

District of Saanich

Inspection Services Department

770 Vernon Ave
Victoria BC V8X 2W7

tel. 250-475-5457 fax 250-475-5418
www.saanich.ca



New Energy Requirements for Buildings, B.C. Building Code

IMPORTANT CODE CHANGES

Section 9.32 Dwelling units - 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. For most dwelling units this means an end to exhaust-only ventilation.

Effective R-Value - Thermal insulation requirements are now defined in terms of effective insulation (RSI), previous versions of the BC Building Code referenced nominal thermal insulation (R-value).

Attached garages - Treated as unconditioned space, even if the garage is insulated and intended to be heated. The assembly separating the garage from the house must be insulated and be made airtight.

HVAC and Service Water Heating - New installation, performance and control requirements have been introduced in Section 9.36.

Equipment location HVAC equipment - Ducts outside the heated envelope or within an exterior assembly must be insulated to same level as required for above grade walls. Only HVAC equipment designed strictly for outdoor installation can be located outside the conditioned space. Attached garages, even if heated, are considered unconditioned space.

RESOURCES



Building and Safety Standards Branch
<https://www.housing.gov.bc.ca/building>



Illustrated Guide: Energy Efficiency Requirements for Houses in British Columbia
<https://www.hpo.bc.ca/energy-efficiency-requirements>

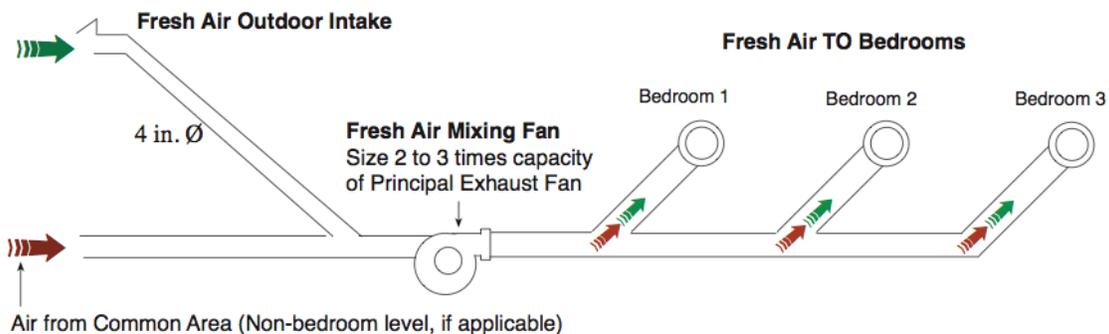
9.32. VENTILATION FOR RESIDENTIAL OCCUPANCIES

Exhaust only ventilation systems are being replaced with systems that include both supply and exhaust air. This applies to houses, secondary suites and condominium units. Principal ventilation systems (as below) are required to exhaust from kitchens and bathrooms and to supply air to bedrooms and living areas. Principal ventilation fans must run continuously, controlled by dedicated switch and with a sound rating not to exceed 1.0 sone. If the building includes a heated crawl space, it must be connected to floor above by at least one transfer grille 25cm² for each 30m² of crawlspace area.

CENTRAL RECIRCULATION VENTILATION SYSTEM

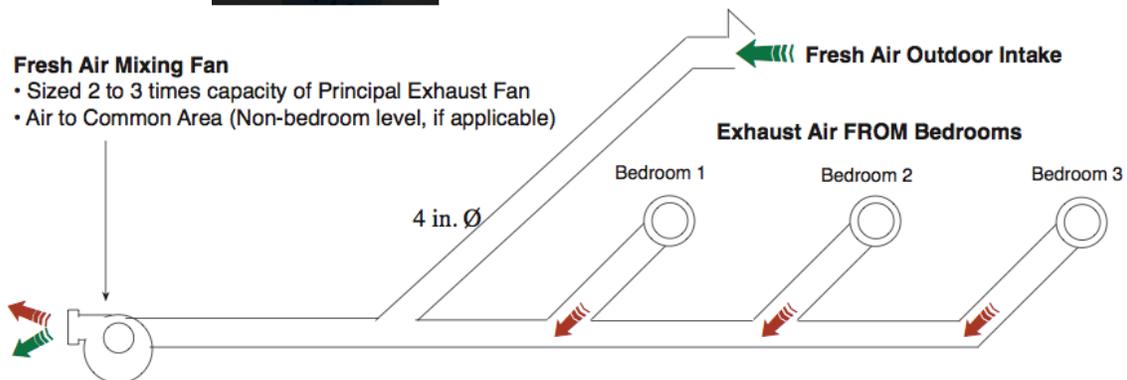
Where the principal ventilation system is a ducted to a central recirculation ventilation system, it shall

- a) Draw air supply 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) common area and deliver it to each bedroom



INSPECTOR CHECK

The Building Inspector will require a completed Mechanical Ventilation Check Sheet at time of Framing Inspection



PRINCIPAL VENTILATION WITH FORCED AIR HEATING

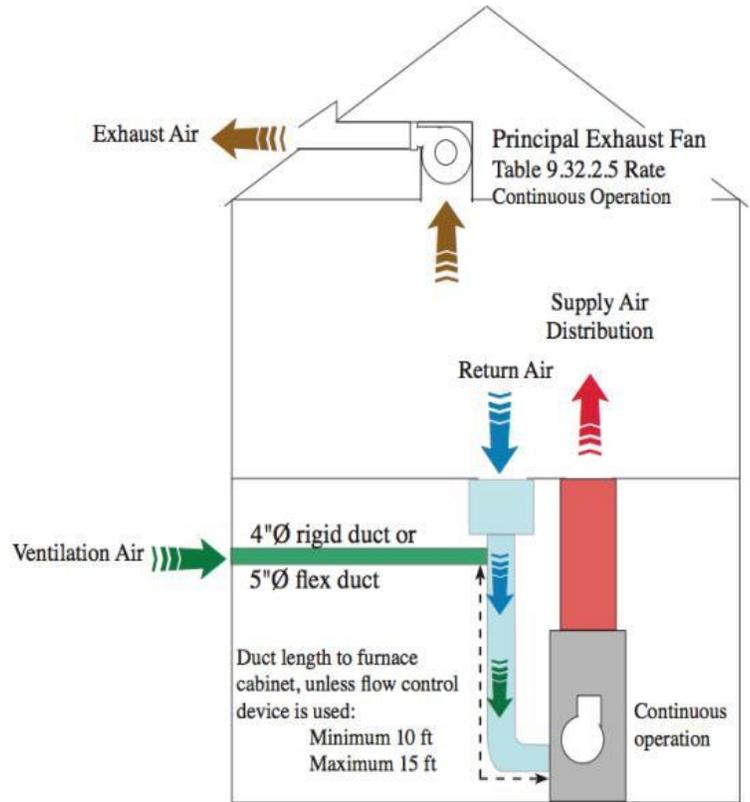
Where the principal ventilation system is a ducted forced air heating system, the system shall

- Provide supply air to the ducting of each bedroom, and each floor level without bedrooms.
- Draw supply air from an outdoor inlet that is connected to the furnace by ducting. With a min. 4" rigid or 5" flexible duct.
- Have a furnace air-circulating fan set to run continuously.



INSPECTOR CHECK

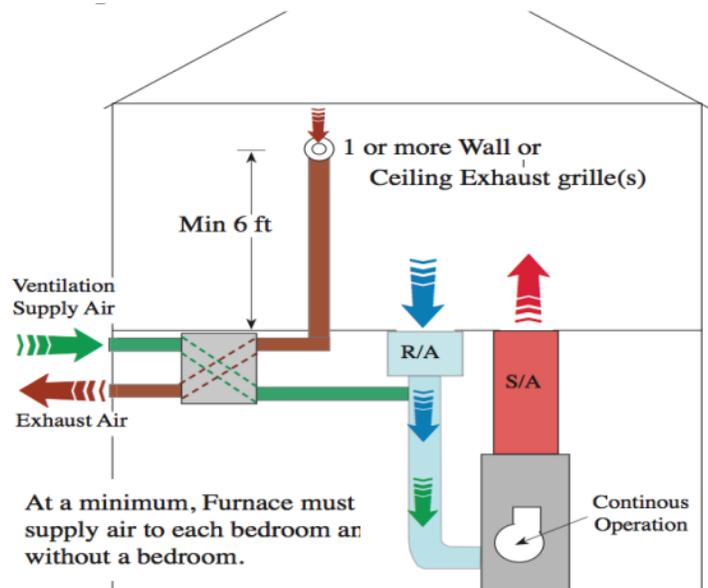
Ducted forced air furnace for continuous supply air: exhaust fan for continuous ventilation.



HRV SUPPLY WITH FORCED WARM AIR HEATING

Where the principal ventilation system is a ducted forced air heating system used in combination with a heat recovery ventilator,

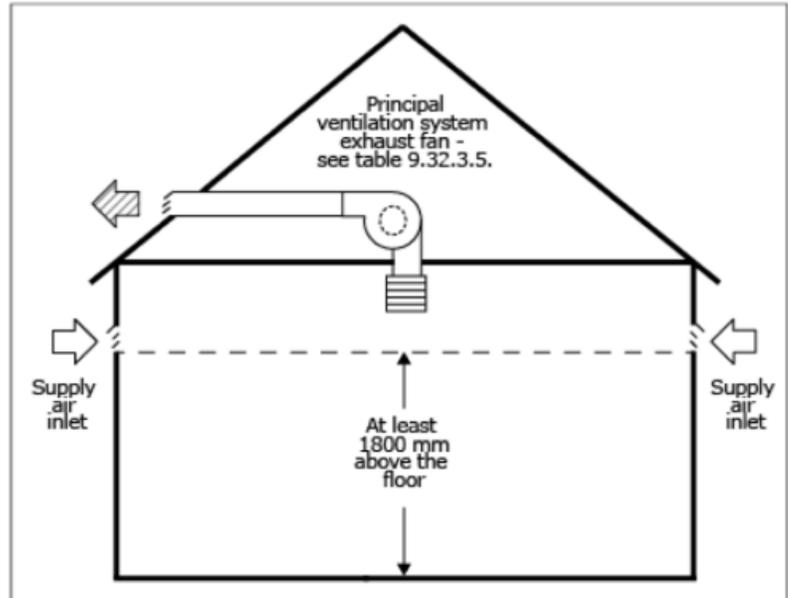
- The ducted forced air furnace shall comply with forced air requirements.
- The HRV shall draw supply air from an outdoor inlet to the return air plenum of the furnace.
- The HRV shall draw exhaust air, though dedicated ducting from one or more indoor inlets, and at the capacity rating of the HRV, which shall be no less than the airflow rate specified in the BC Building Code.



PRINCIPAL VENTILATION WITH PASSIVE AIR SUPPLY VENTS

- Principal ventilation with passive air supply vents may be used where
- January design temp is greater than -10°C .
 - One storey dwelling only.
 - Floor area less than 168 m^2 .
 - There is no forced air heating.

Floor area m^2	Minimum air flow rate, L/s				
	Number of bedrooms				
	0-1	2-3	4-5	6-7	>7
< 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



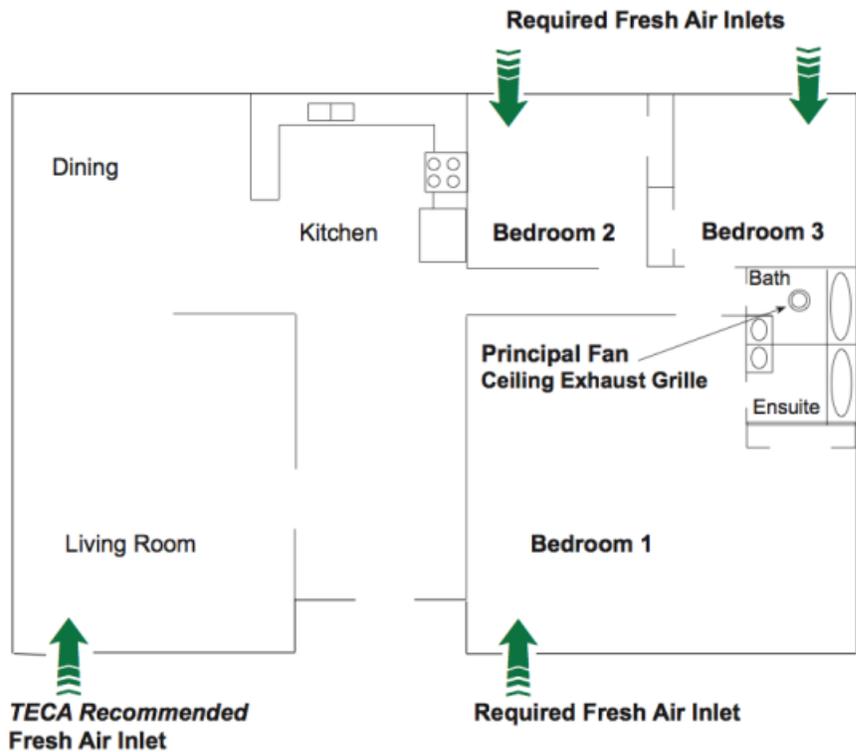
Passive supply air inlet vents must be

- min 1.8m above floor level and,
- are located in each bedroom and with a minimum of one in a common area,
- have an unobstructed area of not less than 100mm^2 .



INSPECTOR CHECK

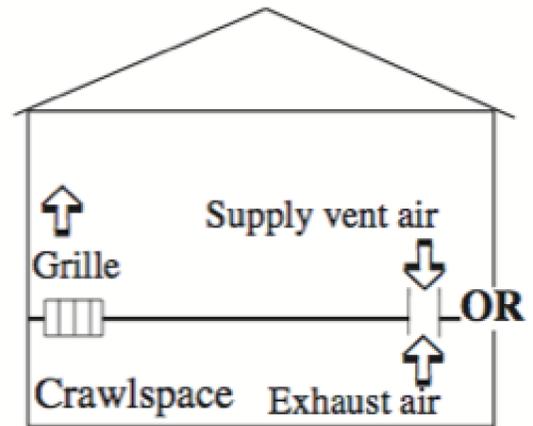
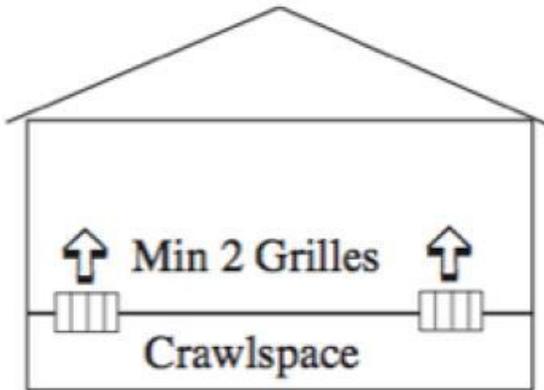
At time of Framing Inspection



HEATED CRAWLSPACE VENTILATION

Option 1

Where a crawl space is heated by a ducted forced-air heating system, the crawl space shall be connected to the floor space above by at least one air-transfer grille 25cm² for each 30 m² of crawl space area and the principal ventilation system by a supply air inlet or an exhaust air inlet.

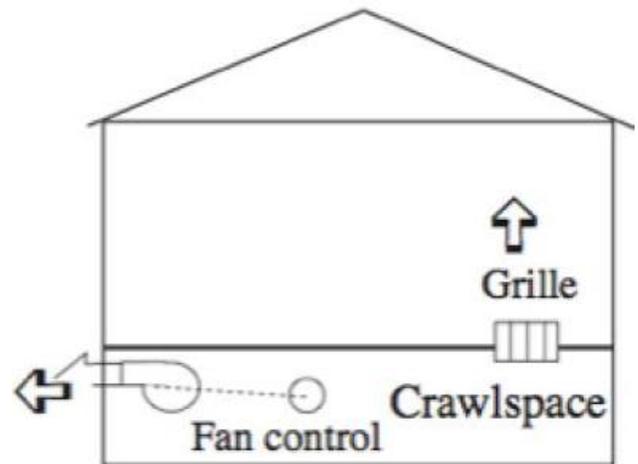


Option 2

Where a crawl space is heated other than by a ducted forced-air heating system, the crawl space shall be connected to the floor above by at least two air-transfer grilles 25cm² for every 30m² of crawl space area,

Option 3

Where a crawl space is heated other than by a ducted forced-air heating system, the crawl space shall be connected to the floor above by at least one air-transfer grille 25cm² for every 30 m² of crawl space area, and the outdoors by a dedicated exhaust fan with an air flow rate of 23 l/s.



INSPECTOR CHECK

At time of Framing Inspection

Note: Crawlspace ventilation in this section must not be confused with exterior ventilation of unheated crawlspace

KITCHEN AND BATH FANS

Exhaust fans must be installed in every kitchen and bathroom, unless served by principal ventilation system, with the minimum flow rate outlined in Table 9.32.3.6.

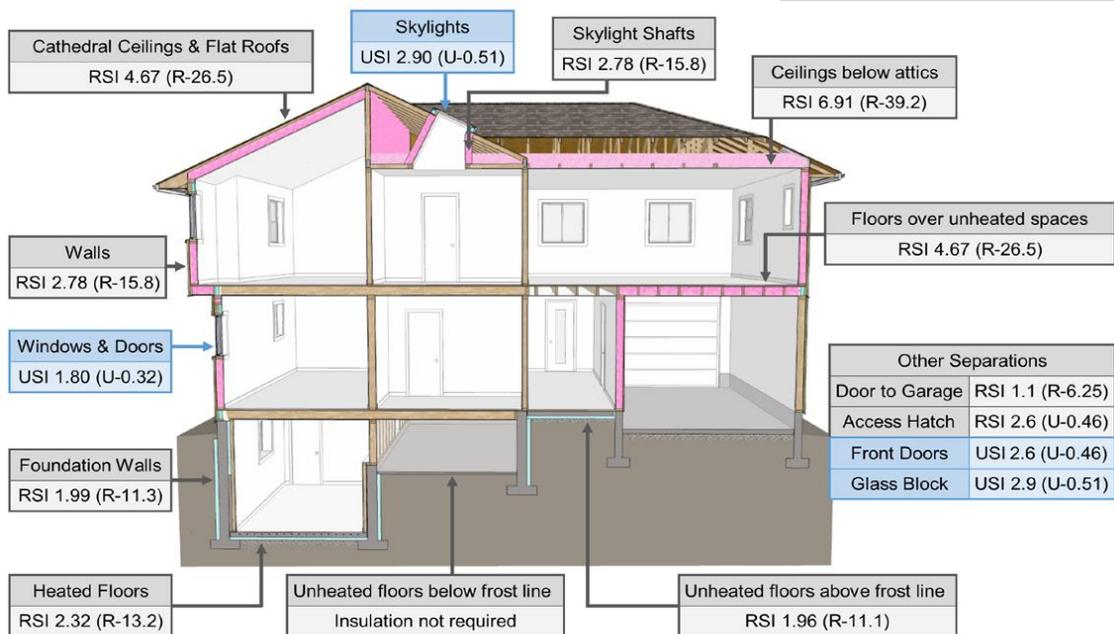
Table 9.32.3.6.		
<u>Kitchen/Bathroom Exhaust Fan Minimum Air-flow Rate</u>		
<u>Forming part of Sentence 9.32.3.6.(1)</u>		
<u>Room</u>	<u>Minimum Exhaust Fan Air-flow Rate, L/s</u>	
	<u>Intermittent</u>	<u>Continuous</u>
<u>Kitchen</u>	<u>47</u>	<u>N/A</u>
<u>Bathroom</u>	<u>23</u>	<u>9</u>

9.36. Energy Efficiency Calculation of Effective Thermal Resistance of Assemblies

The thermal resistance of opaque assemblies uses effective thermal resistance (RSI); this is a change from nominal (R-values) that has been relied on up to now. This takes into account all material layers in an assembly, and the thermal bridging of high conductivity materials such as framing. Tables are provided for most common assemblies, and information on how to calculate other assemblies can be found in table (A.9.36.2.4.(1)a,b,c,d)



Minimum RSI Values Zone 4



PLAN CHECK REQUIREMENT

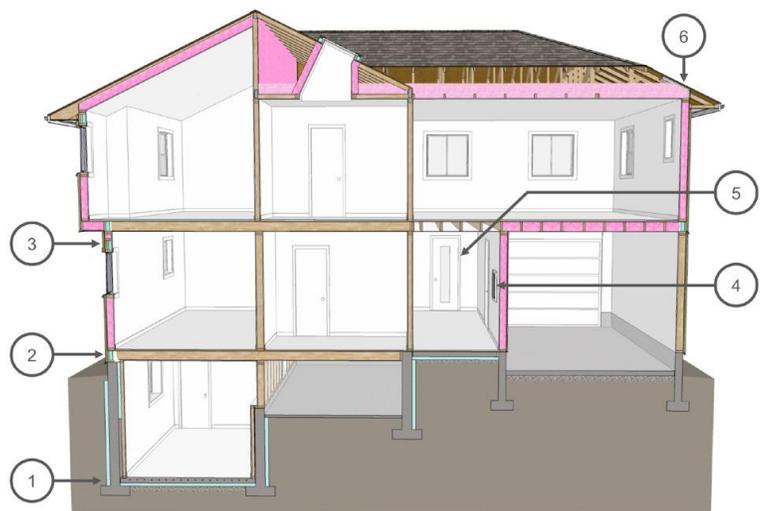
Typical Problem Areas for Insulation Continuity

1. Foundation wall
2. Two planes of insulation
3. Headers and rim joists
4. Electrical panel
5. Wall to window and door interface
6. Attic insulation on outside walls



INSPECTOR CHECK

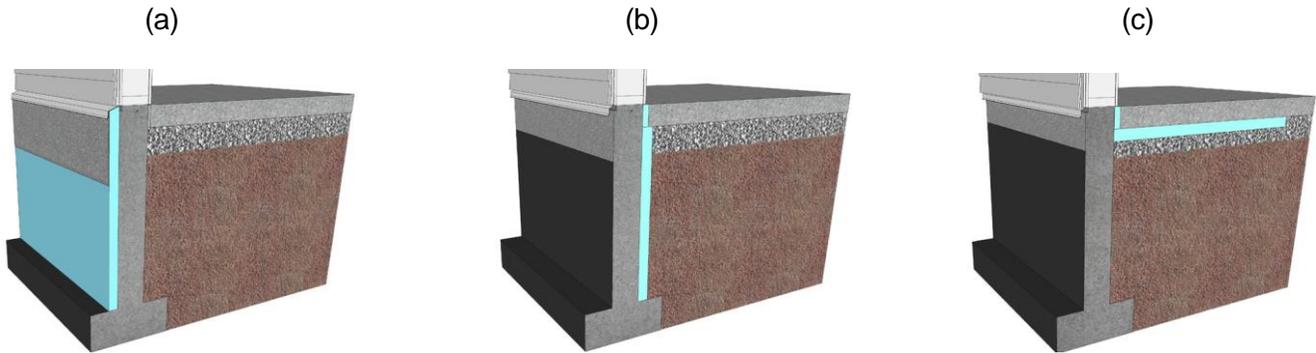
At time of Insulation Inspection



9.36.2.8. Assemblies In Contact With Ground

Unheated floor slabs must be insulated min. 1.2m horizontally or vertically down from its perimeter, with a thermal break along edge of slab with a min. 50% of required insulation.

- a) Slab on grade at foundation wall with exterior insulation to the footing.
- b) Slab on grade at foundation wall with interior insulation down 1.2 m, or to the footing with a thermal break at the slab.
- c) Slab on grade at foundation wall, with insulation in a 1.2 m perimeter under the slab with a thermal break.



Insulation Placement for Heated Slabs

Heated floor slabs must be insulated under entire area, including the edges. Floating slabs must be insulated under entire floor slab, but not under integral perimeter footing (thickened slab), but skirt insulation is required to same value as under the slab.

INSPECTOR CHECK
Prior to Backfill or Placement of Concrete

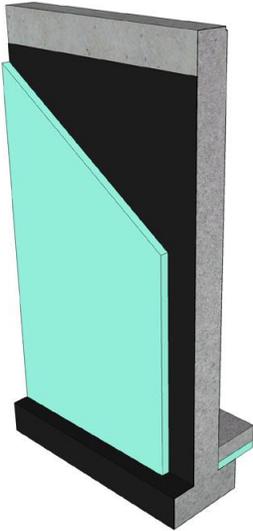


Below Grade and Above Grade Assemblies

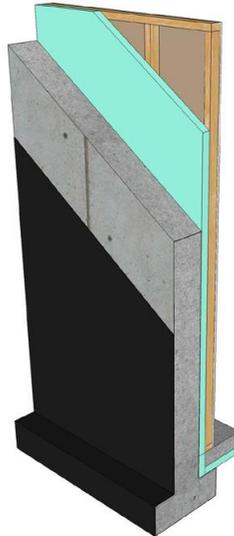
Below Grade Wall Assembly		
Description	Nominal	Effective
2" XPS insulation over 8" poured-in-place concrete wall	RSI 1.76(R-10)	RSI 1.82 (R-10.3)
Other building enclosure layers that contribute to effective insulation: 1. dampproofing 2. interior air film		RSI 0.33 (R-1.9)
Total effective insulation value:		RSI 2.15 (R-12.2)
Minimum effective thermal resistance for below grade walls		RSI 1.99 (R-11.3)

Commonly Accepted Above Grade and Below Grade Assemblies

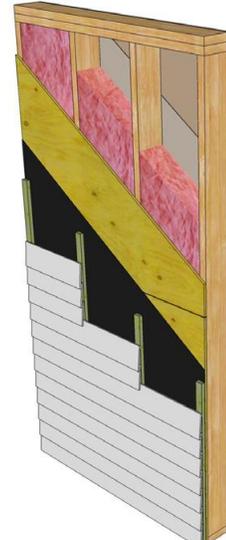
Basement Wall with Exterior Insulation



Basement Wall with Interior Insulation



Above Grade Framed Wall



Inspector Check

Exterior Insulation placement will require an inspection prior to backfill of the foundation wall.

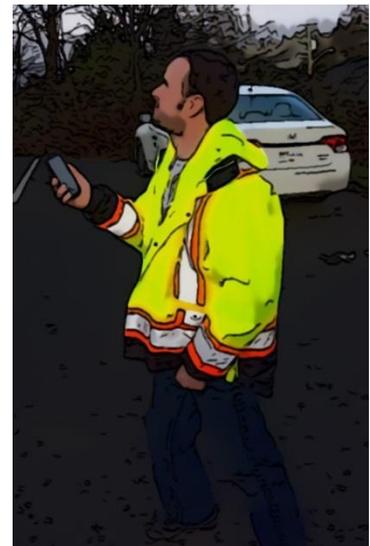
9.36.2.7 Windows, Doors and Skylights

All window, door and skylight assemblies have labeling requirements. A sample label presenting the U-value requirements for a window is presented in figure below.

ENERGY PERFORMANCE RATINGS		
U-Factor 1.80 <small>W/m²·K</small>	Solar Heat Gain Coefficient 0.19	Visual Transmittance 0.35
Energy Rating 17	Air Leakage 1.2 <small>L/m³</small>	
<p>BC's Best Window Company</p> <p>A100 Series Casement window Vinyl frame, Double glazed, Low-E coating Argon fill</p>		
Certification Agency Logo	<p>Energy performance ratings certified to CSA A440.2-09. Ratings are determined for a fixed set of environmental conditions and a specific reference product size. Certification agency does not recommend or warrant product for any specific use.</p>	

INSPECTOR CHECK

All windows and doors to be installed at time of Framing Inspection



9.36.2.9 Airtightness Construction of Air Barrier Details

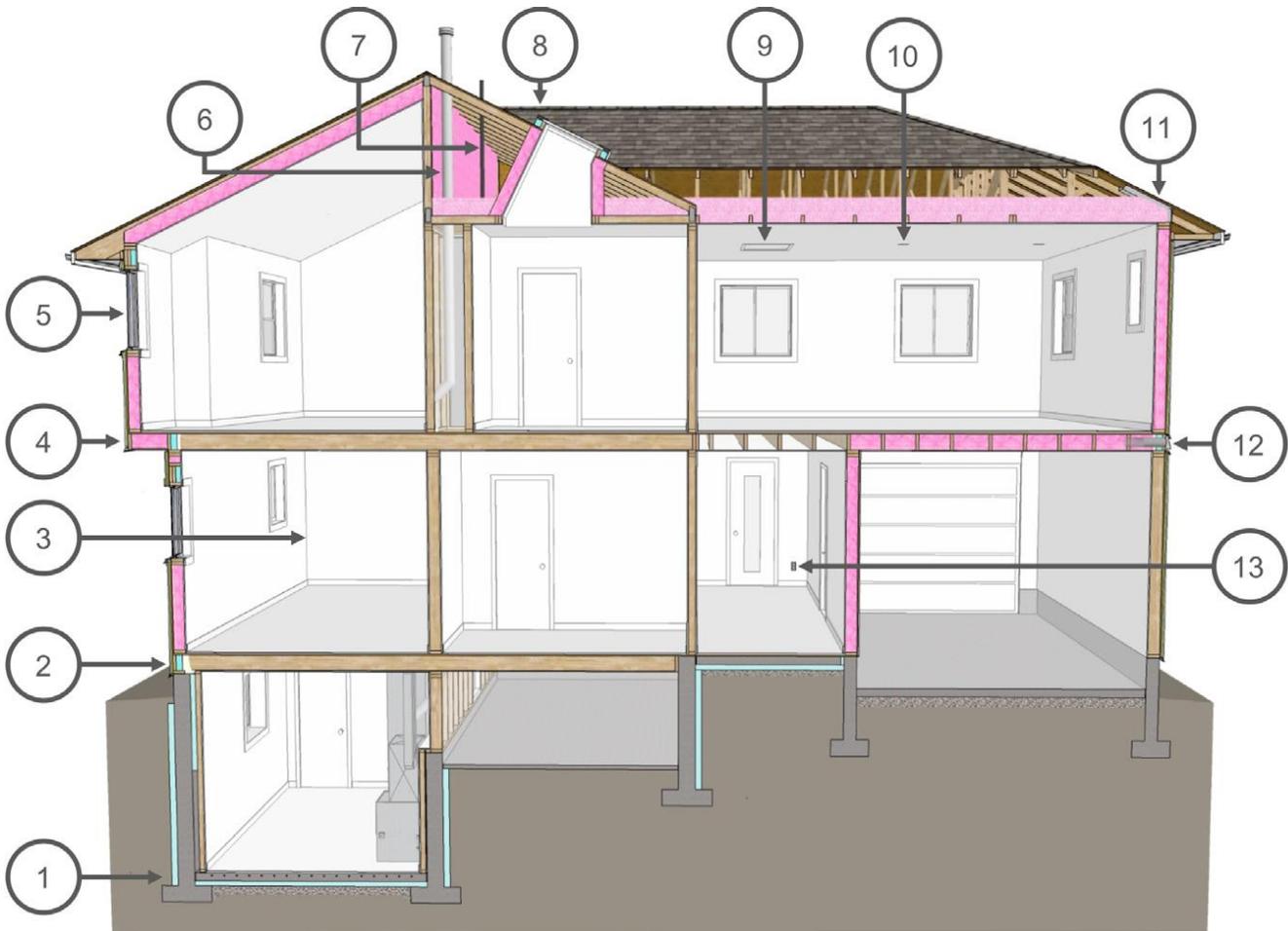
A continuous air barrier is required. Article 9.36.2.9 requires that the air barrier be continuous across joints, between assemblies, and around penetrations. Further requirements for air barriers are defined in Subsection 9.25.3 of the BC Building Code. The BC Building Code has identified a number of details that have been shown to be problematic for air-sealing locations are highlighted below.



INSPECTOR CHECK

Construction details for Air Barrier to be supplied on Building Permit Drawings.

Field inspection for Air Barrier Details will be at various stages of construction to ensure compliance with submitted drawings

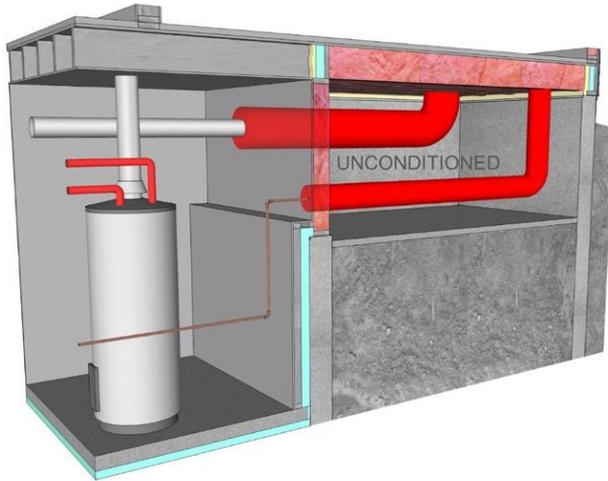


1. Slab foundation wall
2. Foundation to sill plate and rim joists
3. Interior wall surface
4. Rim Joist and cantilever floor
5. Window head and sill
6. Mechanical flues and chimneys
7. Plumbing stacks

8. Skylights
9. Attic hatches
10. Pot lights
11. Wall to ceiling
12. Wall vented ducts
13. Electrical penetrations in walls

9.36.3.3 Piping for Heating and Cooling Systems

Pipe materials, insulation and coverings are now addressed in Subsection 9.33.8 of the Code. To reduce thermal losses from piping systems, piping from heating and cooling equipment must be located inside the plane of insulation. Where piping is installed outside the plane of insulation, additional insulation is required to achieve a thermal resistance equivalent to exterior above grade wall requirements defined in 9.36.2.



The first 2 m of piping from a storage tank or heater must be insulated with pipe insulation.



INSPECTOR CHECK

If piping is located outside the heated envelope, it must be insulated to no less than the effective R-value of exterior walls.

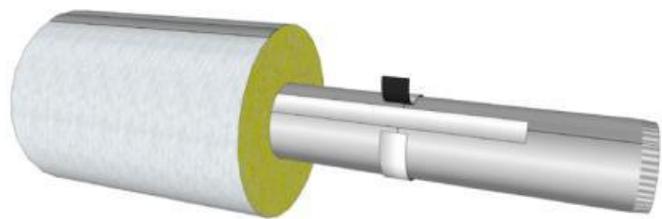
If hot water piping system has recirculation, the entire hot water system must be insulated.
Service water heating systems with storage tank must have thermostat controls to control min & max temperature
Plumbing vents must be air sealed where they penetrate the air barrier

9.36.3. HVAC Ducts

Ducts outside the heated envelope, or within an exterior assembly must have:
All joints in the ducts must be sealed with sealant, mastic, or foil faced tape.
Fabric duct tape is not permitted.



Ducts outside the heated envelope, or within an exterior assembly must be insulated to same level as required for above grade walls.



INSPECTOR CHECK

Inspector will be checking at Framing and or Insulation Inspection

Because of the BC Building Code Energy changes, additional information will be required at the building permit application stage to ensure compliance with new requirements. The following must be specified on the building permit submitted plans:

- The plans comply with the 2012 British Columbia Building Code.
- The plans are designed for Climatic Zone 4 (Lower Mainland and Southern Vancouver Island).
- The compliance path:
 - Prescriptive;
 - Prescriptive with Trade-offs – including calculations and location; or
 - Performance – including energy modelling calculations;
- Building section assemblies with proposed **Effective RSI Values** and calculations for the following:
 - Ceiling below attic assemblies
 - Cathedral ceiling and flat roof assemblies
 - Exterior wall assemblies
 - Skylights assemblies
 - Floors over unheated space assemblies
 - Rim joist assemblies;
 - Garage/dwelling wall assemblies
 - Garage/dwelling floor assemblies
 - Foundation wall assemblies and
 - Floors on ground (slab on grade) assemblies including:
 - Below frost line;
 - Above frost line; and
 - Heated
 - Identification of air barrier location;
 - Insulation details at plumbing and ductwork adjacent to insulated assemblies.
- HVAC heating type
 - Forced Air
 - Hydronic
 - Electric
- Ventilation design
 - Active - HRV CRV Principal Ventilation System (PVS)
 - Passive
- Service water heating
 - Indicate energy source - Electric Gas fired Oil fired
 - Performance rating

In order to expedite the review of building permit applications, the submitted drawings must accurately indicate the proposed construction. Cross sections and details must clearly show enough information to show compliance with the 2012 BCBC.

Common Construction Assemblies and Calculations

Exterior Wall - 2x6 @ 16" o.c. with R20 insulation		VINYL SIDING		CEMENT FIBRE		WOOD SIDING		STUCCO	
		RSI	R	RSI	R	RSI	R	RSI	R
WALL ASSEMBLY COMPONENTS									
1	exterior air film	0.03	0.17	0.03	0.17	0.03	0.17	0.03	0.17
2	Cladding material	.11	0.63	.026	0.148	0.14	0.80	.019	0.107
3	Rainscreen ½' air cavity	0.15	0.85	0.15	0.85	0.15	0.85	0.15	0.85
4	asphalt impregnated paper2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	7/16" (11.1 mm) OSB sheathing	0.11	0.63	0.11	0.63	0.11	0.63	0.11	0.63
6	2x6 framing filled with R20 batt @ 16" o.c.	2.36	13.40	2.36	13.40	2.36	13.40	2.36	13.40
7	1/2" (12.7 mm) gypsum board	0.08	0.45	0.08	0.45	0.08	0.45	0.08	0.45
8	interior air film	0.12	0.68	0.12	0.68	0.12	0.68	0.12	0.68
Effective RSI / R Value of Entire Assembly		2.96	16.82	2.87	16.32	2.99	16.98	2.86	16.31
Required RSI with or without HRV (-0.16 for garage walls)		2.78	15.78	2.78	15.78	2.78	15.78	2.78	15.78

Roof Assembly – ceiling below attic		METAL		ASHPHALT SHINGLES		WOOD SHINGLES		SLATE	
		RSI	R	RSI	R	RSI	R	RSI	R
ROOF ASSEMBLY COMPONENTS									
1	exterior air film	0.03	0.17	0.03	0.17	0.03	0.17	0.03	0.17
2	Roofing material	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	attic trusses with 2x4 bottom cord @ 24" o.c.	1.42	8.07	1.42	8.07	1.42	8.07	1.42	8.07
4	Continuous layer of insulation (min 280mm)	5.26	29.91	5.26	29.91	5.26	29.91	5.29	29.91
5	Poly air / vapour barrier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	1/2" (12.7 mm) gypsum board	0.08	0.45	0.08	0.45	0.08	0.45	0.08	0.45
7	interior air film	0.12	0.68	0.12	0.68	0.12	0.68	0.12	0.68
Effective RSI / R Value of Entire Assembly		6.91(RSI) 39.28 (R)							
Required RSI with or without HRV		6.91(RSI) 39.28 (R)							

Floors over Unheated Space Assembly		GARAGE TO DWELLING		CRAWLSPACE TO DWELLING		CANTILEVERED FLOOR / EXT	
		RSI	R	RSI	R	RSI	R
FLOOR ASSEMBLY COMPONENTS							
1	exterior air film	0.03	0.17	0.03	0.17	0.03	0.17
2	Cladding material (1/2" plywood soffit)	0.0	0.0	0.0	0.0	0.109	
3	carpet	0.37	2.10	0.00	2.10	0.37	0.0
5	3/4" (18.5 mm) sheathing	0.20	0.63	0.20	0.63	0.11	0.63
6	2x10 framing filled with R28 batt @ 16" o.c. Crawlspace (2x10 framing filled with R31 batt @ 16" o.c.)	4.13	20.91	(4.45)	(23.34)	4.13	13.40
7	1/2" (12.7 mm) gypsum board	0.08	0.45	0.00	0.45	0.08	0.45
8	interior air film	0.11	0.68	0.11	0.68	0.11	0.68
Effective RSI / R Value of Entire Assembly		4.52	25.69	4.84	27.51	4.67	26.54
Reduction Allowance enclosed by unconditioned space, (-0.16)		4.51	15.78	4.51	15.78	4.67	26.54