# IAQ by Gord Cooke

## The Impact of Ventilation on Heating and Cooling Loads

Consumers and contractors alike are often concerned that adding continuous ventilation will both increase energy consumption and add to the design loads for heating and cooling. In this article we will address the impact of ventilation on heating loads. In future articles the impact on cooling loads and energy consumption and cost will be shown.

Professional contractors will recall the formula: BTU sensible heat/loss due to ventilation = CFM x temperature difference (°F) x 1.08, where 1.08 is a constant representing the density and specific heat of air.

For example, 150 CFM of ventilation, the total ventilation capacity for a typical home, in a climate with a design day temperature of 0°F (-18°C) and an indoor air temperature of 70°F (21°C) will result in a heat load of 150 x (70-0) x 1.08 = 11,340 BTUs. Historically this amount would have been a small portion of the heat loss of a home. However, in new high-performance homes and specifically in efficient town homes, 11,000 BTUs could represent as much as 30–50% of the total load.

It might seem obvious that the efficiency of heat recovery ventilation systems could be considered when calculating heat loads in houses. However, it has been recommended in some industry training manuals, such as in Canada's Heating, Refrigeration and Air Conditioning Institute's Digest, to exclude the effect of heat recovery technology, presumably to ensure a worst-case safety factor in the case of an HRV malfunction.

Fortunately, this position is being reviewed, and draft changes to the Digest and HRAI training manuals have been circulated that would now allow designers to use the Sensible Recovery Efficiency of an HRV, as listed in the HVI Product Directory, when calculating heat losses for new and existing structures that employ HRV or ERV technology. In the example above, the 150 CFM of ventilation through an HRV with a SRE of 70% would be just 3,402 BTUs.

This change will help HVAC contractors reduce the size of air handlers and duct work in high-performance energy-efficient homes, which will in turn be helpful to the designers and builders of these homes.

BTU total (sensible and latent) heat loss/gain = CFM x enthalpy change x 4.55

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