Proposed Change: Energy Efficiency for Part 9 Buildings

CHANGE NUMBER: BCBC2018-R501-EE

CODE REFERENCE: British Columbia Building Code 2018 – Part 9 of Division B

BACKGROUND

Description

This change contains revisions to the performance requirements of service water heating and HVAC systems to align with the 2020 National Building Code (NBC). Other related proposed changes (see BCBC2018-R502-ESC and BCBC2018-R503-GHG) respond to government direction to require or enable cleaner, more energy efficient building systems.

In addition, the new base code prescriptive energy requirements are provided. These prescriptive tables may be found in Tables 9.36.2.6.-C, 9.36.2.7.-D, and 9.36.2.8.-C. Adjustments to the airtightness metrics as well as provisions relating to modelling and compliance of log homes were made in Subsection 9.36.5.

(Note: only code references that have been revised are included in the proposed code change)

Problem

The design and construction of buildings that are not equipped with energy efficient building systems will tend to use excessive amounts of energy for its desired function. In order to meet government mandates to improve energy efficiency and reduce the effects of climate change, more stringent energy requirements are required for buildings to meet these climate objectives.

Justification

To achieve local and provincial climate goals, new construction including residential buildings, will be required to adapt accordingly. The Government's mandate to require all new buildings to be zero-carbon by 2030 and a commitment for 20% improvement in energy efficiency by 2022 has led to the development of stricter energy requirements in the building code to ensure that each new build conforms to the base code minimum in energy performance.

The Government of British Columbia supports the harmonization of construction codes across Canada, and thus signed the Construction Codes Reconciliation Agreement (CCRA) under the Canadian Free Trade Agreement (CFTA). The agreement supports the harmonization of building, plumbing, and fire and other construction codes across Canada, as well as removing other barriers in construction codes that will help decrease construction costs and improve efficiencies in manufacturing, operation, inspection, education and training. As such, the changes to code requirements have been reflected in the revisions to the airtightness metrics, performance requirements of service water heating and HVAC systems, and Subsection 9.36.5. to better align with the 2020 National Building Code (NBC).

Furthermore, industry capacity to design to and apply energy performance requirements is acknowledged, and as a response, a prescriptive compliance pathway was introduced to provide flexibility to those jurisdictions that are in the transitional stage. These prescriptive options may be found in Tables 9.36.2.6.-C, 9.36.2.7.-D, and 9.36.2.8.-C

Log homes as a specific building archetype may have difficulty achieving these stricter energy performance requirements and accommodations have been provided to account for this. Further research is ongoing.

PROPOSED CHANGE

9.36.1.2. Definitions

1) For the purpose of this Section, the term "common space" shall mean all spaces required to be *conditioned spaces* by Article 9.33.2.1. that are not within a *suite* but shall not include crawl spaces and *vertical service spaces*. (See Note A-9.36.1.3.(3).)

2) For the purpose of this Section, the term "overall thermal transmittance," or U-value, shall mean the rate, in W/(m2·K), at which heat is transferred through a *building* assembly that is subject to temperature differences. (See Note A-9.36.1.2.(2).)

3) For the purpose of this Section, the term "effective thermal resistance," or RSI value, shall mean the inverse of the overall thermal transmittance of an assembly, in (m2·K)/W. (See Note A-9.36.1.2.(3).)

4) For the purpose of this Section, the term "fenestration" shall mean all *building* envelope assemblies, including their frames, that transfer visible light, such as windows, clerestories, skylights, translucent wall panels, glass block assemblies, transoms, sidelights, sliding, overhead or swinging glass doors, and glazed inserts in doors, etc. (See Note A-9.36.1.2.(4).)

5) For the purpose of this Section, the term "annual energy consumption" shall mean the annual sum of service water heating and space-conditioning energy consumption of the proposed house design, as calculated in accordance with Article 9.36.5.4. or 9.36.6.5. as applicable. (See Note A-9.36.1.2.(5) & (6).)

6) For the purpose of this Section, the term "house energy target" shall mean the annual energy consumption of the reference house, as calculated in accordance with 9.36.5.4. or 9.36.6.5. as applicable. (See Note A-9.36.1.2.(5) & (6).)

7) For the purpose of this Section, the term "principal ventilation rate" shall mean the normal operating exhaust capacity of the principal ventilation fan as required by Article 9.32.3.3.

8) For the purpose of this Section, the term "volume of *conditioned space*" shall refer to the volume measured at the interior surfaces of exterior walls, ceilings and floors of a *building*.

9) For the purposes of this Section, the term "log homes" shall mean homes with a type of construction whereby the exterior vertical opaque walls primarily consist of structural log members.

9.36.1.3. Compliance and Application

(See Note A-9.36.1.3.)

1) Except as provided in Sentences (2) to (~~5~~8), *buildings* shall comply with
a) the prescriptive or trade-off requirements in Subsections 9.36.2. to 9.36.4.,
b) the performance requirements in Subsection 9.36.5.,
c) notwithstanding Article 1.1.1.1. of Division A of the NECB, the NECB, or
d) Subsection 9.36.6.

2) Subsections 9.36.2. to 9.36.4. apply to
a) *buildings* of *residential occupancy* to which Part 9 applies,
b) *buildings* containing *business and personal services*, *mercantile* or *low-hazard industrial occupancies* to which Part 9 applies whose combined total *floor area* does not exceed 300 m2, excluding parking garages that serve *residential occupancies*, and
c) *buildings* containing a mix of the *residential* and non-*residential occupancies* described in Clauses (a) and (b).

3) Subsections 9.36.5. and 9.36.6. apply only to
a) houses with or without a *secondary suite* including their common spaces, and

b) except for common spaces in a house with a secondary suite, *buildings* containing only *dwelling units* and common spaces whose total *floor area* does not exceed 20% of the total *floor area* of the *building*.

(See Note A-9.36.1.3.(3).)

4) *Buildings* containing non-*residential occupancies* whose combined total *floor area* exceeds 300 m² or *medium-hazard industrial occupancies* shall comply with the NECB.

5) *Buildings* or portions of *buildings* that are not *conditioned spaces*, and *residential buildings* that are not intended for use in the winter months on a continuing basis, are exempted from the requirements of this Section. (See Note A-9.36.1.3.(5).)

6) Notwithstanding Sentence (2), Tables 9.36.2.6.-C, 9.36.2.7.-D, and 9.36.2.8.-C apply only to

a) houses with or without a *secondary suite* including their common spaces, and

b) except for common spaces in a house with its *secondary suite*, *buildings* containing only *dwelling units* and common spaces whose total *floor area* does not exceed 20% of the total *floor area* of the *building*.

(See Note A-9.36.1.3.(3).)

7) Log homes shall conform to the requirements of

a) Subsections 9.36.2. to 9.36.4, or

b) Subsection 9.36.5.

8) Subsection 9.36.6 and Tables 9.36.2.6.-C, 9.36.2.7.-D, and 9.36.2.8.-C do not apply to log homes.

9.36.2.6. Thermal Characteristics of Above-ground Opaque Building Assemblies

1) Except as provided in Sentences (2) and 9.36.2.8.(3) and Articles 9.36.2.5. and 9.36.2.11., the effective thermal resistance of above-ground opaque *building* assemblies or portions thereof shall be not less than that shown for the applicable heating-degree day category in

a) Table 9.36.2.6.-A, where the ventilation system does not include heat-recovery equipment, ~~or~~

b) Table 9.36.2.6.-B, where the ventilation system includes heat-recovery equipment conforming to Article 9.36.3.9., or

c) Table 9.36.2.6.-C, where the ventilation or space conditioning systems contain either a heat-recovery ventilator conforming to Sentence 9.36.3.9.(3), or a heat pump in conformance with 9.36.3.10.

(See Note A-9.36.2.6.(1).)

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

Notes to Table 9.36.2.6.-A:
(1) See Article 1.1.3.1.
(2) See Sentence 9.36.2.8.(3) for requirements concerning the above-ground portion of *foundation* walls.

Table 9.36.2.6.-B
Effective Thermal Resistance of Above-ground Opaque Assemblies in Buildings with 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	6.91	8.67	8.67	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	2.97	2.97	2.97	3.08	3.08
Floors over unheated spaces	4.67	4.67	4.67	5.02	5.02	5.02

Notes to Table 9.36.2.6.-B:
(1) See Article 1.1.3.1.
(2) See Sentence 9.36.2.8.(3) for requirements concerning the above-ground portion of *foundation* walls.

Table 9.36.2.6.-C
Effective Thermal Resistance and Continuous Insulation Requirements of Above-ground Opaque Assemblies for Buildings Containing Only Dwelling Units
Forming Part of Sentences 9.36.1.3.(6) and 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) and Continuous Insulation Requirements (CI), $(m^2 \cdot K)/W$					
Ceilings below attics(3)	8.67	8.67	14.00	14.00	14.00	14.00
Cathedral ceilings and roof decks(4)	4.67	4.67	4.67	5.02	5.02	5.02
Continuous insulation of flat roofs(5)(6)	5.28 ci	5.28 ci	5.28 ci	5.72 ci	5.72 ci	5.72 ci
Walls(2)	3.08	3.69	3.69	3.69	3.96	3.96
Floors over unheated spaces	4.67	4.67	4.67	5.02	5.02	5.02

Notes to Table 9.36.2.6.-C:
(1) See Article 1.1.3.1.
(2) See Sentence 9.36.2.8.(3) for requirements concerning the above-ground portion of *foundation* walls.
(3) Notwithstanding Sentence 9.36.2.6.(3), ceilings below attics shall not have a reduction in effective thermal resistance above the exterior wall. Unobstructed vent areas and clearances are to be provided in accordance with Subsection 9.19.1.
(4) For the purposes of this table, a roof deck shall mean a horizontal portion of a roof intended for *occupancy*.
(5) For the purposes of this table, flat roofs shall mean a roof that is not intended for *occupancy*.
(6) 'ci' denotes continuous insulation whereby the RSI value provided indicates the thermal resistance of the continuous insulation layer and not the entire assembly.

2) The effective thermal resistance of *rim joists* shall be not less than that required for above-ground walls in Table 9.36.2.6.-A or 9.36.2.6.-B, as applicable.

3) A reduction in the effective thermal resistance of ceiling assemblies in attics under sloped roofs is permitted for a length no greater than 1 200 mm but only to the extent imposed by the roof slope and minimum venting clearance, provided the nominal thermal resistance of the insulation directly above the

exterior wall is not less than 3.52 (m2·K)/W. (See Note A-9.36.2.6.(3).)

4) Except for tubular daylighting devices, the minimum effective thermal resistance values for walls stated in Tables 9.36.2.6.-A and 9.36.2.6.-B shall also apply to shafts for skylights.

9.36.2.7. Thermal Characteristics of Fenestration, Doors and Skylights

1) Except as provided in Sentences (2) to (~~10~~ 11) and Article 9.36.2.11., fenestration and doors shall have an overall thermal transmittance (U-value) not greater than, or an Energy Rating not less than, the values listed in Table 9.36.2.7.-A for the applicable heating-degree day category.
(See Note A-9.36.2.7.(1) and (2).)

Table 9.36.2.7.-A
Required Thermal Characteristics of Fenestration and Doors
Forming Part of Sentence 9.36.2.7.(1)

Components	Thermal Characteristics[1]	Heating Degree-Days of *Building* Location,[2] 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
Fenestration[3] and doors	Max. U-value, W/(m²·K)	1.8~~0~~4	1.8~~0~~4	1.6~~0~~1	1.6~~0~~1	1.4~~0~~4	1.4~~0~~4
	Min. Energy Rating	21	21	25	25	29	29

Notes to Table 9.36.2.7.-A:
(1) See Note A-Table 9.36.2.7.-A.
(2) See Article 1.1.3.1.
(3) Except skylights (see Sentence (2)) and glass block assemblies (see Sentence (4)).

2) Skylights shall have an overall thermal transmittance not greater than the values listed in Table 9.36.2.7.-B for the applicable heating-degree day category. (See Note A-9.36.2.7.(1) and (2).)

Table 9.36.2.7.-B
Overall Thermal Transmittance of Skylights
Forming Part of Sentence 9.36.2.7.(2)

Components	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
	Maximum Overall Thermal Transmittance, W/(m² · K)					
Skylights	2.9~~0~~2	2.9~~0~~2	2.7~~0~~5	2.7~~0~~5	2.4~~0~~1	2.4~~0~~1

Notes to Table 9.36.2.7.-B:
(1) See Article 1.1.3.1.

3) Except for site-assembled or site-glazed factory-made fenestration products, curtain wall construction, and site-built windows and glazed doors that are tested in accordance with Sentence 9.36.2.2.(3), site-built windows and glazed doors need not comply with Sentence (1), provided they are constructed in accordance with one of the options presented in Table 9.36.2.7.-C for the applicable climate zone. (See Note A-9.36.2.7.(3).)

Table 9.36.2.7.-C
Compliance Options for Site-built Windows and Glazed Portion of Doors
Forming Part of Sentence 9.36.2.7.(3)

Component	Description of Component	Compliance Options							
		Climate Zones 4 and 5			Climate Zones 6 and 7A			Climate Zones 7B and 8	
		≤ 3999 HDD			4000 to 5999 HDD			≥ 6000 HDD	
		1	2	3	1	2	3	1	2
Frame	non-metallic	✓	✓	–	✓	✓	–	✓	✓
	thermally broken metallic	–	–	✓	–	–	✓	–	–
Glazing	double	–	✓	–	–	–	–	–	–
	triple	✓	–	✓	✓	✓	✓	✓	✓
	argon-filled	–	✓	–	✓	–	✓	–	✓
Low-e coating	none	✓	–	–	–	–	–	–	–
	number of panes with ≤ 0.10	–	≥ 1	–	–	–	–	≥ 2	–
	number of panes with ≤ 0.20	–	–	2	≥ 1	2	≥ 2	–	≥ 2
Spacer	size, mm	12.7	–	12.7	≥ 12.7	12.7	≥ 12.7	≥ 12.7	≥ 12.7
	non-metallic	–	✓	–	–	–	–	–	–

4) Glass block assemblies separating *conditioned space* from unconditioned space or the exterior shall have

a) an overall thermal transmittance of not more than 2.9 W/(m2·K), and
b) a total aggregate area of not more than 1.85 m2.

5) Reserved.

6) Storm windows and doors need not comply with Sentence (1).

7) Vehicular access doors separating a *conditioned space* from an unconditioned space or the exterior shall have a nominal thermal resistance of not less than 1.1 (m2·K)/W.

8) Access hatches separating a *conditioned space* from an unconditioned space shall be insulated to a nominal thermal resistance of not less than 2.6 (m2·K)/W.

9) A door separating a *conditioned space* from an unconditioned space or the exterior is not required to conform to Sentence (1) if,

a) in the case of a *building* in a location with a heating degree-day value of less than or equal to 3999, the door is one of not more than three nonconforming doors, each of which has an overall thermal transmittance not greater than 2.10 W/m2·K,
b) in the case of a *building* in a location with a heating degree-day value of at least 4000 and not greater than 5999, the door is one of not more than two nonconforming doors, each of which has an overall thermal transmittance not greater than 2.10 W/m2·K,
c) in the case of a *building* in a location with a heating degree-day value of greater than or equal to 6000, the door is one of not more than two nonconforming doors, each of which has an overall thermal transmittance not greater than 2.00 W/m2·K, or
d) in any case, the door is the only nonconforming door and has an overall thermal transmittance not greater than 2.60 W/m2·K.

10) A *building* described in Clause (9)(a) or (b) is permitted to have an additional nonconforming door with an overall thermal transmittance not greater than 2.10 W/m2·K if the effective thermal resistance of the ceilings of the *building* is at least 0.88 m2·K/W greater than the relevant value shown in Table

9.36.2.6.A. or Table 9.36.2.6.B., as applicable.

11) Except as permitted by Sentences (9) and (10), for *buildings* described in Sentence 9.36.1.3.(6), fenestration and doors shall have an overall thermal transmittance (U-value) not greater than the values listed in Table 9.36.2.7.-D for the applicable heating-degree day category.

Table 9.36.2.7.-D
Required Thermal Characteristics of Fenestration and Doors for Buildings Containing Only Dwelling Units
Forming Part of Sentences 9.36.1.3.(6) and 9.36.2.7.(1)

Components	Thermal Characteristics[1]	Heating Degree-Days of *Building* Location,[2] 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
Fenestration[3] and doors	Max. U-value, W/(m²·K)	1.22	1.22	1.22	1.22	1.22	1.22

Notes to Table 9.36.2.7.-D:
(1) See Note A-Table 9.36.2.7.-A.
(2) See Article 1.1.3.1.
(3) Except skylights (see Sentence (2)) and glass block assemblies (see Sentence (4)).

9.36.2.8. Thermal Characteristics of Building Assemblies Below-Grade or in Contact with the Ground

1) Except as provided in Sentence (2) and Article 9.36.2.5., the effective thermal resistance of *building* assemblies that are below-*grade* or in contact with the ground shall be not less than that shown for the applicable heating-degree day category in

a) Table 9.36.2.8.-A, where the ventilation system does not include heat-recovery equipment, ~~or~~

b) Table 9.36.2.8.-B, where the ventilation system includes heat-recovery equipment conforming to Article 9.36.3.9., or

c) Table 9.36.2.8.-C, where the ventilation or space conditioning systems contain either a heat-recovery ventilator conforming to Sentence 9.36.3.9.(3), or a heat pump in conformance with 9.36.3.10.

(See Note A-9.36.2.8.(1).)

Table 9.36.2.8.-A
Effective Thermal Resistance of Assemblies Below-Grade or in Contact with the Ground in Buildings without a Heat-Recovery Ventilator
Forming Part of Sentence 9.36.2.8.(1) to (9)

Building Assembly Below-Grade or in Contact with the Ground[1]	Heating Degree-Days of Building Location,[2] 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), (m² · K)/W					
Foundation walls	1.99	2.98	2.98	3.46	3.46	3.97
Unheated floors[3]						
below frost line [4][5]	uninsulated	uninsulated	uninsulated	uninsulated	uninsulated	uninsulated
above frost line [5]	1.96	1.96	1.96	1.96	1.96	1.96
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	4.44	4.44
Heated floors[6]	2.32	2.32	2.32	2.84	2.84	2.84
Slabs-on-grade with an integral footing[6]	1.96	1.96	3.72	3.72	3.72	4.59

Notes to Table 9.36.2.8.-A:
(1) See Note A-Tables 9.36.2.8.-A and -B.
(2) See Article 1.1.3.1.
(3) Does not apply to below-grade floors over heated crawl spaces.
(4) Typically applies to floors-on-ground in full-height *basements*.
(5) Refers to undisturbed frost line before house is constructed.
(6) See Sentence 9.25.2.3.(5) for requirement on placement of insulation. The design of slabs-on-grade with an integral footing is addressed in Part 4 (see Article 9.16.1.2.).

Table 9.36.2.8.-B
Effective Thermal Resistance of Assemblies Below-Grade or in Contact with the Ground in Buildings with a Heat-Recovery Ventilator
Forming Part of Sentence 9.36.2.8.(1) to (9)

Building **Assembly Below-Grade or in Contact with the Ground[1]**	**Heating Degree-Days of Building Location,[2] 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					
Foundation walls	1.99	2.98	2.98	2.98	2.98	2.98
Unheated floors[3]						
below frost line [4][5]	uninsulated	uninsulated	uninsulated	uninsulated	uninsulated	uninsulated
above frost line [5]	1.96	1.96	1.96	1.96	1.96	1.96
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	4.44	4.44
Heated floors[6]	2.32	2.32	2.32	2.84	2.84	2.84
Slabs-on-grade with an integral footing[6]	1.96	1.96	1.96	2.84	2.84	3.72

Notes to Table 9.36.2.8.-B:
(1) See Note A-Tables 9.36.2.8.-A and -B.
(2) See Article 1.1.3.1.
(3) Does not apply to below-grade floors over heated crawl spaces.
(4) Typically applies to floors-on-ground in full-height *basements*.
(5) Refers to undisturbed frost line before house is constructed.
(6) See Sentence 9.25.2.3.(5) for requirement on placement of insulation. The design of slabs-on-grade with an integral footing is addressed in Part 4 (see Article 9.16.1.2.).

Table 9.36.2.8.-C
Effective Thermal Resistance of Assemblies Below-Grade or in Contact with the Ground for Buildings Containing Only Dwelling Units
Forming Part of Sentences 9.36.1.3.(6) and 9.36.2.8.(1) to (9)

Building **Assembly Below-Grade or in Contact with the Ground[1]**	**Heating Degree-Days of Building Location,[2] 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) and Continuous Insulation Requirements (CI), ($m^2 \cdot K$)/W					
Continuous insulation of *Foundation* walls[7]	3.46 ci	3.97 ci	3.97 ci	3.97 ci	3.97 ci	3.97 ci
Unheated floors[3][8]						
below frost line [4][5]	2.98	2.98	2.98	2.98	2.98	2.98
above frost line [5]	3.46	3.46	3.46	3.46	3.46	3.46
Heated and unheated floors on permafrost	n/a	n/a	n/a	n/a	4.44	4.44
Heated floors[6]	3.46	3.46	3.46	3.97	3.97	3.97
Slabs-on-grade with an integral footing[6]	3.46	3.46	3.46	3.97	3.97	3.97

Notes to Table 9.36.2.8.-C:
(1) See Note A-Tables 9.36.2.8.-A and -B.

(2) See Article 1.1.3.1.
(3) Does not apply to below-grade floors over heated crawl spaces.
(4) Typically applies to floors-on-ground in full-height *basements*.
(5) Refers to undisturbed frost line before house is constructed.
(6) See Sentence 9.25.2.3.(5) for requirement on placement of insulation. The design of slabs-on-grade with an integral footing is addressed in Part 4 (see Article 9.16.1.2.).
(7) 'ci' denotes continuous insulation whereby the RSI value provided indicates the thermal resistance of the continuous insulation layer and not the entire assembly.
(8) Unheated floors shall be insulated to the effective thermal resistance required in Table 9.36.2.8.-C under their full bottom surface including exterior edges.

2) Where an entire floor assembly falls into two of the categories listed in Tables 9.36.2.8.-A, ~~and~~ 9.36.2.8.-B and 9.36.2.8.-C, the more stringent value shall apply. (See Note A-9.36.2.8.(2).)

3) Where the top of a section of *foundation* wall is on average less than 600 mm above the adjoining ground level, the above-ground portion of that section of wall shall be insulated to the effective thermal resistance required in Table 9.36.2.8.-A, ~~or~~ 9.36.2.8.-B or 9.36.2.8.-C.

4) Unheated floors-on-ground that are above the frost line and have no embedded heating pipes, cables or ducts shall be insulated to the effective thermal resistance required in Table 9.36.2.8.-A, ~~or~~ 9.36.2.8.-B or 9.36.2.8.-C

a) on the exterior of the *foundation* wall down to the footing, or
b) on the interior of the *foundation* wall and, as applicable,
i) beneath the slab for a distance not less than 1.2 m horizontally or vertically down from its perimeter with a thermal break along the edge of the slab that meets at least 50% of the required thermal resistance,
ii) on top of the slab for a distance not less than 1.2 m horizontally from its perimeter, or
iii) within the wooden sleepers below the floor for a distance not less than 1.2 m horizontally from its perimeter.

(See Note A-9.36.2.8.(4).)

5) Except as provided in Sentence (6), floors-on-ground with embedded heating ducts, cables or pipes shall be insulated to the effective thermal resistance required in Table 9.36.2.8.-A, ~~or~~ 9.36.2.8.-B or 9.36.2.8.-C under their full bottom surface including the edges.

6) Where only a portion of a floor-on-ground has embedded heating ducts, cables or pipes, that heated portion shall be insulated to the effective thermal resistance required in Table 9.36.2.8.-A, ~~or~~ 9.36.2.8.-B or 9.36.2.8.-C under its full bottom surface to 1.2 m beyond its perimeter including exterior edges if applicable.

7) In addition to the requirements stated in Sentences (5) and (6), heated floors-on-ground shall be insulated to the effective thermal resistance required in Table 9.36.2.8.-A, ~~or~~ 9.36.2.8.-B or 9.36.2.8.-C vertically

a) around their perimeter, or
b) on the outside of the *foundation* wall, extending down to the level of the bottom of the floor.

8) Floors on permafrost shall be insulated to the effective thermal resistance required in Table 9.36.2.8.-A, ~~or~~ 9.36.2.8.-B, or 9.36.2.8.-C under the entire slab and around all edges, and under the integral perimeter footing.

9) Slabs-on-grade with an integral perimeter footing shall

a) be insulated to the effective thermal resistance required in Table 9.36.2.8.-A, ~~or~~ 9.36.2.8.-B, or 9.36.2.8.-C under the entire slab and around all edges, but not under the integral perimeter footing, and
b) be constructed with skirt insulation having the same effective thermal resistance as the insulation installed under the slab.

(See Note A-9.36.2.8.(9).) (See also Sentences 9.25.2.3.(5) and 9.36.2.5.(8).)

10) Junctions between below-*grade* assemblies shall be protected from the ingress of *soil* gas in conformance with Subsection 9.25.3.

9.36.2.11. Trade-off Options for Above-ground Building Envelope Components and Assemblies

(See Note A-9.36.2.11.)

1) Subject to the limitations stated in Sentences (6) to (~~8~~ 9), the trade-off options described in Sentences (2) to (4) apply only to above-ground *building* envelope components and assemblies, or portions thereof, of a single *building*.

2) The effective thermal resistance of one or more above-ground opaque *building* envelope assemblies is permitted to be less than that required in Article 9.36.2.6., provided

a) the total areas of all proposed and reference assemblies are equal,

b) the effective thermal resistance of one or more other proposed above-ground opaque *building* envelope assembly areas is increased to more than that required by Article 9.36.2.6., and

c) the sum of the areas of all traded above-ground opaque *building* envelope assemblies divided by their respective effective thermal resistance is less than or equal to what it would be if all assemblies complied with Article 9.36.2.6.

(See Notes A-9.36.2.11.(2) and A-9.36.2.11.(2) and (3).)

3) The effective thermal resistance of one or more windows, as calculated in accordance with Sentence (5), is permitted to be less than that required in Article 9.36.2.7., provided

a) the total areas of all traded windows are equal,

b) the traded windows are located in the same orientation,

c) the effective thermal resistance of one or more other windows is increased to more than that required by Article 9.36.2.7., and

d) the sum of the areas of all traded windows divided by their respective effective thermal resistance is less than or equal to what it would be if all windows complied with Article 9.36.2.7.

(See Notes A-9.36.2.11.(3) and A-9.36.2.11.(2) and (3).)

4) The effective thermal resistance of one or more portions of floor insulation or ceiling insulation in attics under sloped roofs in *building*s that are one *storey* in *building height* is permitted to be less than that required in Article 9.36.2.6., provided

a) the total area of fenestration, excluding skylights, and doors does not exceed 15% of the above-ground gross wall area as calculated in accordance with Article 9.36.2.3.,

b) the floor-to-ceiling height measured from the top of the subfloor to the underside of the finished ceiling of the *storey* does not exceed 2.34 m,

c) the distance measured from the top of the subfloor to the underside of the bottom chord of the truss or joist of the roof is not more than 2.39 m, and

d) the difference between the sum of the proposed areas of ceilings or floors divided by their respective proposed effective thermal resistance and the sum of the reference areas of ceilings or floors divided by their respective thermal resistance required in Article 9.36.2.6. is not more than the difference between 17% fenestration and door area and the proposed fenestration and door areas divided by the required effective thermal resistance values for windows and doors in Article 9.36.2.7. (See Notes A-9.36.2.11.(4) and A-9.36.2.11.(2) and (3).)

5) The effective thermal resistance of windows shall be determined using one of the following equations, as applicable:

a) RSI = 1/U, where the U-value is known, or

b) reserved.

6) The reduction in effective thermal resistance of above-ground opaque *building* envelope assemblies permitted by Sentences (2) and (4) shall result in an RSI value that is not less than

a) 55% of that required in Article 9.36.2.6. for above-ground walls and joist-type roofs (see Note A-9.36.2.11.(6)(a)), and

b) 60% of that required in Article 9.36.2.6. for other opaque assemblies.

7) The effective thermal resistances of above-ground opaque assemblies with embedded heating cables, pipes or membranes are not permitted to be traded.

8) The effective thermal resistances of doors and access hatches described in Sentences 9.36.2.7.(3) to (7) are not permitted to be traded.

9) The corresponding effective thermal resistance for continuous insulation provided in Table 9.36.2.6.-C shall be used in the calculation for the reduction of effective thermal resistance as described in Sentences (2) and (4).

9.36.3.9. Heat Recovery from Ventilation Systems

1) This Article applies where a self-contained mechanical ventilation system is installed whose principal exhaust component is equipped with heat-recovery capability. (See Note A-9.36.3.9.(1).)

2) Where an integrated mechanical system (IMS) with a heat-recovery ventilator provides the principal exhaust ventilation, the IMS shall

a) be tested in accordance with CSA P.10, "Performance of Integrated Mechanical Systems for Residential Heating and Ventilation," and

b) have a minimum overall thermal performance factor conforming to Table 9.36.3.10.

3) When tested in conformance with the low-temperature thermal and ventilation test methods described in CAN/CSA-C439, "Rating the Performance of Heat/Energy-Recovery Ventilators," heat-recovery ventilators described in Sentence (1) shall have a sensible heat-recovery efficiency of

a) at least 60% at an outside air test temperature of 0°C for locations with a 2.5% January design temperature greater than or equal to -10°C~~, and~~

b) at least 60% at an outside air test temperature of 0°C and at least 55% at an outside air test temperature of -25°C for locations with a 2.5% January design temperature less than -10°C~~.~~, and

c) when conforming with Tables 9.36.2.6.-C, 9.36.2.7.-D or 9.36.2.8.-C, at least 75% at an outside air test temperature of 0°C for locations with a 2.5% January design temperature greater than or equal to -10°C.

(See Note A-9.36.3.9.(3).)

4) The requirements of Sentence (3) shall be met using a principal ventilation rate not less than that required in Section 9.32. (See Note A-9.36.3.9.(3).)

9.36.3.10. Equipment Efficiency

1) HVAC equipment and components shall comply with the performance requirements stated in Table 9.36.3.10. (See Note A-9.36.3.10.(1).)

Table 9.36.3.10.
HVAC Equipment Performance Requirements
Forming Part of Sentences 9.36.3.9.(2) and 9.36.3.10.(1)

~~Component or~~ Type of Equipment	Heating or Cooling Capacity, kW	Performance Testing Standard	Minimum Performance[1]
Air-Cooled Unitary Air Conditioners and Heat Pumps – Electrically Operated			
Split system	~~≤~~ < 19	CSA C656	SEER = 14.5
			EER = 11.5
			HSPF V = 7.1 ~~(region 5 in standard)~~
Single-package system	~~≤~~ < 19	CSA C656 ~~(including General Instruction No. 2)~~	SEER = 14
			EER = 11
			HSPF V = 7.0 ~~(region 5 in standard)~~
~~All systems~~	~~> 19~~	~~CAN/CSA-C746~~	~~See Level 2 in standard~~
Heat pumps, split and single-package	≥ 19	See Tables 5.2.12.1.-A to -P of Division B of the NECB	
Air conditioners, all electrical phases, split and single-package	≥ 19	See Tables 5.2.12.1.-A to -P of Division B of the NECB	
Single-Package Vertical Air Conditioners (SPVAC) and Heat Pumps (SPVHP)			

SPVAC and SPVHP in cooling mode	< 19	CAN/CSA-C746	EER = 11
SPVAC and SPVHP in heating mode	< 19		$COP_h \geq 3.3$
SPVAC and SPVHP	≥ 19	See Tables 5.2.12.1.-A to -P of Division B of the NECB	
Water-Cooled Unitary Air Conditioners and Heat Pumps – Electrically Operated			
Ground-source and water-source heat pumps open loop closed loop	~~<~~ ≤ 40	CAN/CSA-C13256-1	$COP_c \geq 4.75$, $COP_h \geq 3.6$ $COP_c \geq 3.93$, $COP_h \geq 3.1$
Water-to-water heat pumps open loop closed loop	~~<~~ ≤ 40	CAN/CSA-C13256-2	$COP_c \geq 5.60$, $COP_h \geq 3.4$ $COP_c \geq 4.21$, $COP_h \geq 2.8$
Internal water-loop heat pumps	< 5 ≥ 5 and ≤ 40	CAN/CSA-C13256-1	$COP_c \geq 3.28$, $COP_h \geq 4.2$ $COP_c \geq 3.52$, $COP_h \geq 4.2$
Water-cooled air conditioners – all types	< 19	ANSI/AHRI 210/240 ~~or CTI STD 201RS~~	COP = 3.54, ICOP = 3.60
	≥ 19	See Tables 5.2.12.1.-A to -P of Division B of the NECB	
Direct-Expansion Ground-Source Heat Pumps – Electrically Operated			
Direct-expansion ground-source heat pumps	≤ 21	CSA C748	EER = 13.0 COPh = 3.1
Packaged Terminal Air Conditioners (PTAC) and Heat Pumps (PTHP)			
PTAC – all types and modes PTHP – all types and modes	All capacities	See Tables 5.2.12.1.-A to -P of Division B of the NECB	
Room Air Conditioners and Room Air Conditioner Heat Pumps			
Louvered, without reverse cycle	< 2.3		CEER ≥ 11.0
	≥ 2.3 and < 4.1		CEER ≥ 10.9
	≥ 4.1 and < 5.9		CEER ≥ 10.7
	≥ 5.9 and < 8.2		CEER ≥ 9.4
	≥ 8.2 and < 10.6		CEER ≥ 9.0
	< 2.3		CEER ≥ 10.0

Non-louvered, without reverse cycle	≥ 2.3 and < 3.2	CSA C368.1	CEER ≥ 9.6
	≥ 3.2 and < 4.1		CEER ≥ 9.5
	≥ 4.1 and < 5.9		CEER ≥ 9.3
	≥ 5.9 and < 10.6		CEER ≥ 9.4
Louvered, with reverse cycle	< 5.9		CEER ≥ 9.8
	≥ 5.9 and < 10.6		CEER ≥ 9.3
Non-louvered, with reverse cycle	< 4.1		CEER ≥ 9.3
	≥ 4.1 and < 10.6		CEER ≥ 8.7
Room air conditioner, casement only	All capacities		CEER ≥ 9.5
Room air conditioner, casement slider	All capacities		CEER ≥ 10.4
~~Room air conditioners with reverse cycle~~			
~~with louvered sides~~	~~< 10.55~~	~~ANSI/AHAM RAC-1~~	~~EER = 8.5~~
~~without louvered sides~~			~~EER = 8.0~~

			~~EER = 10.7~~
	~~≥ 1.8 and < 2.3~~		~~EER = 10.7~~
			~~EER = 10.8~~
	~~≥ 4.1 and < 5.9~~		~~EER = 10.7~~
	~~≥ 5.9~~		~~EER = 9.4~~
~~Room air conditioner heat pumps with louvered sides~~	~~< 5.9~~		~~EER = 9.9~~
	~~≥ 5.9~~		~~EER = 9.5~~
~~Room air conditioners without louvered sides and without reverse cycle~~	~~< 1.8~~		~~EER = 9.9~~
	~~≥ 1.8 and < 2.3~~		~~EER = 9.9~~
	~~≥ 2.3 and < 4.1~~		~~EER = 9.4~~
	~~≥ 4.1 and < 5.9~~		~~EER = 9.4~~
	~~≥ 5.9~~		~~EER = 9.4~~
~~Room air conditioner heat pumps without louvered sides~~	~~< 4.1~~		~~EER = 9.2~~
	~~≥ 4.1~~		~~EER = 8.8~~
~~Room air conditioner, casement only~~	~~All capacities~~		~~EER = 9.5~~

~~Room air conditioner, casement slider~~	~~All capacities~~		~~EER = 9.5~~
Boilers			
Electric *boilers*	~~≤~~ < 88	–	Must be equipped with automatic water temperature control[2]
Gas-fired *boilers*[3]	~~≤~~ < 88	CAN/CSA-P.2	AFUE ≥ 90%
	~~></~~ ≥ 88 and ~~≤ 117.23~~ < 733	ANSI/AHRI 1500 or DOE 10 CFR, Part 431, Subpart E, Appendix A ~~BTS~~	E_t ≥ 83%
Oil-fired *boilers*	~~≤~~ < 88	~~CSA B212 or ANSI/ASHRAE 103~~ CAN/CSA-P.2	AFUE ≥ 85%
	≥ 88 and ≤ 733	ANSI/AHRI 1500 or DOE 10 CFR, Part 431, Subpart E, Appendix A	E_t ≥ 83%
Warm-Air Furnaces, Combination Warm-Air Furnace/Air-conditioning Units, Duct Furnaces and Unit Heaters			
Gas-fired warm-air *furnaces*[3]	≤ ~~65.9~~ 66 using single-phase electric current	CAN/CSA P.2 ~~CAN/CSA-P.8~~	AFUE ≥ ~~92%~~ 95% and must be equipped with a high-efficiency constant torque or constant airflow fan motor
	~~></~~ ~~65.9~~ ≤ 66, through-the-wall *furnace*		E_t ≥ 78.5%
	≤ 66 using three-phase electric current	ANSI Z21.47/CSA 2.3	AFUE ≥ 90%
	> 66 ~~65.9~~ and ≤ 117.23		AFUE ≥ 78% or E_t ≥ 80% E_t ≥ 80%
Commercial gas-fired outdoor packaged *furnaces* (roof-top units)[3]	> 66 and ≤ 117.23	CAN/CSA-P.8	E_t ≥ 80%
Gas-fired duct *furnaces*[3]	≤ 117.23	ANSI Z83.8/CSA 2.6	E_t ≥ 81%
Gas-fired *unit heaters*[3]	≤ 117.23	CAN/CSA-P.11	E_t ≥ 82%
Oil-fired warm-air *furnaces*	≤ 66	~~CSA B212~~ CAN/CSA-P.2	AFUE ≥ 85%
Oil-fired duct *furnaces* and *unit heaters*	–	~~UL 731~~ CSA-B140.4	~~E_c ≥ 80%~~ E_t ≥ 81%
Combined space- and water-heating systems (combos)	≤ 87.9 if *boiler*-based	CAN/CSA-P.9[4]	TPF = ~~0.65~~ 0.80
	≤ 73.2 if based on *service water heater*		
Integrated mechanical systems	~~–~~ All capacities	CSA P.10	OTPF = 0.78
Electric *furnaces*	≤ 66	No energy performance test required	Must be equipped with a high-efficiency constant torque or constant airflow fan motor

Other			
Gas-fired fireplaces and *stoves*(3) heating decorative(5)(6)	--	CAN/CSA-P.4.1	FE ≥ 50%, see Sentence (2) See Sentence (2)
Solid-fuel-burning space-heating equipment(7)	< 500 kW output capacity	EPA 40 CFR, Part 60, Subpart AAA and Subpart QQQQ, ~~or~~ CSA B415.1, or EN 303-5~~(6)~~	~~See standard(7)~~ (8)
Dehumidifiers	≤ ~~87.5~~ 16.6 L/day	CAN/CSA-C749	~~See standard(7)~~ EF ≥ 1.35
	> 16.6 and ≤ 21.3 L/day		EF ≥ 1.50
	> 21.3 and ≤ 25.5 L/day		EF ≥ 1.60
	> 25.5 and ≤ 35.5 L/day		EF ≥ 1.70
	> 35.5 and ≤ 87.5 L/day		EF ≥ 2.50
Unitary electric resistance space heaters (9)	All capacities	No energy performance test required	—

Notes to Table 9.36.3.10.:

(1) The symbols and abbreviations that appear in this column have the following meanings:

AFUE = annual fuel utilization efficiency

CEER = combined energy-efficiency ratio, in (Btu/h)/W

COP_c = coefficient of performance in cooling mode, in W/W

COP_h = coefficient of performance in heating mode, in W/W

~~COP = coefficient of performance, in W/W (COPc = in cooling mode and COPh = in heating mode)~~

~~E_c = combustion efficiency, in %~~

EER = energy efficiency ratio, in (Btu/h)/W ~~(no metric equivalent)~~

EF = energy factor, in %/h

E_t = thermal efficiency

FE = fireplace efficiency

HSPF V = heating season performance factor for region V (see map in CSA C656), in ~~watt-hours~~ (Btu/h)/W

ICOP = integrated coefficient of performance, in W/W

OTPF = overall thermal performance factor

SEER = seasonal energy efficiency ratio, in (Btu/h)/W ~~(no metric equivalent)~~

TPF = thermal performance factor

(2) ~~No standard addresses the performance efficiency of electric boilers; however, their efficiency typically approaches 100%~~. An automatic water temperature control device adjusts the temperature of the water in the *boiler* so that the heat supplied corresponds more closely to the heat demanded under varying outdoor temperatures.

(3) Includes propane.

(4) See ~~the exception stated in~~ Sentence (3).

(5) ~~See Sentence (2)~~. Decorative gas-fired fireplaces and stoves are vented decorative gas *appliances* that are marked as such on their rating plate and that comply with ANSI Z21.50/CSA 2.22, "Vented decorative gas appliances."

(6) Decorative gas-fired fireplaces and *stoves* shall not be used to satisfy heating requirements or as part of the heating system required by Section 9.33.

(~~6~~7) ~~CSA B415.1 d~~ Does not ~~apply~~ include ~~to~~ *stoves* with an oven whose volume is greater than 0.028 m^3 ~~and automatically fuelled *appliances*~~.

(~~7~~8) Minimum performance values are omitted from the Table in cases where the referenced standard itself contains such requirements. Equipment tested to the referenced standards provides an acceptable level of energy performance.

(9) See Sentence 9.36.3.6.(3).

2) Natural gas and propane fireplaces shall be

a) direct-vent (sealed), and
b) pilot-on-demand, interrupted or intermittent ignition systems without a standing pilot light.

3) The heat source component of combined space- and service water heating systems that are not within the scope of CAN/CSA-P.9, "Performance of Combined Space and Water Heating Systems (Combos)," shall meet the performance requirements stated in Table 9.36.3.10. for the applicable equipment type. (See Note A-9.36.3.10.(3).)

9.36.4.2. Equipment Efficiency

1) *Service water heaters*, *boilers*, pool heaters and storage tanks shall comply with the performance requirements stated in Table 9.36.4.2. (See Note A-9.36.4.2.(1).)

2) Hot service water storage tanks not listed in Table 9.36.4.2. shall be covered with insulation having a minimum thermal resistance of 1.8 (m²·xK)/W.

Table 9.36.4.2.
Service Water Heating Equipment Performance Standards
Forming Part of Sentences 9.36.4.2.(1) and (2)

~~Component~~ Type of Equipment	Input[1]	Performance Testing Standard	Performance Requirement[2]
Storage-Type Service Water Heaters			
Electric	≤ 12 kW (V_r>50 L ~~to~~ but ≤ 270 L ~~capacity~~)	CAN/CSA-C191	SL ≤ 35 + (0.20V_r) (top inlet)
			SL ≤ 40 + (0.20V_r) (bottom inlet)
	≤ 12 kW (V_r > 270 L but ~~and~~ ≤ 454 L ~~capacity~~)		SL ≤ (0.472V_r) – 38.5 (top inlet)
			SL ≤ (0.472V_r) – 33.5 (bottom inlet)
	>12 kW ~~(> 75 L capacity)~~	ANSI Z21.10.3/CSA 4.3 ~~and~~ or DOE 10 CFR, Part 431, Subpart G, Appendix B	~~S = 0.30 + 27/Vm~~ SL ≤ 0.30 + (102.2 V_s)
Heat pump water heaters	≤ 24 A and ≤ 250 V	CAN/CSA-C745	EF ≥ 2.~~0~~ 1
Gas-fired[3]	~~< 22 kW~~	CAN/CSA-P.3 ~~ANSI Z21.10.3/CSA 4.3~~	~~EF ≥ 0.67 – 0.0005V~~
	≤ 22 kW and first-hour rating < 68 L		UEF ≥ 0.3456 – (0.00053 V_s)[4]
	≤ 22 kW and first-hour rating ≥ 68 L but < 193 L		UEF ≥ 0.5982 – (0.00050 V_s)[4]
	~~≥ 22 kW~~		~~Et ≥ 80% and standby loss ≤ rated input(4)/(800 + 16.57·√V)~~

	≤ 22kW and first-hour rating ≥ 193 L but < 284 L		UEF ≥ 0.6483 – (0.00045 V_s)[4]
	≤ 22 kW and first-hour rating ≥ 284 L		UEF ≥ 0.6920 – (0.00034 V_s)[4]
	> 22 kW but ≤ 30.5 kW and V_r ≤ 454 L		UEF ≥ 0.8107 – (0.00021 V_s)[4]
	>22kW	DOE 10 CFR, Part 431, Subpart G, Appendix A	E_t ≥ 90% and SL ≤ 0.84 [(1.25 Q) + (16.57 √V_r)]
Oil-fired	≤ 30.5 kW and first-hour rating < 68 L	CAN/CSA-B211 for EF or CAN/CSA-P.3 for UEF ~~ANSI Z21.10.3/CSA 4.3 and DOE 10 CFR, Part 431, Subpart G~~	~~EF ≥ 0.59 – 0.0005V~~ EF ≥ 0.68 – (0.0005 V_r) or UEF ≥ 0.2509 – (0.00032 V_s)
	~~> 30.5 kW~~ ≤ 30.5 kW and first-hour rating ≥ 68L but < 193 L		~~Et ≥ 78% and standby loss ≤ (rated input(4)/800) + 16.57 √V~~ EF ≥ 0.68 – (0.0005 V_r) or UEF ≥ 0.5330 – (0.00042 V_s)
	≤ 30.5 kW and first-hour rating ≥ 193 L but < 284 L		EF ≥ 0.68 – (0.0005 V_r) or UEF ≥ 0.6078– (0.00042 V_s)
	≤ 30.5 kW and first-hour rating ≥ 284 L		EF ≥ 0.68 – (0.0005 V_r) or UEF ≥ 0.6815 – (0.00037 V_s)
	> 30.5 kW but ≤ 40.99 kW and V_r ≤ 454 L		UEF ≥ 0.6740 – (0.00035 V_s)
	> 40.99 kW	DOE 10-CFR, Part 431, Subpart G, Appendix A	E_t ≥ 80% and SL ≤ (1.25 Q) + (16.57 √V_r)
Tankless Service Water Heaters			
Gas-fired	~~≤ 73.2 kW~~ < 58.56 kW, V_r ≤ 7.6L and max. flow rate < 6.4 L/min	CAN/CSA-P.~~7~~3 ~~ANSI Z21.10.3/CSA 4.3 and DOE 10 CFR, Part 431, Subpart G~~	~~EF ≥ 0.8~~ UEF ≥ 0.86
	~~> 73.2 kW~~ < 58.56 kW, V_r ≤ 7.6L and max. flow rate ≥ 6.4 L/min		~~Et ≥ 80%~~ UEF ≥ 0.87
	≥ 58.56 kW, V_r ≤ 37.85 L and input rate to V_r ratio ≥ 309 W/L	DOE 10 CFR, Part 431, Subpart G, Appendix C	E_t ≥ 94%

Oil-fired	≤ 61.5 kW(5)	DOE 10 CFR, Part 430, Subpart B, Appendix E	EF ≥ 0.59 – ~~0.0019V_m~~ (0.0005 V_r)
	Other	ANSI Z21.10.3/CSA 4.3 and DOE 10 CFR, Part 431, Subpart G	E_t ≥ 80%
Electric	--	--	(6)
Combined space- and water-heating systems (combos)	≤ 87.9 kW if *boiler*-based	CAN/CSA-P.9	TPF = ~~0.65~~ 0.80
	≤ 73.2 kW if based on *service water heater*		
Integrated mechanical systems	--	CSA P.10	OTPF = ~~0.78~~ 0.85
Pool Heaters			
Gas-fired(3)	< 117.2 kW	ANSI Z21.56/CSA 4.7 or CSA P.6	E_t ≥ 82%
Oil-fired	--	CSA B140.12	E_t ≥ ~~75%~~ 78%

Notes to Table 9.36.4.2.:
(1) 1 kW = 3412 Btu/h
(2) The symbols and abbreviations used in this column have the following meanings:
EF = energy factor, in %/h
E_t = thermal efficiency with 38.9°C water temperature difference
OTPF = overall thermal performance factor
Q = nameplate input rate, in kW
~~S = standby loss, in %/h (percentage heat content of stored water per hour)~~
SL = standby loss, in W
TPF = thermal performance factor
UEF = uniform energy factor
~~V = storage volume, in L, as specified by the manufacturer~~
~~V_m = measured storage volume, in US gallons~~
V_r = rated nominal storage volume, in L
Vs = measured storage volume, in L
(3) Includes propane.
(4) Industry and regulators are transitioning from using EF to UEF as the metric to evaluate *service water heater* performance. While this Code sets out performance requirements for gas-fired *storage-type service water heaters* within the scope of CAN/CSA-P.3 in terms of UEF, the "Energy Efficiency Regulations" set out performance standards for such *service water heaters* in terms of both EF and UEF.
(5) Consistent with the U.S. Congress "National Appliance Energy Conservation Act of 1987."
(6) No standard addresses the performance efficiency of electric tankless *service water heaters*; however, their efficiency typically approaches 100%.

3) Except for components that are required to be installed outdoors, service water heating equipment shall be installed in a *conditioned space*. (See Note A-9.36.4.2.(3).)

9.36.5.2. Definitions

(See Note A-9.36.5.2.)

1) For the purpose of this Subsection, the term "reference house" shall mean a hypothetical replica of the proposed house design using the same energy sources for the same functions and having the same environmental requirements, *occupancy*, climatic data and operating schedules, but made to comply with all applicable prescriptive requirements of Subsections 9.36.2. to 9.36.4.

2) For the purpose of this Subsection, the term "proposed house" shall mean a modeled replica of the actual house under consideration, in which some elements covered in Subsections 9.36.2. to 9.36.4. are specific to the actual house, while other elements not covered in those Subsections, but that are necessary for the calculation of the annual energy consumption, are assigned default values.

~~**2)** For the purpose of this Subsection, the term "annual energy consumption" shall mean the annual sum of service water heating and space conditioning energy consumption of the proposed house design, as calculated in accordance with this Subsection.~~

~~**3)** For the purpose of this Subsection, the term "house energy target" shall mean the annual energy consumption of the reference house, as calculated in accordance with this Subsection.~~

~~**4)** For the purpose of this Subsection, the term "principal ventilation rate" shall mean the normal operating exhaust capacity of the principal ventilation fan as required by Article 9.32.3.3.~~

9.36.5.3. Compliance

1) The performance compliance calculations shall determine the annual energy consumption of the proposed house and the house energy target of a reference house in accordance with

a) ~~the annual energy consumption of the proposed house, and~~ this Subsection, or

b) ~~the house energy target of a reference house.~~ The EnerGuide Rating System, version 15, and Sentence (2).

(See Note A-9.36.5.3.(1).)

2) Except as permitted by Sentence (7), ~~T~~the annual energy consumption of the proposed house ~~shall not exceed~~ in comparison to the house energy target of the reference house~~.~~ shall demonstrate a percent improvement in accordance with Table 9.36.6.3.-G. (See Note A-9.36.5.3.(2).)

3) In establishing the house energy target, *building* components, systems and assemblies shall be accounted for in accordance with the prescriptive requirements of Subsections 9.36.2. to 9.36.4. for the climate zone under consideration, not including Tables 9.36.2.6.-C, 9.36.2.7.-D, and 9.36.2.8.-C.

4) In establishing the annual energy consumption, *building* components, systems and assemblies that are addressed in the scope of the prescriptive requirements of Subsections 9.36.2. to 9.36.4. shall be accounted for for the climate zone under consideration.

5) Where the construction techniques or *building* components, systems or assemblies used are more energy-efficient than those prescribed by the prescriptive requirements, the performance compliance calculations are permitted to take this increased performance level into account in the determination of the annual energy consumption, provided it can be quantified and is not dependent on occupant interaction.

6) Both the proposed and reference houses shall be modeled using the same climatic data, *soil* conditions, operating schedules in Article 9.36.5.4. and temperature set-points.

7) For log homes, the annual energy consumption of the proposed house shall not exceed the house energy target of the reference house. (See Note A-9.36.5.3.(2).)

9.36.5.4. Calculation Methods

1) Except as provided in Sentence (2), the energy model calculations shall account for the annual energy consumption of systems and equipment required for

a) space heating,

b) ventilation,

c) service water heating, and

d) where installed, space cooling.

(See Note A-9.36.5.4.(1).)

2) Redundant or back-up equipment for the systems and equipment listed in Sentence (1) is permitted to be excluded from the energy model, provided it is equipped with controls and is not required to meet the space-conditioning load of the house. (See Note A-9.36.5.4.(2).)

3) The schedules used in the energy model shall
a) be based on a time interval not greater than one hour, where the energy model evaluates the performance of the house over hourly intervals, or
b) be applied in an hourly-bin model then averaged, where the energy model does not evaluate the performance of the house over hourly intervals.

4) The energy model calculations shall account for the loads due to heat gains from occupants, lighting and miscellaneous equipment, which shall be fixed for every day of the year, by ~~using the default schedule provided in Table 9.36.5.4. for every day of the year and such loads shall be~~
a) ~~multiplied by the following adjustment factors, as applicable:~~ following the schedule provided in Table 9.36.5.4., and
~~i) 1 for a house with or without a *secondary suite*,~~
~~ii) 0.625 for each *suite* in a residential *building* containing 2 *suites*,~~
~~iii) 0.606 for each *suite* in a residential *building* containing 3 *suites*, or~~
~~iv) 0.598 for each *suite* in a residential *building* containing more than 3 *suites*,~~ and
b) increasing~~ed~~ the loads for each hour by 3.58 W per square metre of *floor area* in common spaces, if applicable.

Table 9.36.5.4.
Default Schedule for Internal Heat Gain Loads(1)
Forming Part of Sentence 9.36.5.4.(4)

Houses without a *Secondary Suite*(2)											
Average Load, in W, Before Noon											
12 a.m.	**1 a.m.**	**2 a.m.**	**3 a.m.**	**4 a.m.**	**5 a.m.**	**6 a.m.**	**7 a.m.**	**8 a.m.**	**9 a.m.**	**10 a.m.**	**11 a.m.**
~~786~~ 646	~~552~~ 454	~~549~~ 452	~~523~~ 431	~~521~~ 429	~~547~~ 450	~~634~~ 522	~~726~~ 597	~~847~~ 696	~~880~~ 724	~~906~~ 745	~~986~~ 811
Average Load, in W, After Noon											
12 p.m.	**1 p.m.**	**2 p.m.**	**3 p.m.**	**4 p.m.**	**5 p.m.**	**6 p.m.**	**7 p.m.**	**8 p.m.**	**9 p.m.**	**10 p.m.**	**11 p.m.**
~~992~~ 815	~~934~~ 768	~~898~~ 738	~~911~~ 749	~~924~~ 760	~~1 089~~ 895	~~1 410~~ 1159	~~1 588~~ 1305	~~1 568~~ 1288	~~1 483~~ 1218	~~1 194~~ 981	~~952~~ 783
Each *Dwelling Unit* in Residential *Buildings* with Two or More *Dwelling Units*(2)											
Average Load, in W, Before Noon											
12 a.m.	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.
397	284	283	270	269	282	324	368	426	442	455	493
Average load, in W, After Noon											
12 p.m.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.	10 p.m.	11 p.m.
496	468	451	457	463	543	697	783	773	732	593	477

Notes to Table 9.36.5.4.:

(1) The schedule indicates at what time of day the heat gains from the metabolic activity of the occupants and occupant-dependent appliance, lighting and receptacle electrical loads are present ~~internal loads and hot water draws are present~~; it does not account for heat gains from exterior lighting, ~~and from~~ lighting of unconditioned spaces~~.~~, service water heating systems and HVAC equipment.

(2) See Note A-Table 9.36.5.4.

5) The energy model calculations shall account for the following space-heating temperature set-points:

a) 20~~1~~°C in all living spaces above the *basement*,

b) 19°C in *basements* and common spaces, and
c) 15°C in crawl spaces intended to be *conditioned spaces*.

6) The energy model calculations shall account for a space-cooling temperature set-point of 25°C in all *conditioned spaces* served by the cooling system.

7) The energy model calculations shall account for a thermostatic control that responds to fluctuations of ±0.5°C from the temperature set-point. (See Note A-9.36.5.4.(7).)

8) If a computer program is used to carry out the compliance calculations, the calculation methods employed in the energy model shall
a) be used for both the reference and proposed houses, and
b) be tested in accordance with ANSI/ASHRAE 140, "Evaluation of Building Energy Analysis Computer Programs," with variations in the computer program from the range recommended therein reported in accordance with Division C.

9) The proposed and reference houses shall both be modeled using the same approach and assumptions, except where *building* components or energy efficiency features are permitted by this Subsection to be different.

10) The energy model calculations shall account for the effect of airtightness in accordance with ~~Article~~ Sentence 9.36.5.10(10) or Article 9.36.7.3., as applicable.

11) The energy model calculations shall account for heat transfer through elements separating *conditioned space* from unconditioned space, the exterior or the ground.

9.36.5.8. Service Water Heating System Calculations

1) The energy model calculations shall account for the energy consumption of all service water heating systems.

2) The performance requirements stated in Table 9.36.4.2. shall be used in the energy model calculations.

3) Where piping or standby losses are accounted for in the energy model calculations, they shall be included for both the proposed and reference houses, including their effect on space heating and cooling, and calculated the same way for both houses.

4) The energy model calculations shall use a supply cold water temperature, in °C, that is
a) equal to –0.002 (HDD) + 20.3, where HDD < 7 999,
b) equal to 4.3, where HDD ≥ 8 000, or
c) determined based on the ground and air temperatures in the climatic data file.

5) Except as provided in Sentence (8), ~~T~~the energy model calculations shall use a service water delivery temperature of 55°C.
(See Note A-9.36.5.8.(5).)

6) For hot service water usage other than for showering, ~~T~~the energy model calculations shall take into account the service water heating use schedule presented in Table 9.36.5.8. using a load of
a) ~~225~~ 97 L/ day for houses ~~with or~~ without a *secondary suite*, or
b) ~~140~~ 65 L/day for each *dwelling unit* in residential *buildings* with two or more *dwelling units*. ~~per *dwelling unit* for other types of residential *buildings*.~~

Table 9.36.5.8.
Default Schedule of Service Water Heating Use
Forming Part of Sentence 9.36.5.8.(6)

Type of Small Residential *Building*	Distribution Schedule of Service Water Heating, L/h											
Houses ~~with or~~ without a *secondary suite* (~~225~~ 97 L/day/house)	12 a.m.	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.
	0	0	0	0	0	0	0	~~5~~ 2.2	~~20~~ 8.6	~~30~~ 12.9	~~55~~ 23.7	~~27.5~~ 11.9
	12 p.m.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.	10 p.m.	11 p.m.
	~~7.5~~ 3.2	~~2.5~~ 1.1	~~5~~ 2.2	~~12.5~~ 5.4	~~22.5~~ 9.7	~~15~~ 6.5	~~15~~ 6.5	~~5~~ 2.2	~~2.5~~ 1.1	0	0	0
~~*Dwelling units in other types of residential buildings*~~ Each *dwelling unit* in residential *buildings* with two or more *dwelling units* (~~140~~ 65 L/day/*dwelling unit*)	12 a.m.	1 a.m.	2 a.m.	3 a.m.	4 a.m.	5 a.m.	6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.
	0	0	0	0	0	0	0	~~3.1~~ 1.4	~~12.4~~ 5.7	~~18.7~~ 8.6	~~34.2~~ 15.8	~~17.1~~ 7.9
	12 p.m.	1 p.m.	2 p.m.	3 p.m.	4 p.m.	5 p.m.	6 p.m.	7 p.m.	8 p.m.	9 p.m.	10 p.m.	11 p.m.
	~~4.7~~ 2.2	~~1.6~~ 0.7	~~3.1~~ 1.4	~~7.8~~ 3.6	~~14~~ 6.5	~~9.3~~ 4.3	~~9.3~~ 4.3	~~3.1~~ 1.4	~~1.6~~ 0.7	0	0	0

7) The energy model calculations shall take into account daily hot service water usage for showering

a) at 7 a.m. for 15 mins for houses without a *secondary suite*, or

b) at 7 a.m. for 10 mins for each *dwelling unit* in residential *buildings* with two or more *dwelling units*.

8) The energy model shall set the service water delivery temperature for showering to 41°C at the shower head, with a flow rate of 7.6 L/min.

9.36.5.10. Modeling Building Envelope of Proposed House

1) Except as provided in Sentences (2) and (3), the energy model calculations for the proposed house shall be consistent with the proposed construction specifications for that house with regard to

a) the area of the above-ground portion of *foundation* walls,

b) the effective thermal resistance of above-ground walls, ceilings below attics, roof assemblies and *rim joists*,

c) the maximum overall thermal transmittance of doors, as calculated in accordance with Sentence 9.36.2.2.(3),

d) the effective thermal resistance of below-ground walls and slabs-on-ground,

e) exterior walls, roof-ceiling assembly, doors, walls, exposed floors, and floors in contact with the ground,

f) distribution, orientation and area of fenestration and doors, as calculated in accordance with Article 9.36.2.3.,

g) solar heat gain coefficient and overall thermal transmittance of fenestration, as calculated in accordance with Sentence 9.36.2.2.(3),

h) configuration of insulation in assemblies in contact with the ground, and

i) effective thermal resistance of *foundation* walls.

2) Except for penetrations, slab-on-ground edge insulation and assemblies with embedded heating pipes, where a *building* envelope component or assembly covers less than 2% of the total area of the assembly type to which it belongs, its thermal characteristics are not required to be calculated as belonging to

a distinct assembly, provided the area of the component or assembly is included in an adjacent assembly having the same orientation
(See Note A-9.36.5.10.(2).)

3) *Building* envelope assemblies with the same thermal characteristics and orientation are not required to be calculated as distinct assemblies, provided their area is included in an adjacent assembly.

4) *Building* envelope assemblies and components separating *conditioned space* from enclosed unconditioned space shall have a solar heat gain coefficient equal to 0.

5) Except as stated in Sentence 9.36.5.6.(9), the energy model calculations for the proposed house shall account for the effects of exterior permanent and fixed shading devices, including fins, overhangs, and light shelves, on solar heat gain.

6) Where thermal mass is included in the energy model calculations for the proposed house, it shall be set as

a) the specified mass up to the inside edge of insulation in exterior walls, the mass of interior walls, the mass up to the centre-line of *party walls*, and the mass of floors, as applicable,
b) the specified mass of the *building* envelope assembly, where the energy model calculations include a transient analysis of thermal transfer of the entire *building* envelope assembly, or
c) a default value of 0.060 MJ/(m^2 ~~x~~ x°C).

7) Exterior walls, roofs and exposed floors shall have a solar absorptance of 0.4.

8) The orientation of the *foundation* of the proposed house as constructed shall be within 22.5° of the orientation used in the energy model calculations.

9) The airtightness value used in the energy model calculations for the proposed house shall be

a) ~~4.5~~ 3.2 air changes per hour at 50 Pa pressure differential, where the construction complies with Section 9.25.,
b) ~~3.5~~ 2.5 air changes per hour at 50 Pa pressure differential, where it can be shown that the *air barrier system* is constructed in accordance with Subsection 9.25.3. and Articles 9.36.2.9. and 9.36.2.10., or
c) ~~tested in accordance with Sentence (11), and shall be~~ the airtightness determined in accordance with Sentence 9.36.7.3.(1).

~~i) the number of air changes per hour at 50 Pa pressure differential, and~~
~~ii) the equivalent leakage area. (see Note A-9.36.5.10.(9)(c)(ii)).~~

10) For compliance with Clause (9)(c), a design airtightness value shall be assigned for use in the energy model until the actual airtightness has been measured. ~~Where airtightness is measured in accordance with Clause 9.36.5.10.(9)(c), the applicable airtightness value in Clause 9.36.5.10.(9)(a) or (b) shall be assigned for use in the energy model calculations until the actual airtightness has been measured in accordance with Sentence (11).~~
11) When conforming with Subsection 9.36.6, the energy model shall account for the air leakage rate derived in accordance with Article 9.36.7.

~~**11)** Where measured airtightness is used in the energy model calculations, it shall be determined in accordance with CAN/CGSB-149.10-M, "Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method,"~~
~~a) as written, or~~
~~b) excluding Clause 6.1.6, which allows intentional openings for mechanical equipment to be left unsealed.~~
~~(See Note A-9.36.5.10.(11).)~~

~~**12)** Reserved.~~

~~**13)** Where airtightness is determined in accordance with Clause (11)(b), its rate shall be adjusted in the energy model calculations to account for air leakage through mechanical equipment.~~

9.36.5.12. Modeling Service Water Heating System of Proposed House

1) The service water heating system used in the energy model calculations shall be sized as specified in the design for the proposed house.

2) The energy model calculations may include

a) piping losses, and

b) drain-water heat recovery, provided ~~the calculation of the heat recovered is based on the efficiency of the drain-water heat-recovery unit specified for the proposed house and the energy savings are determined using a drain-water~~

i) ~~inlet temperature to the recovery system of 36°C,~~ the calculation of the heat recovered is based on the performance of the drain-water heat recovery unit specified, as determined in accordance with CSA B55.1, "Test method for measuring efficiency and pressure loss of drain water heat recovery units," using a drain-water inlet temperature of 35°C, and

ii) ~~flow rate of 9.5 L/min, and~~ where there are one or two above-ground showers, all of them are served by the drain-water heat-recovery unit, and where there are more than two above-ground showers, at least two of them are served by the drain-water heat-recovery unit.

~~iii) flow that is available for recovery 15 min/day for a house and 10 min/day per *suite* for a multi-unit residential *building* with more than 2 *suites*.~~

(See Note A-9.36.5.12.(2).)

9.36.5.14. Modeling Building Envelope of Reference House

1) The energy model calculations for the reference house shall include the same values as those used for the proposed house with regard to

a) the gross area of above-ground portion of *foundation* walls,

b) *soil* conditions,

c) the orientation of the *foundation*, and

d) the ratio of fenestration area to opaque area of doors.

2) The energy model calculations for the reference house shall use the following set values:

a) 0.060 MJ/m^2·°C for thermal mass,

b) a solar absorptance of 0.4 for the exterior walls, roofs and exposed floors,

c) 0.26 for the solar heat gain coefficient of fenestration, ~~and~~

d) ~~2.5 air changes per hour at 50 Pa pressure differential for airtightness.~~ an airtightness of

i) 3.0 air changes per hour at 50 Pa pressure differential where airtightness used for the proposed house is determined in accordance with Sentence 9.36.7.3.(1) using the unguarded method, and

ii) 2.5 air changes per hour at 50 Pa pressure differential otherwise, and

e) the pressure exponent used for the proposed house where this value is less than 0.67, otherwise, 0.67.

3) The effective thermal resistance and overall thermal transmittance values, as applicable, used in the energy model calculations for the reference house shall be determined for the applicable heating degree-day zone in accordance with

a) Table 9.36.2.6.-A for walls, ceilings below attics, roof assemblies and *rim joists*,

b) Table 9.36.2.7.-A for doors, and

c) Table 9.36.2.8.-A for below-*grade* walls and slabs-on-ground.

4) Except as provided in Sentences (5) and (6), the exterior walls, roof-ceiling assembly, doors, walls, exposed floors, and floors of the reference house that are in contact with the ground shall have the same area as those of the proposed house.

5) The area and orientation of fenestration and doors of the reference house shall be modeled as being equally distributed on all sides of the house.

6) The gross wall area and the area of fenestration and doors of the reference house shall be

determined in accordance with Article 9.36.2.3.

7) Windows and other glazed components in the reference house shall have a maximum overall thermal transmittance as required in Table 9.36.2.7.-A for the applicable heating degree-day category.

8) The configuration of insulation in assemblies of the reference house that are in contact with the ground shall be modeled as conforming to Article 9.36.2.8.

9) *Foundation* walls shall be modeled using the applicable effective thermal resistance values in Table 9.36.2.8.-A and as conforming to Sentence 9.36.2.8.(2).

10) The fenestration and door area to gross wall area ratio (FDWR) of the reference house shall be
a) for houses containing 1 or 2 *dwelling units*,
   i) as per the proposed house, where its FDWR is between 17% and 22%,
   ii) 17%, where the FDWR of the proposed house is less than 17%, or
   iii) 22%, where the FDWR of the proposed house is greater than 22%, and
b) for *buildings* of *residential occupancy* containing more than 2 *dwelling units*,
   i) the FDWR determined in Clause (a) for the areas determined in accordance with Sentence 9.36.2.3.(2) and, where the FDWR determined in accordance with the calculation in Sentence 9.36.2.3.(3) only does not exceed 40%, or
   ii) 40% of the gross wall area enclosing *conditioned space* where the area of fenestration and doors is greater than 40% of the gross wall area enclosing *conditioned space* determined in accordance with Sentence 9.36.2.3.(2).

(See Note A-9.36.5.14.(10).)

A-9.36.1.2.(5) and (6) Annual Energy Consumption and House Energy Target.

The annual energy consumption and the house energy target are not intended to include loads from small appliances and lighting. They represent the annual sum of service water heating and space-conditioning energy consumption in the proposed and reference houses, respectively. The values of these metrics are calculated by subtracting the loads specified in Article 9.36.5.4. from the total annual energy consumption, which is generated by the models for the proposed and reference houses in accordance with Article 9.36.5.4. or 9.36.6.5.

The annual energy consumption and the house energy target are then used to calculate percent improvement in Article 9.36.6.5.

A-9.36.1.3. Compliance Options According to Building Type and Size. Table A-9.36.1.3. describes the types and sizes of Part 9 buildings to which the various compliance paths within Section 9.36. apply.

Table 9.36.1.3.
Energy Efficiency Compliance Options for Part 9 Buildings
Forming Part of Note A-9.36.1.3.

Building **Types and Sizes**	**Energy Efficiency Compliance Options**			
	9.36.2. to 9.36.4. (Prescriptive)	**9.36.5. (Performance)**	**9.36.6. (Energy Step Code)**	**NECB**
• houses with or without a secondary suite • buildings containing only dwelling units with common spaces ≤ 20% of building's total floor area(1)	✓	✓	✓	✓
• buildings containing Group D, E or F3 occupancies whose combined total floor area ≤ 300 m² (excluding parking garages that serve residential occupancies) • buildings with a mix of Group C and Group D, E or F3 occupancies where the non-residential portion's combined total floor area ≤ 300 m2 (excluding parking garages that serve residential occupancies)	✓	X	X	✓

• buildings containing Group D, E or F3 occupancies whose combined total floor area > 300 m² • buildings containing F2 occupancies of any size	X	X	X	✓
• Log homes(2)	✓	✓	X	X

Notes to Table A-9.36.1.3.:
(1) The walls that enclose a common space are excluded from the calculation of floor area of that common space.
(2) For the 9.36.2-9.36.4 compliance option, see Sentences 9.36.1.3.(7) and (8).

A-9.36.1.3.(3) Houses and Common Spaces.

Houses

For the purpose of Sentences 9.36.1.3.(3) and 9.36.1.3.(6), the term "houses" includes detached houses, semi-detached houses, duplexes, triplexes, townhouses, row houses and boarding houses.

Common spaces

The walls that enclose a common space are excluded from the calculation of floor area of that common space.

A-9.36.3.9.(3) Efficiency of Heat-Recovery Ventilators (HRVs). HRVs are required to be tested in conformance with CAN/CSA-C439, "Rating the Performance of Heat/Energy-Recovery Ventilators," under different conditions to obtain a rating: to be rated for colder locations, HRVs must be tested at two different temperatures, as stated in Clause 9.36.3.9.(3)(b), whereas their rating for locations in mild climates relies only on the 0°C test temperature, as stated in Clause 9.36.3.9.(3)(a). When applying Tables 9.36.2.6.-C, 9.36.2.7.-D or 9.36.2.8.-C, Clause (c) applies and requires a higher sensible heat-recovery efficiency than permitted by Clause (a).

The performance of an HRV product and its compliance with Sentence 9.36.3.9.(3) can be verified using the sensible heat recovery at the 0°C and/or –25°C test station (i.e. location where the temperature is measured) published in the manufacturer's literature or in product directories, such as HVI's Certified Home Ventilating Products Directory.

The rating of HRVs also depends on the flow rate used during testing. Therefore, the minimum flow rate required in Section 9.32. needs to be taken into consideration when selecting an HRV product.

A-9.36.5.3.(1) Energy Modeling. The energy modeling of the proposed and reference houses should be performed using the same software. An energy modeling platform other than the EnerGuide Rating System may be used to demonstrate compliance with Clause 9.36.5.3.(1)(a).

A-9.36.5.3.(2) Concept of Comparing Performance. Comparing the performance of a reference house to that of a proposed house is one way to benchmark the performance of a proposed house in relation to Code requirements. There are other ways to benchmark energy consumption models: for example, by setting a quantitative energy target or using a benchmark design. In the performance compliance option presented in Subsection 9.36.5., the user must demonstrate, with the exception of log homes, that their design ~~results in a similar level of~~ exceeds the performance ~~to that~~ of the prescriptive requirements – an approach that is consistent with the concept of objective-based codes.

A-Table 9.36.5.4. Terminology Used in Table 9.36.5.4. The phrase "houses without a secondary suite" refers to buildings and dwelling units that are house-like in form, whether or not the units therein are subdivided by firewalls or fire separations. It encompasses housing forms such as single detached houses, semi-detached houses, row houses and townhouses, which do not typically share significant common conditioned spaces and have private entrances from the exterior.

The phrase "each dwelling unit in residential buildings with two or more dwelling units" refers to dwelling units that are apartment-like in form, such as those in multi-unit residential buildings and stacked units in duplexes and triplexes, which typically share common spaces such as corridors and exterior entrances.