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## Part 9 – Housing and Small Buildings

### Section 9.32. Ventilation

#### 9.32.1. GENERAL

##### 9.32.1.1. Application

- 1) This Section applies to the ventilation of rooms and spaces in *residential occupancies* by natural ventilation and to self-contained mechanical ventilation systems serving only one *dwelling unit*.
- 2) Mechanical ventilation systems other than self-contained systems serving single *dwelling units* shall conform to Part 6.
- 3) A *storage garage* for more than 5 motor vehicles shall be ventilated in accordance with Part 6.
- 4) Systems used for ventilation shall conform to the energy efficiency requirements in [Section 9.36](#).

##### 9.32.1.2. Required Ventilation

- 1) Every *dwelling unit* shall incorporate
  - a) provisions for non-heating-season ventilation in accordance with [Subsection 9.32.2.](#), and
  - b) if supplied with electrical power, provisions for heating season ventilation in accordance with [Subsection 9.32.3](#).

#### 9.32.2. NON-HEATING-SEASON VENTILATION

##### 9.32.2.1. Required Ventilation

- 1) Rooms or spaces in *dwelling units* shall be ventilated during the non-heating season by
  - a) natural ventilation in accordance with [Article 9.32.2.2.](#), or
  - b) a mechanical ventilation system conforming to [Subsection 9.32.3](#).

- 2) Where a habitable room or space is not provided with natural ventilation as described in [Clause \(1\)\(a\)](#), mechanical ventilation shall be provided to exhaust inside air from, or to introduce outside air to, that room or space at the rate of
- one-half air change per hour if the room or space is mechanically cooled during the non-heating season, or
  - one air change per hour if it is not mechanically cooled during the non-heating season.

### 9.32.2.2. Non-Heating-Season Natural Ventilation

- 1) The unobstructed openable ventilation area to the outdoors for rooms and spaces in residential *buildings* ventilated by natural means shall conform to [Table 9.32.2.2](#).

| <b>Table 9.32.2.2.</b><br><b>Natural Ventilation Area</b><br>Forming part of <a href="#">Sentence 9.32.2.2.(1)</a> |   |  |
|--|---|--|
| <b>Location</b>  |   | <b>Minimum Unobstructed Area</b>                 |
| Within<br>a <i>dwelling unit</i>   | Bathrooms or water-closet rooms   | 0.09 m <sup>2</sup>                              |
|  | Unfinished <i>basement</i> space  | 0.2% of the <i>floor area</i>                    |
|  | Dining rooms, living rooms, bedrooms, kitchens, combined rooms, dens, recreation rooms and all other finished rooms | 0.28 m <sup>2</sup> per room or combination room |
| Other than<br>within<br>a <i>dwelling unit</i>   | Bathrooms or water-closet rooms   | 0.09 m <sup>2</sup> per water closet             |
|  | Sleeping areas  | 0.14 m <sup>2</sup> per occupant                 |
|  | Laundry rooms, kitchens, recreation rooms   | 4% of the <i>floor area</i>                      |
|  | Corridors, storage rooms and other similar public rooms or spaces   | 2% of the <i>floor area</i>                      |
|  | Unfinished <i>basement</i> space not used on a shared basis   | 0.2% of the <i>floor area</i>                    |

- 2) Where a vestibule opens directly off a living or dining room within a *dwelling unit*, ventilation to the outdoors for such rooms may be through the vestibule.
- 3) Openings for natural ventilation other than windows shall provide protection from the weather and insects.
- 4) Screening shall be of corrosion-resistant material.

### 9.32.2.3. Reserved

## 9.32.3. HEATING-SEASON (MECHANICAL) VENTILATION

(See [Appendix A.](#))

### **9.32.3.1. Required Ventilation**

- 1) Every *dwelling unit* that is supplied with electrical power shall be provided with a mechanical ventilation system that conforms to
  - a) [CAN/CSA-F326-M, "Residential Mechanical Ventilation Systems,"](#) or
  - b) this Subsection.

### **9.32.3.2. Design and Installation**

- 1) Aspects of a mechanical ventilation system not specifically addressed in this Subsection shall be designed, constructed and installed in accordance with good practice such as that described in the ASHRAE Handbook and standards, the HRAI Digest, the HRAI Residential Mechanical Ventilation Manual, the TECA Ventilation Guidelines, the Hydronics Institute manuals and the SMACNA manuals.
- 2) Exhaust fans and supply fans shall be installed in accordance with this Subsection and the manufacturer's instructions.
- 3) The mechanical components of a mechanical ventilation system shall be installed so as to be accessible for inspection, maintenance, repair, and cleaning.

### **9.32.3.3. Mechanical Ventilation System Components**

- 1) A mechanical ventilation system shall include
  - a) a principal ventilation system that
    - i) provides supply air in accordance with [Article 9.32.3.4.](#), and
    - ii) includes an exhaust fan that conforms with [Article 9.32.3.5.](#),
  - b) the kitchen and bathroom exhaust fans that are required by [Article 9.32.3.6.](#), and
  - c) if the building includes a heated crawl space, the components that are required by [Article 9.32.3.7.](#)

### **9.32.3.4. Principal Ventilation System Supply Air**

(See [Appendix A.](#))

- 1) Except as provided in [Sentence \(6\)](#), a principal ventilation system shall mechanically provide supply air in accordance with [Sentence \(2\), \(3\), \(4\) or \(5\)](#).
- 2) Where the principal ventilation system is a ducted forced-air heating system, the ducted forced-air heating system shall
  - a) provide supply air through the ducting to
    - i) each bedroom, and
    - ii) each floor level without a bedroom,

- b) draw supply air from an outdoor inlet that is connected to the cabinet containing the furnace air circulating fan required by [Clause \(d\)](#) by ducting that measures, from that cabinet to the point at which the ducting intersects the return air plenum,
    - i) between 3 m and 4.5 m in length, or
    - ii) if a flow control device is used, not more than 4.5 m in length.
  - c) draw supply air through ducting that is
    - i) rigid ducting with an equivalent diameter of at least 100 mm, or
    - ii) flexible ducting with an equivalent diameter of at least 125 mm, and
  - d) have a furnace air circulating fan set to run continuously.
- 3) Where the principal ventilation system is a ducted forced-air heating system used in combination with a heat-recovery ventilator,
- a) the ducted forced-air heating system shall conform to [Clauses \(2\)\(a\), \(c\) and \(d\)](#),
  - b) the heat-recovery ventilator shall draw supply air from an outdoor inlet into the return air plenum of the ducted forced-air heating system, and
  - c) the heat-recovery ventilator shall draw exhaust air, through dedicated ducting,
    - i) from one or more indoor inlets, at least one of which is located at least 2 m above the floor of the uppermost floor level, and
    - ii) at the capacity rating of the heat-recovery ventilator, which shall be no less than the air-flow rate specified in [Table 9.32.3.5](#).
- 4) Where the principal ventilation system is a heat-recovery ventilator, the heat-recovery ventilator shall
- a) provide supply air through dedicated ducting to
    - i) each bedroom, and
    - ii) each floor level without a bedroom, and
  - b) draw exhaust air, through dedicated ducting,
    - i) from one or more indoor inlets, at least one of which is located at least 2 m above the floor of the uppermost floor level, and
    - ii) at the capacity rating of the heat-recovery ventilator, which shall be no less than the air-flow rate specified in [Table 9.32.3.5](#).
- 5) Where the principal ventilation system is a ducted central-recirculation ventilation system, the ducted central-recirculation ventilation system shall
- a) draw supply air from an outdoor inlet connected upstream of the fan, and
  - b) draw air from
    - i) each bedroom and deliver it to a common area, or
    - ii) a common area and deliver it to each bedroom.

- 6) A principal ventilation system need not conform to [Sentence \(1\)](#) if the principal ventilation system
- a) services a *dwelling unit* that
    - i) is located where the January design temperature, on a 2.5% basis determined in conformance with [Article 1.1.3.1.](#), is greater than  $-20^{\circ}\text{C}$ ,
    - ii) has only 1 *storey* and a *floor area* of less than  $168\text{ m}^2$  within the *building* envelope (see [Appendix A](#)), and
    - iii) does not have a ducted forced-air heating system, and
  - b) provides supply air passively from outdoors through dedicated inlets that
    - i) are located in each bedroom and at least one common area,
    - ii) are located at least 1 800 mm above the floor, and
    - iii) have an unobstructed vent area of not less than  $25\text{ cm}^2$ .

### 9.32.3.5. Principal Ventilation System Exhaust Fan

- 1) A principal ventilation system exhaust fan shall
- a) run continuously, and
  - b) provide at least the air-flow rate specified in [Table 9.32.3.5.](#)

| <b>Table 9.32.3.5.</b>  |                                   |            |            |            |              |
|---|-----------------------------------|------------|------------|------------|--------------|
| <b>Principal Ventilation System Exhaust Fan Minimum Air-flow Rate</b> |                                   |            |            |            |              |
| Forming part of <a href="#">Sentence 9.32.3.5.(1)</a>                 |                                   |            |            |            |              |
| <b>Floor Area, m<sup>2</sup></b>                                      | <b>Minimum Air-flow Rate, L/s</b> |            |            |            |              |
|   | <b>Number of Bedrooms</b>         |            |            |            |              |
|   | <b>0-1</b>                        | <b>2-3</b> | <b>4-5</b> | <b>6-7</b> | <b>&gt;7</b> |
| < 140   | 14                                | 21         | 28         | 35         | 42           |
| 140-280   | 21                                | 28         | 35         | 42         | 49           |
| 281-420   | 28                                | 35         | 42         | 49         | 56           |
| 421-560   | 35                                | 42         | 49         | 56         | 64           |
| 561-700   | 42                                | 49         | 56         | 64         | 71           |
| > 700   | 49                                | 56         | 64         | 71         | 78           |

- 2) For the purposes of [Sentence \(1\)](#), the capacity rating of the principal ventilation system exhaust fan shall be determined, based on air-flow performance at 50 pa of external static pressure, in accordance with
- a) [HVI Publication 916, "Airflow Test Procedure,"](#) or
  - b) [CAN/CSA-C260-M, "Rating the Performance of Residential Mechanical Ventilating Equipment."](#)
- 3) The principal ventilation system exhaust fan shall be
- a) designed to run continuously, and

- b) controlled by a dedicated switch that
  - i) has 2 settings, on and off,
  - ii) is located where it will be accessible for the purposes of servicing the exhaust fan but not likely to be turned off inadvertently, and
  - iii) is clearly marked "PRINCIPAL VENTILATION EXHAUST FAN."
- 4) If the principal ventilation system exhaust fan is designed to run at multiple air-flow rates,
  - a) the air-flow rate of the fan shall be controlled by a switch other than the switch described in [Clause \(3\)\(b\)](#), and
  - b) the lowest air-flow rate shall not be less than the air-flow rate specified in [Table 9.32.3.5](#).
- 5) The sound rating of the principal ventilation system exhaust fan shall not exceed 1.0 sone when running continuously at the air-flow rate specified in [Table 9.32.3.5](#) as determined in accordance with
  - a) [HVI Publication 915, "Loudness Testing and Rating Procedure,"](#) or
  - b) [CAN/CSA-C260-M, "Rating the Performance of Residential Mechanical Ventilating Equipment."](#)

### 9.32.3.6. Kitchen and Bathroom Exhaust Fans

- 1) An exhaust fan that provides at least the air-flow rate specified in [Table 9.32.3.6](#) shall be installed in
  - a) every kitchen, and
  - b) every bathroom or water-closet room, unless the bathroom or water-closet room is served by the principal ventilation system exhaust fan that complies with [Article 9.32.3.5](#).
- 2) For the purposes of [Sentence \(1\)](#), the capacity rating of the exhaust fan shall be determined, based on air-flow performance at 50 pa of external static pressure, in accordance with
  - a) [HVI Publication 916, "Airflow Test Procedure,"](#) or
  - b) [CAN/CSA-C260-M, "Rating the Performance of Residential Mechanical Ventilating Equipment."](#)

| <b>Table 9.32.3.6.</b>                                    |   |                   |
|---|---|-------------------|
| <b>Kitchen/Bathroom Exhaust Fan Minimum Air-flow Rate</b> |   |                   |
| Forming part of <a href="#">Sentence 9.32.3.6.(1)</a>     |   |                   |
| <b>Room</b>   | <b>Minimum Exhaust Fan Air-flow Rate, L/s</b> |                   |
|   | <b>Intermittent</b>                           | <b>Continuous</b> |
| Kitchen   | 47  | N/A               |
| Bathroom  | 23  | 9                 |

### 9.32.3.7. Heated Crawl Space Ventilation

- 1) Where a crawl space is heated by a ducted forced-air heating system that does not draw air from the crawl space to the furnace through the return air plenum, the crawl space shall be connected to the floor space above the crawl space by at least one air-transfer grille.
- 2) Where a crawl space is heated other than by a ducted forced-air heating system, the crawl space shall
  - a) be connected to
    - i) the floor space above the crawl space by at least one air-transfer grille, and
    - ii) the principal ventilation system by a supply air outlet or an exhaust air inlet,
  - b) be connected to the floor space above the crawl space by at least 2 air-transfer grilles, or
  - c) be connected to
    - i) the floor space above the crawl space by at least one air-transfer grille, and
    - ii) the outdoors by a dedicated exhaust fan that complies with [Sentence \(4\)](#).
- 3) An air-transfer grille required by [Sentence \(1\) or \(2\)](#) shall have an unobstructed vent area of the greater of
  - a) 25 cm<sup>2</sup>, and
  - b) 0.83 cm<sup>2</sup> for every m<sup>2</sup> of crawl space area.
- 4) Where a dedicated exhaust fan is installed in accordance with [Subclause \(2\)\(c\)\(ii\)](#), the dedicated exhaust fan shall
  - a) provide an air-flow rate of at least 23 L/s, and
  - b) be controlled by
    - i) a humidity control device, or
    - ii) an adjustable time control device that is capable of providing not less than 8 total hours of ventilation per 24 hour period.
- 5) Where a crawl space is divided into 2 or more compartments, each heated compartment shall conform to [Sentence \(1\) or \(2\)](#).

### 9.32.3.8. Air Ducts

- 1) *Exhaust ducts* shall discharge to the outdoors.
- 2) *Exhaust ducts* that are downstream of an exhaust fan shall have no connections to other fans or ducts.
- 3) *Exhaust ducts*, and *supply ducts* that conduct heated or cooled air, shall
  - a) be sized in accordance with the requirements of the manufacturer of the fans to which they are connected, and
  - b) have an equivalent diameter not less than that specified by [Table 9.32.3.8.\(3\)](#).

| <b>Table 9.32.3.8.(3)</b>   |                          |           |           |           |           |           |
|---|--------------------------|-----------|-----------|-----------|-----------|-----------|
| <b>Maximum Equivalent Duct Length<sup>(1)</sup>, m</b>  |                          |           |           |           |           |           |
| Forming part of <a href="#">Sentence 9.32.3.8.(3)</a>   |                          |           |           |           |           |           |
| <b>Flexible Duct</b>  |                          |           |           |           |           |           |
| <b>Equivalent Diameter, mm<br/>(Cross Section Area for<br/>Rectangular Ducts, cm<sup>2</sup>)</b> | <b>Fan Capacity, L/s</b> |           |           |           |           |           |
|   | <b>25</b>                | <b>40</b> | <b>50</b> | <b>60</b> | <b>70</b> | <b>80</b> |
| 125 (123)   | 32                       | 15        | —         | —         | —         | —         |
| 150 (177)   | 46                       | 40        | 28        | 18        | 13        | —         |
| 175 (240)   | 46                       | 46        | 46        | 46        | 46        | 24        |
| 200 (314)   | 46                       | 46        | 46        | 46        | 46        | 46        |
| <b>Rigid Duct</b>   |                          |           |           |           |           |           |
| <b>Equivalent Diameter, mm<br/>(Cross Section Area for<br/>Rectangular Ducts, cm<sup>2</sup>)</b> | <b>Fan Capacity, L/s</b> |           |           |           |           |           |
|   | <b>25</b>                | <b>40</b> | <b>50</b> | <b>60</b> | <b>70</b> | <b>80</b> |
| 100 (79)  | 32                       | 15        | —         | —         | —         | —         |
| 125 (123)   | 46                       | 40        | 28        | 18        | 13        | —         |
| 150 (177)   | 46                       | 46        | 46        | 42        | 34        | 24        |
| 175 (240)   | 46                       | 46        | 46        | 46        | 46        | 46        |

Notes to Table 9.32.3.8.(3):

(1) The equivalent length of a duct is the length of the duct plus 10 m for the exterior hood and 3 m for each 90° elbow.

- 4) Where an *exhaust duct* passes through or is located adjacent to a space that is not *conditioned space*, the duct shall conform to [Article 9.36.3.2.](#), except that in no case shall such a duct be insulated to less than RSI 0.75.
- 5) Where a principal ventilation system *supply duct* passes through or is located adjacent to a *conditioned space*, the duct shall be
  - a) insulated to not less than RSI 0.75, and
  - b) provided with an effective vapour barrier.
- 6) Where a kitchen exhaust fan grille is installed within 1.2 m horizontally of a *cooktop*, the exhaust fan duct shall
  - a) be constructed of a material that is noncombustible, corrosion-resistant, and cleanable, and
  - b) be equipped with a grease filter at the intake end.
- 7) Except for a supply air system described in [Sentence 9.32.3.4.\(2\) or \(3\)](#), all joints in *exhaust ducts*, and in *supply ducts* that conduct conditioned air, shall be sealed against air leakage with
  - a) sealants or gaskets made from liquids, mastics or heat-applied materials,



- b) mastic with embedded fabric,
  - c) foil-faced butyl tape, or
  - d) aluminum foil tape.
- 8) *Supply ducts* for a mechanical ventilation system shall not be used to provide combustion or dilution air to fuel-burning appliances.

### **9.32.3.9. Outdoor Inlets and Outlets**

- 1) Outdoor air inlets and exhaust outlets shall be shielded from the weather, birds and rodents by using hoods incorporating a screen of corrosion-resistant material with openings of 6 to 12 mm.

### **9.32.3.10. Interior Distribution**

- 1) Interior doors shall be undercut by a minimum of 12 mm above the finished floor or the rooms shall be provided with an air-transfer grille with an unobstructed vent area that is not less than 100 cm<sup>2</sup>.

## **9.32.4. ADDITIONAL PROTECTION AGAINST DEPRESSURIZATION**

### **9.32.4.1. Protection Requirements**

- 1) Additional make-up air for the actual *appliance* exhaust rate shall be provided for any *appliance* that discharges air to the exterior at an installed rate exceeding 0.5 air change per hour when it is located within a *dwelling unit* that contains a vented *appliance* that is subject to back drafting (Naturally Aspirating Fuel-Fired Vented Appliance). (See [Appendix A](#).)
- 2) Where additional make-up air is required for appliances described in [Sentence \(1\)](#), it shall be provided by a supply fan rated to deliver outdoor air at the rate of the installed exhaust appliance.
- 3) The supply fan as required in [Sentence \(2\)](#) shall be interconnected with the exhaust fan for which make-up air is required.
- 4) The outdoor air required by [Sentence \(3\)](#) shall be
- a) tempered to at least 1°C before being introduced to a normally unoccupied area of the *dwelling unit*, or
  - b) tempered to at least 12°C before being introduced to occupied areas either by passive transfer grille or directly from outside.

## 9.32.4.2. Carbon Monoxide Alarms

(See [Appendix A.](#))

- 1) This Article applies to every *building* that contains a *residential occupancy* and that also contains
  - a) a fuel-burning *appliance*, or
  - b) a *storage garage*.
- 2) Carbon monoxide (CO) alarms required by this Article shall
  - a) conform to [CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"](#)
  - b) be equipped with an integral alarm that satisfies the audibility requirements of [CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"](#)
  - c) have no disconnect switch between the overcurrent device and the CO alarm, where the CO alarm is powered by the *dwelling unit's* electrical system, and
  - d) be mechanically fixed at a height recommended by the manufacturer's instructions.
- 3) Where a room contains a solid-fuel-burning *appliance*, a CO alarm conforming to CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices," shall be mechanically fixed
  - a) at a height recommended by the manufacturer's instructions where those instructions specifically mention solid-fuel-burning *appliances*, or
  - b) in the absence of specific instructions related to solid-fuel-burning *appliances*, on or near the ceiling.
- 4) Where a fuel-burning *appliance* is installed in a *suite* of *residential occupancy*, a CO alarm shall be installed
  - a) inside each bedroom, or
  - b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.
- 5) Where a fuel-burning *appliance* is installed in a *service room* that is not in a *suite* of *residential occupancy*, a CO alarm shall be installed
  - a) in the *service room*, and
  - b) for every *suite* of *residential occupancy* that shares a wall or floor/ceiling assembly with that *service room*, either
    - i) inside each bedroom, or
    - ii) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.
- 6) For each *suite* of *residential occupancy* that shares a wall or floor/ceiling assembly with a *storage garage* or that is adjacent to an attic or crawl space to which the *storage garage* is also adjacent, a CO alarm shall be installed
  - a) inside each bedroom, or
  - b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.

## Appendix to Section 9.32.

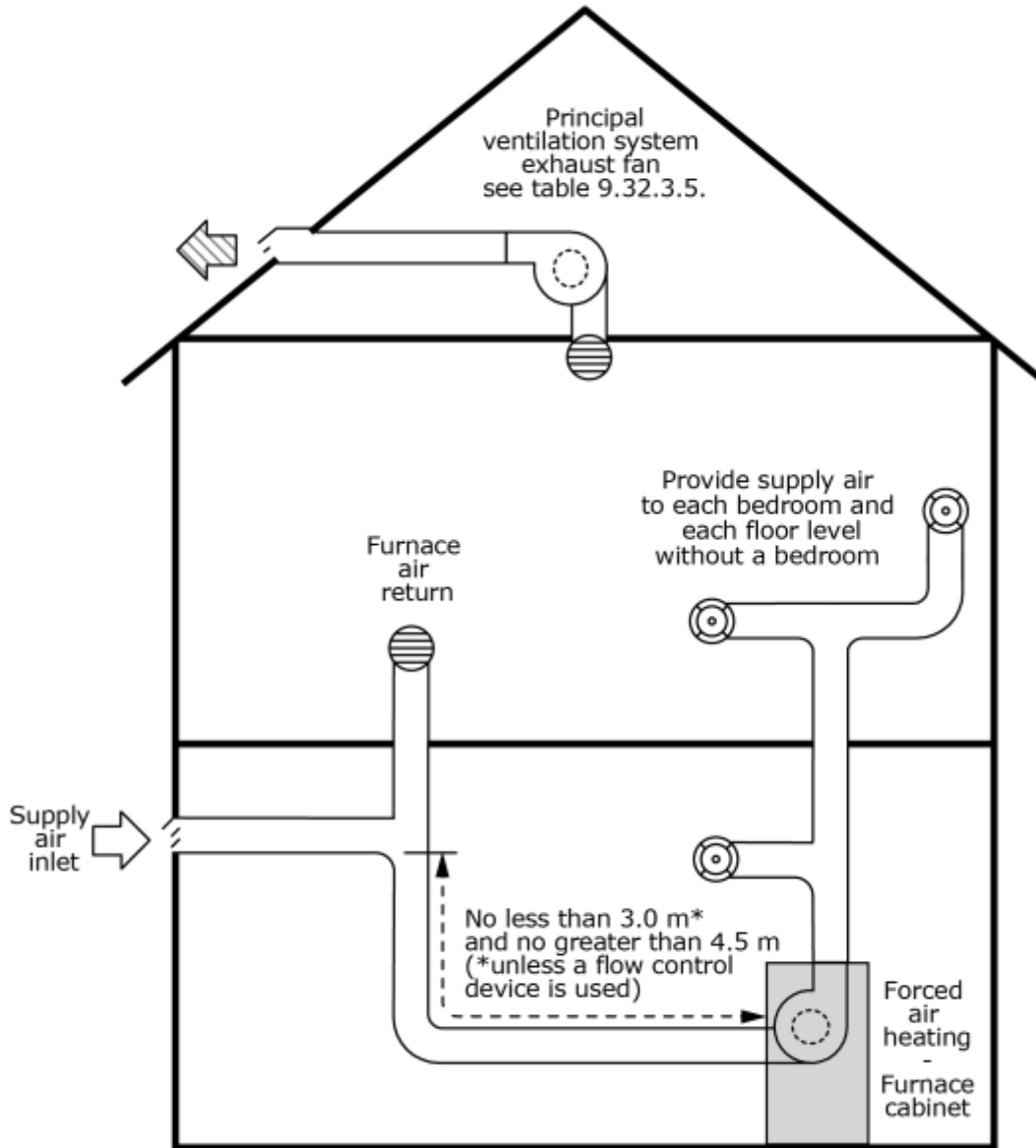
### A-9.32.3. Heating-Season (Mechanical) Ventilation

While ventilation strategies can have a significant impact on energy performance, ventilation is primarily a health and safety issue. Inadequate ventilation can lead to mold, high concentrations of CO<sub>2</sub>, and other indoor air pollutants, which can lead to adverse health outcomes. Previous editions of the British Columbia Building Code relied on ventilation through the building envelope in combination with a principal exhaust fan. However, with the increased attention on the continuity of the air barrier system in buildings, builders can no longer rely on uncontrolled ventilation through the building envelope. In most buildings, mechanical systems will be required to provide adequate ventilation for occupants.

As described in [Article 9.32.3.3.](#), every dwelling unit must include a principal ventilation system. A principal ventilation system is the combination of an exhaust fan and a supply fan (or passive supply in some instances: see [Sentence 9.32.3.4.\(6\)](#)).

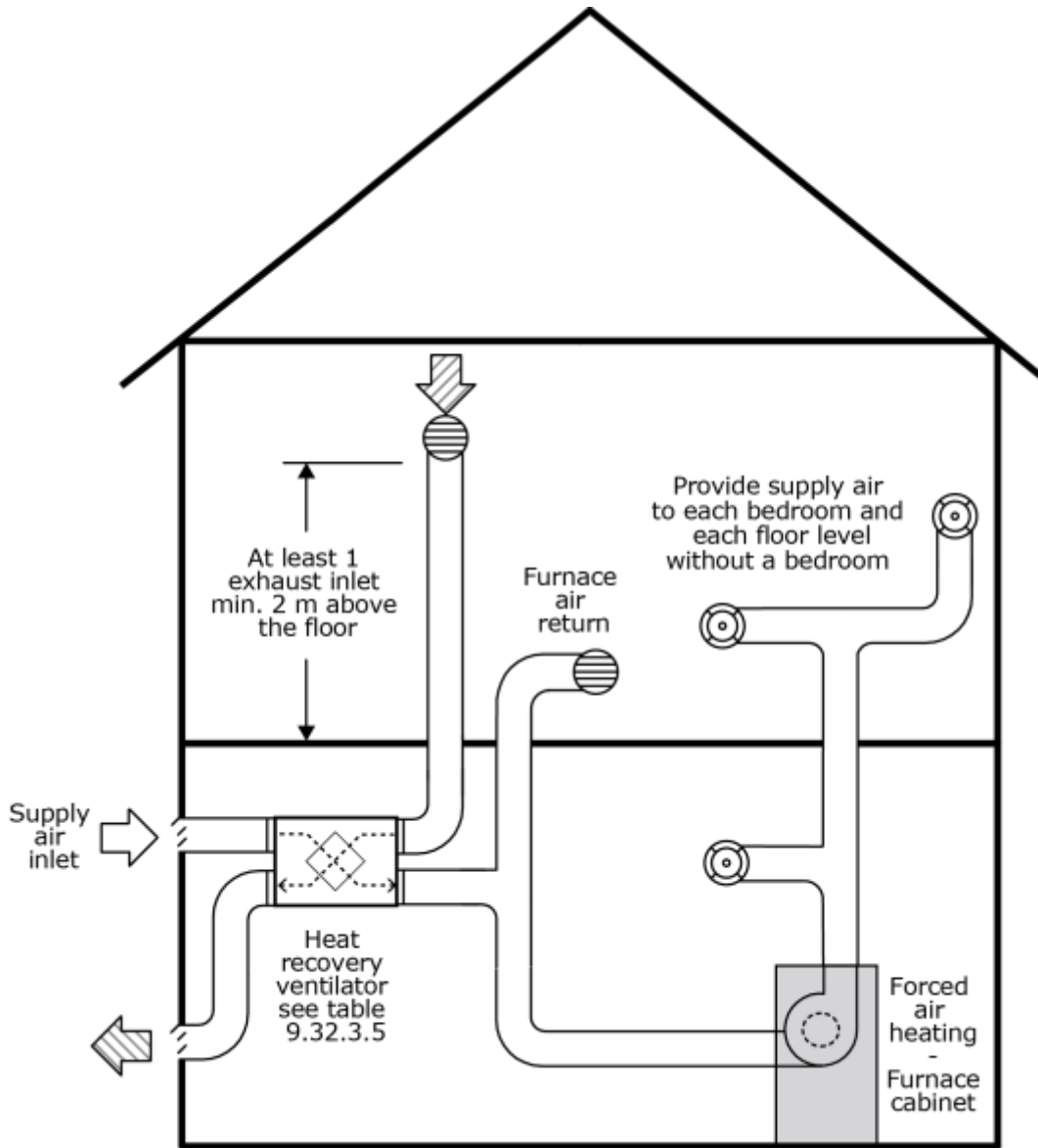
The principal ventilation system exhaust fan is separate from the requirements for a fan in every bathroom and kitchen. While a bathroom fan may be used to satisfy both the requirements for the principal ventilation exhaust fan and the requirements for a bathroom fan, the requirements for each must be met. If the fan provides this combined function of the principal ventilation exhaust fan and the bathroom fan, it will also need to have controls that conform to [Sentences 9.32.3.5.\(3\) and \(4\)](#). Unlike other bathroom fans, the principal ventilation exhaust fan is required to run continuously and should not have a control switch in a location where it may be turned off inadvertently.

**A-9.32.3.4. Principal Ventilation System Supply Air**



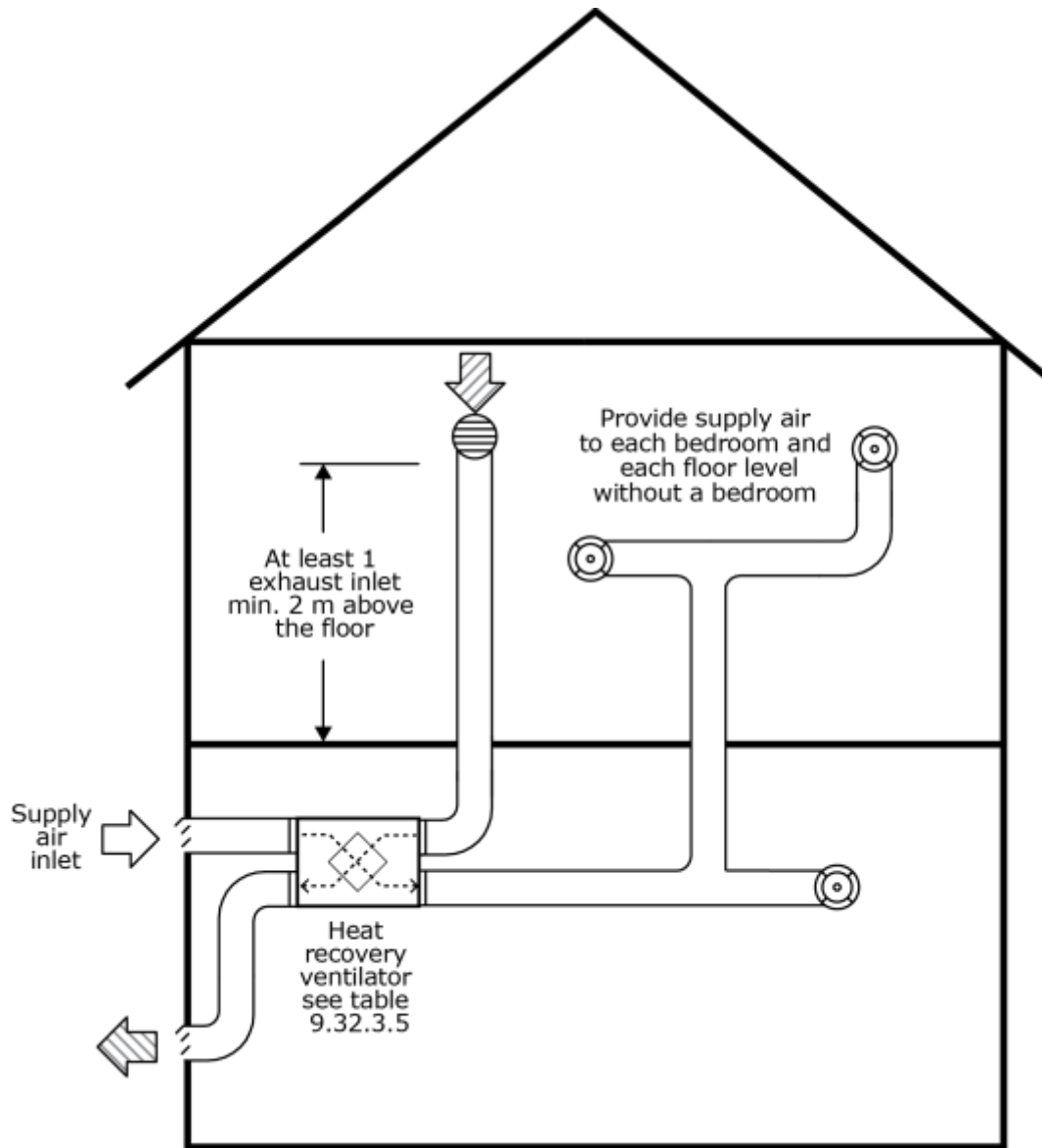
**Figure A-9.32.3.4.(2)**

Forced-Air Heating System Supply Air Distribution



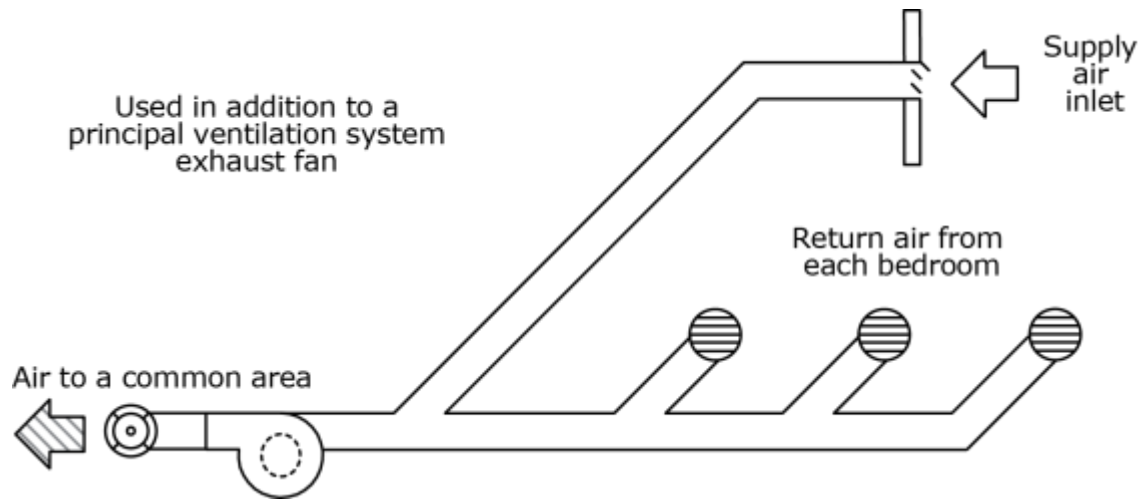
**Figure A-9.32.3.4.(3)**

Forced-Air Heating System with Heat Recovery Ventilator Supply Air Distribution



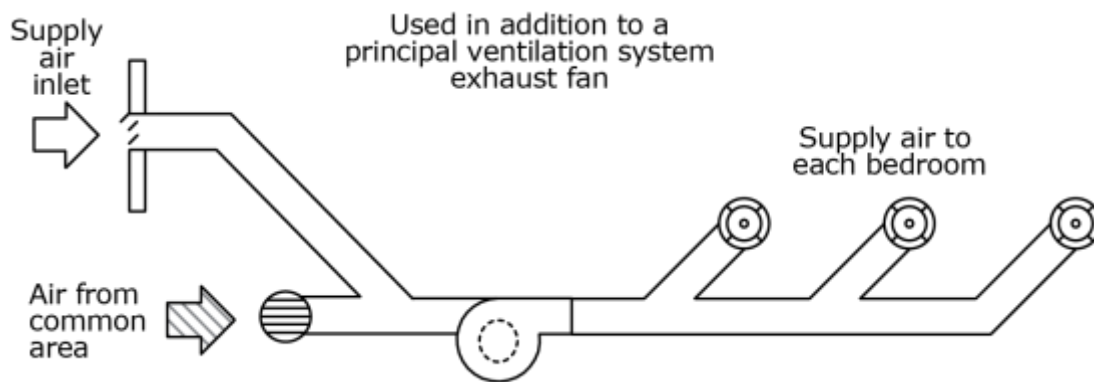
**Figure A-9.32.3.4.(4)**

Heat Recovery Ventilator Supply Air Distribution



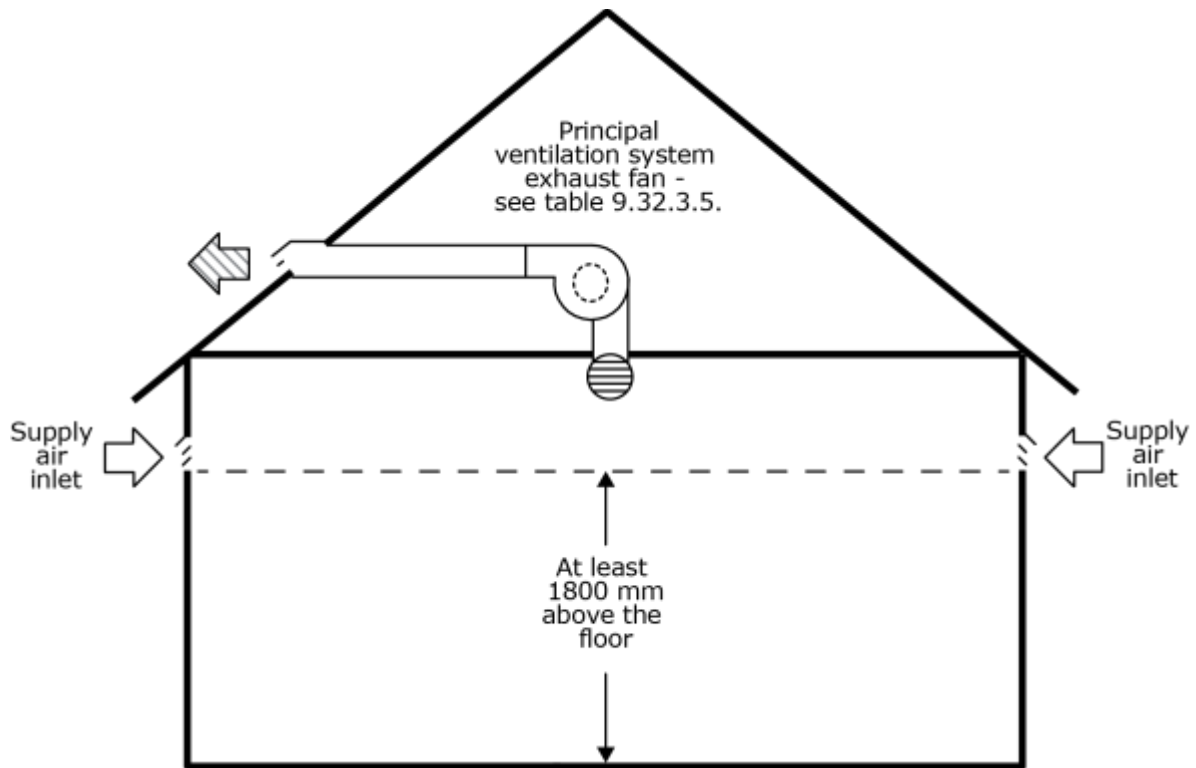
**Figure A-9.32.3.4.(5)(b)(i)**

Central Recirculation System Supply Air Distribution



**Figure A-9.32.3.4.(5)(b)(ii)**

Central Recirculation System Supply Air Distribution



**Figure A-9.32.3.4.(6)**  
Passive Supply Air Distribution

**A-9.32.3.4.(6)(a)(ii) Floor Area Calculation for Passive Supply Air Distribution**

The floor area to be calculated for [Subclause 9.32.3.4.\(6\)\(a\)\(ii\)](#) does not include sun porches, enclosed verandas, vestibules, attached garages, or other spaces that are outside the building envelope and do not require ventilation supply air.

**A-9.32.4.1.(1) Naturally Aspirating Fuel-Fired Vented Appliance (NAFFVA)**

NAFFVA, typically appliances with draft hoods, are subject to back drafting when a negative pressure condition occurs in the dwelling. The following tables describe the conditions under which [Sentence 9.32.4.1.\(1\)](#) applies:



| <b>Table A-9.32.4.1.(1)A.<br/>Vent Safety – Natural Gas and Propane</b> |   |                                     |  |   |
|---|---|-------------------------------------|--|---|
| <b>Fuel Type</b>  | <b>Natural Gas and Propane</b>                  |                                     |  |   |
| <b>Vent Type</b>  | <b>Power Vent<sup>(3)</sup></b>                 | <b>Direct Vent<sup>(3)</sup></b>    | <b>Thermal Buoyancy Chimney<sup>(2)</sup></b>                |   |
| <b>Appliance Type</b>   | <b>Furnace<br/>Boiler<br/>HWT<br/>Fireplace</b> | <b>HWT<br/>Fireplace<br/>Heater</b> | <b>Mid-Efficient F/A<br/>Furnace or Boiler<sup>(5)</sup></b> | <b>Drafthood Boiler<br/>HWT<sup>(4)</sup></b>           |
| <b>Special Conditions</b>   |   |                                     |  | <b>Located in Air-<br/>Barriered Room<sup>(1)</sup></b> |
| <b>Classification</b>   | <b>Non-NAFFVA</b>                               |                                     | <b>NAFFVA</b>  | <b>Non-NAFFVA</b>                                       |
| 9.32.4.1.(1)<br>Applies   | No  |                                     | Yes  | No  |

Notes to Table A-9.32.4.1.(1)A.:

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- 1) Mechanical room must be air-barriered from remainder of house with no access from within house. Room must be lined with panel products with sealed joints and all pipe and wire penetrations sealed. Effectively, the room must be finished before equipment is installed and holes drilled for pipes and wires. This option is not available for forced air furnaces as it is not possible to effectively seal the ducts.
  - 2) Thermal buoyancy chimneys must be within the heated envelope of the house to provide acceptable venting performance.
  - 3) Any power vented appliance with pressurized vent (1 pipe) or sealed combustion (2 pipe) or direct vent appliance (fireplace, heater or HWT) are non-NAFFVA.
  - 4) Mid-efficient (draft induced) appliances are considered NAFFVA with the exception of a boiler or HWT located in an air-barriered room.
  - 5) This category applies only to
    - a) mid-efficient forced air furnaces equipped with induced draft fans and exhaust proving switch, and
    - b) boilers equipped with induced draft fans and exhaust proving switch.

| <b>Table A-9.32.4.1.(1)B.<br/>Vent Safety – Oil and Solid Fuel</b> |  |   |                               |  |  |                       |
|--|--|---|-------------------------------|--|--|-----------------------|
| <b>Fuel Type</b>   | <b>Oil</b>   |   |                               | <b>Solid</b>                                       |  |                       |
| <b>Vent Type</b>   | <b>Thermal Buoyancy Chimney<sup>(2)</sup></b>      |   | <b>Direct Vent</b>            | <b>Thermal Buoyancy Chimney<sup>(2)</sup></b>      |  | <b>Any</b>            |
| <b>Appliance Type</b>  | <b>Boiler HWT<sup>(4)</sup></b>                    | <b>F/A Furnace Boiler HWT<sup>(3),(4)</sup></b> | <b>F/A Furnace Boiler HWT</b> | <b>Boiler</b>                                      | <b>F/A Furnace Boiler HWT<br/>Fireplace Heat Stove</b> | <b>Outside Boiler</b> |
| <b>Special Conditions</b>  | <b>Located in Air-Barriered Room<sup>(1)</sup></b> |   |                               | <b>Located in Air-Barriered Room<sup>(1)</sup></b> |  |                       |
| <b>Classification</b>  | <b>Non-NAFFVA</b>                                  | <b>NAFFVA</b>                                   | <b>Non-NAFFVA</b>             | <b>Non-NAFFVA</b>                                  | <b>NAFFVA<sup>(5)</sup></b>                            | <b>N/A</b>            |
| 9.32.4.1.(1) Applies   | No   | Yes   | No                            | No   | Yes <sup>(5)</sup>                                     | No                    |

Notes to Table A-9.32.4.1.(1)B.:

- (1) Mechanical room must be air-barriered from remainder of house with no access from within house. Room must be lined with panel products with sealed joints and all pipe and wire penetrations sealed. Effectively, the room must be finished before equipment is installed and holes drilled for pipes and wires. This option is not available for forced air furnaces as it is not possible to effectively seal the ducts.
- (2) Thermal buoyancy chimneys must be within the heated envelope of the house to provide acceptable venting performance.
- (3) Oil-fired HWT, boilers and furnaces equipped with blocked vent switches.
- (4) Sealed combustion kits can be added to oil-fired appliances but they switch to interior combustion air if intake is blocked and rely on barometrically dampered thermal buoyancy chimneys so they are considered NAFFVA.
- (5) Wood-burning appliances certified for use in mobile homes and installed to mobile home installation standards are considered non-NAFFVA and Sentence 9.32.4.1.(1) does not apply to them.

#### **A-9.32.4.2. Carbon Monoxide Alarms**

Carbon monoxide (CO) is a colourless, odourless gas that can build up to lethal concentrations in an enclosed space without the occupants being aware of it. Thus, where an enclosed space incorporates or is near a potential source of CO, it is prudent to provide some means of detecting its presence.

Dwelling units have two common potential sources of CO:

- fuel-fired space- or water-heating equipment within the dwelling unit or in adjacent spaces within the building, and
- attached storage garages.

Most fuel-fired heating appliances do not normally produce CO and, even if they do, it is normally conveyed outside the building by the appliance's venting system. Nevertheless, appliances can malfunction and venting systems can fail. Therefore, the provision of appropriately placed CO alarms can improve safety in the dwelling unit is a relatively low-cost back-up safety measure.

Similarly, although Article 9.10.9.16. requires that the walls and floor/ceiling assemblies separating attached garages from dwelling units incorporate an air barrier system, there have been several instances of CO from garages being drawn into houses, which indicates that a fully gas-tight barrier is difficult to achieve. When the attached storage garage is located at or below the elevation of the living space, winter season stack action will generate a continuous pressure between the garage and the dwelling unit. This pressure is capable of transferring potentially contaminated air into the house. The use of exhaust fans in the dwelling unit may further increase this risk.