

# HRAI TECHNICAL COMMENTARY

*Residential Ventilation Issues*  
by Dara Bowser & Bob Allison

## 1993 Building Code Ventilation Requirements: How are They Working?

The OBC Section 9.32 underwent substantial changes in July of 1993. Since that time, the building industry has been adapting their practices to meet the new requirements. Many will quickly say that almost two years later, the process of adapting is not yet complete.

A report on the early experiences with the new ventilation requirements has recently been published and this article is a synopsis of the contents. The full report (titled 1993 OBC Mechanical Ventilation Assessment) is available from the Ministry of Housing.

**a) Study Design:** The study involved 26 homes in southern Ontario with ventilation systems designed to meet the '93 OBC ventilation requirements.

Testing involved:

- inspection of the ventilation system
- measurement of the air change rates, both natural and with the mechanical system operating using a tracer gas
- measurement of the house air-tightness
- house depressurization
- indoor air quality testing for airborne particulates, formaldehyde, humidity, radon, carbon monoxide and carbon dioxide.

Occupant interviews were also conducted.

**b) Limitations:** The sample of houses does not give uniform representation of ventilation

systems and housing. There are only two houses with simplified HRV (ONHWP Option 3) installations, and no houses with fully ducted HRVs (ONHWP Option 4). There are only five "exhaust only" installations, and four "Part 6" designs. Only 13 of the houses were built under permits issued after July 1993, but the balance of the houses were judged to have ventilation systems which complied with the post-July '93 requirements even if the permits were issued earlier.

### c) Inspection Findings:

- 5 out of 5 houses did not have CO detectors installed as required.

### Conclusions

- Basic Code requirements with respect to house type and system capacity are being followed.
- There are some installation practice deficiencies which should be remedied.
- The Code-required ventilation rates appear to provide good air quality.
- The air quality in "exhaust only" houses is unacceptable and could be a health concern. The poor air quality appears to be caused by improper use of ventilation equipment by homeowners.
- Houses equipped with HRV-based systems tend to be over-ventilated.
- HRVs are frequently installed without regard to balancing.
- The air-tightness of new homes is sufficient to justify the requirements for protection against combustion spillage.
- The level of satisfaction and comfort among homeowners is high, with consumers being more satisfied with HRV-based systems than other types.

- 11 out of 13 houses did not have a "circulation fan" control

- only 1 house had a central ventilation switch label

- 54% of houses did not have the required central ventilation switch, (usually an HRV installation).

- 3 out of 7 (43%) did not have HRV balancing dampers.

- None of the houses was provided with grease filters for the kitchen exhaust ducts and 31% of these were judged to have ducts that were inaccessible for cleaning

**d) Ventilation Rates:** For all houses natural plus

mechanical ventilation together exceeded the code-required ventilation rate. Many of the HRVs were found not to be balanced or poorly balanced. In several cases, the HRV capacity was much too large for the house.

**e) Indoor Air Quality:** All of the "exhaust only" houses had formaldehyde levels over the Health and Welfare Canada long term guideline. Two of these houses had levels over

the short-term action level, 85% of HRV-equipped houses had formaldehyde levels below the guideline, and none had levels above the "action level". Two-thirds of the "exhaust only" houses had indoor particulate levels above the long-term exposure guidelines. All of the HRV-equipped houses were below the guidelines. "Exhaust only" houses had generally higher humidity levels than HRV-equipped houses.

**f) Depressurization:** Of the 18 houses with spillage-susceptible combustion equipment, 3 might experience depressurization of 5 Pa or more with the dryer alone operating. In 5 or 18 cases, more than 5 Pa of depressurization might be experienced if the HRV intake became blocked.

**g) Occupant Satisfaction:** "Exhaust only" occupants expressed a 75% satisfaction level and a 65% comfort level. Occupants of HRV-equipped homes expressed an 80% satisfaction level and an 82% comfort level. The occupants of HRV-equipped homes also tended to be more knowledgeable about the operation of their

ventilation system. There were more complaints of "dryness" in HRV-equipped homes.

**h) Why the poor Air Quality in "Exhaust Only" houses?** Quite simply, occupants of an

"exhaust only" house do not operate their "principal" exhaust fan as a ventilation device, rather they treat it as just another bathroom fan. Occupants of an HRV-equipped house, however, tend to operate the HRV continuously on low-speed. This results in about 6 times more mechanical ventilation being provided in the HRV-equipped house. It is interesting to note that the "exhaust only" occupants are not markedly dissatisfied with the air quality in their homes, they were just "less satisfied" than the owners of HRV-equipped homes.

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### Recommendations

- Builders should be trained on how to ensure that trades are complying with the new code provisions. (**Author's note:** *The study does not mention the existence of the long-standing HRAI Ventilation training and certification program, nor does it say how many of the systems were installed by "certified" tradespersons.*)
- Municipal inspectors should be trained to check specifically for installation deficiencies. (**Author's note:** *The study does not mention the existence of the OBOA training program in ventilation and whether or not the particular building official had such training.*)
- Information should be provided to new home purchasers emphasizing continuous use of exhaust only systems. Consideration should be given to amending the Code to require timers to increase principal fan usage.
- Consideration should be given to amending the Code to provide clearer upper limits on HRV capacity. (**Author's note:** *9.32.3.4.(6) provides this limit.*)
- Consideration should be given to amending the Code to provide clearer requirements for balancing HRVs.
- Municipal Inspectors should be attempting to verify that flow balancing has been carried out during inspections.

## OBOA PEOPLE

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