Section 10.2. Energy Efficiency

10.2.1. General

10.2.1.1. Application

1) This Section does not apply to *buildings* described in Sentence 1.3.3.3.(1) of Division A.

10.2.2. Design and Construction

10.2.2.1. Design and Construction

1) Except as permitted in Article 10.2.2.2., *buildings* shall be designed and constructed to conform to

a) ANSI/ASHRAE/IES 90.1, "Energy Standard for Buildings Except Low-Rise Residential Buildings" (except Subsection 8.4.2.),

b) the NECB, or

c) Subsection 10.2.3.

2) Where a *building* contains one or more *major occupancies* that conform to Subsection 10.2.3., the remaining *major occupancies* shall comply with Clause (1)(a) or (b).

10.2.2.2. Application to Existing Buildings

(See Note A-10.2.2.2.)

1) Where a *building* or *major occupancy* designed and constructed to conform to any version of ANSI/ASHRAE/IES 90.1, "Energy Standard for Buildings Except Low-Rise Residential Buildings" is altered, rehabilitated, or renovated, or there is a change in *occupancy*, the energy performance of the *alteration*, rehabilitation, renovation, or change in *occupancy* shall comply with Clause 10.2.2.1.(1)(a) or (c).

2) Notwithstanding Article 1.1.1.1. of Division A of the NECB, where a *building* or *major occupancy* designed and constructed to conform to any version of the NECB is altered, rehabilitated, or renovated, or there is a change in *occupancy*, the energy performance of the *alteration*, rehabilitation, renovation or change in *occupancy*, shall comply with Clause 10.2.2.1.(1)(b) or (c).

3) Notwithstanding Article 1.1.1.1. of Division A of the NECB, where a *building* or *major occupancy* designed and constructed to conform to any version of Subsection 10.2.3. is altered, rehabilitated, renovated, or there is a change in *occupancy*, the energy performance of the *alteration*, rehabilitation, renovation, or change in *occupancy*, shall comply Clauses 10.2.2.1.(1)(b) or (c).

4) Notwithstanding Article 1.1.1.1. of Division A of the NECB, where a *building* or *major occupancy* that is not described in Sentences (1) through (3) is altered, rehabilitated, renovated, or there is a change in *occupancy*, the energy performance of the *alteration*, rehabilitation, renovation, or change in *occupancy* shall comply with Sentence 10.2.2.1.(1).

10.2.3. Energy Step Code

10.2.3.1. Application

1) This Subsection applies to *buildings* containing any of the following *major occupancies*:

a) *assembly*, as described in Tables 10.2.3.3.-A, 10.2.3.3.-B, 10.2.3.3.-C and 10.2.3.3.-D,

b) *treatment*, as described in Table 10.2.3.3.-E,

c) *care*, as described in Table 10.2.3.3.-F,

d) *residential*,

e) *business and personal service*, or

f) *mercantile*.

(See Sentence 1.1.3.1.(1) and Table C-2 in Appendix C.)

10.2.3.2. Definitions

(See Note A-9.36.6.2.)

1) For the purpose of this Subsection, the term "total energy use intensity" shall mean a metric of the energy used over a year by the *building*, estimated by using an energy model in accordance with Article 10.2.3.4., normalized per square metre of floor area of *conditioned space* and expressed in kWh/(m²•year), for all of the following combined:

a) space-heating equipment,

b) space-cooling equipment,

c) fans,

d) interior and exterior lighting devices,

e) service water heating equipment,

f) pumps,

g) auxiliary HVAC equipment (see A-9.36.6.2.(1)(f) in Appendix A),

h) receptacle loads and miscellaneous equipment,

i) appliances, and

j) elevators and escalators.

2) For the purpose of this Subsection, the term "thermal energy demand intensity" shall mean a metric of the annual heating required by the *building* for space conditioning and for conditioning of ventilation air, estimated by using an energy model in accordance with Article 10.2.3.4., normalized per square metre of floor area of *conditioned space* and expressed in kWh/(m²•year), taking into account all of the following:

a) thermal transmittance of above-ground walls and roof-ceiling assemblies,

b) thermal transmittance of floors and walls in contact with the ground, or space that is not *conditioned space*,

c) thermal transmittance and solar heat gain of windows, doors and skylights,

d) air leakage through the *air barrier system*,

e) internal heat gains from occupants and equipment, and

f) heat recovery from exhaust ventilation.

(See Note A-10.2.3.2.(2).)

3) For the purpose of this Subsection, the term "Step" shall mean a Step referred to in Tables 10.2.3.3.-A to 10.2.3.3.-J.

10.2.3.3. Compliance Requirements

1) *Buildings* and *major occupancies* conforming to the requirements of any of Steps 1 to 4 shall be designed and constructed to conform to the applicable energy performance requirements in Tables 10.2.3.3.-A and 10.2.3.3.-J

Table 10.2.3.3.-A
Energy Performance Requirements for Schools Other than Colleges
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000-Greater than 4999	1	Conform to Part 8 of the NECB	

Table 10.2.3.3.-B
Energy Performance Requirements for Libraries
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000-Greater than 4999	1	Conform to Part 8 of the NECB	

Table 10.2.3.3.-C
Energy Performance Requirements for Colleges
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000-Greater than 4999	1	Conform to Part 8 of the NECB	

Table 10.2.3.3.-D
Energy Performance Requirements for Recreation Centres
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000-Greater than 4999	1	Conform to Part 8 of the NECB	

Table 10.2.3.3.-E
Energy Performance Requirements for Hospitals
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000-Greater than 4999	1	Conform to Part 8 of the NECB	

Table 10.2.3.3.-F
Energy Performance Requirements for Care Centres
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000-Greater than 4999	1	Conform to Part 8 of the NECB	

Table 10.2.3.3.-G
Energy Performance Requirements for Hotels and Motels
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000	1	Conform to Part 8 of the NECB	
	2	170	30
	3	140	20
	4	120	15
3000 to 3999	1	Conform to Part 8 of the NECB	
	2	170	30
	3	145	21
	4	130	16
4000 to 4999	1	Conform to Part 8 of the NECB	
	2	170	30
	3	145	25
	4	130	18
Greater than 4999	1	Conform to Part 8 of the NECB	
	2	170	32
	3	150	28
	4	145	20

Table 10.2.3.3.-H
Energy Performance Requirements for Other Residential Occupancies
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000	1	Conform to Part 8 of the NECB	
	2	130	45
	3	120	30
	4	100	15
3000 to 3999	1	Conform to Part 8 of the NECB	
	2	130	45
	3	120	35
	4	110	22
4000 to 4999	1	Conform to Part 8 of the NECB	
	2	135	50
	3	120	35
	4	110	22
5000 to 5999	1	Conform to Part 8 of the NECB	
	2	135	55
	3	120	40
	4	110	22
6000 to 6999	1	Conform to Part 8 of the NECB	
	2	150	60
	3	140	50
	4	125	35
Greater than 6999	1	Conform to Part 8 of the NECB	
	2	180	90
	3	160	75
	4	140	60

Table 10.2.3.3.-I
Energy Performance Requirements for Offices
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000	1	Conform to Part 8 of the NECB	
	2	130	30
	3	100	20
3000 to 3999	1	Conform to Part 8 of the NECB	
	2	130	30
	3	100	20
4000 to 4999	1	Conform to Part 8 of the NECB	
	2	130	30
	3	100	20
Greater than 4999	1	Conform to Part 8 of the NECB	
	2	130	30
	3	110	20

Table 10.2.3.3.-J
Energy Performance Requirements for Other Business and Personal Service or Mercantile Occupancies
Forming part of Sentences 10.2.3.3.(1) and (2)

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m²•year)	*Building* Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m²•year)
Less than 3000	1	Conform to Part 8 of the NECB	
	2	170	30
	3	120	20
3000 to 3999	1	Conform to Part 8 of the NECB	
	2	170	30
	3	125	25
4000 to 4999	1	Conform to Part 8 of the NECB	
	2	170	45
	3	130	30
Greater than 4999	1	Conform to Part 8 of the NECB	
	2	190	55
	3	150	40

2) Except as permitted by Sentence (3),

a) energy performance shall be calculated in conformance with Article 10.2.3.4., and

b) airtightness shall be tested in accordance with Article 10.2.3.5.

(See Note A-10.2.3.3.(2).)

3) *Buildings* and *major occupancies* designed and constructed to conform to Step 4 of Tables 10.2.3.3.-A to 10.2.3.3.-H or to Step 3 in Tables 10.2.3.3.-I and 10.2.3.3.-J, and to the Passive House Planning Package, version 9 or newer, are deemed to comply with this Subsection provided the energy model according to which the *building* or the *major occupancy* of the *building* is designed and constructed is prepared by a Certified Passive House Designer, or Certified Passive House Consultant, who is approved by the Passive House Institute.
(See also Sentence 10.2.2.1.(2).)

10.2.3.4. Energy Modelling

(See Note A-10.2.3.4.)

1) Except as required by Sentence (2), for *buildings* and *major occupancies* conforming to the requirements of any of Steps 1 to 4, energy modelling shall conform to

a) the applicable requirements of Part 8 of the NECB, and

b) the City of Vancouver Energy Modelling Guidelines.

2) Except as permitted by Sentence (3), energy modelling for *buildings* and *major occupancies* conforming to the requirements of any of Steps 2 to 4 shall account for the air leakage rate derived in accordance with Article 10.2.3.5.

3) Until the air leakage rate determined by Sentence (2) is available, an air leakage rate determined in accordance with the City of Vancouver Energy Modelling Guidelines shall be used.

4) In case of conflict between the provisions of the NECB and the City of Vancouver Energy Modelling Guidelines, the provisions of the City of Vancouver Energy Modelling Guidelines shall govern.

10.2.3.5. Building Envelope Airtightness Testing

1) Except as required by Sentence (2), *buildings* and *major occupancies* shall be tested for airtightness in accordance with

a) ASTM E 779, "Standard Test Method for Determining Air Leakage Rate by Fan Pressurization", or

b) USACE Version 3, "Air Leakage Test Protocol for Building Envelopes".

(See Note A-10.2.3.5.(1).)

2) Where airtightness is determined in accordance with Sentence (1) with intentional openings for mechanical equipment left unsealed, the airtightness rate shall be adjusted in the energy model calculations to account for air leakage through mechanical equipment.

3) *Buildings* and *major occupancies* shall be tested for airtightness to an induced test pressure of not less than 75 Pa.