CITY OF PORT COQUITLAM

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Bulletin:
Energy Efficiency and Ventilation for Houses and Other Conditioned (Heated) Part 9 Buildings

PURPOSE

This bulletin is to identify what will be required to be shown on all plan submissions due to recent changes to the British Columbia Building Code (BCBC) regarding the Energy Efficiency and Ventilation for Part 9 buildings effective December 19, 2014. The changes will result in much higher energy efficiency.
This information will be updated when appropriate. Your feedback will be appreciated.

Please note – this information is provided for convenience only and is not a substitution of applicable City Bylaws, Provincial or Federal Codes or Laws. You must satisfy yourself that any existing or proposed construction or other works comply with such Bylaws, Codes or other laws.

Applies to:

- Buildings of residential occupancies to which Part 9 applies
- Buildings containing a major occupancy classification, Group D Office/Service, Group E Retail, or Groups F-2 / F-3 Medium and Low hazard industrial to which Part 9 applies with a total floor area that does not exceed 300 m^2
- Buildings containing a mix of residential and non-residential occupancies described above

There are three methods of compliance:

- Prescriptive requirements of section 9.36 – outlined below
- Prescriptive requirements with trade-offs – outlined below
- Performance Modeling – requires compliance with the National Energy Code

PERSCRIPTIVE REQUIREMENTS

Drawings, details and documents for a building permit application to address 9.32 and 9.36:

- Type of heating/cooling system
- Except for forced air heating systems, specify air outlet locations as per 9.32\
- Location of principle ventilation fan
- Heat recovery ventilators, if provided, are to be installed in conditioned space
- Identify method of airtightness for air barrier system. See 9.36.2.9(1)
- Location of air barrier
- Type of air barrier if other than poly
- Section of each wall, ceiling, floor and other assemblies including effective RSI values for each
- RSI Calculation Sheet for each assembly - see attached worksheets and reference materials
- "U" ratings of proposed fenestrations i.e. windows, doors, skylights, glass block etc.
- Rim joists - maintain insulation value for exterior above ground wall assembly
- Beam entering exterior wall assembly – see attached detail - effective RSI value of 60% of the wall assembly RSI value to be maintained across the end of the beam
- Detail for landings - to be mounted to ledger boards to allow for a continuous air / vapour barrier installation
- Detail of slab edge showing insulation at RSI value to 50% of under slab - insulation to be installed between slab edge and foundation wall
- Detail of services in exterior walls - full RSI value is to be maintained (IE. heat ducts, plumbing pipes, electrical panel, electrical boxes, etc.)

- Indicate method of ventilation for heated crawl space. Provide size and location of exhaust grill or specifications of dedicated exhaust fan as required by 9.32.3.7

Provide the following notes on the drawings:

- Meets 2012 BC Building Code including Dec 2014 revisions
- Overhead garage doors to be weather stripped around the entire perimeter
- Overhead garage doors to be RSI 1.1 (R-6.2) when the garage is supplied with heat
- Ducts running through unconditioned space to be RSI 2.78 (R-15.78)
- Attic access hatch to be RSI 2.6 (R-14.76)
- Air barrier must be continuous:
  - across construction, control and expansion joints
  - across junctions between different materials and assemblies, and
  - around penetrations through all building assemblies
- Air barrier materials shall be compatible with adjoining materials and be free of holes and cracks
- Air barrier system consisting of flexible sheets shall be lapped not less than 50mm, sealed and structurally supported
- All non-gasket devices installed in insulated assemblies are to be provided with backing to allow sealing of sheet poly to poly boots

EFFECTIVE THERMAL RESISTANCE (ETR) CLIMATIC ZONE 4

The City of Port Coquitlam is in Zone 4 as is most of the lower mainland.
The information provided in the tables below is identical.
The required ETR ratings from the BCBC for Zone 4 are as follows:

Buildings without a Heat-recovery Ventilator		
Assembly	**RSI**	**R**
Ceilings below attics	6.91	39.23
Cathedral ceilings and flat roofs	4.67	26.52
Walls	2.78	15.78
Floors over unheated spaces	4.67	26.52
Foundation walls*	1.99	11.30
Unheated floors**		
Below frost line	Uninsulated	Uninsulated
Above frost line	1.96	11.13
Heated floors	2.32	13.17
Slabs-on-grade with an integral footing	1.96	11.13

Buildings with a Heat-recovery Ventilator		
Assembly	**RSI**	**R**
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Floors over unheated spaces	4.67	26.52
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Unheated floors**		
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Above frost line	1.96	11.13
Heated floors	2.32	13.17
Slabs-on-grade with an integral footing	1.96	11.13

*A substantial increase from current foundation insulation requirements.
**Where an unheated floor assembly falls into both categories the entire floor shall be insulated as required for above frost line.

PRESCRIPTIVE WITH TRADE-OFFS

This method allows for increasing the RSI value of assemblies to offset other assemblies that lack the minimum required RSI values. This method may be used to account for custom windows that do not meet the minimum RSI or in additions where it is not practical to achieve code compliance through the prescriptive path.

Opaque building envelope assembly trade-off

- The plans are to identify the building envelope assemblies requiring the trade-off option and building envelope assemblies being used to off-set
- Provide a table comparing the Code compliant referenced design
- This trade-off assumes compliant RSI value of the glazing within the wall in question

Fenestration trade-off

- The plans are to identify the windows (fenestrations) requiring the trade-off option and the windows being used to off-set
- Identify the orientation of the windows in question. Windows involved in trade-off must be from the same orientation
- Provide a table comparing the referenced design with the proposed trade-off option for the windows

Fenestration area trade-off for reduced floor insulation or ceiling insulation for attics under sloped roofs in buildings that are one storey in building height

- The plans are to identify the floor or ceiling areas requiring the trade-off option and the windows being used to off-set
- Provide a table comparing the referenced design with the proposed trade-offs
- This trade off assumes compliant RSI value of the glazing within the wall in question

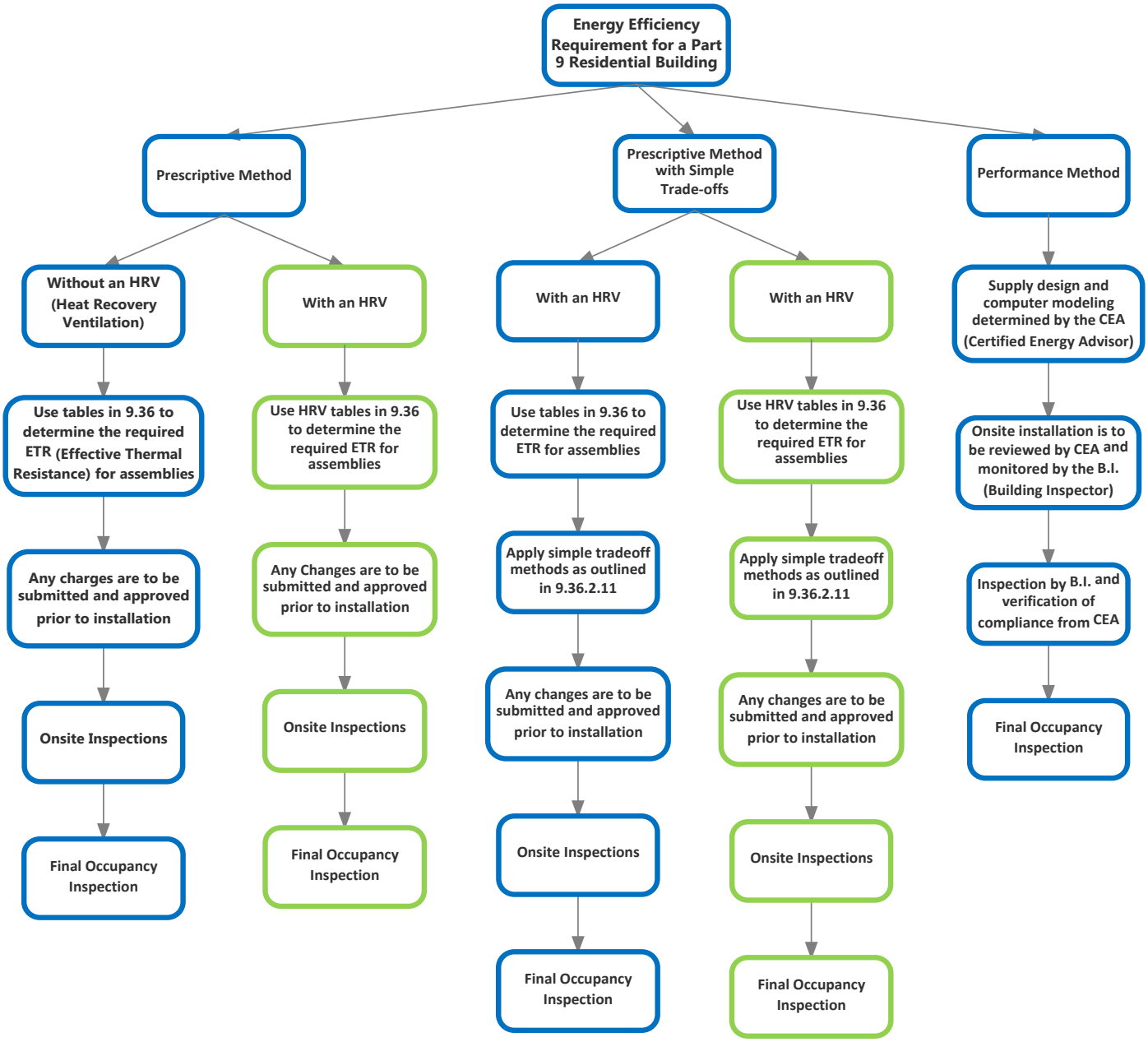
Note: Reference table showing calculations attached.

SOURCES OF INFORMATION

For additional information to aid in determining code compliance consider the following documents:

- HPO's "Illustrated Guide – Energy Efficiency Requirements for Houses in British Columbia" Zone 4. hpo.bc.ca
- BOABC's Energy Provisions Seminar material: "BCBC Energy Efficiency Requirements for Part 9 Buildings" boabc.org
- Canadian Wood Councils wall thermal design calculator. cwc.ca/resources/wall-thermal- design
- City of North Vancouver Trade-off calculator: cnv.org and type in under the search line "Trade-off Spreadsheet Template" or click on the link Trade-off spread sheet and go to the related documents at the bottom of the web page
- BC Energy Advisors list from Natural Resources Canada (NRCan) for Performance path. (revision 01/23/2015)
- Find BC Energy Advisors
    - (http://www2.nrcan.gc.ca/oee/nh-mn/f-t/index.cfm?fuseaction=s.ssr&lang=eng)
- TECA : Thermal Environmental Comfort Association : British Columbia

Energy Efficiency Requirement for a Part 9 Residential Building



Example of Trade-off calculation:

For the trade off to work the A/R value for the proposed design must be equal to or less than the Reference design A/R value.

Assembly	Area	Reference Design Values		Proposed Trade-offs	
		RSI	A/RSI	RSI	A/RSI
Wall 1	170 m^2	2.78	61.15	2.86	59.44
Wall 2	30 m^2	2.78	10.79	2.19	13.69
		Total A/R:	71.94	Total A/R:	73.13
Increased A/R that needs to be compensated:					
73.13 - 71.94 = 1.19					
Subtract from A/R value required for improved wall:					
59.44 - 1.19 = 58.25					
Increase R value to compensate:					
170 m^2 /58.25 = 2.91					
		Reference Design Values		Proposed Trade-offs	
Wall 1	170 m^2	2.78	61.15	2.91	58.25
Wall 2	30 m^2	2.78	10.79	2.19	13.69
		Total A/R:	71.94		71.94

Reference Building			
	Area (m2)	Effective RSI	A/R
Wall 1	170	2.78	61.15
Wall 2	30	2.78	10.79
Cumulative			71.94

Proposed Building			
	Area (m2)	Effective RSI	A/R
Wall 1	170	2.86	59.44
Wall 2	30	2.19	13.70
Cumulative			73.14

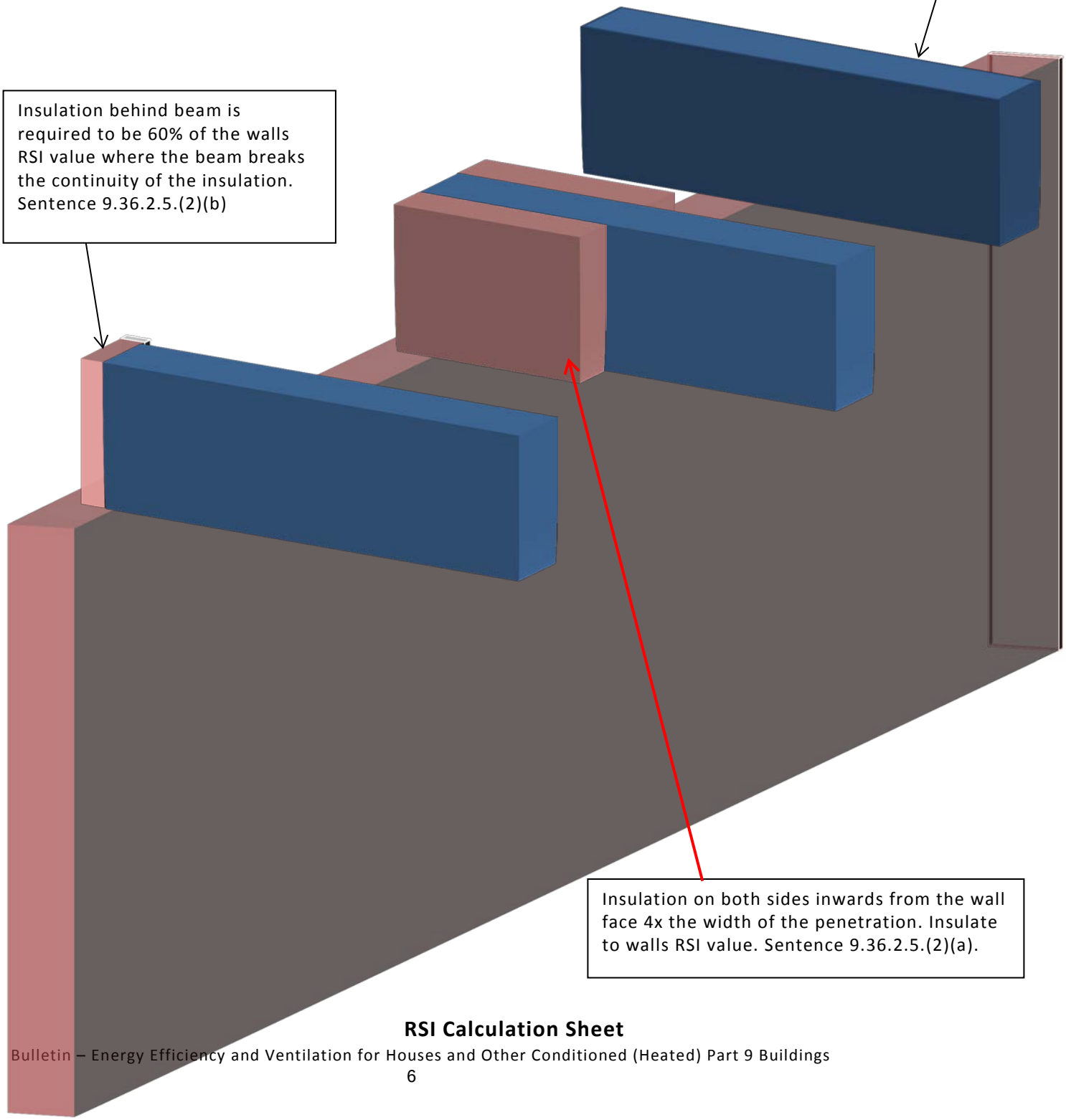
Does Trade –off comply ? NO

Proposed Building			
	Area (m2)	Effective RSI	A/R
Wall 1	170	2.92	58.24
Wall 2	30	2.19	13.70
Cumulative			71.94

Structural Element Breaking Insulation Continuity

Where a beam completely penetrates the building envelope to perform its intended function, the only requirement is for the insulation to be tight and that the air barrier is maintained. Sentence 9.36.2.4.(3)

Insulation behind beam is required to be 60% of the walls RSI value where the beam breaks the continuity of the insulation. Sentence 9.36.2.5.(2)(b)



Insulation on both sides inwards from the wall face 4x the width of the penetration. Insulate to walls RSI value. Sentence 9.36.2.5.(2)(a).

RSI Calculation Sheet

Is a Heat Recovery Ventilator (HRV) to be used? □ YES □ NO

Typical Ceiling Assembly			
	Material	RSI	R
Outside air film			
Roofing			
Strapping			
Sheathing membrane			
Sheathing			
Insulation above trusses			
Truss spacing			
Bottom cord height			
Vapour barrier			
Gypsum (mm)			
Interior air film			
	Total Effective RSI/R value of entire assembly		
Typical Wall Assembly			
	Material	RSI	R
Outside air film			
Cladding			
Strapping			
Sheathing membrane			
Sheathing			
Stud wall			
Insulation			
Vapour barrier			
Gypsum (mm)			
Interior air film			
	Total Effective RSI/R value of entire assembly		
	Typical Floor Assembly		
	Material	RSI	R
Interior air film			
Flooring material			
Underlay			
Sheathing			
Air Barrier			

Typical Floor Assembly Continued			
	Material	RSI	R
Vapour barrier			
Joist spacing			
Insulation			
Gypsum (mm)			
Outside air film			
	Total Effective RSI/R value of entire assembly		
Typical Foundation Wall Assembly			
	Material	RSI	R
Outside air film			
Insulation			
Damp proofing			
Concrete			
Interior air film			
	Total Effective RSI/R value of entire assembly		
Typical Additional Assembly			
	Material	RSI	R
1.			
2.			
3.			
	Total Effective RSI/R value of entire assembly		