Section 9.36 Energy Efficiency

Under the 2014 Alberta Building Code, section 9.36 goes into effect November 1, 2016.

There are 3 compliance paths, (1) Prescriptive, (2) Simple Trade off and (3) Performance

(1) Prescriptive - Follow table of insulation levels and mechanical efficiency (**Zone 7A** = Red Deer, Calgary, Edmonton)

Zone 7A	**NO HRV**		**WITH HRV**	
	RSI and Insulation Level		RSI and Insulation Level	
Attic Insulation	10.43 RSI	R-65	8.67 RSI	R-55
Walls & Rim	3.08 RSI	R-24 or R-22 @24" OC	2.97 RSI	R-22
Foundation	3.46 RSI	R-26	2.98 RSI	R-22
Cantilevers	5.02 RSI	R-28.5	5.02 RSI	R-28.5
Windows / Doors	U-1.6 (RSI 0.625)	R-3.55 .26 SHGC	U-1.6 (RSI 0.625)	R-3.55 .26 SHGC

(2) Simple trade Off – Trade insulation values of the building envelope. Reduce one and increase another.

(3) Performance - Perform two energy compliance models – a PROPOSED house and a code compliant baseline called a REFERENCE. If the house you want to build (PROPOSED) is equal to or less than the energy used by the REFERENCE house, you are in compliance.

Most houses currently being constructed in these regions, built with R-20 walls, Dual Low E Argon windows, R-12 foundation walls, air tightness of 2.5 ACH and R-40 attics that add heat recovery (HRV) will be code compliant.

You must also follow the prescriptive code requirements for air tightness shown below in 9.36.2.9 & 10

The following is a condensed version of the details of this code.

9.36.1 – GENERAL, Definitions, application and compliance

9.36.1.3 Compliance and Application

(2) Buildings of residential occupancy to which part 9 applies

(3) Subsection 9.36.5 applies to

a) houses

b) Buildings containing only dwelling units

Appendix A – A9.36.1.3 (3) Houses and common space – For the purpose of sentence 9.36.1.3 (3) the term houses includes detached houses, semi-detached houses, duplexes, triplexes, townhouses, row houses and boarding houses.

9.36.2 – BUILDING ENVELOPE

9.36.2.1 – Scope

9.36.2.3 (2) – Calculating Gross Areas – Total sum of all interior surface areas of all exterior building envelope assemblies including Rims, Windows, Doors,

9.36.2.3 (4) – Use actual frame size to measure doors and windows (not R.O.)

9.36.2.4 (1) – Effective thermal resistance and Thermal bridging calculation of assemblies

U-Value – Thermal Transmittance = Reciprocal of RSI

RSI-Value – Thermal resistance = R value (1 RSI = R- 5.678)

Tables for calculating Thermal Bridging (13 pages in Appendix)

9.36.2.4 (2, 3) – Minor penetrations – don't calculate, Major penetrations 2% or OVER must be calculated

9.36.2.4 (4) – Protected walls (i.e. garage common) can have their insulation value reduced by R–0.9

9.36.2.5 Continuity of insulation – Can't break the continuity, except;

9.36.2.5 (2) – Structural that penetrates – Insulate 4X in by the thickness (8" thick X 4 = 32" insulation inward) – or at least 60% of R- Value.

9.36.2.5 (6) – WALLS items inside – have to maintain R-value. Can't compress or remove. (i.e. plumbing vent pipes) Have to add.

9.36.2.5 (7) – FLOORS and/or CEILLINGS items inside – have to maintain R-value. Minimum insulation value outside the item is R-15.8 (i.e. plumbing vent pipes)

9.36.2.5 (8) – Rough Openings – have to maintain R-value of lowest component. i.e. Door to wall RO will require R-3.2 – HOWEVER if it blocks required drainage, DON'T INSULATE

9.36.2.6 – Thermal Characteristics of assemblies – with and without heat recovery

Table 9.36.2.6 – 9.36.2.8 EFFECTIVE Values -

Zone 7A	NO HRV		WITH HRV	
	RSI and Insulation Level		RSI and Insulation Level	
Attic Insulation	10.43 RSI	R-65	8.67 RSI	R-55
Walls & Rim	3.08 RSI	R-24 or R-22 @24" OC	2.97 RSI	R-22
Foundation	3.46 RSI	R-28	2.98 RSI	R-22
Cantilevers	5.02 RSI	R-28.5	5.02 RSI	R-28.5
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Appendix Tables A-9.36.2.6 (1) A EFFECTIVE Values Walls - Calculation

Wall Insulation	Wall	Value	Add*	Total	R-Value
R-19	2X6 16" OC	2.36 RSI	.44	2.80 RSI	15.90
R-22	2X6 16" OC	2.55 RSI	.44	2.99 RSI	16.98
R-24	2X6 16" OC	2.66 RSI	.44	3.10 RSI	17.6
R-19	2X6 24" OC	2.45 RSI	.44	2.89 RSI	16.41
R-22	2X6 24" OC	2.67 RSI	.44	3.11 RSI	17.66
R-24	2X6 24" OC	2.80 RSI	.44	3.24 RSI	18.40

Outside air film	0.03 RSI
Vinyl Siding	0.11 RSI
Building paper	0
Sheathing	0.093
Wall	***Use numbers from table***
Drywall	0.08
Inside air film	0.12
TOTAL	**0.44**

*You must add the other insulation values associated with sheathing, drywall and cladding to the wall assembly. See Appendix 9.36 for various cladding and materials insulation value

9.36.2.9 – Air Tightness – 3 options prescriptive and 2 tested (Blower Door) - Continuous across construction and joints and penetrations - Doors & Windows tested to NAFS and CSA 440

9.36.2.9 (5)– Fireplaces require a damper to prevent air through chimney when not in use

9.36.2.9 (6)– Air barrier should be vapour permeable

9.36.2.10 – Air barrier material spec- compatibility, free of holes

9.36.2.10 (5) – Air barrier membranes (paper or poly) shall have

- 2" lap
- Sealant or tape – Non hardening
- Structurally supported (backing both sides)

9.36.2.10 (7)– Penetrations should be airtight

9.36.2.10 (8)– Mechanical joints caulked – Under walls, under joist/rim,

9.36.2.10 (9)– Air tight window openings – mechanical jamb extensions

9.36.2.10 (10)– Air tight Cantilevers – bonus room floors

9.36.2.11– Trade off options

9.36.3 HVAC Requirements

9.36.3.9 (3)– Heat recovery – minimum efficiency 60% @ 0^0C and 60% @ -25^0C

Table 9.36.3.10 – Efficiency of equipment

A/C Split System	14.5 SEER or 11.5 EER
A/C single Package System	14 SEER or 11 EER
Gas Boiler	90% AFUE
Gas Furnace	92% AFUE

9.36.4 Service Water Heating Systems (DHW)

Table 9.36.4.2 – Efficiency of equipment

Gas - Tank	67% EF
Gas - Instantaneous	80% EF

Table 9.36.4.4 (1) – First 6' (2 m) in and out must have ½" pipe insulation

Table 9.36.4.4 (2) –½" pipe insulation required on entire recirculating system

Table 9.36.4.4 (3) –pipe insulation required on pipes outside the building envelope must be insulated with the same insulation level as the wall it goes through.

9.36.5 Performance Compliance

9.36.5.2 – Reference house will be the baseline to compare a proposed house to.

9.36.5.4 (8) – Ashrae 140 compliant software or manual calculation must be used – Same for both reference and proposed houses

9.36.5.6 (11) – Opaque Door to wall ratio is the same in both reference and proposed house models

9.36.5.7 (3) – Heating only is modeled where only heating provided same in both reference and proposed house models. If A/C is included it is modeled in both.

9.36.5.10 – Modeling Proposed house – Building Envelope

9.36.5.10 (9) – Model air tightness at 2.5 or 3.2 ACH

9.36.5.10 (12) – Tested on site -50 pascal differential – When house is substantially complete

9.36.5.11 – Modeling Proposed house – HVAC

9.36.5.11 (5-6) – Ventilation to meet 9.32.3.3 (number of bedrooms) at 8 hours per day

9.36.5.12 – Modeling Proposed house – Service Water (DHW)

9.36.5.14 – Modeling REFERENCE house – Building Envelope

9.36.5.14 (2) – ACH for reference house shall be 2.5

9.36.5.14 (3) – Use the NON-HRV tables for insulation values.

9.36.5.14 (5) – Windows / door distributed equally on 4 sides

9.36.5.14 (10) – For reference house use minimum 17% window door ratio divided equally on 4 sides when proposed house is less than 17%. When between 17% - 22% use actual number. When above 22% in proposed house use 22% maximum in reference house.

9.36.5.15 – Modeling Reference house – HVAC

9.36.5.16 – Modeling Reference house – Service Water (DHW)