

VENTILATION REQUIREMENTS: Changes to B.C. Building Code Ventilation Standards

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The ventilation requirements of the B.C. Building Code have been revised, and are now in force. The revisions go a long way to cleaning up the code language, making it more understandable.

A number of tables are provided with the code, to ease calculation. For most standard houses the builder need just follow the steps through a series of tables to calculate what's required.

We're presenting the essential elements of the revised code.

System Capacity

All dwelling units must have a mechanical ventilation system capable of providing at least 0.5 air change per hour (ACH) during the heating season.

Systems designed to distribute ventilation air to or from all rooms, (but excluding rooms such as storage, foyer, laundry or mechanical) must be capable of providing at least 0.3 ACH.

The ventilation rate is to be based on the total heated volume (including basement and heated crawl spaces).

A portion of the required ventilation must be controlled automatically by a centrally located dehumidistat or be provided by a continuously operating fan during the heating season. Table 9.33.3.B spells out the minimum required rates to be controlled automatically or continuously.

In many houses this will mean that bath fans must be run continuously or controlled on a dehumidistat.

Most houses (over 2100 sf) will require that 80 cfm of capacity be controlled by a dehumidistat. Houses with continuous ventilation (e.g. HRV or continuous exhaust fan) will require 40 cfm continuous (80 cfm for houses over 4300 sf).

The alert reader will note that the minimum ventilation rate provided continuously (at 80 cfm for large houses) can be as low as 0.15 ACH. While the system capacity must be .3 ACH for distributed and .5 ACH for

non-distributed ventilation, it need not run at that rate continuously.

The ventilation standard related to air changes per hour is not a meaningful measure. We began using it when we first seriously looked at ventilation requirements in homes, and had to look at what others do. In Europe, where ventilation has been mandated for much longer, they may use "air changes per hour" - but the volume of the average dwelling unit is much smaller than the average Canadian home.

What has been recognized by the B.C. Building Code (directly or otherwise) is that ventilation is for people. The acknowledged minimum quantity required by a human is around 15 cfm (plus or minus 5 cfm).

Exhaust equipment such as central vacuums, downdraft cook tops and clothes dryers will not be considered in calculating the ventilation system capacity.

Make-up Air

Mechanical ventilation systems must include provision for introduction of fresh make-up air from the exterior to match the ventilation controlled automatically.

Make-up air is not needed if the dwelling has no naturally-aspirating fuel-fired heating appliances, or if all fuel-fired appliances (including fireplaces) are isolated from the interior atmosphere.

In colder climates (design temperature less than -10°C) tempering of the make-up air is required. It can be done by mixing it with forced air heat, by use of an HRV, fan coil unit or other suitable method.

Make-up air need not be tempered in mild climate zones (winter design temperature above -10°C). It can be supplied into areas such as utility or storage rooms.

Make-up air tempered through forced-air heating systems must be provided by a duct connected directly into the return air plenum. The make up air duct must be provided with a motorized damper that is interlocked with the exhaust fan controlled by a dehumidistat so that the exhaust fan only operates when the damper is open. The dehumidistat must also be interlocked with the furnace fan so that the furnace fan will operate when the exhaust fan is on and the damper is open.

Table 9.33.3.B.
Forming Part of 9.33.3.5.

MINIMUM REQUIRED VENTILATION RATE CONTROLLED AUTOMATICALLY OR PROVIDED CONTINUOUSLY			
Max. Total Interior Volume ⁽¹⁾ , m ³	Max. Total Floor Area ⁽¹⁾ Based On Standard 2.44 m Ceiling Height, m ²	Minimum Ventilation Rate, Controlled Automatically, L/s	Minimum Ventilation Rate, Provided Continuously, L/s
244	100	20	10
366	150	30	15
488	200	40	20
732	300	40	30
975 and over	400 and over	40	40
Column 1	2	3	4

1 l/s = 2 cfm

Additional make-up air must be provided for other exhaust appliances installed in the dwelling unit with a rated capacity exceeding 0.5 ACH. This may have to be by a fan-forced unit of equivalent capacity interlocked with the exhaust appliance. This would apply to equipment such as high capacity downdraft cook tops.

Small houses with naturally aspirating appliances require fan forced make-up for 100% of the capacity (tempered if in a cold climate with winter design temperatures $< -10^{\circ}\text{C}$).

A naturally-aspirating forced heating system serving a maximum total heated floor area of 460 m^2 is acceptable as providing the ventilation requirements, if the system is capable of providing at least 0.3 air changes per hour during its heating operation or has an air supply (as provided for in a table providing minimum supply duct diameter).

Combination Forced Air-Ventilation

In houses up to 4900 sf, with a naturally drafted furnace, if the supply air is directly connected to the return air plenum, no other ventilation is required if the system can contribute .3 ACH. This type of system requires dehumidistat control of the furnace fan or a continuous running furnace fan.

This system is a minor modification of existing furnace installations that have proven to be acceptable in the general housing stock. It is being accepted for the time being because of its proven track record (and in part because of pressure from the gas industry).

As houses get tighter and more sealed combustion furnaces are used it is likely that this kind of passive system may not be adequate.

Combustion air ducts for fuel burning appliances are not to be used to supply make-up air for the ventilation systems unless their capacity is enough to serve both functions at the same time.

Sound ratings

Wall and ceiling fans that are controlled automatically or meant to operate continuously must be rated by the manufacturer not to exceed a sound level of 60 dBA or 2.5 Sones.

Exhaust Ducts

Exhaust ducts must vent directly to the outdoors. Where the exhaust duct passes through or adjacent to unheated spaces, it must be insulated to prevent moisture condensation in the duct.

Ventilation ducts must be metal, but exhaust ducts that serve only a bathroom or powder room can be made of combustible material that is impervious to water.

Service Access

Ventilation equipment must be accessible for inspection, maintenance, repair and cleaning. Kitchen exhaust ducts must be designed and installed so that the duct can be cleaned if there is no filter at the intake. Kitchen ducts must be metal.

Outdoor air intake and exhaust outlets must be shielded from weather and insects. Screening for insects may be by an accessible filter at the equipment and by a 6mm mesh screen at the intake or exhaust hood. Screening must be made of rust-proof material.

Distribution

To ensure distribution of air through the house, interior doors should be undercut $\frac{1}{2}$ ", the rooms provided with a grille, or a transfer grill with an equivalent area.

Fan ratings must be rated by the manufacturer at a pressure difference of at least 50 Pascals.

INFORMATION WANTED

A study to evaluate the impact of the draft CSA F326 Standard for Residential Mechanical Ventilation is being done by Allen Associates. (What are the consequences for the building industry if the standard becomes mandatory?)

The study will include a review of available equipment and costs of complete systems.

If you can help, please send your literature to:

Allen Associates
33 Madison Avenue
Toronto, Ontario
M5R 2S2

Attn: Mario Kani, P. Eng.

Allen Associates would like to receive current product literature, preferably with price lists, from manufacturers and suppliers of residential ventilation equipment such as:

- * exhaust fans
- * make-up air fans and ducts
- * recirculation fan systems
- * central exhaust systems
- * heat recovery ventilators
- * exhaust air heat pumps
- * passive supply vents
- * forced air and low flow high-wall or ceiling supply registers
- * exhaust grilles
- * intake and exhaust vent hoods (for exterior walls, complete with screens add/or filters)
- * ductwork (with an without insulation an for low-flow applications)
- * and controls.

Information required is engineering and technical in nature and should specify, among other data, air flows, sound ratings, and applicability.