heat exchanger. If we set up the pressures correctly, we can minimize the amount of air leakage through roofs and walls in either direction. This should solve all our problems!

What's in an HRV?

- An HRV contains two duct systems. One collects exhaust air from the house and pushes it outside. The second draws fresh air into the house. Fans move the air into and out of the house at the desired rate.
- A heat exchanger captures some of the heat from the exhaust air and transfers it to the incoming air.
- A defrost mechanism removes ice from the heat exchanger.
- Balancing dampers and flow collars allow the system to be adjusted.



- A drain carries away condensed humidity and melted frost.
- Controls determine the speed of fans and the volume of air moved, depending on manual controls, humidistats and/or timers.

Thousands of homes have been provided with HRVs. Have they worked? Yes and no. The theory and the mechanics of these systems are fine. In practice, there have been many problems. As with any new technology, installation methods don't always match the designers' intent. Many of these units were installed incorrectly. Not surprisingly, with more installations, we've learned more about how these units should be installed and operated. The technology has changed somewhat over the years.

Do They Work Now?

The outdoor environment is changeable. Temperatures, moisture levels, wind direction and intensity vary. Heat recovery ventilators are typically set up with a single operating parameter. In many cases, they are not set up as intended by the designer or not maintained by the occupant. As a result, many heat recovery ventilators do not provide the optimal interior air conditions. In some studies, the majority of HRVs were found to be set up incorrectly. Many were shut off by homeowners who either didn't understand them or found they were not operating properly.

Efficiency Question

Many systems don't deliver the desired interior conditions. Perhaps because of enthusiastic marketing, homeowner neglect or both, many units do not deliver expected efficiencies. The value of the heat reclaimed from the exhaust air can often be largely offset by the electricity cost of the continuous operation of the HRV and the furnace fan.

Time will tell whether heat recovery ventilators become more or less popular. Home inspectors should understand the operating principles and installation issues for these units.

There are many common problems with heat recovery ventilators. Here we have listed a few that can typically be determined at a home inspection. These include:

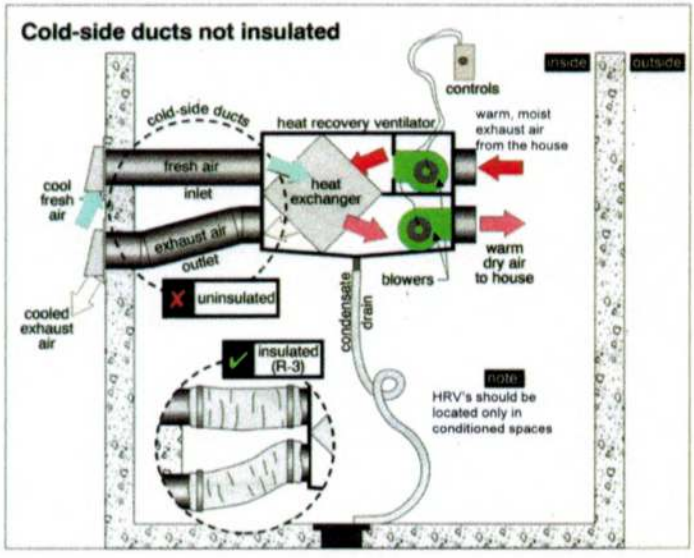
1. Inoperative
2. Noisy
3. Cabinet cover missing or dirty
4. Ducts leaky, damaged, disconnected or missing
5. Cold-side ducts not insulated
6. Poor termination or inlet point location
7. Warm-side fresh air duct not properly connected to furnace duct
8. Exhaust grilles missing, poor location or obstructed in house
9. Flow collars missing on warm-side ducts
10. Dampers missing on warm-side ducts
11. HRV not interlocked with furnace fan
12. Filters dirty or missing
13. Cabinet damaged, rusted, poorly supported

Let's discuss a couple of these conditions.

Cold-side Ducts Not Insulated

A fresh air inlet duct running from the outdoor wall to the HRV should be insulated.

Similarly, the exhaust air outlet from the HRV to the outside wall should be insulated. Insulation values of approximately R-3 are adequate unless the duct runs are long.



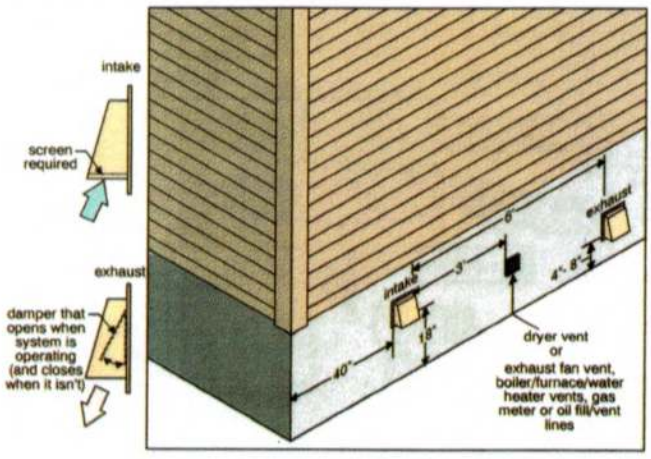
This discussion assumes that the HRV is in a conditioned space such as a basement. HRVs should not be located in unconditioned spaces. This is rare, but is a possibility.

Any duct passing through cold spaces (or warm spaces in cooling climates) should be insulated. A minimum insulation of R-3 is typically recommended. Missing insulation is usually an installation issue. Condensation inside the duct in the heating season and on the outside of the duct in the cooling season is the implication.

Follow the ductwork where possible and ensure that it is insulated where it runs through unconditioned spaces. A common practice with exhaust fans at ceiling levels is to run the uninsulated ductwork across the ceiling, below the attic insulation. This may effectively insulate the ductwork, although if often creates voids in batt insulation.

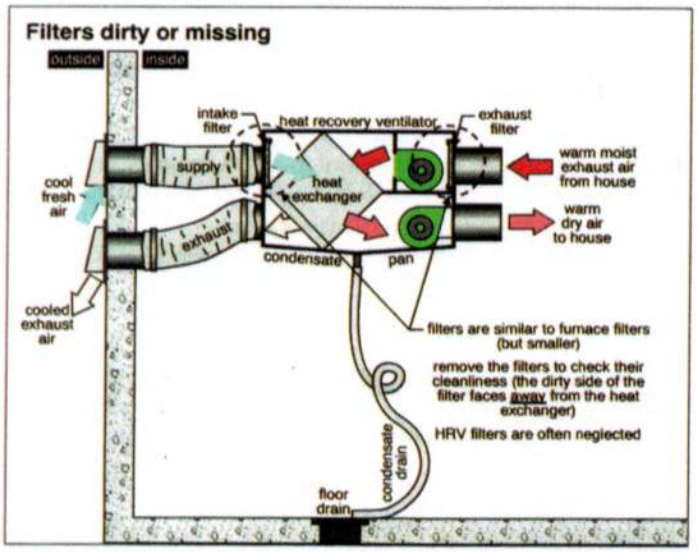
The cold-side ducts of this HRV unit leading to the exterior are not insulated.

HRV intake and exhaust locations



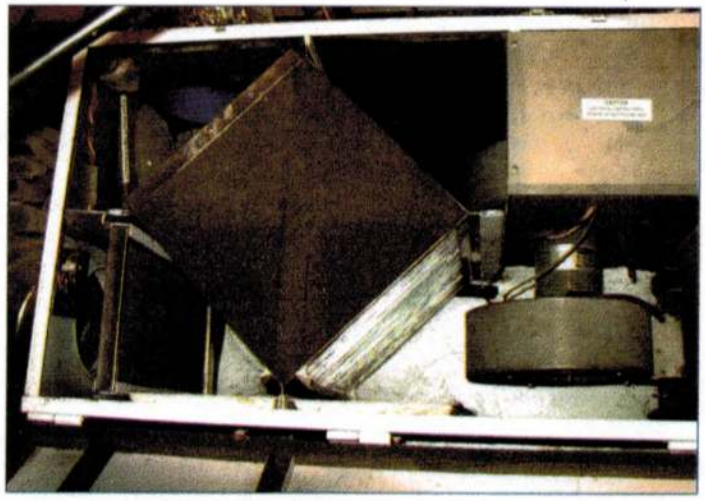
Poor Termination or Inlet Point Location

Fresh air inlets should be at least eighteen inches above grade level and away from areas where pollutants may enter the house. For example, intakes should not be adjacent to clothes dryer vents, driveways or carports, garbage storage areas, etc. Inlet and exhaust points are typically separated by six feet or more. Various manufacturers and local jurisdictions have varying recommendations here.



Filters Dirty or Missing

Filters are typically located in the HRV cabinet. Open the cabinet cover and look for filters. You will typically see a slotted tray that accommodates the filter. If they are present, remove them and check their cleanliness. Remember the flow of air will be in two different directions through the heat exchanger.



The filter shown on the bottom left of this HRV unit is dirty and should be replaced.

Dirty or missing filters are either an original installation issue or a maintenance issue. If the filter is missing, the heat exchanger is likely to get dirty. If the filters are dirty, airflow may be restricted. Check that the filters are in place and clean. ■

We have introduced heat recovery ventilators in this discussion and have outlined a few common conditions related to these systems. More information regarding the other conditions, implications and strategies for inspection can be found in the ASHI@HOME training program.

Herspective

From The Women of ASHI

BY TAMMY NICHOLAS, HOMEGUARD INC. *Home Inspector and Treasurer, Silicon Valley ASHI/CREIA chapter.*

A KEY PART OF YOUR CONFIDENCE and success as a home inspector will be your ability to perform a thorough inspection using the ASHI Standard of Practice (see more about that below), as well as looking for the deficiencies in a home's systems readily accessible components, which you will summarize for the client at the completion of the inspection.

Demonstrate Confidence and Knowledge

Teach yourself not to doubt your observations and recommendations for service or examination by an appropriate tradesperson or licensed contractor. (Hint: I recommend that you should know

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