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September 17, 2014

9.32. Ventilation

The Province is introducing new requirements to the BC Building Code for the ventilation of residential dwelling units, such as houses, apartments and secondary suites. These new requirements only apply to ventilation systems that serve a single dwelling unit and they come into effect on December 19, 2014. This bulletin provides a brief overview of the key changes to Section 9.32. of the BC Building Code, and where code users can find more information.

The End of Exhaust-Only Ventilation Systems

For many years, the BC Building Code has relied on an “exhaust-only” ventilation system. This system uses a bathroom or hallway fan to exhaust air out of the building and allows fresh air to enter the house through leaks in the building’s exterior, such as around doors, windows, and other wall penetrations. This system is only able to work effectively when a building is drafty. However, a drafty building does not distribute fresh air to where it is needed, and it does not work when air leakage is controlled for energy efficiency reasons. New energy efficiency requirements that also take effect on December 19, 2014 will require builders to do a better job of controlling leakage of air in and out of buildings, which is why exhaust-only ventilation systems are being replaced by a system that includes both exhaust and supply.

Principal Ventilation System Requirements

Effective December 19, 2014 residential dwelling units, such as houses, apartments and secondary suites will be required to have a principal ventilation system that exhausts air from bathrooms and kitchens and supplies fresh air to bedrooms and living areas [9.32.3.3.]. The principal ventilation system is intended to create a continuous flow of air through the dwelling unit, making it easier to control issues related to moist and contaminated air, such as mold and mildew. Some small dwelling units in mild climates are permitted to supply fresh air through passive vents [9.32.3.4.(6)], but for most dwelling units exhaust and supply will require a mechanical fan.

Additional Exhaust Fans

In addition to the principal exhaust fan for the dwelling, every kitchen and bathroom is required to have a fan that exhausts air to the outdoors at the minimum exhaust rates outlined in Table 9.32.3.6. While this is additional to the exhaust required in Table 9.32.3.5, conditional permission is given that both functions can be performed by the same fan.

To satisfy the exhaust requirements of a principal ventilation system, every dwelling unit needs to have one fan that exhausts air continuously (24hr/day) at the minimum exhaust rates outlined in Table 9.32.3.5. This principal exhaust fan may double as a kitchen or bathroom fan, or it could be an additional fan installed anywhere in the dwelling unit. The air-flow rates for the principal ventilation exhaust fan are typically lower than the air-flow rates for kitchen and bathroom fans.

If a kitchen or bathroom fan is designated as the principal ventilation exhaust fan, it needs to operate continuously at the rate required for a principal ventilation system exhaust fan [Table 9.32.3.5.], as well as intermittently, on command of the occupant, at the slightly higher rate required for kitchen and bathroom fans [Table 9.32.3.6.]. This means the fan will operate at the lower principal ventilation exhaust fan rate most of the time, and when the kitchen or bathroom is in use, it will operate at the higher minimum rate for kitchen and bathroom fans.

If a kitchen or bathroom fan is designated as the principal ventilation exhaust fan, it also needs to have two separate switches; one for the operation as a kitchen and bathroom fan that may have multiple air-flow rates, and one for the operation as the principal ventilation exhaust fan, which must turn “on” and “off” only and have a label that reads: “PRINCIPAL VENTILATION EXHAUST FAN.” The separate switches are intended to prevent someone from turning off the principal ventilation fan inadvertently when they leave the kitchen or bathroom.

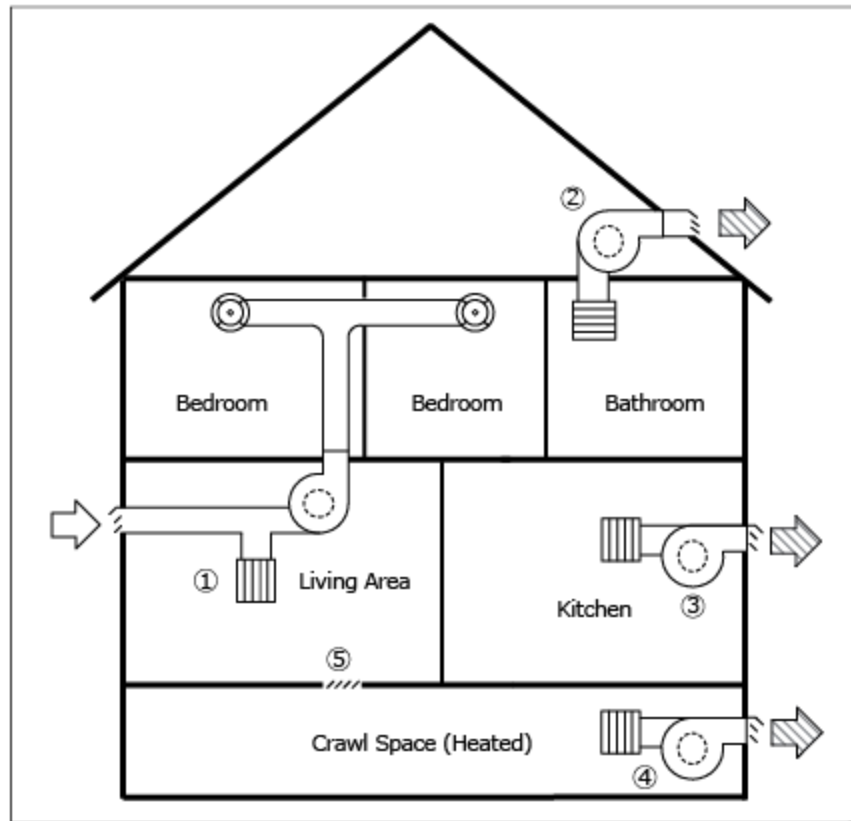


Figure 1 – Example of a house that includes a principal ventilation system including supply (1) and continuous exhaust (2). The bathroom fan (2) provides continuous exhaust as the principal ventilation exhaust fan and intermittent, on command exhaust at a higher air flow rate as a bathroom fan. The kitchen exhaust is provided by a dedicated kitchen exhaust fan (3). The heated crawl space is provided with a dedicated fan (4) and at least one passive grille to the rest of the house (5).

The principal ventilation exhaust fan is not required to be a kitchen or bathroom fan, but if it is, it must meet the requirements outlined in the BC Building Code for both kitchen/bathroom fans as well as the principal ventilation exhaust fan.

Supply Air

As part of the principal ventilation system, every dwelling unit needs to be provided with a supply of fresh air directly from the outdoors to every bedroom and every storey without a bedroom (including heated crawlspaces). Supply air provides a replacement for the air exhausted by the principal ventilation exhaust fan, and helps to create a steady flow of air throughout the dwelling unit.

In most situations, supply air needs to be supplied and distributed mechanically, using a fan and ducts. The BC Building Code provides five separate compliance paths for mechanical distribution of supply air that utilize different systems, including forced-air furnaces, HRV's, ERV's, and central-recirculation ventilation systems [9.32.3.4.]. Each compliance path requires that fresh air be supplied directly from outdoors to bedrooms and storeys without a bedroom.

Passive Vents

For small, single-storey dwelling units in mild climates, fresh air may be supplied using passive vents in an exterior wall, rather than using a ducted mechanical system. The use of passive supply air systems may only be used where the January 2.5% design temperature is greater than -10°C, the dwelling unit is single-storey and less than 168m², and the dwelling unit does not have a ducted forced-air heating system [9.32.3.4.(6)].

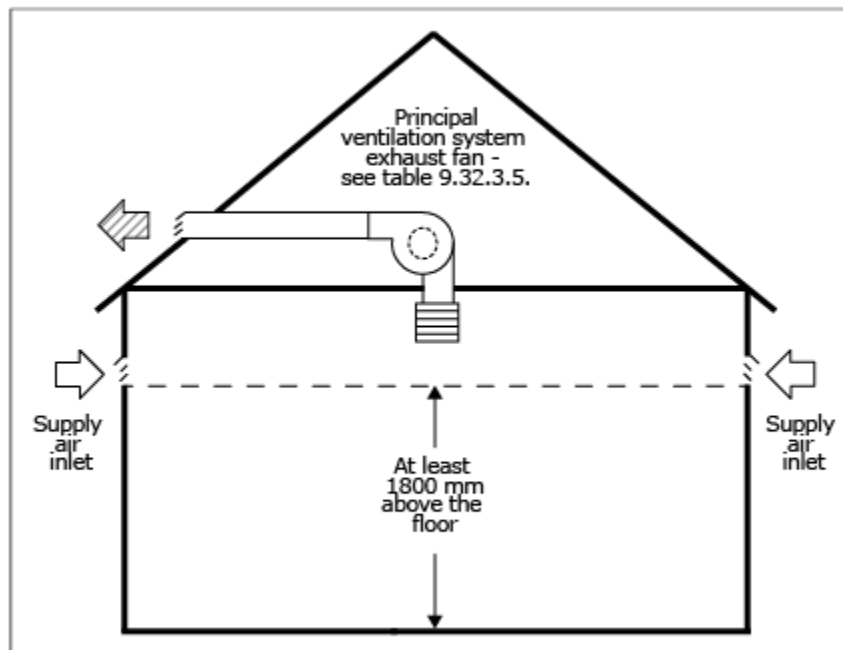


Figure 2 – Example of supply air provided by passive inlets in a small, single-storey dwelling unit, such as an apartment or small house.

If a dwelling unit satisfies this criteria, it can meet the requirements for supply air using a passive vent in each bedroom and at least one common area [see 9.32.3.4.(6) for full requirements].

Crawl Space Ventilation

The requirements are less onerous than the principal ventilation system in the rest of the dwelling unit, but a heated crawl space must be provided with at least a mechanical supply or exhaust fan and be provided with a passive grille to the rest of the house, or the crawl space may be ventilated using two separate passive grilles [see 9.32.3.7. for full requirements].

Air Ducts

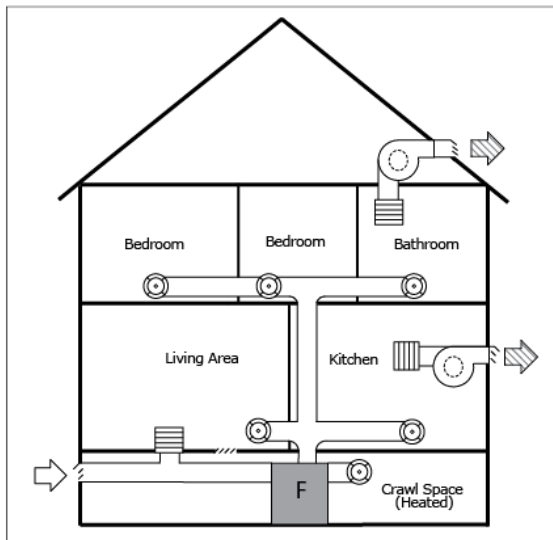
Air ducts are required to be properly sized, insulated and sealed against leakage, depending on their use [9.32.3.8.]. Generally speaking, ducts need to be sized according to the manufacturer's instructions and not less than the sizes in Table 9.32.3.8.(3). This table provides sizing requirements for both flexible and rigid ducting.

Air ducts that carry conditioned air, such as exhaust ducts, forced-air furnace ducts, and fresh air distribution ducts, need to be sealed against air leakage. This requirement applies inside the dwelling unit [9.32.3.8.(7)] and where ducts are installed in unconditioned spaces such as attics or crawlspaces [9.36.3.2.].

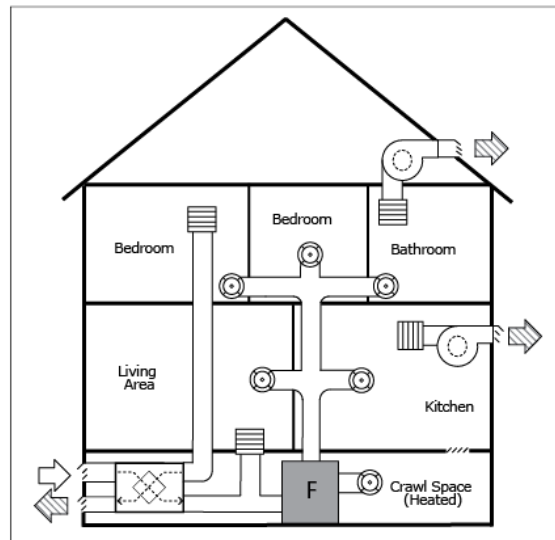
Where ducts travel through or adjacent to unconditioned spaces they are required to meet all of the requirements of 9.36.3.2. and be insulated to no less than RSI 0.75 [see 9.32.3.8.(4) and (5)]. Supply ducts that travel through conditioned space also need to have a vapour barrier to prevent condensation.

Appendix:

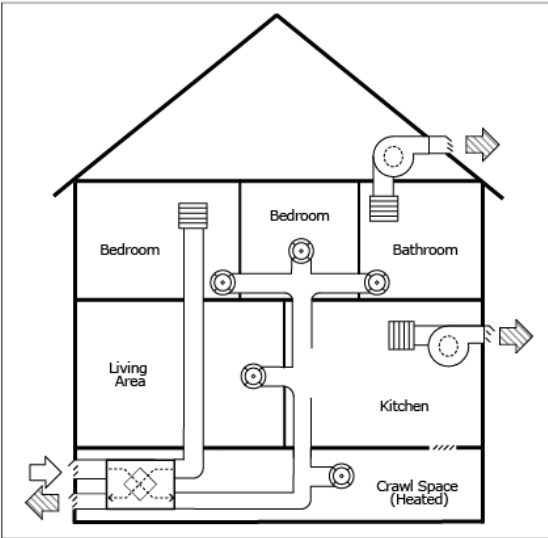
The following illustrations provide a representation of compliant ventilation systems, but are not intended to be used in place of the written Code requirements in Division B. The illustrations are intended to provide a representation of the equipment involved in each compliance path and some indication of how that compliance path is intended to operate. The location and number of exhaust and supply inlets and outlets may not be representative of the actual code requirements in 9.32.3.



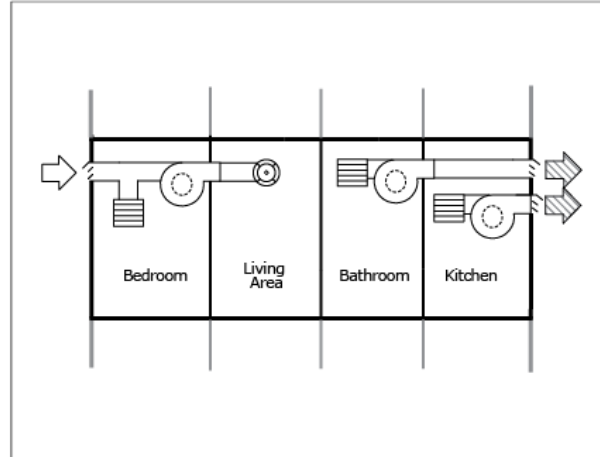
9.32.3.4.(2) Using a ducted forced-air furnace in the principal ventilation system. The furnace ducting provides supply air to required areas of the dwelling unit and the bathroom fan is designated as the principal ventilation exhaust fan, operating continuously as the principal ventilation exhaust fan (see 9.32.3.5.) and intermittently as a bathroom fan (see 9.32.3.6.).



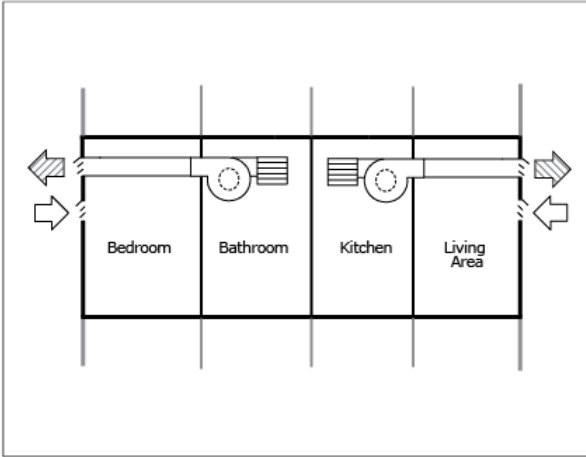
9.32.3.4.(3) Using a ducted forced-air furnace in the principal ventilation system. The HRV may act as the principal ventilation exhaust fan and may exhaust from more than one location in the dwelling unit. In this case, the bathroom and kitchen fans are not part of the principal ventilation system.



9.32.3.4.(4) Using a HRV as the principal ventilation system. The HRV may exhaust from more than one location in the dwelling unit. In this case, the bathroom and kitchen fans are not part of the principal ventilation system. Supply air is provided to each bedroom and each storey without a bedroom.



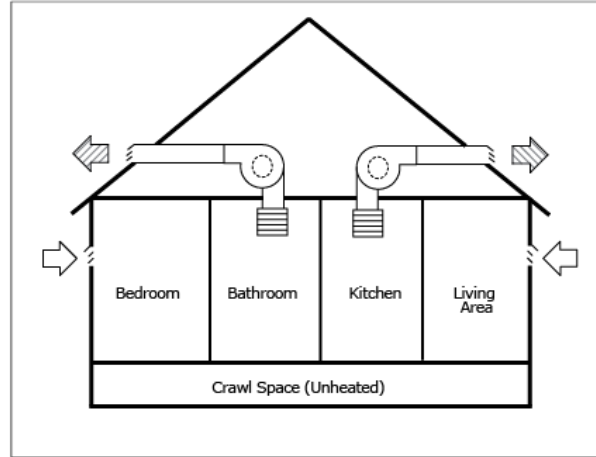
9.32.3.4.(5) Using a ducted central-recirculation ventilator (CRV) in the principal ventilation system. In this example the CRV draws air from the outdoors and the bedroom(s) and distributes this air to a common area. Alternatively, the CRV may reverse this flow and return from the common area and provide supply air to the bedrooms. The bathroom fan is designated as the principal ventilation exhaust fan, operating continuously as the principal ventilation exhaust fan (see 9.32.3.5.) and intermittently as a bathroom fan (see 9.32.3.6.).



9.32.3.4.(6) Using passive vents in each bedroom and one common area for supply air distribution is a ductless option for some small houses and apartments. To use this option, the dwelling unit:

- must be located where the January design temperature is greater than -10°C ,
- has only 1 storey,
- has a floor area inside the building envelope of less than 168m^2 (1808 sq. ft.), and
- does not have a ducted forced-air heating system.

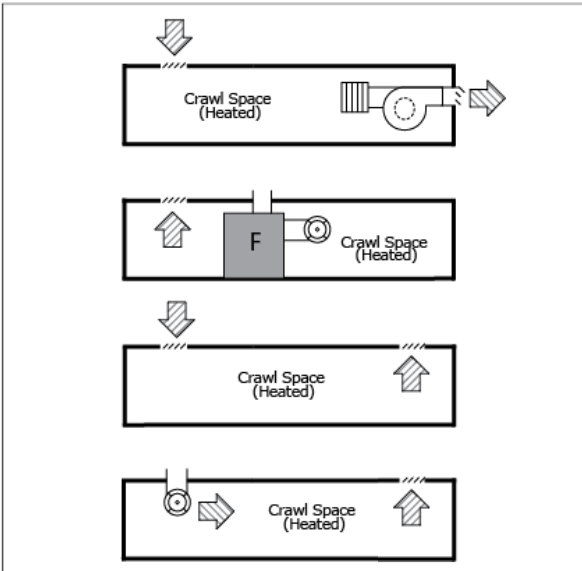
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The bathroom fan is designated as the principal ventilation exhaust fan, operating continuously as the principal ventilation exhaust fan (see 9.32.3.5.) and intermittently as a bathroom fan (see 9.32.3.6.).



9.32.3.7. Heated crawl space ventilation may be achieved through various options, all of which include at least one air-transfer grille to the rest of the dwelling unit for every 30m² of crawl space area. A second grille, supply air, or exhaust needs to be provided in addition to the first grille to satisfy the requirements for ventilation of heated crawl spaces. Where a crawl space is divided into compartments, each compartment would need to be interconnected or satisfy the ventilation requirements independently. For ventilation purposes, two compartments may be interconnected through the joist cavities or by inserting grilles or holes in a sheathed interior separation, such as a 'pony wall'.