

Canadian Energy Efficiency Codes

1. Energy Efficiency Codes across Canada

British Columbia	Energy Step Code / Zero Carbon Step Code
Alberta	NECB 2020 (Tier 1)
Saskatchewan	NECB 2020 (Tier 1)
Manitoba	NECB 2020 (Tier 1)
Ontario	Supplementary Standard SB10
Quebec	NECB 2015 (amended)
New Brunswick	NECB 2011
Nova Scotia	NECB 2017
Prince Edward Island	NECB 2020 (Tier 1)
Newfoundland & Labrador	none
Yukon	none
Nunavut	none
Northwest Territories	none

2. Fenestration & Opaque Wall Provisions

1. SB10

Energy Efficiency Design / Carbon Dioxide Equivalents / Peak Electric Demand

ANSI / ASHRAE / IES 90.1 2013 modified by Chapter 2 of SB10

Compliance Requirements – Prescriptive and Performance Paths

Trade-off Options:

Area weighted averaging of U-values and SHGC

Can be used for multiple assemblies within a single class of construction

exposed to a single space-conditioning category

Cannot be used to increase FWR

Building Envelope Trade-off

Can be used for all envelope components by establishing their envelope performance factor - requires the use of software e.g. ComCheck

Can be used to increase FWR

Modifications

Change of use, extension and renovation provisions as per OBC

Air barrier assemblies, materials and systems

Insulation continuity on or below grade

Thermal bridging effects

Wall orientation requirements

Alternative fenestration energy standards

SB-10 Climate Zone Definitions for Ontario

Zone # Thermal Criteria

Zone 5 $\text{HDD}_{18} \leq 4000$

Zone 6 $4000 < \text{HDD}_{18} \leq 5000$

Zone 7 $5000 < \text{HDD}_{18}$

Fenestration-to-wall ratio (FWR) $\leq 40\%$ and SRR $\leq 3\%$

Thermal performance specified for:

Climate zone - 5, 6 or 7

Building occupancy - non residential or residential

Space type - heated or semi-heated

Component type - opaque or fenestration

Energy source - electric space heating uses zone 7 requirements

regardless of location

Table SB 5.5-5 - 2017 (IP)
Building Envelope Requirements for Climate Zone 5 (A, B, C)

	NONRESIDENTIAL		RESIDENTIAL		SEMI HEATED	
Opaque Elements	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R
Walls, Above Grade						
Steel-Framed	U-0.050	R-13+R-12 ci	U-0.050	R-13+R-12 ci	U-0.076	R-13+R-6.3 ci
Wood-Framed & Other	U-0.046	R-13+R-10 ci	U-0.046	R-13+R-10 ci	U-0.080	R-13+R-1 ci
Fenestration						
Fenestration	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0%-40% of Wall						
Metal Framing:						
Fixed	U-0.38			U-0.38		U-0.56
Operable	U-0.45	0.40	1.10	U-0.45	0.40	1.10
Entrance Door	U-0.69			U-0.61		U-0.69

Table SB 5.5-6 - 2017 (IP)
Building Envelope Requirements for Climate Zone 6 (A, B)

	NONRESIDENTIAL		RESIDENTIAL		SEMI HEATED	
Opaque Elements	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R
Walls, Above Grade						
Steel-Framed	U-0.044	R-13+R-15 ci	U-0.044	R-13+R-15 ci	U-0.076	R-13+R-6 ci
Wood-Framed & Other	U-0.046	R-13+R-10 ci	U-0.046	R-13+R-10 ci	U-0.080	R-13+R-1 ci
Fenestration						
Fenestration	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0%-40% of Wall						
Metal Framing:						
Fixed	U-0.38			U-0.38		U-0.46
Operable	U-0.45	0.40	1.10	U-0.45	0.40	1.10
Entrance Door	U-0.69			U-0.61		U-0.69

Table SB 5.5-7 - 2017 (IP)
Building Envelope Requirements for Climate Zone 7

Opaque Elements	NONRESIDENTIAL		RESIDENTIAL		SEMI HEATED		
	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R	
Walls, Above Grade							
Steel-Framed	U-0.044	R-13+R-15 ci	U-0.038	R-13+R-20 ci	U-0.058	R-13+R-10 ci	
Wood-Framed & Other	U-0.046	R-13+R-10 ci	U-0.046	R-13+R-10 ci	U-0.058	R-13+R-6 ci	
Fenestration	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	
Vertical Fenestration, 0%-40% of Wall							
Metal Framing:							
Fixed	U-0.34			U-0.34		U-0.34	
Operable	U-0.36	0.45	1.10	U-0.36	0.45	1.10	U-0.40
Entrance Door	U-0.69			U-0.61		U-0.69	N/R
N/R N/R							

NECB 2015 modified by Chapter 3 of SB10

Compliance Requirements – Prescriptive and Performance Path

Trade-off options:

Simple trade-off

Used for above ground envelope components of the same orientation for trading U-values with some limitations

not permitted for additions and semi-heated buildings

vertical to vertical / horizontal to horizontal components

Can be used to increase FDWR.

Objective based code

Focus on energy use not energy cost considerations

Applicable to all buildings outside of Part 9 and possibly some Part 9 buildings

Consistent performance levels for all paths of compliance

Allowable fenestration to wall area dependent on climate zone

Energy source neutral requirements based on climate zones not administrative regions

Air leakage limits for all components

Fenestration-and-door-to-wall ratio (FDWR):

Based on heating degree-days (HDD) of location

FDWR = 0.40 for HDD < 4000

FDWR ≤ (2000-0.2HDD)/3000 for 4000 ≤ HDD ≤ 7000

FDWR = 0.20 for HDD > 7000

NECB 2015 Ontario	Overall Thermal Transmittance of Building Assemblies					
Component	Heating Degree-Days of Building Location in Celsius Degree-Days					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000<4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 ≥7000
Above-ground Opaque Building Assembly	Maximum Overall Thermal Transmittance in Btu/(h*ft ² *°F)					
Walls	N/A	0.049	0.042	0.037	0.037	0.032
Component						
All Fenestration	N/A	0.33	0.33	0.33	0.33	0.25
All Doors	N/A	0.33	0.33	0.33	0.33	0.25
	SHGC					
Vertical Fenestration	N/A	0.40	0.40	0.40	0.40	N/R
Skylights	N/A	0.40	0.40	N/R	N/R	N/R

ANSI / ASHRAE / USGBC / IES 189.1 2014

Table E-5 (IP)
Building Envelope Requirements for Climate Zone 5 (A, B, C)

Opaque Elements	NONRESIDENTIAL		RESIDENTIAL		SEMI HEATED	
	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R
Walls, Above Grade						
Steel-Framed	U-0.050	R-13+R-12.5 ci	U-0.050	R-13+R-12.5 ci	U-0.076	R-13+R-7.5 ci
Wood-Framed & Other	U-0.046	R-13+R-12.5 ci	U-0.046	R-13+R-12.5 ci	U-0.080	R-13+R-3.8 ci
Fenestration	Assembly Max. SHGC		Assembly Max. SHGC		Assembly Max. SHGC	
	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Min. VT/SHGC	Assembly Max. U
Vertical Fenestration, 0%-40% of Wall						
Metal Framing:						
Fixed	U-0.38	S-0.40		U-0.38	S-0.40	U-0.56
Operable	U-0.45	E/W-0.36	1.10	U-0.45	E/W-0.36	1.10
Entrance Door	U-0.69	N-0.50		U-0.61	N-0.50	U-0.69
					N/R	N/R

Table E-6 (IP)
Building Envelope Requirements for Climate Zone 6 (A, B)

Opaque Elements	NONRESIDENTIAL		RESIDENTIAL		SEMI HEATED	
	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R
Walls, Above Grade						
Steel-Framed	U-0.044	R-13+R-15.6 ci	U-0.044	R-13+R-15.6 ci	U-0.076	R-13+R-7.5 ci
Wood-Framed & Other	U-0.046	R-13+R-12.5 ci	U-0.046	R-13+R-12.5 ci	U-0.080	R-13+R-3.8 ci
Fenestration	Assembly Max. SHGC		Assembly Max. SHGC		Assembly Max. SHGC	
	Assembly Min. VT/SHGC	Assembly Max. VT/SHGC	Assembly Min. VT/SHGC	Assembly Max. VT/SHGC	Assembly Min. VT/SHGC	Assembly Max. VT/SHGC
Vertical Fenestration, 0%-40% of Wall						
Metal Framing:						
Fixed	U-0.38	S-0.40	U-0.38	S-0.40	U-0.46	
Operable	U-0.45	E/W-0.36	1.10	U-0.45	E/W-0.36	1.10
Entrance Door	U-0.69	N-0.50		U-0.61	N-0.50	U-0.69
					N/R	N/R

Table E-7 (IP)
Building Envelope Requirements for Climate Zone 7

Opaque Elements	NONRESIDENTIAL		RESIDENTIAL		SEMI HEATED	
	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R	Assembly Max. U	Insulation Min. R
Walls, Above Grade						
Steel-Framed	U-0.044	R-13+R-15.6 ci	U-0.038	R-13+R-18.8 ci	U-0.058	R-13+R-12.5 ci
Wood-Framed & Other	U-0.046	R-13+R-12.5 ci	U-0.046	R-13+R-12.5 ci	U-0.058	R-13+R-7.5 ci
Fenestration	Assembly Max. SHGC		Assembly Max. SHGC		Assembly Max. SHGC	
	Assembly Min. VT/SHGC	Assembly Max. VT/SHGC	Assembly Max. VT/SHGC	Assembly Min. VT/SHGC	Assembly Max. VT/SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0%-40% of Wall						
Metal Framing:						
Fixed	U-0.34	S-0.45	U-0.34	S-0.45	U-0.34	
Operable	U-0.36	E/W-0.41	1.10	U-0.36	E/W-0.41	1.10
Entrance Door	U-0.69	N-0.55		U-0.61	N-0.55	U-0.69
					N/R	N/R

2. BC Step Code

Part 10 of the BC Building Code

Performance Compliance Path Only with Energy Modelling to the applicable requirements of

Part 8 of the NECB, and the City of Vancouver Energy Modelling Guidelines.

Energy Performance Requirements for Schools, Libraries, Colleges, Recreation Centers, Hospitals, Care Centers

Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m ² *year)	Building Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m ² *year)
1		Reserved
2		Conform to Part 8 of NECB

Energy Performance Requirements for Hotels and Motels

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

Energy Performance Requirements for Other Residential Occupancies

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m ² *year)	Building Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m ² *year)
Less than 3000	1	Reserved	
	2	130	45
	3	120	30
	4	100	15
3000 to 3999	1	Reserved	
	2	130	45
	3	120	36
	4	110	22
4000 to 4999	1	Reserved	
	2	135	50
	3	120	35
	4	110	22
5000 to 5999	1	Reserved	
	2	135	55
	3	120	40
	4	110	22
6000 to 6999	1	Reserved	
	2	150	60
	3	140	50
	4	125	35
Greater than 6999	1	Reserved	
	2	180	90
	3	160	75
	4	140	60

Energy Performance Requirements for Offices

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m ² *year)	Building Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m ² *year)
Less than 3000	1	Reserved	
	2	110	30
	3	100	20
3000 to 3999	1	Reserved	
	2	110	30
	3	100	20
4000 to 4999	1	Reserved	
	2	110	30
	3	100	20
Greater than 4999	1	Reserved	
	2	115	30
	3	110	20

Energy Performance Requirements for Other Businesses and Personal Service or Mercantile Occupancies

Degree-Days Below 18°C	Step	Equipment and Systems – Maximum Total Energy Use Intensity, kWh/(m ² *year)	Building Envelope – Maximum Thermal Energy Demand Intensity, kWh/(m ² *year)
Less than 3000	1	Reserved	
	2	145	
	3	120	
3000 to 3999	1	Reserved	
	2	145	
	3	125	
4000 to 4999	1	Reserved	
	2	145	
	3	130	
Greater than 4999	1	Reserved	
	2	170	
	3	150	

Greenhouse Gas Emissions

GHG Emission Level	Maximum GHGI of the Building, Expressed in kgCO _{2e} /m ² /year			
	Residential Major Occupancy		Business and Personal Service and Mercantile Major Occupancies	
	Hotels and Motels	Other Residential Occupancies	Offices	Other Business and Personal Service and Mercantile Occupancies
EL-1	Measure Only			
EL-2	9.0	7.0	5.0	6.0
EL-3	4.0	3.0	3.0	3.0
EL-4	2.0	1.8	1.5	2.0

3. NECB 2011

See notes applicable to NECB under SB10

NECB 2011	Overall Thermal Transmittance of Building Assemblies					
Component	Heating Degree-Days of Building Location in Celsius Degree-Days					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000<4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 >=7000
Above-ground Opaque Building Assembly	Maximum Overall Thermal Transmittance in Btu/(h*ft ² *°F)					
Walls	0.055	0.049	0.044	0.037	0.037	0.032
Component						
All Fenestration	0.42	0.39	0.39	0.39	0.39	0.28
All Doors	0.42	0.39	0.39	0.39	0.39	0.28

4. NECB 2015

See notes applicable to NECB under SB10

NECB 2015	Overall Thermal Transmittance of Building Assemblies					
Component	Heating Degree-Days of Building Location in Celsius Degree-Days					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000<4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 >=7000
Above-ground Opaque Building Assembly	Maximum Overall Thermal Transmittance in Btu/(h*ft ² *°F)					
Walls	0.055	0.049	0.044	0.037	0.037	0.032
Component						
All Fenestration	0.42	0.39	0.39	0.39	0.39	0.28
All Doors	0.42	0.39	0.39	0.39	0.39	0.28

NECB 2015 Quebec	Overall Thermal Transmittance of Building Assemblies					
Component	Heating Degree-Days of Building Location in Celsius Degree-Days					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000<4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 >=7000
Above-ground Opaque Building Assembly	Maximum Overall Thermal Transmittance in Btu/(h*ft ² *°F)					
Walls	0.049	0.049	0.049	0.049	0.043	0.043
Component						
All Fenestration	0.35	0.35	0.35	0.35	0.28	0.28
Skylights	0.50	0.50	0.50	0.50	0.48	0.48
All Doors	0.35	0.35	0.35	0.35	0.18	0.18
All Doors	0.16	0.16	0.16	0.16	0.14	0.14

5. NECB 2017

See notes applicable to NECB under SB10

NECB 2017	Overall Thermal Transmittance of Building Assemblies					
Component	Heating Degree-Days of Building Location in Celsius Degree-Days					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000<4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 >=7000
Above-ground Opaque Building Assembly	Maximum Overall Thermal Transmittance in Btu/(h*ft ² *°F)					
Walls	0.055	0.049	0.044	0.037	0.037	0.032
Component						
All Fenestration	0.37	0.33	0.33	0.33	0.33	0.25
All Doors	0.37	0.33	0.33	0.33	0.33	0.25

6. NECB 2020

See notes applicable to NECB under SB10

Tiered Performance Path added.

NECB 2020	Overall Thermal Transmittance of Building Assemblies					
Component	Heating Degree-Days of Building Location in Celsius Degree-Days					
	Zone 4 < 3000	Zone 5 3000 to 3999	Zone 6 4000<4999	Zone 7A 5000 to 5999	Zone 7B 6000 to 6999	Zone 8 >=7000
Above-ground Opaque Building Assembly	Maximum Overall Thermal Transmittance in Btu/(h*ft ² *°F)					
Walls	0.051	0.047	0.042	0.038	0.033	0.029
Component						
Vertical Fenestration	0.33	0.33	0.30	0.30	0.25	0.25
Skylights	0.47	0.47	0.42	0.42	0.35	0.35
All Doors	0.37	0.33	0.33	0.33	0.33	0.25

7. Future Developments

The NECB 2020 has 4 tiers of performance improvement, with the last tier yielding at least a 60% reduction in energy consumption over the baseline tier 1. The energy efficiency improvements per tier of the NECB 2020 are as follows:

Tier 1: Baseline target

Tier 2: improvement of 25% over Tier 1

Tier 3: improvement of 50% over Tier 1

Tier 4: improvement of 60% over Tier 1