Residential Ventilation Issues

by Dara Bowser & Bob Allison

HRV SYSTEMS:
What is the Field Experience?

Recently, some new research has been published which can be very helpful in understanding the problems that usually arise with HRV-based ventilation systems.

The research is summarized in CMHC R&D Highlight # 96-215 called ***Field Survey of HRV Ventilation Systems***. It is available from the CMHC at 613-748-2367, fax 613-748-2098.

The survey investigated 60 HRV installations including 30 in Ontario. The installations range from one to fourteen years old.

FIELD INSPECTION

The inspections revealed that most of the systems were operating as intended, however the most frequently noted problems were:

- missing or compressed insulation on cold-side ductwork;
- lack of grease filters in HRV kitchen exhaust grilles *(OBC 9.32.3.10.(5));*
- lack of traps for condensate drains;
- pollutant sources within 6 ft of HRV outside air intake;
- dirty filters, cores and/or fresh air intakes (over 50% of installations);
- poorly installed flex duct on simplified systems reducing airflow up to 40%;
- over and under ventilation with respect to code requirements;

A major concern is lack of balancing of newer systems.

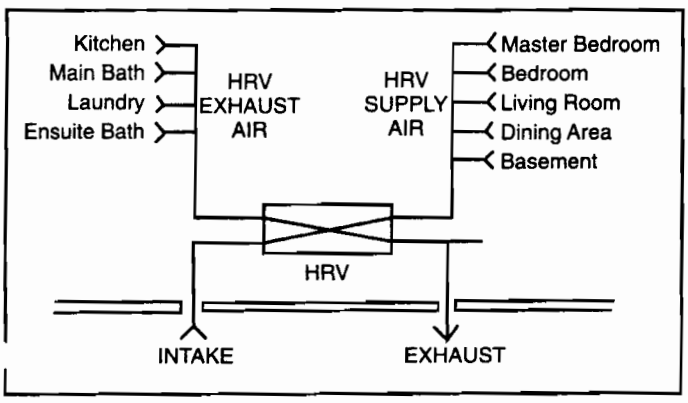

Figure 1 HRV not Connected to a Furnace (ONHWP Redbook Option 4)

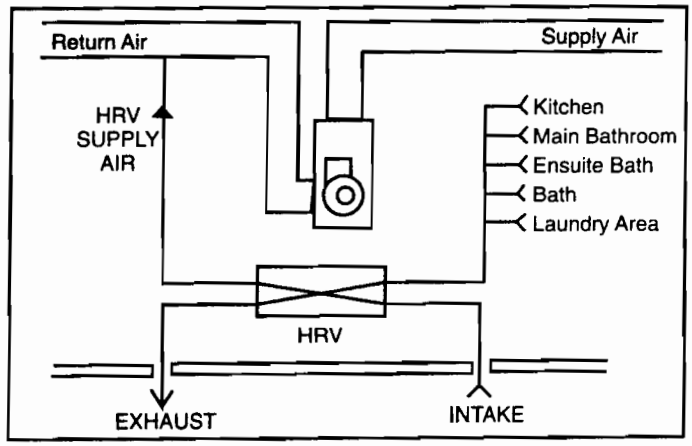

Figure 2 HRV Connected to a Furnace, Extended Exhaust Ductwork (ONHWP Redbook Option 2)

AIR DISTRIBUTION

Testing of the actual air-change rates and ventilation distribution found that:

- Natural ventilation is insufficient.
- Small open plan bungalows had better distribution than two story homes (upper floors).
- Operating a simplified or extend-exhaust type HRV *(ONHWP Redbook Options 2 & 3)* without the furnace circulation fan resulted in poor ventilation distribution on the upper floors and over-ventilation of the basement.
- Both high and low speeds on furnace fans worked well.

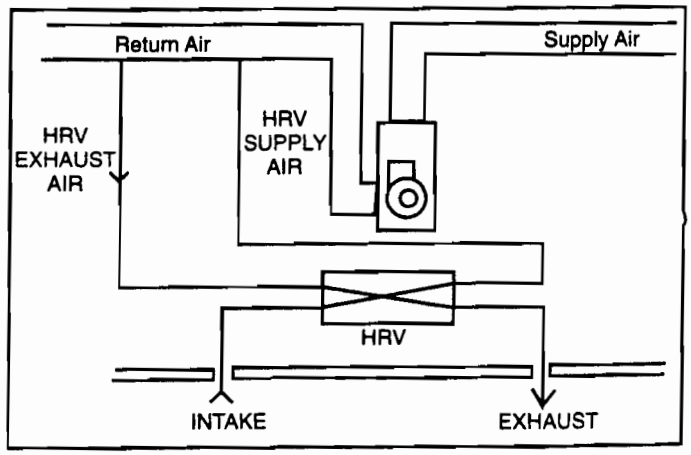

Figure 3 HRV Connected to a Furnace, Simplified Exhaust Ductwork (ONHWP Redbook Option 3)

HOMEOWNER SURVEY

Homeowner general understanding was good, however few understood the technical aspects or the negative effects of a poorly installed or maintained HRVs. 55% of homeowners did not realize that the furnace fan had to be operated in order to assure proper ventilation distribution.

CONCLUSIONS

The report concludes that:

- Many problems could have been avoided by Proper installation, therefore system installers should be required to pass the HRAI Ventilation Training Programs.
- Installers should offer maintenance agreements to homeowners and impress upon them the need for maintenance.
- Properly balanced systems are important and are an aspect that homeowners may not be aware of.
- Poor maintenance leading to clogged filters and intakes is problem.
- The industry should be encourage to develop trouble-indicating lights to signal component failure or over-due maintenance.
- HRV systems should be installed with balancing dampers and permanent flow-measuring devices.
- The use of flex duct should be limited or proper system design required.
- Circulation systems should operate in conjunction with the ventilation system as required by OBC 9.32.3.6.(4).
- Interlocking of the ventilation system and circulation fan is beneficial but not required in the OBC version of 9.32.)

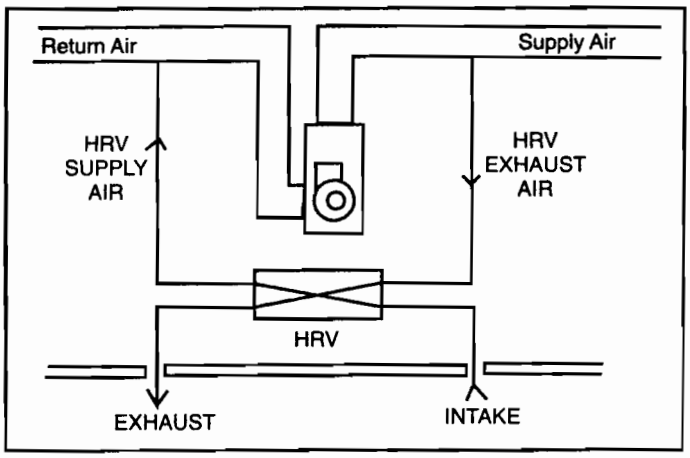

Figure 4 HRV Cross-Furnace Connection
(Not permitted by O.B.C. see 9.32.3.11.(3) and 9.32.3.4.(7)

- Much more training and communication sharing is necessary between owners, installers and building officials.
- Cross-Furnace installations do not perform well. *(See Figure 4)*

SUMMARY

When looking at field research of this type, it is good to remember that it appears to turn up mostly "bad stuff" and that all of the recommendations may not be practical immediately. This study only looked at "HRV-based systems". Other studies have shown that non-HRV ventilation systems may be worse. It is also important to recognize how the general conclusions confirm that we are on the right track by:

- enforcing installation requirements, particularly the requirements for balancing.
- requiring higher levels of training and certification for installers. Finally, we always suspected that maintenance was a problem and this has been confirmed. (The next Journal issue will deal with resources for communicating the need for maintenance.)

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****illustrations courtesy CMHC****

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