The devotion of a whole section it the code to 9.36 is a massive shift in detail.

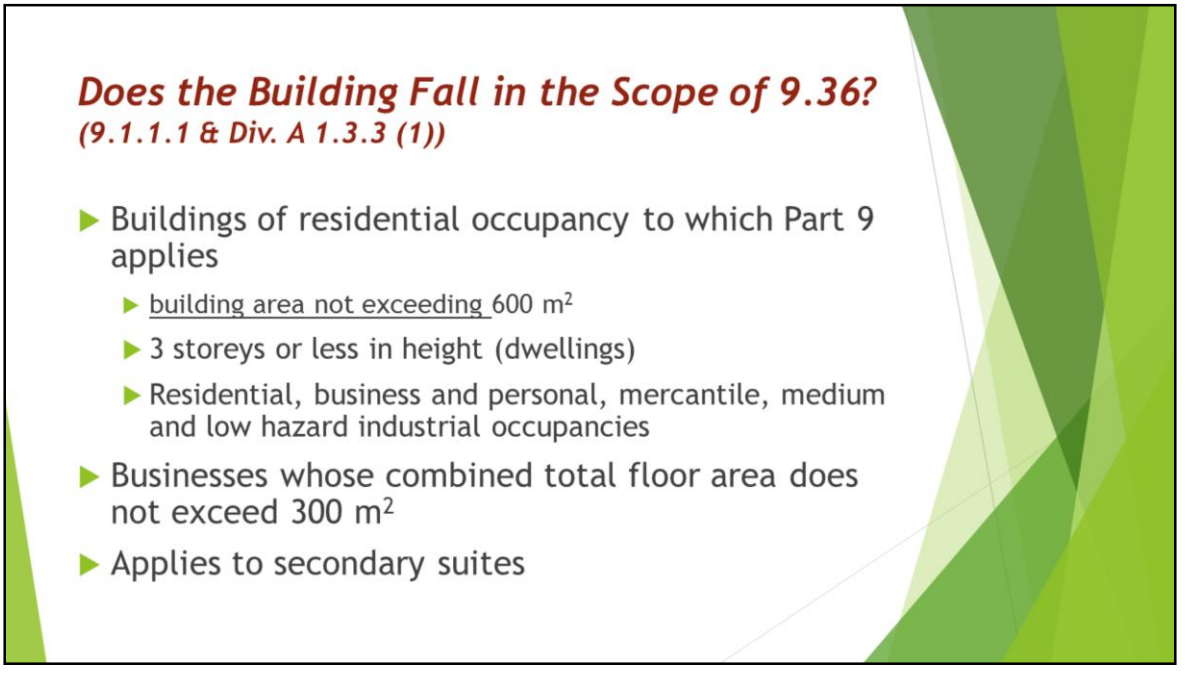
It is meant to be flexible, but thorough. It provides options, but these options mean builders must do more than meet a requirement they must think about which is the most cost-effective way to meet that requirements

Key Questions You Need to be Able to Answer

1. Does the project fall under the scope of 9.36?
2. Should I choose the prescriptive, trade-off or performance path?
3. What "Zone" is the building built in?
4. What are the required RSI values for assemblies?
5. How do I calculate assembly RSI values?
6. Have I achieved continuity of insulation?
7. Have I dealt with the key areas for air sealing?
8. Have I confirmed the that windows, doors, skylights, and HVAC equipment meet the code?
9. An over view of the Performance Path

Question #1

Does My Building Fall Under Part 9?



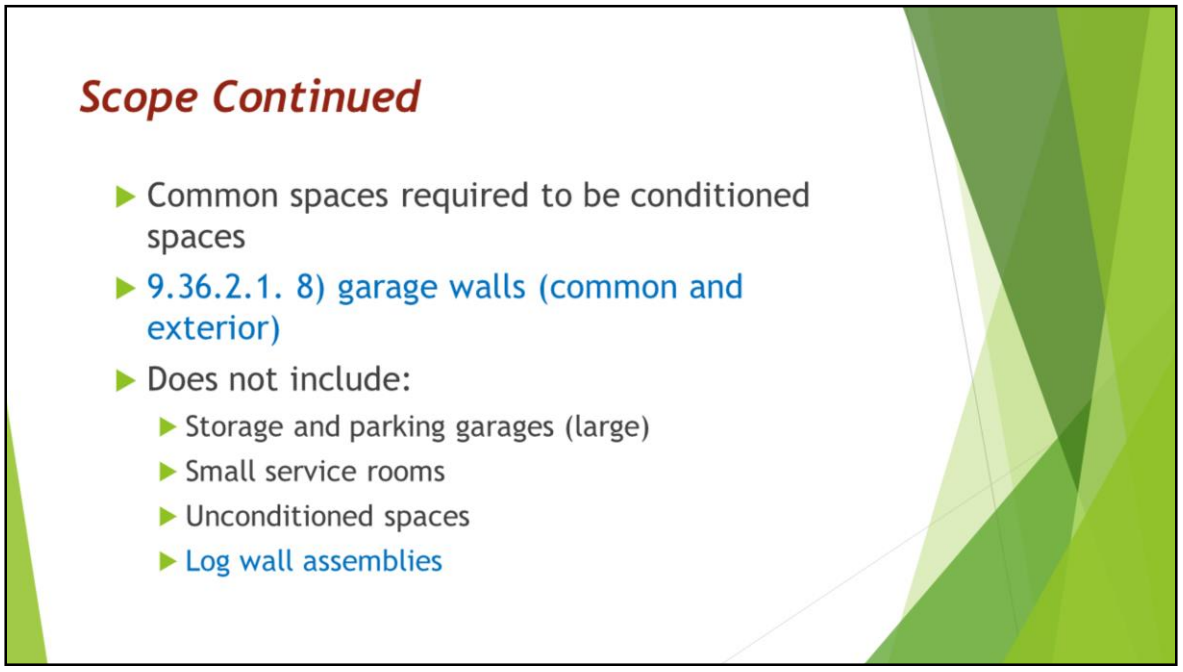
The Scope is set in 9.1.1.1 Application that references Division A Subsection 1.3.3 Application of Parts 9, 10 and 11

1) Part 9 of Division B applies to all *buildings* described in Article 1.1.1.1. of 3 *storeys* or less in *building height*, having a *building area* not exceeding 600 m2, and used for *major occupancies* classified as

a) Group C, *residential occupancies* (see Appendix Note A-9.1.1.1.(1) of Division B),
b) Group D, *business and personal services occupancies*,
c) Group E, *mercantile occupancies*, or
d) Group F, Divisions 2 and 3, *medium*- and *low-hazard industrial occupancies*.

- Area excludes parking garages that serve residential occupancies

Buildings containing non residential occupancies where the non-residential spaces are more than 300m^2 floor area



For the purpose of this Section "common space" means all spaces intended to be conditioned to the requirements of the Code not within a *suite and walls serving suites except crawl spaces, vertical service shafts, and elevator shafts.*

There is an Alberta clause related to garages in the scope and application section - 9.36.2.1 8 related to garages:

> 8) The requirements of this Subsection also apply to components of a *building* envelope assembly that separate a heated or unheated attached garage from unconditioned space or the exterior air, where
>
> a) not more than one *dwelling unit*, or
>
> b) a house with a *secondary suite*.

From M.A. - That ABC-specific provision was a result of the Alberta-specific provisions we have under Section 9.35. of the ABC, for the HIRF-based interior finishing/thermal insulation requirement for garages.

Log homes must still meet the other bldg. envelope requirements, such as those for windows and door. This is an Alberta-specific rule.

Alberta also exempts walls, floor and ceiling assemblies of Part 10 Relocatable Industrial Accommodation

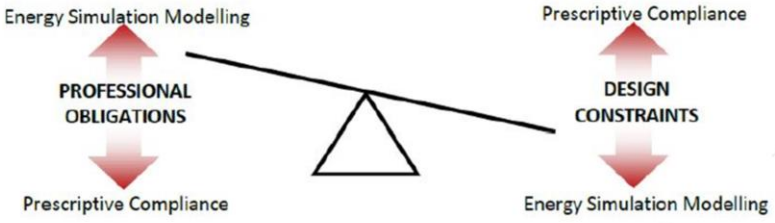
Question #2

Should I choose the prescriptive, trade-off or performance path?

Which Path for Compliance?

- Prescriptive
- Performance

- Do you build custom or production
- Do you build with a lot of glass?
- Do you experiment with new ways of building?
- Do you want to optimize costs and savings?
- Is there a sale advantage in one or the other?

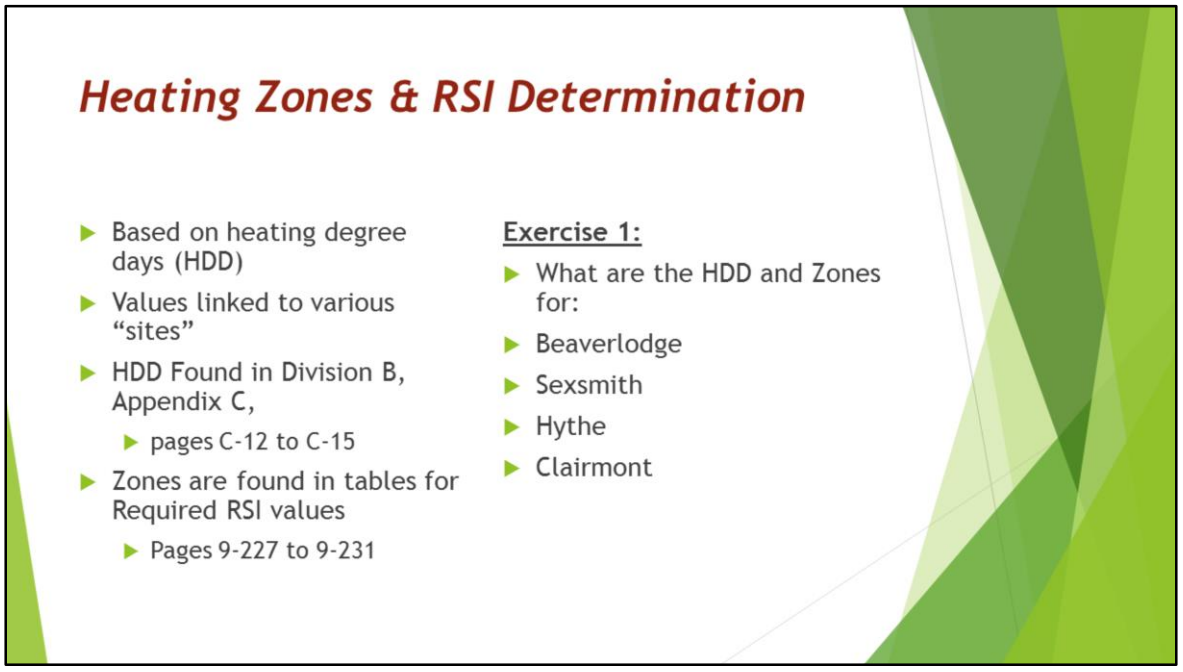


Learn the Prescriptive Path and Then Decide

- Know what heating Zone you are building in;
- Do you want to meet the requirements with or without an HRV?
- How do you want to build the wall assemblies?
- Determine if each assembly meets the requirements?
- Ensure continuity of insulation
- Ensure the other pieces meet requirements (wdws, HVAC)
- Learn to speak the new lingo;

Question #3

What Zone is my construction in?



A heating degree days is

Beaver Lodge = 5700
Sexsmith = 5850
Hythe not listed
Clairmont not listed

All the areas you build in area in zone 7A

This area is:

- Zone 7A = 5000 to 5999 HDD

Question #4

What are the required RSI values for assemblies?

- Effective versus nominal; taking into account the varying insulation abilities of different materials in an assembly; a blended thermal resistance value;
-Tables given for framing percentages with and without framing in common assemblies;
-Tables given for RSI values of common materials
- Simple calculation for calculating the overall (effective) thermal resistance of an assembly'
-Calculations given for calculating and overall RSI for an assembly

- A440 procedure calculates U-values for overall windows, taking into account centre of glass, edge of glass and frame.

RSI Requirements in the Code

- ABC page 9-227, Page 9-231, or Illustrated Guide

Table 9.36.2.6.A.
Effective Thermal Resistance of Above-ground Opaque Assemblies in Buildings without a Heat-Recovery Ventilator
Forming Part of Sentence 9.36.2.6.(1)

Above-ground Opaque *Building* Assembly	Heating Degree-Days of *Building* Location,(1) in Celsius Degree-Days					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000 to 4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 ≥ 7000
	Minimum Effective Thermal Resistance (RSI) $(m^2 \cdot K)/W$					
Ceilings below attics	6.91	8.67	8.67	10.43	10.43	10.43
Cathedral ceilings and flat roofs	4.67	4.67	4.67	5.02	5.02	5.02
Walls(2)	2.78	3.08	3.08	3.08	3.85	3.85
Floors over unheated spaces	4.67	4.67	4.67	5.02	5.02	5.02

Look through the pages.

Exercise: Find These RSI Requirements in the code:

- What would the effective RSI value in Zone 7A be for an above grade wall if you do not use an HRV?
  - Page 9-227, 3.08
- What would be the effective RSI value in Zone 7A for basement wall ***with*** an HRV?
  - Page 9-231 2.98
- What would be the effective RSI value for an ***unheated*** floor above grade?
  - Page 9-231, 1.98
- Were does it talk abut RSI values for rim joists?
  - Page 9-228. 9.36.2.6 (2)

RSI Values for Assemblies: Illustrated Guide

Thermal Characteristics of Building Assemblies (9.36.2.6. to 9.36.2.8.)

Effective thermal resistance values to achieve the requirements of Section 9.36. in the 2014 Alberta Building Code ar shown in ***Table 1*** below. Wall assembly requirements are relaxed where a heat recovery ventilator (HRV) is utilized.

Table 1: **Insulation levels by assembly to achieve effective thermal resistance requirements**

	Zone 6		Zone 7A		Zone 7B	
	No HRV RSI (R)	HRV RSI (R)	No HRV RSI (R)	HRV RSI (R)	No HRV RSI (R)	HRV RSI (R)
Ceiling below attics	8.67 (49.2)	8.67 (49.2)	10.43 (59.2)	8.67 (49.2)	10.43 (59.2)	10.43 (59.2)
Cathedral ceilings and flat roofs	4.67 (26.5)	4.67 (26.5)	5.02 (28.5)	5.02 (28.5)	5.02 (28.5)	5.02 (28.5)
Above grade walls	3.08 (17.5)	2.97 (16.9)	3.08 (17.5)	2.97 (16.9)	3.85 (21.9)	3.08 (17.5)
Floors over unheated spaces	4.67 (26.5)	4.67 (26.5)	5.02 (28.5)	5.02 (28.5)	5.02 (28.5)	5.02 (28.5)
Rim joists	3.08 (17.5)	2.97 (16.9)	3.08 (17.5)	2.97 (16.9)	3.85 (21.9)	3.08 (17.5)
Below grade foundation walls	2.98 (16.2)	2.98 (16.2)	3.46 (19.7)	2.98 (16.2)	3.46 (19.7)	2.98 (16.2)
Unheated floors below frost line	Uninsulated		Uninsulated		Uninsulated	
Exterior walls of a heated attached garage	3.08 (17.5)	2.97 (16.9)	3.08 (17.5)	2.97 (16.9)	3.85 (21.9)	3.08 (17.5)
Walls adjacent to an unconditioned garage	2.92 (16.6)	2.81 (16.0)	2.92 (16.6)	2.81 (16.0)	3.69 (21.0)	2.92 (16.6)
Unheated floors above frost line	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)
Slabs-on-grade with an integral footing	1.96 (11.1)	1.96 (11.1)	3.72 (21.1)	2.84 (16.1)	3.72 (21.1)	2.84 (16.1)
Heated Floors	2.32 (13.2)	2.32 (13.2)	2.84 (16.1)	2.84 (16.1)	2.84 (16.1)	2.84 (16.1)
Windows and doors	1.60 (9.1)	1.60 (9.1)	1.60 (9.1)	1.60 (9.1)	1.40 (8.0)	1.40 (8.0)
Skylights	2.70 (15.3)	2.70 (15.3)	2.70 (15.3)	2.70 (15.3)	2.40 (13.6)	2.40 (13.6)
Skylight shafts	3.08 (17.5)	2.97 (16.9)	3.08 (17.5)	2.97 (16.9)	3.85 (21.9)	3.08 (17.5)
Attic access hatch	2.60 (14.8)	2.60 (14.8)	2.60 (14.8)	2.60 (14.8)	2.60 (14.8)	2.60 (14.8)

Note #2 | Section 9.36.2.4.(4) of the Code allows for a relaxation of RSI 0.16 for building envelope assemblies adjacent to unconditioned enclosed spaces such as enclosed verandas, sun porches, floors over garages, or walls between an attached garage and a house. This does not include vented spaces such as an attic, roof and crawl spaces.

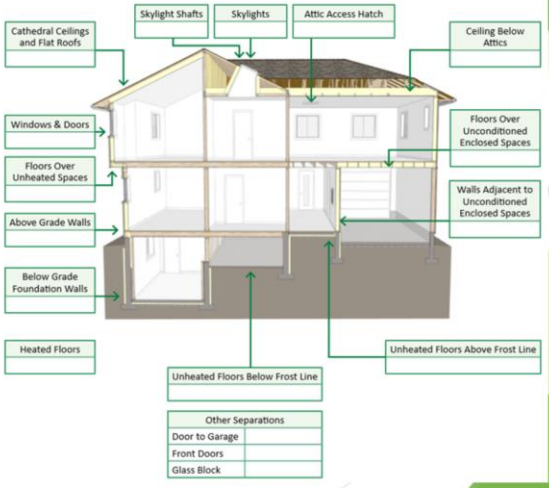
Note #3 | See the exception for site-glazed or site-assembled, factory made products in 9.36.2.7.(3).

Question #5

How do I calculate assembly RSI values?

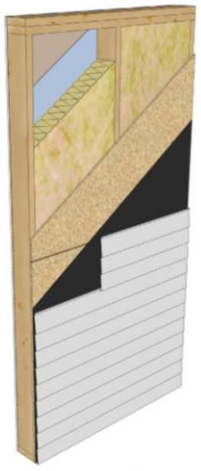
Step 1: List the Assemblies Used in the Building

- Roof
- Above grade wall
- Below grade wall
- Floors over unheated spaces
- Rims, headers etc.
- Areas built differently
  - *Garage walls*
  - *Tall walls*
  - *Areas with <u>significant</u> different finishes*

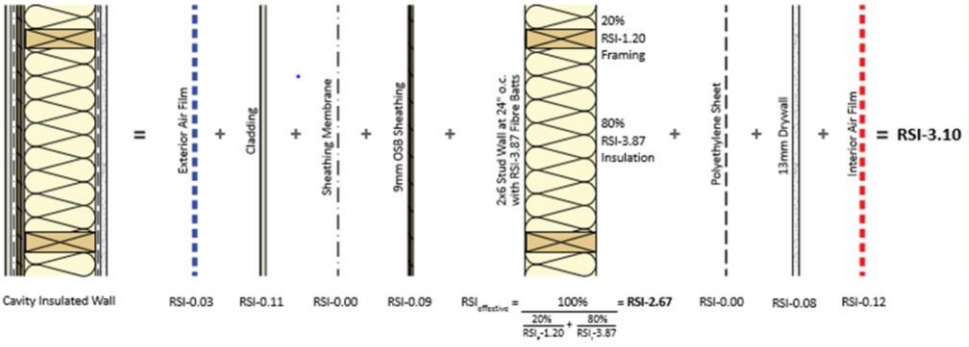


Step #2: List the Layers in each assembly

- Outside Air Film
- Siding
- Sheathing paper
- Sheathing
- Studs 2x6 24” o.c
- R22 Insulation
- Poly
- Gypsum Board
- Interior Air Film



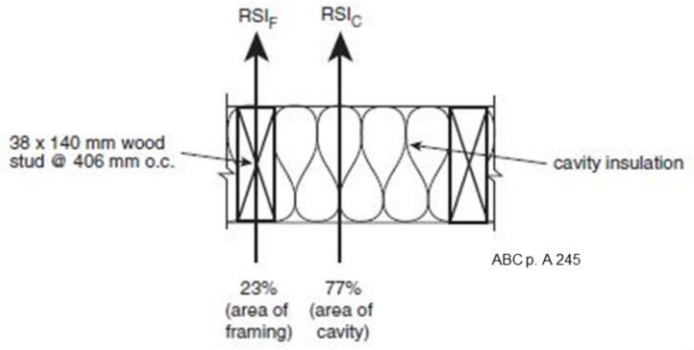
Cavity Insulated Wall Assembly



Note #5 | For wall assemblies with no exterior vented air space behind the cladding, the insulation value of the cladding can be included in the effective RSI value calculation.

Step 3: Determine Framing & Cavity Percentages

- ABC pages A 245 to a 248



If you are going to use the prescriptive path for compliance, you need to understand how to calculate areas of various assemblies

9.36.2.3 - Fenestration means more than windows. It is any building envelope assembly that transmits visible light such as skylights, glass block, translucent panels, transoms, skylights, tubular light pipes etc.

-If the trade-off options is used, calculation of envelope areas and window areas may be necessary.

-There is a credit for adjoining unconditioned spaces of 0.16 RSI (R-1)

- Areas that may need to be calculated separately could be tall wall areas.

Framing Cavity Percentages in ABC

Table A-9.36.2.4.(1)A.
Framing and Cavity Percentages for Typical Wood-frame Assemblies(1)

Wood-frame Assemblies		Frame Spacing, mm o.c.									
		304		406		488		610		1220	
		% Area Framing	% Area Cavity	% Area Framing	% Area Cavity	% Area Framing	% Area Cavity	% Area Framing	% Area Cavity	% Area Framing	% Area Cavity
Floors	lumber joists	–	–	13	87	11.5	88.5	10	90	–	–
	I-joists and truss	–	–	9	91	7.5	92.5	6	94	–	–
Roofs/ Ceilings	ceilings with typical trusses	–	–	14	86	12.5	87.5	11	89	–	–
	ceilings with raised heel trusses	–	–	10	90	8.5	91.5	7	93	–	–
	roofs with lumber rafters and ceilings with lumber joists	–	–	13	87	11.5	88.5	10	90	–	–
	roofs with I-joist rafters and ceilings with I-joists	–	–	9	91	7.5	92.5	6	94	–	–
	roofs with structural insulated panels (SIPs)	–	–	–	–	–	–	–	–	9	91
Walls	typical wood-frame	24.5	75.5	23	77	21.5	78.5	20	80	–	–
	advanced wood-frame with double top plate(2)	–	–	19	81	17.5	82.5	16	84	–	–
	SIPs	–	–	–	–	–	–	–	–	14	86
	basement wood-frame inside concrete foundation wall	–	–	16	84	14.5	85.5	13	87	–	–

From the 2014 Alberta Building Code

Step #4: Determine the RSI of Materials:

- See Tables in ABC 2014 pages A-253 to A-259

Sheathing Materials	Thickness of Material	Thermal Resistance (RSI), $(m^2 \cdot K)/W$ per mm	Thermal Resistance (RSI), $(m^2 \cdot K)/W$ for thickness listed
Gypsum sheathing	12.7 mm	0.0063	0.08
Insulating fibreboard	—	0.016	—
Particleboard:			
low density (593 kg/m^3)	—	0.0098	—
medium density (800 kg/m^3)	—	0.0077	—
high density (993 kg/m^3)	—	0.0059	—
Plywood – generic softwood	9.5 mm	0.0087	0.083
	11 mm		0.096
	12.5 mm		0.109
	15.5 mm		0.135
	18.5 mm		0.161

Exercise #2

1. What is the RSI value of:
   - A fiberglass batt in a 2x6 above grade wall?
     - Page A-251, R19 (R20 compressed) = 3.34
   - A 2x6 wall stud?
     - Page A-253, Wood, structural framing, spruce-pine-fir
     - 0.0085 x 140 mm = 1.19
   - 4" of spray foam?
     - Closed cell = medium density
     - 100 mm x 0.036 = 3.60

Step 5:Determine Blended RSI for Assemblies

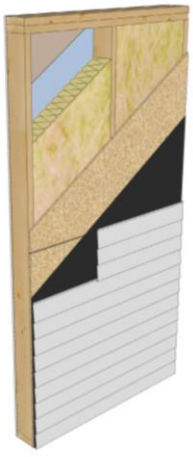
* RSI for 2x6 (38x140mm) wood framing at 24" (600mm) on centre filled with R22 mineral fibre batt insulation

	Thickness (mm)	RSI/ mm	RSI-value (R-value)	Effective RSI-value calculation	RSI-value Effective
38x140 wood studs at 600 mm o.c.	140	0.0085	1.19	$\frac{100}{\frac{20}{1.19} + \frac{80}{3.87}}$	= 2.67 (R-15.2)
R22 batt insulation	140	-	3.87		

Revised example May 25, 2016

Step 6:Add RSI's for Each Material

Example: Above Grade wall2x6, 24 o.c. R22 Batt vinyl clad



	Thickness (mm)	RSI/mm	RSI-value
Exterior air film	-	-	0.03
Vinyl siding	-	-	0.11
Building paper	-	-	0.00
OSB sheathing	9.5	0.0098	0.09
2x6 wood framing at 24" o.c. filled with R22 batt insulation*	-	-	2.67*
Polyethylene sheet	-	-	0.00
Gypsum board	12.7	0.0061	0.08
Interior air film	-	-	0.12
	Assembly effective RSI =		**3.10** (R-17.6)

REVISED to reflect change to slide 17 may 25, 2016
Highlight how cladding can change the RSI.
Also how walls built in different ways need to be modeled differently.
Look at percentage of windows.

Above Grade Wall - Framed Wall Caculation

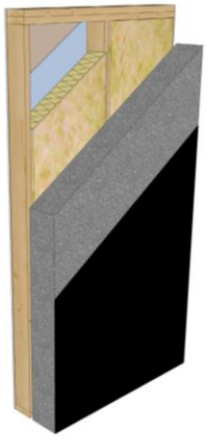
* RSI for 2x6 (38x140mm) wood framing at 24" (600mm) on centre filled with R22 mineral fibre batt insulation

	Thickness (mm)	RSI/ mm	RSI-value (R-value)	Effective RSI-value calculation	RSI-value Effective
38x140 wood studs at 600 mm o.c.	140	0.0085	1.19	$\frac{100}{\frac{20}{1.19} + \frac{80}{3.87}}$	= 2.67 (R-15.2)
R22 batt insulation	140	-	3.87		

ICF Wall

	Thickness (mm)	RSI/mm	RSI-value
Exterior water-/ dampproofing	-	-	0.00
EPS Type 2	70	0.028	1.96
Concrete wall	152	0.0004	0.06
EPS Type 2	70	0.028	1.96
Gypsum board	12.7	0.0061	0.08
Interior air film	-	-	0.12
	Assembly effective RSI =		**4.22** (R-24.0)

Concrete Frost Wall



	Thickness (mm)	RSI/mm	RSI-value
Exterior water-/ dampproofing	-	-	0.00
Concrete wall	203	0.0004	0.08
1/2" batt insulation against concrete	13	0.030	0.39
2x6 wood framing at 24" o.c. filled with R24 batt insulation*	-	-	2.53*
Air cavity in framing	13	-	0.16
Polyethylene sheet	-	-	0.00
Gypsum board	12.7	0.0061	0.08
Interior air film	-	-	0.12
		Assembly effective RSI =	3.36 (R-19.1)

Step 7: Compare Calculated RSI to Required RSI

Thermal Characteristics of Building Assemblies (9.36.2.6. to 9.36.2.8.)

Effective thermal resistance values to achieve the requirements of Section 9.36. in the 2014 Alberta Building Code are shown in ***Table 1*** below. Wall assembly requirements are relaxed where a heat recovery ventilator (HRV) is utilized.

Table 1: **Insulation levels by assembly to achieve effective thermal resistance requirements**

	Zone 6		Zone 7A		Zone 7B	
	No HRV RSI (R)	HRV RSI (R)	No HRV RSI (R)	HRV RSI (R)	No HRV RSI (R)	HRV RSI (R)
Ceiling below attics	8.67 (49.2)	8.67 (49.2)	10.43 (59.2)	8.67 (49.2)	10.43 (59.2)	10.43 (59.2)
Cathedral ceilings and flat roofs	4.67 (26.5)	4.67 (26.5)	5.02 (28.5)	5.02 (28.5)	5.02 (28.5)	5.02 (28.5)
Above grade walls	3.08 (17.5)	2.97 (16.9)	3.08 (17.5)	2.97 (16.9)	3.85 (21.9)	3.08 (17.5)
Floors over unheated spaces	4.67 (26.5)	4.67 (26.5)	5.02 (28.5)	5.02 (28.5)	5.02 (28.5)	5.02 (28.5)
Rim joists	3.08 (17.5)	2.97 (16.9)	3.08 (17.5)	2.97 (16.9)	3.85 (21.9)	3.08 (17.5)
Below grade foundation walls	2.98 (16.2)	2.98 (16.2)	3.46 (19.7)	2.98 (16.2)	3.46 (19.7)	2.98 (16.2)
Unheated floors below frost line	Uninsulated		Uninsulated		Uninsulated	
Exterior walls of a heated attached garage	3.08 (17.5)	2.97 (16.9)	3.08 (17.5)	2.97 (16.9)	3.85 (21.9)	3.08 (17.5)
Walls adjacent to an unconditioned garage	2.92 (16.6)	2.81 (16.0)	2.92 (16.6)	2.81 (16.0)	3.69 (21.0)	2.92 (16.6)
Unheated floors above frost line	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)
Slabs-on-grade with an integral footing	1.96 (11.1)	1.96 (11.1)	3.72 (21.1)	2.84 (16.1)	3.72 (21.1)	2.84 (16.1)
Heated Floors	2.32 (13.2)	2.32 (13.2)	2.84 (16.1)	2.84 (16.1)	2.84 (16.1)	2.84 (16.1)
Windows and doors	1.60 (9.1)	1.60 (9.1)	1.60 (9.1)	1.60 (9.1)	1.40 (8.0)	1.40 (8.0)
Skylights	2.70 (15.3)	2.70 (15.3)	2.70 (15.3)	2.70 (15.3)	2.40 (13.6)	2.40 (13.6)
Skylight shafts	3.08 (17.5)	2.97 (16.9)	3.08 (17.5)	2.97 (16.9)	3.85 (21.9)	3.08 (17.5)
Attic access hatch	2.60 (14.8)	2.60 (14.8)	2.60 (14.8)	2.60 (14.8)	2.60 (14.8)	2.60 (14.8)

Note #2 | Section 9.36.2.4.(4) of the Code allows for a relaxation of RSI 0.16 for building envelope assemblies adjacent to unconditioned enclosed spaces such as enclosed verandas, sun porches, floors over garages, or walls between an attached garage and a house. This does not include vented spaces such as an attic, roof and crawl spaces.

Note #3 | See the exception for site-glazed or site assembled, factory made products in 9.36.2.7.(3).

CHBA - Alberta | Illustrated Guide for the Alberta Building Code 9.36. Prescriptive Energy Efficiency Requirements for Houses p. 7

Climatic data shows most regions are warmer.

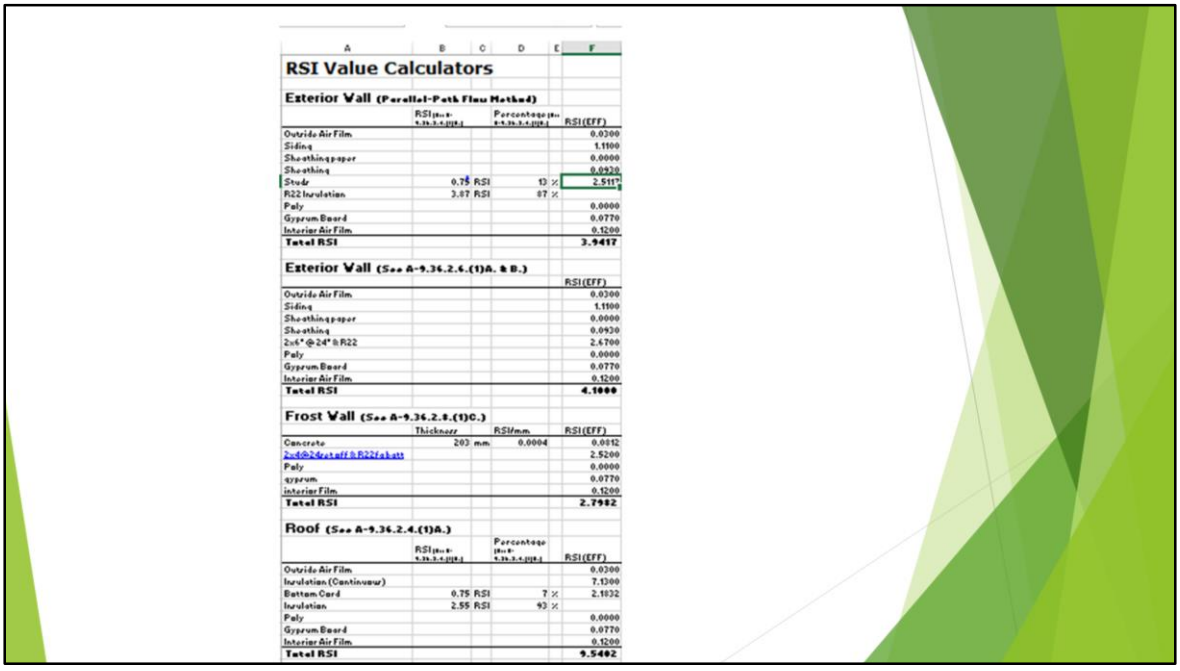
Division B, Appendix C C-12 –C15

REVIEW: Steps to Assembly RSI For the PRESCRIPTIVE Path

1. List the different assemblies used in the building
2. List the materials that make up the assembly
3. Determine framing and cavity percentages of the assembly
4. Assign RSI values for each material in an assembly
5. Adjust the framing and insulation RSI's to arrive at a blended RSI value for framed areas
6. Add the RSI values of each layer of the assembly to determine overall assembly RSI
7. Compare with the required RSI for your zone for each assembly

Make Your Own Tables or Excel Sheet

Component	Thickness (mm_	RSI/mm	Percentages	RSI value
			Total=	



RSI Value Calculators

Exterior Wall (Parallel-Path Flow Method)

	RSI		Percentage	RSI(EFF)
Outside Air Film				0.0200
Siding				1.1100
Sheathing paper				0.0000
Sheathing				0.0920
Stud	0.75	RSI	13 %	2.5117
R22 Insulation	3.87	RSI	87 %	
Poly				0.0000
Gypsum Board				0.0770
Interior Air Film				0.1200
Total RSI				**3.9417**

Exterior Wall (See A-9.36.2.6.(1)A. & B.)

				RSI(EFF)
Outside Air Film				0.0200
Siding				1.1100
Sheathing paper				0.0000
Sheathing				0.0920
2x6" @ 24" & R22				2.6700
Poly				0.0000
Gypsum Board				0.0770
Interior Air Film				0.1200
Total RSI				**4.1000**

Frost Wall (See A-9.36.2.8.(1)C.)

	Thickness		RSI/mm	RSI(EFF)
Concrete	203	mm	0.0004	0.0812
2x6@24cc stuff & R22 fiberglass				2.5200
Poly				0.0000
gypsum				0.0770
interior Film				0.1200
Total RSI				**2.7982**

Roof (See A-9.36.2.4.(1)A.)

	RSI		Percentage	RSI(EFF)
Outside Air Film				0.0200
Insulation (Continuous)				7.1300
Bottom Card	0.75	RSI	7 %	2.1832
Insulation	2.55	RSI	93 %	
Poly				0.0000
Gypsum Board				0.0770
Interior Air Film				0.1200
Total RSI				**9.5402**

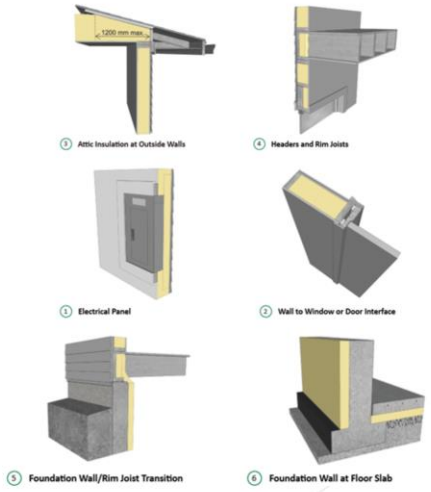
PAUSE - GOT That?

Take Break!

Continuity of Insulation (9.36.2.5)

1. Interior building components that meet building envelope components
2. and major structural members what PARTLY penetrate the building envelope shall not:
   - break the continuity of the insulation and
   - decrease the RSI to less than the required for assemblies

These are the key exceptions:

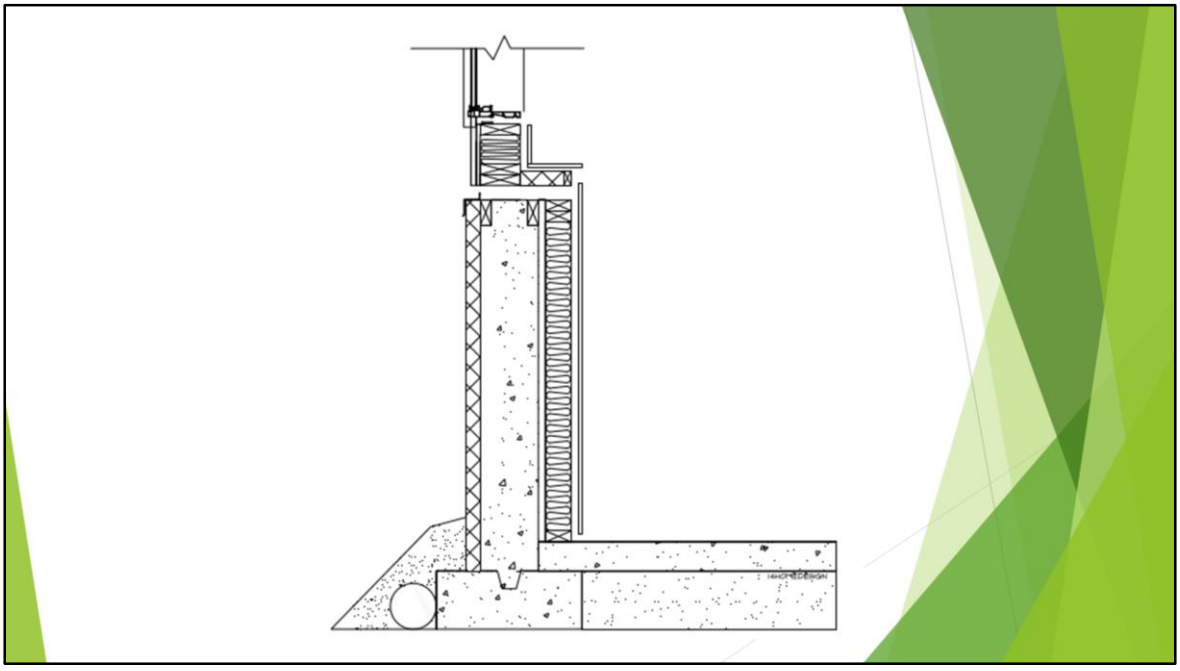


Interior building components that meet building envelope components and major structural members what PARTLY penetrate the building envelope shall not:


06.12.2016

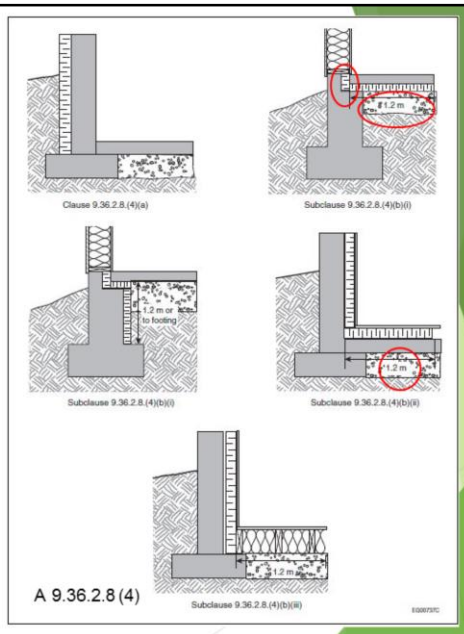
Continuity at Beams


06.12.2016



Insulating Slabs Above Frost Line

- Walk-out basements
- Bi-level homes
- Must work with soil gas control



4a – on the exterior
4bi – interior beneath slab for 1.2 m with thermal break at edge of slab, with 50% of RSI required
4bii – on top of slab 1.2 m from perimeter
4biii –within sleepers on the slab

Airtightness

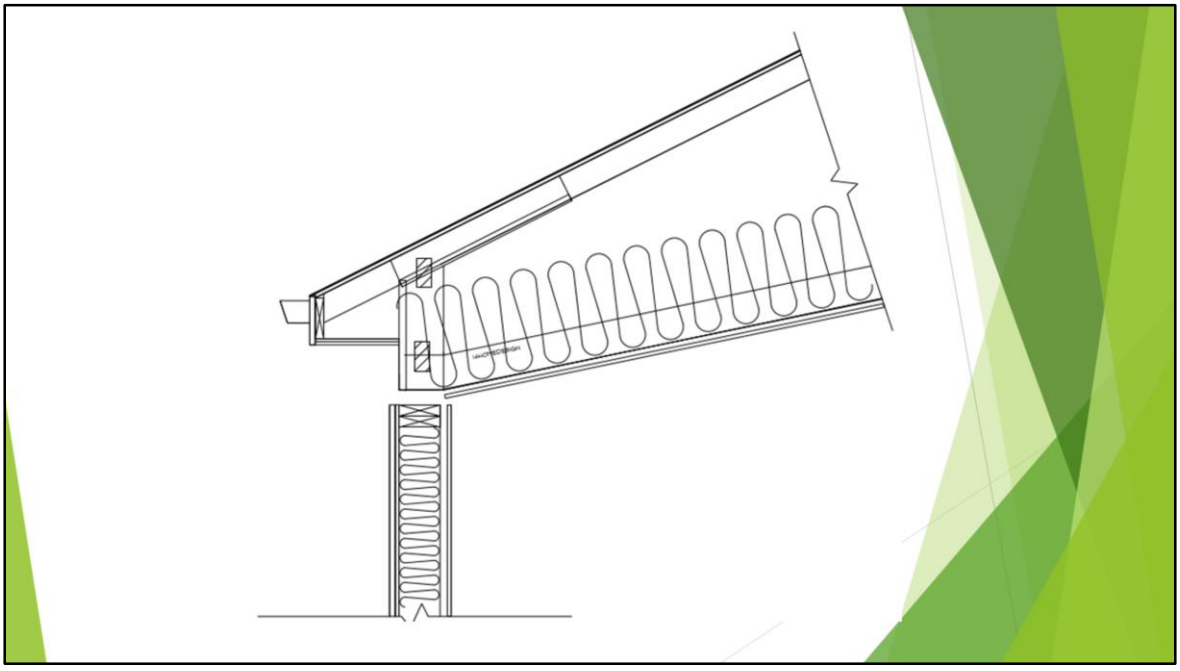
Airtightness 9.36.2.10

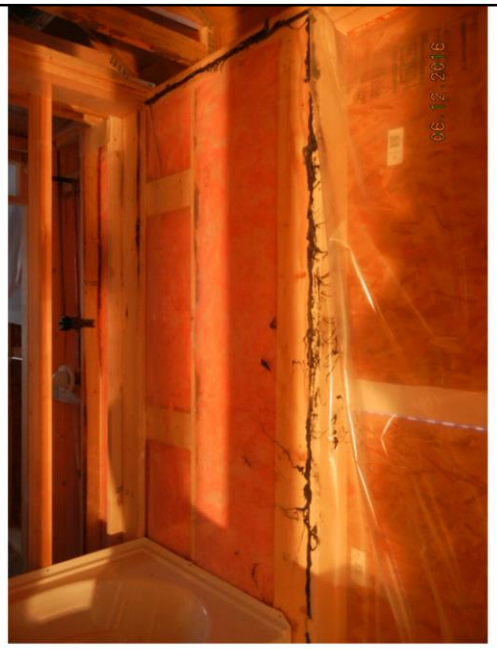
3 modes of meeting airtightness in 9.36:

- Meet 9.25.3 and 9.36.2.10
- 9.25 PLUS a tested assembly blower door test (performance compliance)
- Blower door test (performance compliance)

Specific Areas for Prescriptive Compliance

- Between wall and ceiling assemblies
- Joints from the wall /ceiling interface to the top of the foundation
- Cantilevered floors
- Interfaces of windows, doors, skylights
- Interior walls that meet exterior walls
- Electrical wiring outlets, switches, recessed light fixtures
- Ducts, stacks, chimneys, - any penetrations through the wall, ceiling or foundation assemblies.
- Party walls

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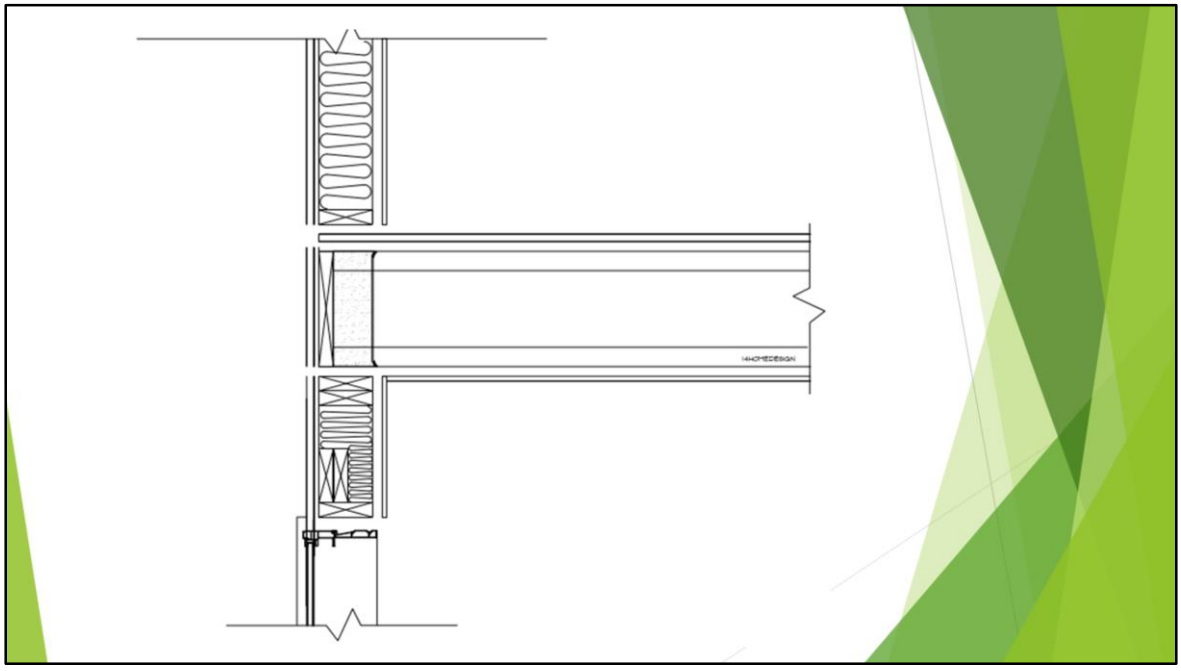
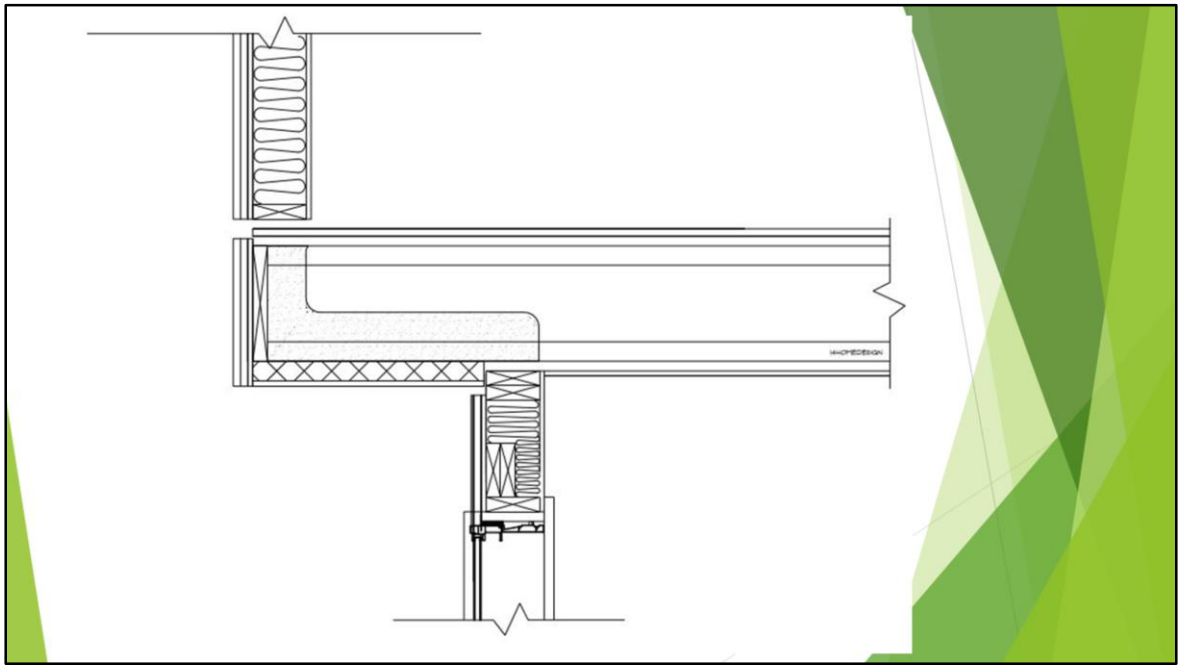
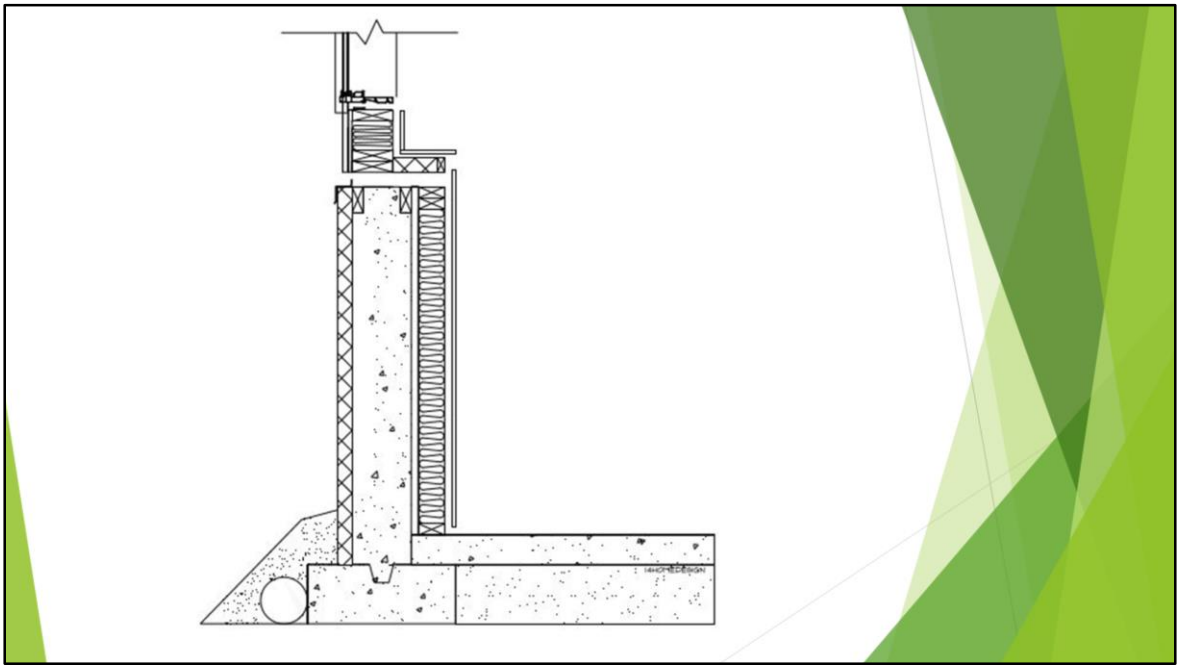


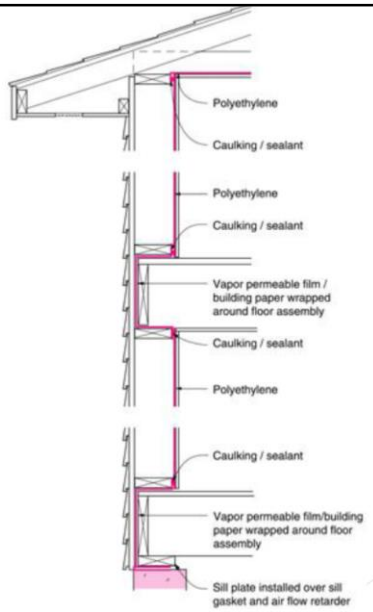


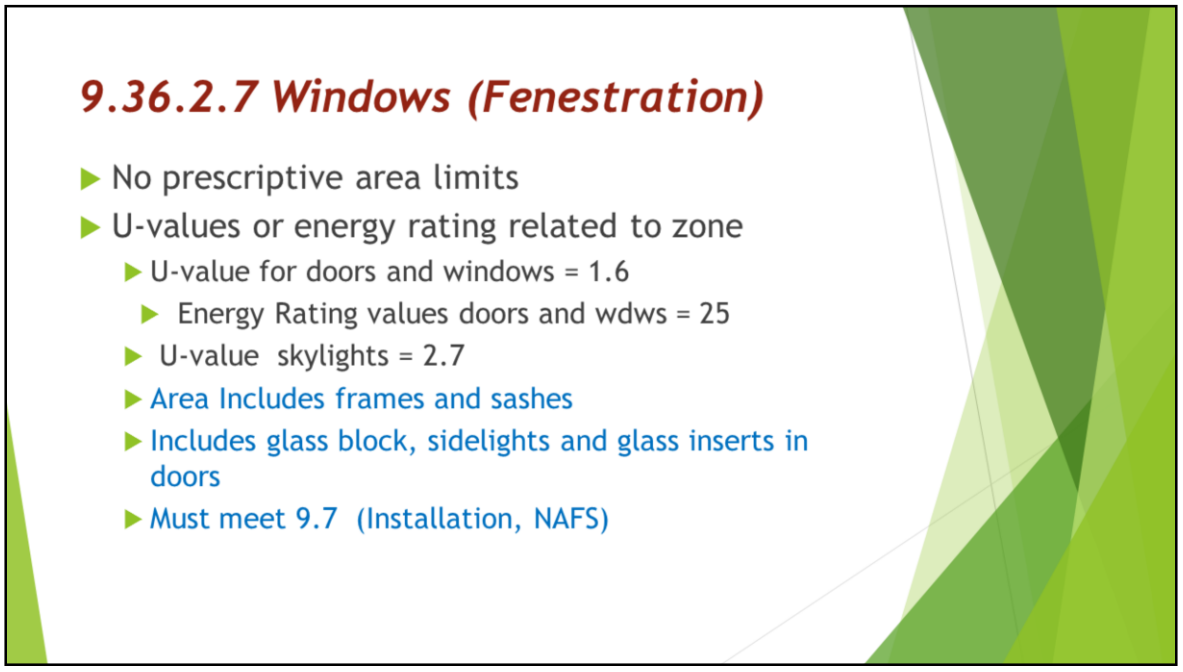



06.12.2016

Exercise #3 Air Sealing - Make the air barrier Continuous

- A system of Sheet materials, sealants and solid materials across the whole assembly

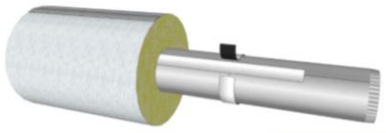




-9.7 Performance of Window
-9.36.1.2 (4) defines fenestration as all building envelope, assemblies, including their frames, that transfer visible light, such aa windows, clerestories, skylights, translucent wall panels, glass block, transom sidelights, sliding overhead or swinging glass door, and glass inserts in doors
-These numbers are for zones 6 and 7A
- ER is harder to reach as it has an air tightness requirement; difficult for sliding windows and sliding patio doors
-Could be an issue with some basement windows; Some door manufacturers.
- site-built windows do not need to comply to U-values but must still meet airtightness
-There is more information on compliance options for site-built windows and doors and glass block in section 9.36.2.7
-17% to 22% FDWR used as references in building envelope trade-off option 3
- 9.36 assumes an maximum window area of 22 % compared to 33% for the NECB but the maximum is not stated in the body of 9.36

HVAC Equipment and Ducts 9.36.3.

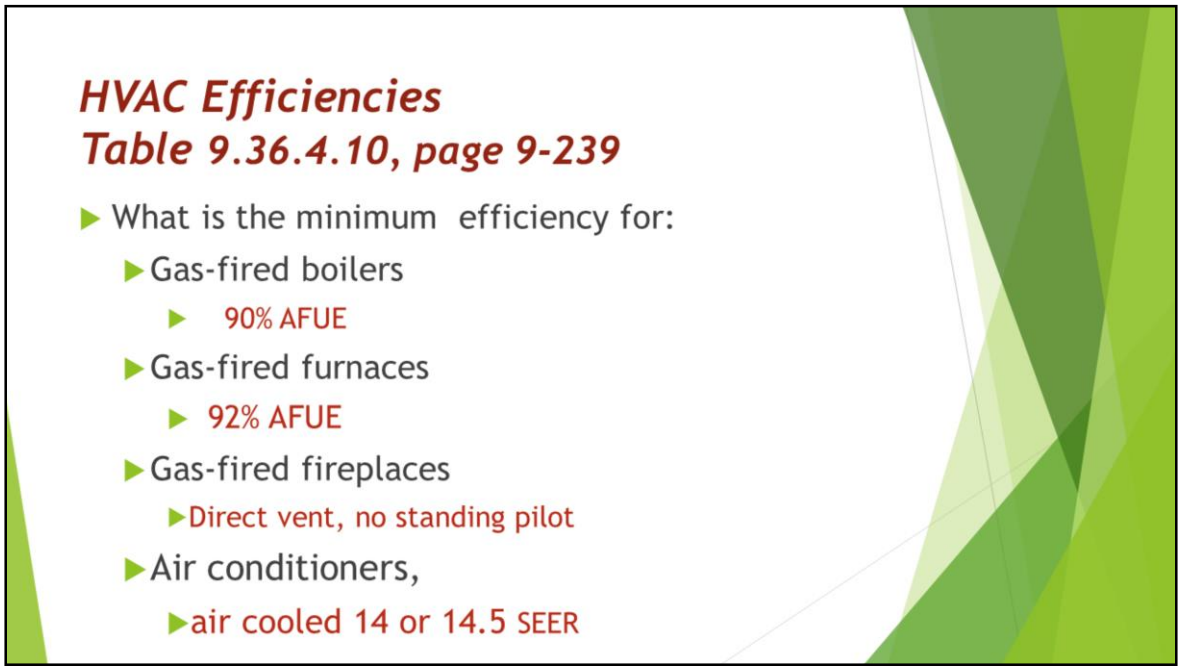
- Equipment sized as per good practice and (9.23 & 9.33)
- Ducts *outside the plane of insulation*
  - Sealed joints
  - Insulated to same level as required for above-grade walls
- Ducts - under insulated floors over unheated spaces
  - Sealed
  - Insulated to wall RSI
- Dampers on
  - HRV intakes



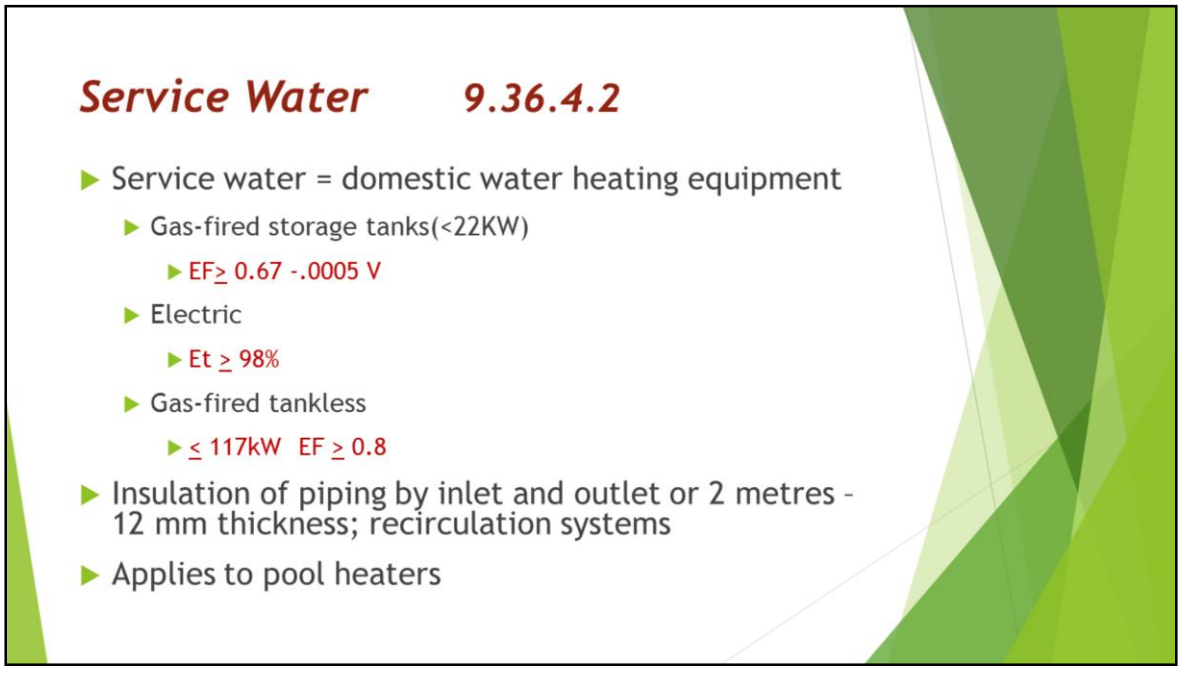
-Equipment sizing – do our contractors know how to do this? This has been an issue in B.C.
-Duct sizing – Best practice according to HRAI, ASHRAE, SMCANA
-Under floors – Does this apply to bonus room floors? Does not consider round ducts.

- Dampers not needed where other regulations do not permit them or on equipment that is designed to operate continuously (furnaces?)
-Piping installed to the hydronic standard, B-214

-Alberta has an additional require clause 9.36.3.3 3) that provides and exemption for Part 10 buildings with fuel-fired warm-air furnaces

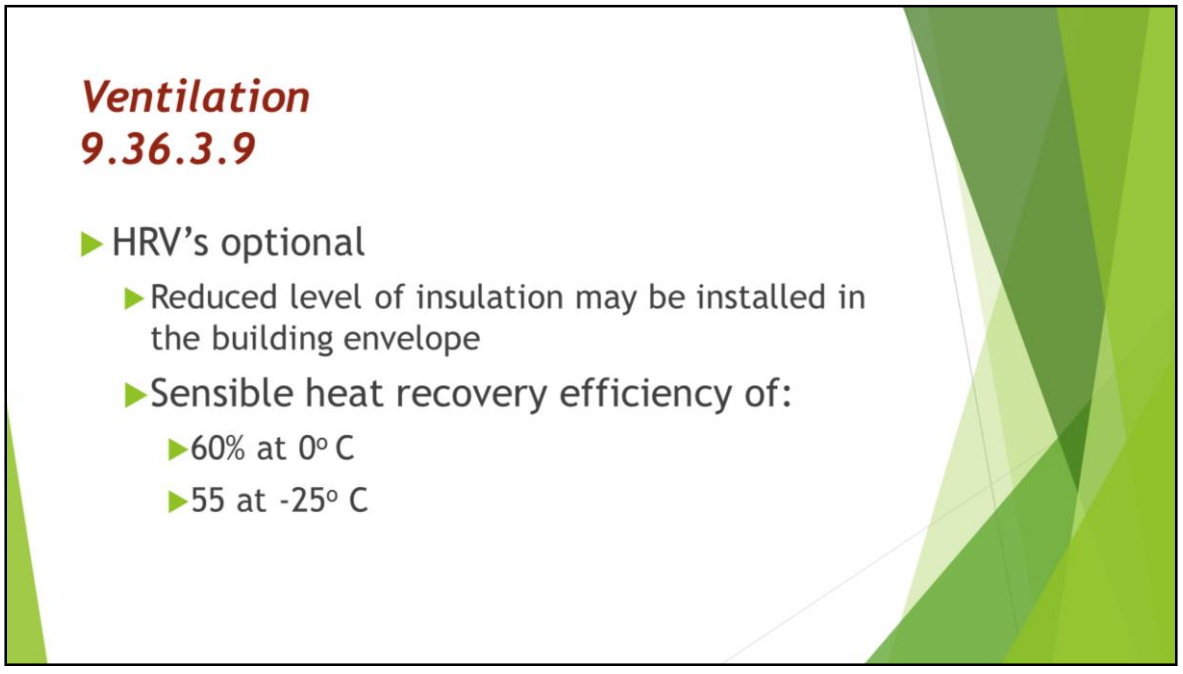


Fireplaces efficiencies according to CSA P4 or Enerchoice
Issue with these being considered as heating appliances
Split and single packages



-Such as boilers, pool heaters and storage tanks

- water heater tank efficiency is after standby losses

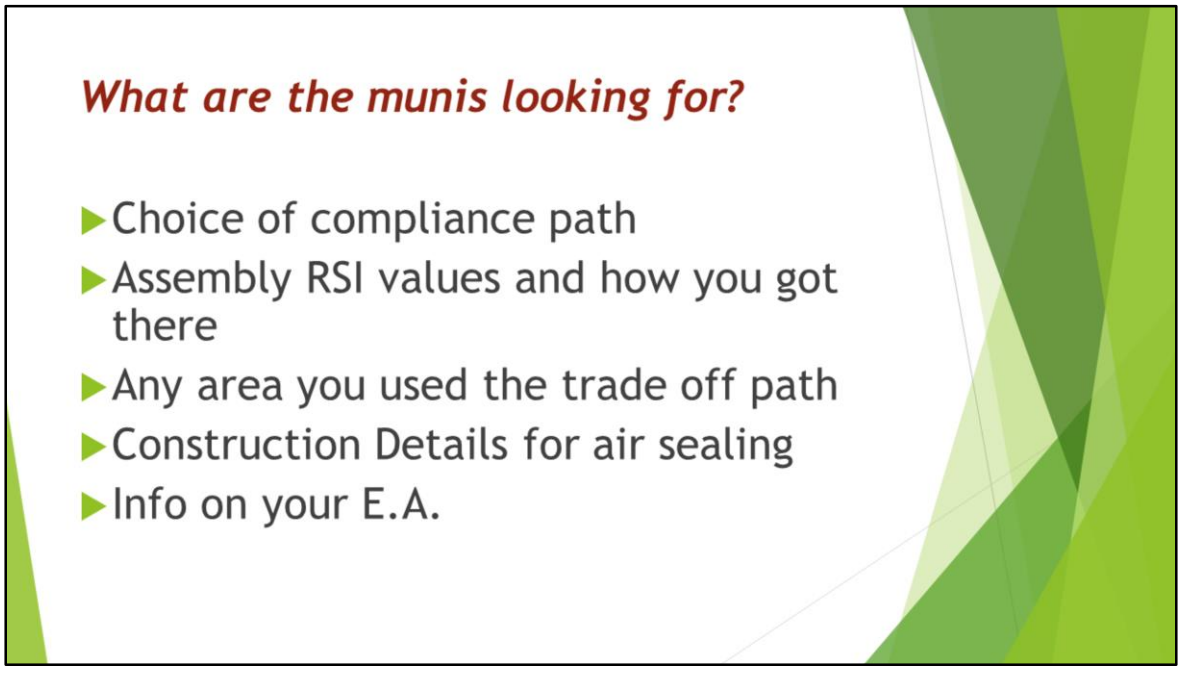


- No mention of installation type or requirements for installation – no standards, no reference for training etc.

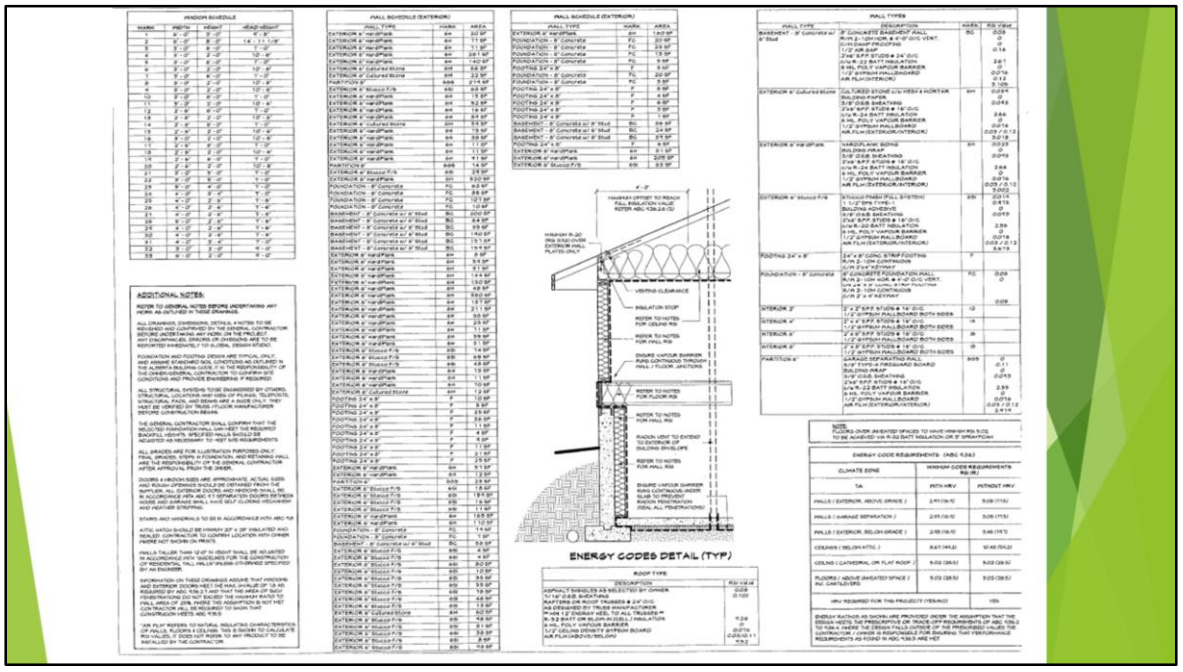
- Sensible heat recovery percentage are for 2.5% January design temperature of les than -10 C

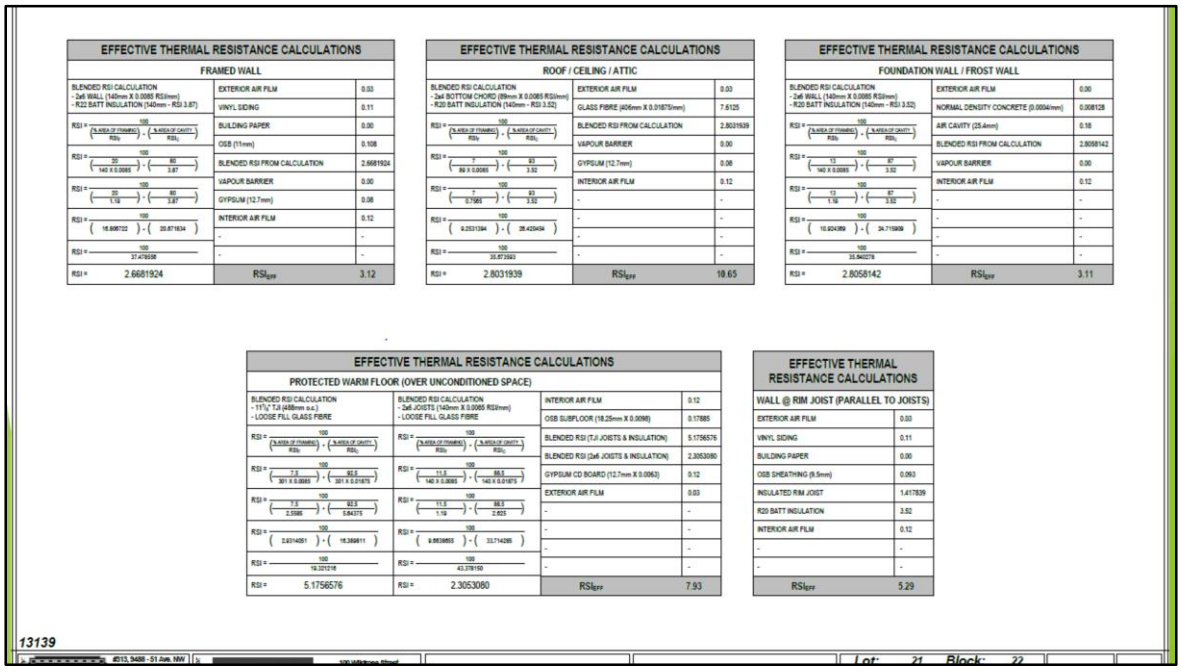
Trade-off (9.36.2.11)

- opaque for opaque, window for window
- several restrictions on this path;
- minimum thermal resistance levels (55%)
- areas must be the same


What are the munis looking for?
Choice of compliance path
Assembly RSI values and how you got there
Any area you used the trade off path
Construction Details for air sealing
Info on your E.A.

What Grande


ENERGY CODED DETAIL (TYP)



EFFECTIVE THERMAL RESISTANCE CALCULATIONS

FRAMED WALL

BLENDED RSI CALCULATION
- 2x6 WALL (140mm X 0.0085 RSI/mm)
- R22 BATT INSULATION (140mm - RSI 3.67)

RSI = 100 / ((% AREA OF FRAMING / RSI$_F$) + (% AREA OF CAVITY / RSI$_C$))

RSI = 100 / ((20 / (140 X 0.0085)) + (80 / 3.67))

RSI = 100 / ((20 / 1.19) + (80 / 3.67))

RSI = 100 / (16.806722 + 33.651634)

RSI = 100 / 37.478936

RSI = 2.6681924

EXTERIOR AIR FILM	0.03
VINYL SIDING	0.11
BUILDING PAPER	0.00
OSB (11mm)	0.108
BLENDED RSI FROM CALCULATION	2.6681924
VAPOUR BARRIER	0.00
GYPSUM (12.7mm)	0.08
INTERIOR AIR FILM	0.12
-	-
-	-
RSI$_{EFF}$	3.12

EFFECTIVE THERMAL RESISTANCE CALCULATIONS

ROOF / CEILING / ATTIC

BLENDED RSI CALCULATION
- 2x6 BOTTOM CHORD (89mm X 0.0085 RSI/mm)
- R20 BATT INSULATION (140mm - RSI 3.52)

RSI = 100 / ((% AREA OF FRAMING / RSI$_F$) + (% AREA OF CAVITY / RSI$_C$))

RSI = 100 / ((7 / (89 X 0.0085)) + (93 / 3.52))

RSI = 100 / ((7 / 0.7565) + (93 / 3.52))

RSI = 100 / (9.2531394 + 26.420454)

RSI = 100 / 35.673593

RSI = 2.8031939

EXTERIOR AIR FILM	0.03
GLASS FIBRE (406mm X 0.01875/mm)	7.5125
BLENDED RSI FROM CALCULATION	2.8031939
VAPOUR BARRIER	0.00
GYPSUM (12.7mm)	0.06
INTERIOR AIR FILM	0.12
-	-
-	-
-	-
RSI$_{EFF}$	10.65

EFFECTIVE THERMAL RESISTANCE CALCULATIONS

FOUNDATION WALL / FROST WALL

BLENDED RSI CALCULATION
- 2x6 WALL (140mm X 0.0085 RSI/mm)
- R20 BATT INSULATION (140mm - RSI 3.52)

RSI = 100 / ((% AREA OF FRAMING / RSI$_F$) + (% AREA OF CAVITY / RSI$_C$))

RSI = 100 / ((13 / (140 X 0.0085)) + (87 / 3.52))

RSI = 100 / ((13 / 1.19) + (87 / 3.52))

RSI = 100 / (10.924369 + 24.715909)

RSI = 100 / 35.640278

RSI = 2.8058142

EXTERIOR AIR FILM	0.00
NORMAL DENSITY CONCRETE (0.0004/mm)	0.008128
AIR CAVITY (25.4mm)	0.18
BLENDED RSI FROM CALCULATION	2.8058142
VAPOUR BARRIER	0.00
INTERIOR AIR FILM	0.12
-	-
-	-
-	-
-	-
RSI$_{EFF}$	3.11

EFFECTIVE THERMAL RESISTANCE CALCULATIONS

PROTECTED WARM FLOOR (OVER UNCONDITIONED SPACE)

BLENDED RSI CALCULATION
- 11⅞" TJI (488mm o.c.)
- LOOSE FILL GLASS FIBRE

RSI = 100 / ((% AREA OF FRAMING / RSI$_F$) + (% AREA OF CAVITY / RSI$_C$))

RSI = 100 / ((7.9 / (301 X 0.0085)) + (92.5 / (301 X 0.01875)))

RSI = 100 / ((7.9 / 2.5585) + (92.5 / 5.6475))

RSI = 100 / (2.9214051 + 16.380911)

RSI = 100 / 19.321216

RSI = 5.1756576

BLENDED RSI CALCULATION
- 2x6 JOISTS (140mm X 0.0085 RSI/mm)
- LOOSE FILL GLASS FIBRE

RSI = 100 / ((% AREA OF FRAMING / RSI$_F$) + (% AREA OF CAVITY / RSI$_C$))

RSI = 100 / ((11.5 / (140 X 0.0085)) + (88.5 / (140 X 0.01875)))

RSI = 100 / ((11.5 / 1.19) + (88.5 / 2.625))

RSI = 100 / (9.6638655 + 33.714285)

RSI = 100 / 43.378150

RSI = 2.3053080

INTERIOR AIR FILM	0.12
OSB SUBFLOOR (18.25mm X 0.0096)	0.17685
BLENDED RSI (TJI JOISTS & INSULATION)	5.1756576
BLENDED RSI (2x6 JOISTS & INSULATION)	2.3053080
GYPSUM CD BOARD (12.7mm X 0.0063)	0.12
EXTERIOR AIR FILM	0.03
-	-
-	-
-	-
RSI$_{EFF}$	7.93

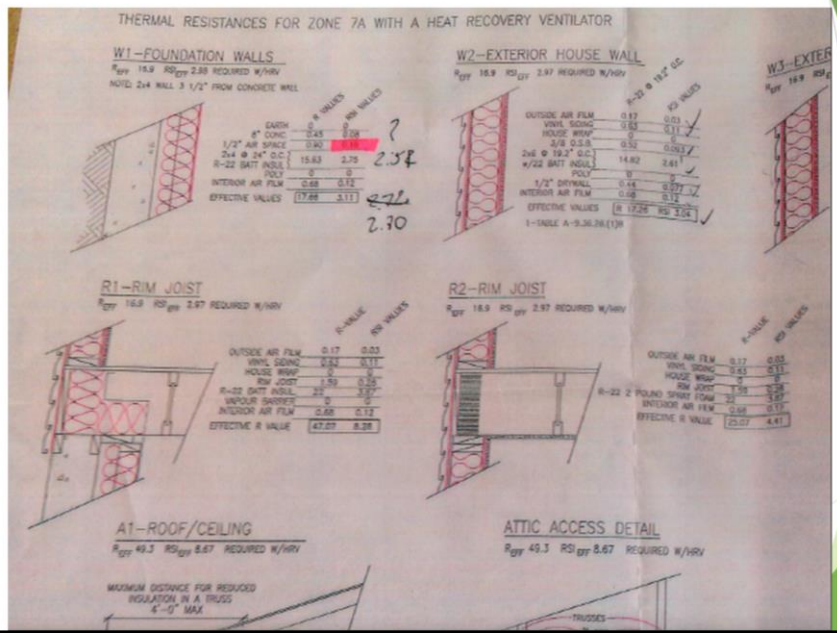
EFFECTIVE THERMAL RESISTANCE CALCULATIONS

WALL @ RIM JOIST (PARALLEL TO JOISTS)

EXTERIOR AIR FILM	0.03
VINYL SIDING	0.11
BUILDING PAPER	0.00
OSB SHEATHING (9.5mm)	0.063
INSULATED RIM JOIST	1.417839
R20 BATT INSULATION	3.52
INTERIOR AIR FILM	0.12
-	-
-	-
RSI$_{EFF}$	5.29

13139

#513, 9488 - 51 Ave, NW | Lot: 21 Block: 22


THERMAL RESISTANCES FOR ZONE 7A WITH A HEAT RECOVERY VENTILATOR

W1–FOUNDATION WALLS

W2–EXTERIOR HOUSE WALL

R1–RIM JOIST

R2–RIM JOIST

A1–ROOF/CEILING

ATTIC ACCESS DETAIL


Performance Path
Monte Heyn