

# Mechanical Ventilation: What is the cost of CSA F326.1?

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Changes in construction practices and today's desire for more comfortable housing means tighter draft free construction is increasingly the norm. In the tighter house there is not enough air change to ensure adequate fresh air to maintain good indoor air quality, to remove odours and control moisture levels in the house. Even in leaky older houses there is no certainty of adequate fresh air when it is needed.

## Why Ventilate?

In the last 40 years construction practices has changed significantly due to the use of new sheet materials and greater emphasis on insulation, caulking and sealing so that special attention must be paid to ventilation. This has now been recognized in the building code and is the subject of a new draft CSA standard for residential ventilation. The changes will have a major impact on the building industry and local building authorities.

The object of ventilation is to maintain indoor air quality for health and comfort, and to control moisture levels in the house to preserve the building and its contents.

Until recently residential ventilation was achieved accidentally through random leakage across the building envelope, the exhaust action of open chimneys (fireplaces and naturally aspirating appliances) and fans. Odours, stale air, and moisture generated indoors were generally removed by combustion appliances and other exhaust routes. However, the major concern is to maintain temperature, humidity and air movement conditions for comfort. Traditionally during the heating season in Canada we have closed up our homes as tightly as we could, and applied heat to maintain comfort

levels. Opening a window in winter has never been a comfortable option.

## Indoor Pollutants

Ventilation controls the build up of indoor pollutants generated by occupants. Major contaminants of concern are water vapour, carbon dioxide, odours, combustion gasses such as carbon monoxide and nitrogen oxides, radon gas, particles (including airborne fungi, bacteria, viruses and volatile organic compounds such as formaldehyde).

The sources of these are normal metabolic processes, cooking and bathing, combustion, soil gasses, offgassing of building materials and contents, plus activities such as hobbies and smoking. Pollutants generated by building products and soil gasses should be dealt by proper attention to building materials (by using clean products) and construction details. Only pollutants generated by normal household activities are the ones that are dealt by ventilation.

Passive ventilation (which is what has traditionally be relied upon) is driven by temperature differences and wind. It is controlled by opening windows and other vents and uncontrolled passive ventilation by air leakage through random cracks, but it is weather dependent, so there is too much during cold weather and windy conditions. During warm calm weather (as in spring and fall) there is not enough ventilation.

Moisture control is better dealt with by proper exhaust systems, while the problem of hidden condensation is reduced by air sealing measures.

Combustion gases are another area of concern in new housing. Standard fuel burning appliances, when used at the same time as large exhaust fans and traditional fireplaces, can back-vent so that flue gasses spill inside. Accidental passive ventilation is no

longer enough to ensure comfort and indoor air quality.

## Mechanical Ventilation

Controlled ventilation which ensures adequate air change for health, comfort and humidity control is a must which follows naturally from the changes that have been happening in the housing industry.

### How is ventilation measured?

#### Air Changes per hour (ACH)

The number of times per hour that the entire volume of air is exchanged with outside air as a ratio of total building volume. An air change rate of 0.5 ACH means that half the air of the house is exchanged each hour (or the total volume is changed every 2 hours).

*There is little distinction between large or small houses, or between heavily or little occupied rooms. Ventilation calculated by ACH can provide inadequate ventilation for a small house, but too much for a large house.*

#### Ventilation flow rate:

litres per second (l/s) or cubic feet per minute (cfm).

*A flow rate specified either by number of occupants or number/type of rooms more closely matches ventilation to the actual needs. This is the approach used in commercial and institutional buildings.*