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For more information on Ventilation Guidelines please visit www.teca.ca

Note – the 2012 BC Building Code became effective December 20, 2012. There were no significant changes to Section 9.32 “Ventilation” – attached.

Venting/Heating Contractor or homeowner is required to **complete the applicable checklist** attached and submit a copy to the Building Official **PRIOR TO THE FRAMING INSPECTION.**
Failure to comply may result in framing rejection and construction delays.

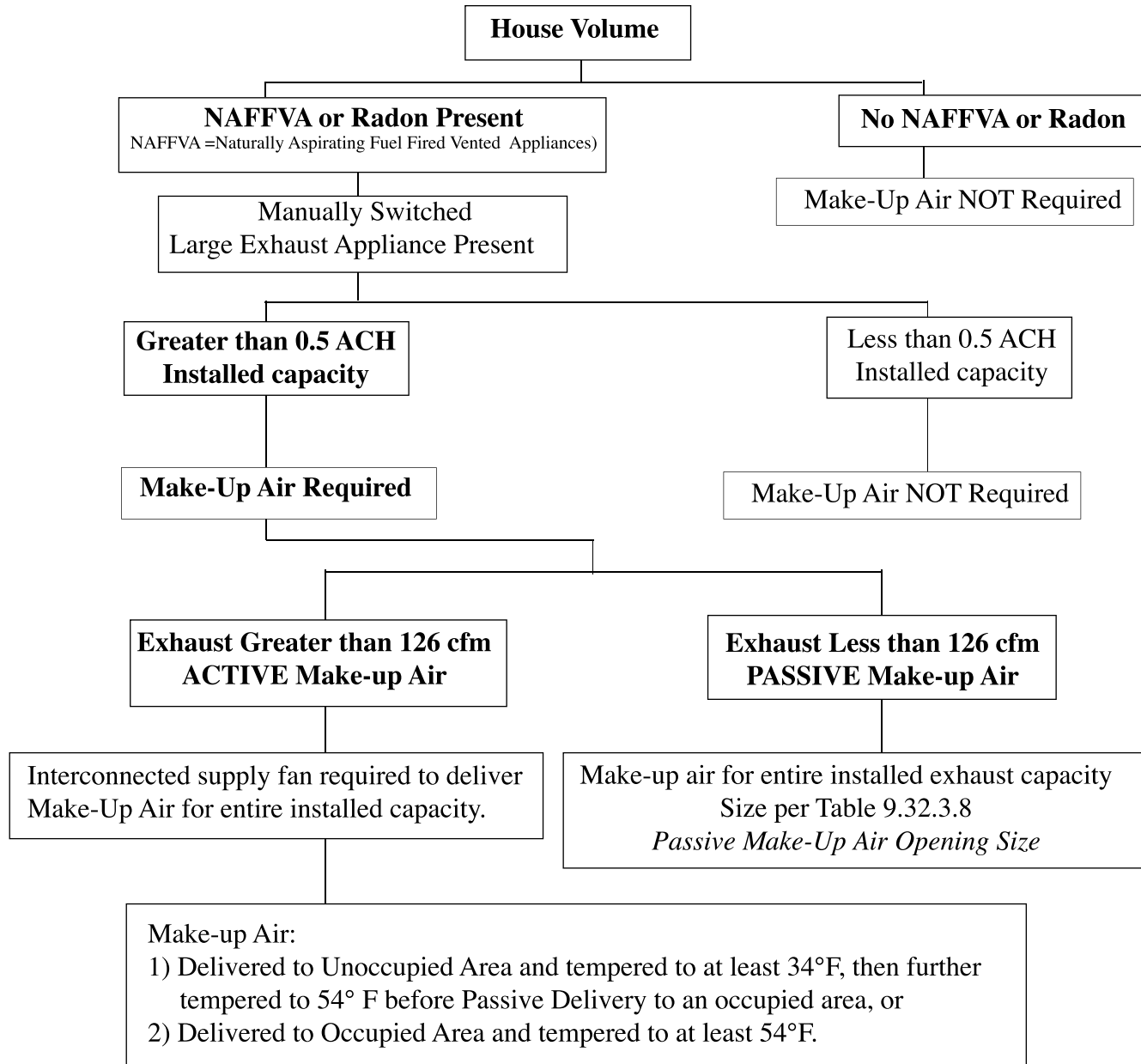


Make-Up Air For Other Exhaust Appliances

Per Code Section 9.32.4: Additional Protection Against Depressurization*

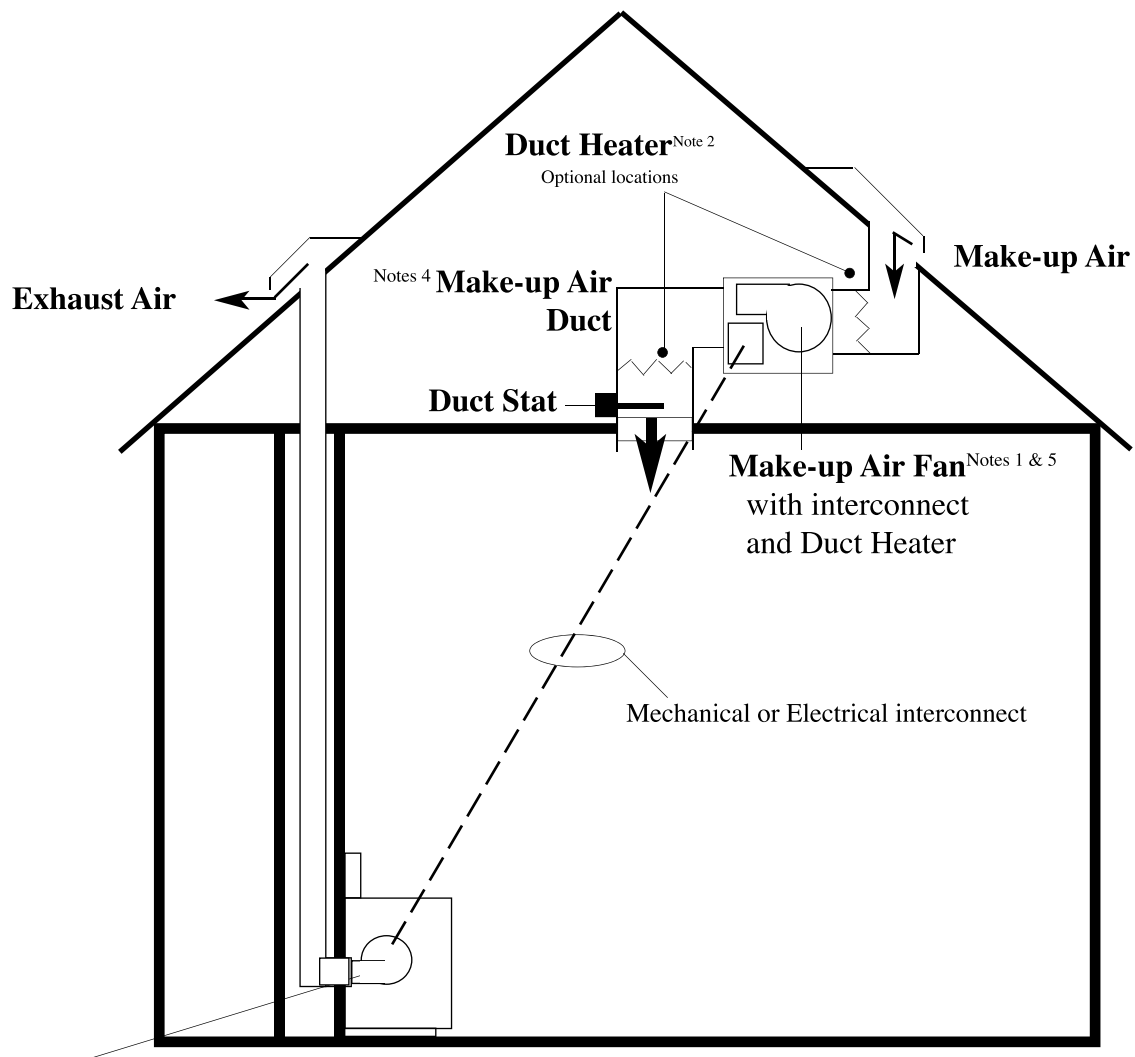
BC Building Code ERRATUM:

Section 9.32.4 Sentence 1 refers to a Sentence 8 exception. However, Sentence 8 has been removed from the Code. The Building Policy Branch has informed us the Sec 9.32.4 requirement for make-up air now applies to **solid fuel fired appliances**, formerly exempted from this requirement by Sentence 8.



***9.32.4.2: Carbon Monoxide Alarms.** New requirements for CO detectors in *all* dwellings that contain a fuel burning appliance or a storage garage are also included in this section. Typically electricians will be installing this equipment, but may need contractor input. See Appendix Page 54-A for code wording.

Example: Active Make-up Air System



Exhaust Air Fan^{Note 3} with Fan Switch, PD (Pressure Differential) Switch, or Current Sensing Switch

1. Select Make-up Air Fan so when installed it will equal the exhaust appliance's actual installed exhaust rate, per 9.32.4.2.(b). Interconnect with supply fan, per 9.32.4.3.
See *Appendix: Duct Sizing for Larger Fans* for make-up air system design considerations.
2. Deliver supply make-up air to an unoccupied area of dwelling and temper to required minimum of 34°F with further tempering to 54°F before passive delivery to occupied area, or deliver directly to occupied area and temper to required minimum of 54°F, per 9.32.4.4.(a) & (b).
See *Appendix: Duct Heater Sizing*
3. Applies to conventional overhead range hoods, down-draft cook tops and any other exhaust appliance (dryer, exhausting vacuum system, etc.) with an installed capacity exceeding 0.5 ACH when make-up air required due to Radon Gas or NAFFVA appliance present).
4. See *Appendix: Duct Sizing for Larger Fans* to size ducts for Make-up Air Fans.
5. Per BCBC Section 2.5 Equivalents, Sentence 2.5.1.2 (1) states: "Any person desirous of providing an equivalent to satisfy one or more of the requirements of this Code shall submit sufficient evidence to demonstrate that the proposed equivalent will provide the level of performance required by this Code." See *Appendix: Depressurization Test for Larger Fans*

A

Mechanical Ventilation Checklist A—Non-Distributed

Use this checklist with **Non-Distributed Systems** such as those usually found in dwellings with **electric or hot water radiant or baseboard heating systems** or where duct systems do not distribute ventilation air.

Civic Address _____		Permit No. _____	
Number of Bedrooms	<input style="width: 80px; height: 30px;" type="text"/>	(A)	A bedroom is a room with an openable window (minimum dimensions apply), a closet and a closing interior door.
Total Interior Volume of Dwelling	<input style="width: 80px; height: 30px;" type="text"/> ft ³		Total volume includes heated interior joist spaces and heated crawlspaces.
.5 ACH (air changes/hr) = Volume x 0.5 ÷ 60 =	<input style="width: 80px; height: 30px;" type="text"/> cfm	(B)	Exhaust appliances exceeding .5 ACH may require make-up air.

1. Principal Fan

a) Exhaust Rate: Use the bedroom count from Box (A) above and Table 9.32.3.3.A. to determine Minimum Rate. Maximum Rate of 110 cfm if NAFFVA/Radon present.

The Principal Exhaust Fan will be controlled automatically with an interval timer OR run continuously.

Minimum required rate: **Interval Timer**

cfm (C)

Continuous

cfm (D)

b) Principal Fan CFM & Sone Rating:

Make _____ Model _____

cfm (E)

Box E Maximum allowed is **110 cfm** if Make-up Air Required in Step 4.

Sones: Interval _____ Continuous _____
 Maximum rating: Interval Timer 1.5 Sones Continuous 1 Sone

Fan Location: _____

c) Principal Fan Duct Size:

Use actual fan cfm in Box E above and Table 9.32.3.9.

Fan Duct size: _____ inches. Duct type: ___Smooth ___Flex

2. Required Kitchen and Bathroom Exhaust Fans:

Room	Fan Make & Model	Fan CFM		Duct Diameter (in)	
		Code Req'd Min. @ .2"W.C. per Table 9.32.3.3.B	actual Fan CFM @ .2"W.C. per Manf. Rating	Table 9.32.3.9*	
				Smooth	Flex

* For fan capacities **exceeding** Table 9.32.3.9, follow manufacturer's installation instructions or use good engineering practice to size duct. See *Ventilation Guidelines* Appendix page 24-A.

3. NAFFVA (Naturally Aspirated Fuel Fired Vented Appliance) **and/or Radon Gas present in dwelling unit?**

Yes, Proceed to Step 4 & 5

No, Omit Steps 4 to 7.

4. Passive Make-Up Air Duct for Principal Fan: Use the Box E installed cfm and Table 9.32.3.8.

Make-up air duct diameter _____ inches. Location _____

5. Exhaust Appliance present which exceeds Box B 0.5 ACH:

Yes, Proceed to Step 6.

No such appliance. Omit Steps 6 to 7.

6. Use Passive Make-up Air for Exhaust Appliance with actual installed exhaust rate of **126 cfm or less:**

Appliance Cfm _____ **Passive Make-up Air Duct** Sized to Table 9.32.3.8: _____ inches

7. Use Active Make-up Air for Exhaust Appliance with actual installed exhaust rate of **more than 126 cfm.**

Make-up Air Fan required:

***Exhaust Appliance Cfm** _____

Fan Make _____ Model _____

Fan Cfm _____

Duct diameter _____ inches

*Must equal actual installed exhaust rate of appliance.

Fan Location _____ Fan ducted to _____

A) Active Make-up Air delivered to an Unoccupied Area (not directly to room containing the appliance).

Tempering Required per 9.32.4.1.(4)(a):

Show calculation & describe how make-up air will be tempered to at least 34°F (1°C) before entering unoccupied area.

Transfer Grill Required: Size to Table 9.32.3.8 (or 1 sq in of gross area per 2 cfm):

Transfer grill size _____ sq. in. Location _____

Additional Tempering Required per 9.32.4.1.(4)(b) before transfer to occupied area: Show calculation and describe how make-up air will be further tempered to at least 54°F (12°C).

B) Active Make-up Air delivered to an Occupied Area: Tempering Required. Show calculation and describe how make-up air will be tempered to at least 54°F (12°C).

Installer Certification:

Date _____

I hereby certify that the design and installation of the ventilation system complies with the 2006 B.C. Building Code.

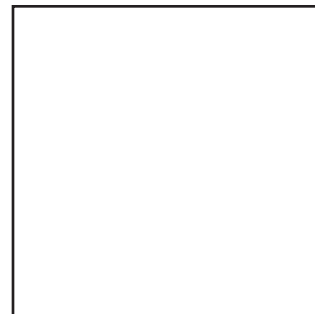
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Signature _____

Company _____

Phone _____



Checklist A2

B

Permits applied for before December 20, 2014

Mechanical Ventilation Checklist B—Distributed

Previously Checklist C (per former 1998 BCBC)

This Checklist is for use with **forced air heating systems** where the heating duct system distributes ventilation air.

Civic Address _____		Permit No. _____	
Number of Bedrooms	<input style="width: 50px; height: 20px;" type="text"/>	(A)	A bedroom is a room with an openable window (minimum dimensions apply), a closet and a closing interior door.
Total Interior Volume of Dwelling	<input style="width: 50px; height: 20px;" type="text"/> ft ³		Total volume includes heated interior joist spaces and heated crawlspaces.
.5 ACH (air changes/hr) = Volume x 0.5 ÷ 60 =	<input style="width: 50px; height: 20px;" type="text"/> cfm	(B)	Exhaust appliances exceeding .5 ACH may require make-up air.

1. Principal Fan

a) Exhaust Rate: Use the bedroom count from Box (A) above and Table 9.32.3.3.A. to determine Minimum Rate. (Maximum Rate of 110 cfm if NAFFVA/Radon present.)

Minimum required rate: **Interval Timer**

cfm (C)

Continuous

cfm (D)

b) Principal Fan CFM & Sone Rating:

Make _____ Model _____

cfm (E)

Sones: Interval _____ Continuous _____
 Maximum allowed: Interval timer 1.5 sones Continuous 1 sone

Box E Maximum allowed is **110 cfm** if Make-up Air Required in Step 4.

Fan Location: _____

c) Principal Fan Duct Size: Use actual fan cfm in Box E above and Table 9.32.3.9 for Duct.

Fan Duct size: _____ inches. Duct type: ___Smooth___Flex

2. Required Kitchen and Bathroom Exhaust Fans:

Room	Fan Make & Model	Fan CFM		Duct Diameter (in)	
		Code Req'd Min @.2"W.C. per Table 9.32.3.3.B	actual Fan CFM @.2"W.C. per Manf. Rating	Table 9.32.3.9*	
				Smooth	Flex

* For fan capacities **exceeding** Table 9.32.3.9, follow manufacturer's installation instructions or use good engineering practice to size duct. See *Ventilation Guidelines* Appendix page 24-A.

Checklist B1

3. NAFFVA (Naturally Aspirated Fuel Fired Vented Appliance) and/or Radon Gas present in dwelling unit?

Yes, Proceed to Step 4 & 5

No, Omit Steps 4 to 7.

4. Active Make-Up Air Duct for Principal Fan: Per Sec 9.32.3.8. (2) (b) (ii & iii) Install a 4"Ø outdoor air duct into the furnace return air plenum not more than 15ft (unless a flow control device is used) or less than 10ft from the furnace cabinet. In locations with winter design temperature less than -10° C, this duct must have a motorized damper interconnected with principal ventilation air fan. **Interconnect in place:** Principal Fan & Furnace Blower Yes

Damper make _____ Voltage _____

& Damper (if present) Yes

5. Exhaust Appliance present which exceeds Box B 0.5 ACH:

Yes, Proceed to Step 6.

No such appliance. Omit Steps 6 to 7.

6. Use Passive Make-up Air for Exhaust Appliance with actual installed exhaust rate of 126 cfm or less:

Appliance Cfm _____ Passive Make-up Air Duct Sized to Table 9.32.3.8: _____ inches

7. Use Active Make-up Air for Exhaust Appliance with actual installed exhaust rate of more than 126 cfm.

Make-up Air Fan required:

***Exhaust Appliance Cfm _____**

Fan Make _____ Model _____

Fan Cfm _____

Duct diameter _____ inches

*must equal actual installed exhaust rate of appliance.

Fan Location _____ Fan ducted to _____

a) Active Make-up Air delivered to an Unoccupied Area (not directly to room containing the appliance).

i) Tempering Required per 9.32.4.1.(4)(a):

Show calculation & describe how make-up air will be tempered to at least 34°F (1°C) before entering unoccupied area.

ii) Transfer Grill Required: Size to Table 9.32.3.8 (or 1 sq in of gross area per 2 cfm):

Transfer grill size _____ sq. in. Location _____

iii) Additional Tempering Required per 9.32.4.1.(4)(b) before transfer to occupied area: Show calculation and describe how make-up air will be further tempered to at least 54°F (12°C).

OR b) Active Make-up Air delivered to an Occupied Area: Tempering Required. Show calculation and describe how make-up air will be tempered to at least 54°F (12°C).

Installer Certification:

Date _____

I hereby certify that the design and installation of the ventilation system complies with the 2006 B.C. Building Code.

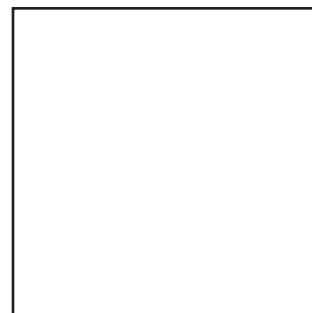
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Checklist B2

C Mechanical Ventilation Checklist C – Distributed or Non-Distributed

Use this checklist when a centrally ducted exhaust ventilation systems such as an HRV (heat recovery ventilator or a CEV (central exhaust ventilator) is used to meet principal fan requirements.

Civic Address _____		Permit No. _____
Number of Bedrooms	<input style="width: 100%;" type="text"/>	(A) A bedroom is a room with an openable window (minimum dimensions apply), a closet and a closing interior door.
Total Interior Volume of Dwelling	<input style="width: 80%;" type="text"/> ft ³	Total volume includes heated interior joist spaces and heated crawlspaces.
.5 ACH (air changes/hr) = Volume x 0.5 ÷ 60 =	<input style="width: 80%;" type="text"/> cfm	(B) Exhaust appliances exceeding .5 ACH may require make-up air.

1. Use the bedroom count from Box (A) above and Table 9.32.3.3.A. to determine the minimum Principal Exhaust Rate provided by the system.

Minimum Required Rate: cfm (C)

2. HRV or CEV Equipment: Make _____ Model _____

3A. HRV Capacity: CFM @.4"W.C. Box D must meet Box C Minimum Requirement. cfm (D)

3B. CEV Capacity: CFM @.4"W.C. Box E must meet Box C Minimum Requirement.
a) The fan must be controlled either with an interval timer or run continuously:
 Continuous Operation Intermittent Operation cfm (E)

b) The Principal Fan Rate may be set lower than its full Box E Capacity if installation is in a NAFFVA home where the principal fan cfm rate must not exceed 110 cfm per 9.32.3.3.(2). If this applies, indicate fan cfm setting in Box F.
 Box F must meet Box C Minimum Requirement. cfm (F)

4. Required Kitchen and Bathroom Exhaust:

ROOM	EXHAUST RATE Required per Table 9.32.3.3.B	EXHAUST EQUIPMENT				
		Additional WALL/CEILING FANS				HRV/CEV
		Make & Model	CFM@.2" Manf. Rated	*Duct Dia (in)		Exhaust CFM
smooth	flex					

* Use Table 9.32.3.9. For fan capacities exceeding Table 9.32.3.9, follow manufacturer's installation instructions or use good engineering practice to size duct. See *Ventilation Guidelines* Appendix pg 24-A. TOTAL (Box D or E)

5. NAFFVA (Naturally Aspirated Fuel Fired Vented Appliance) and/or Radon Gas present in dwelling unit?

Yes, Proceed to Step 6 if CEV or Step 7 if HRV. **No, Omit Steps 6 to 9.**

6. CEV only—Make-Up Air Duct for Principal Fan: Choose (a) or (b) and proceed to Step 7.

a) Non-Distributed system—Passive make-up air duct: Use Box E or F installed cfm and Table 9.32.3.8.

Make-up air duct diameter _____ inches. Location _____

b) Distributed system—Active Make-Up Air Duct for Principal Fan: Per Sec 9.32.3.8. (2) (b) (ii & iii)

Install a 4"Ø outdoor air duct into the furnace return air plenum not more than 15ft (unless a flow control device is used) or less than 10ft from the furnace cabinet. In locations with winter design temperature less than -10° C, this duct must have a motorized damper interconnected with principal ventilation air fan.

Interconnect in place: Principal Fan & Furnace Blower Yes
Damper make _____ Voltage _____ & Damper (if present) Yes

7. Exhaust Appliance present which exceeds Box B —0.5 ACH:

Yes, Proceed to Step 8. **No such appliance. Omit Steps 8 to 9.**

8. Use Passive Make-up Air for Exhaust Appliance with actual installed exhaust rate of 126 cfm or less:

Appliance Cfm _____ Passive Make-up Air Duct Sized to Table 9.32.3.8: _____ inches

9. Use Active Make-up Air for Exhaust Appliance with actual installed exhaust rate of more than 126 cfm.

Make-up Air Fan required: *Exhaust Appliance Cfm _____

Fan Make _____ Model _____ Fan Cfm _____

Duct diameter _____ inches *must equal actual installed exhaust rate of appliance.

Fan Location _____ Fan ducted to _____

a) Active Make-up Air delivered to an Unoccupied Area (not directly to room containing the appliance).

i) Tempering Required per 9.32.4.1.(4)(a):

Show calculation & describe how make-up air will be tempered to at least 34°F (1°C) before entering unoccupied area.

ii) Transfer Grill Required: Size to Table 9.32.3.8 (or 1 sq in of gross area per 2 cfm):

Transfer grill size _____ sq. in. Location _____

iii) Additional Tempering Required per 9.32.4.1.(4)(b) before transfer to occupied area: Show calculation and describe how make-up air will be further tempered to at least 54°F (12°C).

OR b) Active Make-up Air delivered to an Occupied Area: Tempering Required. Show calculation and describe how make-up air will be tempered to at least 54°F (12°C).

Installer Certification:

Date _____

I hereby certify that the design and installation of the ventilation system complies with the 2006 B.C. Building Code.

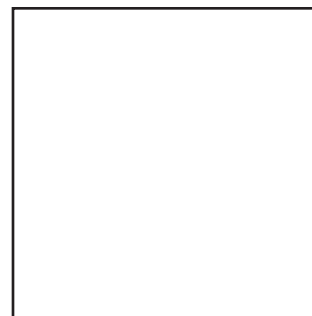
Print Name _____

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Signature _____

Company _____

Phone _____



Checklist C2

Table 9.32.2.2.
Natural Ventilation Area
 Forming part of Sentence 9.32.2.2.(1)

	Location	Minimum Unobstructed Area
Within a <i>dwelling unit</i>	Bathrooms or water-closet rooms	0.09 m ²
	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 ² per room or combination room
Other than within a <i>dwelling unit</i>	Bathrooms or water-closet rooms	0.09 m ² per water closet
	Sleeping areas	0.14 m ² 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,"
 - b) <Part 6, or>
 - c) <this Subsection.>

9.32.3.2. Design and Installation

1) Aspects of mechanical ventilation systems not specifically described in this Subsection shall be designed, constructed and installed in accordance with good practice such as that described in the ASHRAE Handbooks and Standards, the HRAI Digest, the HRAI Residential Mechanical Ventilation Manual, the TECA Ventilation Guideline, the Hydronics Institute Manuals and the SMACNA manuals.

9.32.3.3. Required Ventilation Capacity

- 1) Every *dwelling unit* shall be equipped with
 - a) a principal ventilation exhaust fan or ducted central ventilation system providing a minimum ventilation rate complying with Table 9.32.3.3.A, and
 - b) an exhaust fan with a minimum ventilation rate <complying with Table 9.32.3.3.B in
 - i) every kitchen and
 - ii) every bathroom or water-closet room, unless the bathroom or water-closet room is served by a principle ventilation exhaust fan or ducted central ventilation system providing a minimum ventilation rate complying with Table 9.32.3.3.B.>
- 2) Where make-up air is required by Article 9.32.3.8. for <a> principal ventilation exhaust fan, the maximum ventilation rate shall not exceed 55 l/s (110 cfm).

Table 9.32.3.3.A
Principal Exhaust Fan Ventilation Rate
 Forming part of Clause 9.32.3.3.(1)(a)

Number of Bedrooms	Minimum Ventilation Rate
	l/s
1	15
2	22
3	30
4 or more	35

Table 9.32.3.3.B
Bathroom/Kitchen Exhaust Ventilation Rate
 Forming part of Clause 9.32.3.3.(1)(b)

Room	Minimum Exhaust Rate l/s	
	Intermittent	Continuous
Kitchen	40	N/A
Bathroom	25	10

9.32.3.4. Principal Exhaust Fan Control

- 1) The principal ventilation exhaust fan shall
 - a) be controlled by an adjustable time control device capable of providing <not less than 8 total hours of ventilation in not less than 2 periods per 24 hr day,> and have a separate manual switch when serving both the principle ventilation exhaust function and a bathroom or water-closet room exhaust function, or
 - b) be designed to run continuously.

9.32.3.5. Principal <Ventilation> Exhaust Fan Capacity Rating

- 1) The principal ventilation exhaust fan capacity rating shall be based on air flow performance at 50 pa external static pressure as determined in accordance with
 - a) HVI 916 "Airflow Test Standard," or
 - b) CAN/CSA-C260-M90, "Rating the Performance of Residential Mechanical Ventilating Equipment."

9.32.3.6. Principal <Ventilation> Exhaust Fan Sound Rating

- 1) Wall and ceiling fans used as a principal ventilation exhaust fan shall not have a sound rating exceeding
 - a) 1.5 Sone when controlled by an adjustable time control device, or
 - b) 1.0 Sone when designed to run continuously.
- 2) The principal ventilation exhaust fan sound rating shall be determined <in accordance with>
 - a) HVI 915, "Procedure for Loudness Rating of Residential Fan Products," or
 - b) CAN/CSA-C260-M90, "Rating the Performance of Residential Mechanical Ventilating Equipment."

9.32.3.7. Kitchen and Bathroom <Ventilation Exhaust> Fan Capacity Ratings

- 1) Kitchen and bathroom <ventilation> exhaust fan capacity ratings shall be based on air flow performance at 50 pa external static pressure as determined in accordance with
 - a) HVI 916, "Airflow Test Standard," or
 - b) CAN/CSA-C260-M, "Rating the Performance of Residential Mechanical Ventilating Equipment."

9.32.3.8. Required Make-up Air for Principal <Ventilation> Exhaust Fan

- 1) Make-up ventilation air shall be provided from the outdoors where
 - a) a *dwelling unit* contains a naturally aspirating fuel-fired vented appliance that is subject to back drafting (See Appendix A), or

- b) the *dwelling unit* is located in an area where soil gas is deemed to be a problem and incorporates no soil gas mitigation system
- 2) Where make-up air is required, <the make-up air supply> shall
 - a) when not connected to a forced air heating duct system be sized in accordance with Table 9.32.3.8. for the rating of the principal exhaust fan installed, or
 - b) when connected to the return air duct of a forced air heating appliance,
 - i) have an outdoor air supply duct size of 100 mm diameter for smooth duct or 125 mm diameter for insulated flex duct or equivalent area, and
 - ii) have the outdoor air supply duct connected not more than 5 m or, unless a flow control device is used, less than 3 m upstream of the return air connection to the furnace cabinet,
 - iii) have the furnace air circulating fan interconnected with the principal ventilation exhaust fan, and
 - iv) where the winter design temperature is colder than -10°C, have a duct provided with a motorized damper also interconnected with the principal ventilation exhaust fan.
- 3) Where make-up ventilation air is provided as required <by> Clause (1)(a), in geographic areas where the winter design temperature is warmer than -10°C, it shall be delivered by
 - a) ducting into secondary areas such as a utility or storage room,
 - b) specially designed inlets in the upper sash or high on a wall, or
 - c) <another method that avoids creating a cold draft or otherwise prevents occupants from blocking the ventilation.>
- 4) Where make-up ventilation air is provided as required by Clause (1)(a) in geographic areas where the winter design temperature is colder than -10°C, it shall be delivered as described in Sentence (3) with the addition of heat.
- 5) Systems or ducts designed to provide combustion <air, dilution air or both for fuel-burning> appliances shall not be used to supply make-up air for ventilation systems.

Table 9.32.3.8.
Passive Make-up Air Opening Size
 Forming part of Sentence 9.32.3.8.(2)

Maximum Exhaust <Fan> Ventilation Rate	Minimum Make-up Air Duct Size	
	Vent Area	Vent <Diameter>
l/s	cm ²	mm
8	47	80
12	66	90
15	85	100
17	95	110
20	114	120
25	142	130
30	170	150
35	199	160
40	227	170
45	255	180
50	284	190
55	312	200
60	340	210

- 6) Reserved.
- 7) Reserved.
- 8) The provision of makeup air as described in Sentence (1) is not required for mechanical exhausting devices operating a subfloor depressurization system installed for the purpose of reducing the risk of radon ingress.

9.32.3.9. Exhaust and Make-up Air Ducts

- 1) Exhaust ducts serving wall or ceiling exhaust fans shall be sized in accordance with Table 9.32.3.9.
- 2) Exhaust ducts shall discharge directly to the outdoors.
- 3) Where an exhaust duct passes through or is located adjacent to an unheated space, the duct shall be insulated to not less than RSI 0.75.
- 4) Where a ventilation air supply duct passes through a heated space the duct shall be insulated to not less than RSI 0.75 and provided with an effective vapour barrier.
- 5) Where an exhaust duct exceeds 30 m in total equivalent length, using an equivalent length of 10 m for the exterior hood and 3 m for each 90 degree elbow, the duct shall be increased to the next diameter.
- 6) Ductwork for range hoods and range-top fans shall
 - a) be of noncombustible, corrosion-resistant material,
 - b) lead directly to the outdoors with no connections to other exhaust fans or ducts, and
 - c) be equipped with a grease filter at the intake end.

Table 9.32.3.9.
<Minimum Exhaust Duct Size
 Forming part of Article 9.32.3.9.

Maximum Exhaust Fan Ventilation Rate, l/s	Minimum Exhaust Duct Diameter, mm	
	Smooth Duct	Flexible Duct
10	75	100
25	100	125
45	125	150
70	150	175>

9.32.3.10. Protection from Weather

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

9.32.3.11. Exhaust Fan Installation

- 1) Installation of exhaust fans shall be in accordance with manufacturer's instructions for minimizing noise and vibration transmission and achieving the required sound rating.

9.32.3.12. Accessibility

- 1) Ventilation equipment shall be accessible for inspection, maintenance, repair and cleaning.
- 2) Except where the kitchen exhaust grille is located at least 1.2 m horizontally from the range <or equipped with an intake filter, kitchen exhaust ducts shall be designed and installed so that the entire duct can be cleaned.>

9.32.3.13. Ventilation Ducts

- 1) Except as required by Sentence 9.32.3.9.(6), ventilation air ducts serving general exhaust and supply ventilation air are permitted to be of combustible material.

9.32.3.14. Interior Distribution

- 1) To facilitate ventilation air transfer, interior doors in dwelling units shall be undercut a minimum of 12 mm or the rooms shall be provided with a grille of equivalent area.

9.32.4. Additional Protection Against Depressurization

9.32.4.1. Protection Requirements

- 1) Except as permitted by Sentence (8), 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
 - a) contains a vented appliance that is subject to back drafting (Naturally Aspirating Fuel Fired Vented Appliance) (See Appendix Note A-9.32.3.8.(1)(a) in Appendix A), or
 - b) is located in an area where soil gas is deemed to be a problem and incorporates no soil gas mitigation system.

- 2) Where additional make-up air is required for appliances described in Sentence (1), it shall be provided by
 - a) supply ducts sized in conformance with Table 9.32.3.8. for requirements of 60 l/s or less, or
 - b) a supply fan rated to deliver outdoor air at the rate of the installed exhaust appliance.
- 3) The supply fan as required in Clause (2)(b) 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.
- 7) Where CO alarms are installed in a house with a *secondary suite* including their common spaces, the CO alarms shall be wired so that the activation of any one CO alarm causes all CO alarms within the house with a *secondary suite* including their common spaces to sound.

Section 9.33. Heating and Air-conditioning

9.33.1. General

9.33.1.1. Application

- 1) <This Section applies to the design and installation of heating systems, including requirements for combustion air and air-conditioning systems serving only one *dwelling unit*.>
- 2) The design and installation of heating systems, including requirements for combustion air, and air-conditioning systems other than those <described in Sentence (1)> shall conform to Part 6. (See Appendix A and Subsection 9.10.10.)

9.33.2. Required Heating Systems

9.33.2.1. Required Heating Systems

- 1) Residential *buildings* intended for use in the winter months on a continuing basis shall be equipped with heating facilities conforming to this Section.

9.33.3. Design Temperatures

9.33.3.1. Indoor Design Temperatures

- 1) At the outside winter design temperature, required heating facilities shall be capable of maintaining an indoor air temperature of not less than
 - a) 22°C in all living spaces,
 - b) 18°C in unfinished *basements*, <and>
 - c) <Reserved.>
 - d) 15°C in heated crawl spaces.

9.33.3.2. Outdoor Design Temperatures

- 1) The outdoor conditions to be used in designing heating and air-conditioning systems shall be determined in conformance with Article 1.1.3.1.

9.33.4. General Requirements for Heating and Air-conditioning Systems

9.33.4.1. Design of Heating and Air-conditioning Systems

- 1) Heating and air-conditioning systems, including ducting, and mechanical heating and refrigeration equipment, shall be designed, constructed and installed to conform to the relevant provincial or territorial regulations or municipal bylaws or, in the absence of such regulations or bylaws, with good practice such as that described in the ASHRAE Handbooks and Standards, the HRAI Digest, <the CHC Handbook on Hydronic Heating Systems,> the Hydronics Institute Manuals and the SMACNA Manuals. (See also Subsection 9.32.3. for the design of systems that also provide ventilation.)

9.33.4.2. <Installation of Hydronic Heating Systems

- 1) The installation of a hydronic heating system shall conform to applicable provincial or territorial regulations or municipal bylaws or, in the absence of such regulations or bylaws, to CAN/CSA-B214, "Installation Code for Hydronic Heating Systems."

9.33.4.3. Reserved.

- 1) Reserved.>

9.33.4.4. Access

- 1) Equipment forming part of a heating or air-conditioning system, with the exception of embedded pipes or ducts, shall be installed with provision for access for inspection, maintenance, repair and cleaning.

9.33.4.5. Protection from Freezing

- 1) Equipment forming part of a heating or air-conditioning system that may be adversely affected by freezing temperatures and that is located in an unheated area shall be protected from freezing.

9.33.4.6. Expansion, Contraction and System Pressure

- 1) Heating and cooling systems shall be designed to allow for expansion and contraction of the heat transfer fluid and to maintain the system pressure within the rated working pressure limits of all components of the system.