Overview

- National Energy Codes in Canada
- Pan-Canadian Framework on Clean Growth and Climate Change
- ENERGY STAR 2020
- Provincial Regulations
National Energy Codes
National Energy Codes
NBC 9.36 Heating Degree Day Map

Zone 4 & 5 NBC 9.36
Zone 6 & 7A NBC 9.36
Zone 7B & 8 NBC 9.36
### NBC 2010 and 2015 9.36 Requirements

#### 9.36.2.7. Thermal Characteristics of Fenestration, Doors and Skylights

1) Except as provided in Sentences (2) to (8) 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 Appendix A.)

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

<table>
<thead>
<tr>
<th>Components</th>
<th>Thermal Characteristics(1)</th>
<th>Heating Degree-Days of Building Location,(2) in Celsius Degree-Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Zone 4 &lt; 3000</td>
</tr>
<tr>
<td>Fenestration(3) and doors</td>
<td>Max. U-value, W/(m²·K)</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>Min. Energy Rating</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.32</td>
</tr>
</tbody>
</table>

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

(BTU/hr*ft²*F)
9.36.2.7.  **Thermal Characteristics of Fenestration, Doors and Skylights**

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 Appendix A.)

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Heating Degree-Days of Building Location, (1) in Celsius Degree-Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone 4 &lt; 3000</td>
</tr>
<tr>
<td>Skylights</td>
<td>2.90</td>
</tr>
</tbody>
</table>

**Maximum Overall Thermal Transmittance, W/(m²·K)**

| Skylights | 0.51 | 0.51 | 0.48 | 0.48 | 0.42 | 0.42 |

( BTU/hr*ft²*F )

**Notes to Table 9.3**
(1) See Article 1.1.3.1.
Residential Energy Codes in Canada

- Unique Provincial Energy Code
  - Newfoundland NBC 2010 9.36 enforced locally
  - Prince Edward Island NBC 2015 9.36 enforced locally, province wide January 1, 2020

- Using NBC 2010 Section 9.36
- Using NBC 2015 Section 9.36
Residential Energy Codes in Canada

- BC uses U-factor only for compliance
- QC requires a combination of U-factor and ER
- All other jurisdictions allow U-factor or ER for compliance
Residential Energy Codes in Canada

- British Columbia Step Code

Net-Zero Energy Ready

Building built to high energy-efficiency standards such that it could – with additional measures – generate enough on-site energy to meet its own energy needs.

Courtesy of Zachary May, BC Building Codes and Standards
Residential Energy Codes in Canada

• British Columbia Step Code

• Steps above minimum code are all performance calculations with no prescriptive options

• Changing how specification are written
  – Energy Advisors are running multiple options for the entire house with different performance levels
  – Specification may ask for quotes on the following:
    • $U \leq 1.8 \text{ W/m}^2\text{K}$ (0.32 BTU/hr*ft$^2$*F) (current maximum code $U$-factor),
    • $U \leq 1.6 \text{ W/m}^2\text{K}$, (0.28 BTU/hr*ft$^2$*F) and
    • $U \leq 1.4 \text{ W/m}^2\text{K}$ (0.25 BTU/hr*ft$^2$*F).
Residential Energy Codes in Canada

• Ontario SB-12

[Map showing Ontario and its zones with color coding: yellow for Zone 1 ≤ 5000 and green for Zone 2 > 5000]
Residential Energy Codes in Canada

- Sample Ontario building packages
- Zone 1 has 16 packages that vary by heating equipment type
- Zone 2 has 14 packages

Table 3.1.1.2.B (3b)

<table>
<thead>
<tr>
<th>Component</th>
<th>Thermal Values</th>
<th>Compliance Package</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B1</td>
<td>B2</td>
</tr>
<tr>
<td>Ceiling with Attic Space</td>
<td>Min. RSI</td>
<td>8.80</td>
</tr>
<tr>
<td></td>
<td>Max. UP</td>
<td>0.115</td>
</tr>
<tr>
<td>Ceiling Without Attic Space</td>
<td>Min. RSI</td>
<td>5.46</td>
</tr>
<tr>
<td></td>
<td>Max. UP</td>
<td>0.205</td>
</tr>
<tr>
<td>Exposed Floor</td>
<td>Min. RSI</td>
<td>6.16</td>
</tr>
<tr>
<td></td>
<td>Max. UP</td>
<td>0.177</td>
</tr>
<tr>
<td>Walls Above Grade</td>
<td>Min. RSI</td>
<td>3.87</td>
</tr>
<tr>
<td></td>
<td>Max. UP</td>
<td>0.088</td>
</tr>
<tr>
<td>Basement Walls</td>
<td>Min. RSI</td>
<td>3.52</td>
</tr>
<tr>
<td></td>
<td>Max. UP</td>
<td>0.265</td>
</tr>
<tr>
<td>Below Grade Slab</td>
<td>Min. RSI</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Max. UP</td>
<td>-</td>
</tr>
<tr>
<td>Heated Slab or Slab ≤ 600 mm Below Grade</td>
<td>Min. RSI</td>
<td>1.76</td>
</tr>
<tr>
<td></td>
<td>Max. UP</td>
<td>0.51</td>
</tr>
<tr>
<td>Windows and Sliding Glass Doors</td>
<td>Max. UP</td>
<td>1.6</td>
</tr>
<tr>
<td>Skylights</td>
<td>Max. UP</td>
<td>2.8</td>
</tr>
<tr>
<td>Space Heating Equipment</td>
<td>Min. AFUE</td>
<td>90%</td>
</tr>
<tr>
<td>HRV</td>
<td>Min. BRE</td>
<td>75%</td>
</tr>
<tr>
<td>Domestic Water Heater</td>
<td>Min. EF</td>
<td>0.66</td>
</tr>
<tr>
<td>Column 1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
Residential Energy Codes in Canada

• Quebec Heating Degree Day Map

- Quebec ≤ 6000
- Quebec > 6000
Quebec Section 11 – Residential Energy Code

<table>
<thead>
<tr>
<th>Building component</th>
<th>Building located in a municipality where the HDD under 18°C is less than or equal to 6000</th>
<th>Building located in a municipality where the HDD under 18°C is greater than 6000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum overall U value of doors with no glazing</td>
<td>0.9 (0.16)</td>
<td>0.8 (0.14)</td>
</tr>
<tr>
<td>Maximum overall U value of doors with glazing OR Minimum ER of doors with glazing</td>
<td>1.8 (0.32) or 21</td>
<td>1.6 (0.28) or 25</td>
</tr>
<tr>
<td>Maximum overall U value / Minimum ER of windows</td>
<td>2.0 (0.35) and 21 Or 1.8 (0.32) and 13</td>
<td>2.0 (0.35) and 25 Or 1.6 (0.28) and 21</td>
</tr>
<tr>
<td>Maximum overall U value of skylights</td>
<td>2.85 (0.50)</td>
<td>2.7 (0.48)</td>
</tr>
</tbody>
</table>
Residential Energy Codes in Canada

British Columbia (max U)
- U≤1.8 W/m²K (0.32)
- U≤1.6 W/m²K (0.28)
- U≤1.4 W/m²K (0.25)
  Vancouver U≤1.4 (0.25)

Alberta, Saskatchewan, Manitoba, and Newfoundland
- U≤1.6 W/m²K (0.28) or ER≥25
- U≤1.4 W/m²K (0.25) or ER≥29

New Brunswick, Nova Scotia, and Prince Edward Island
- U≤1.6 W/m²K (0.28) or ER≥25

Yukon, Northwest Territory, and Nunavut
- U≤1.4 W/m²K (0.25) or ER≥29
National Energy Code for Buildings (NECB) Heating Degree Day Map

Zone 4 NECB
Zone 5, 6, 7A, & 7B NECB
Zone 8 NECB
**NECB 2011 and 2015 Requirements**

### Table 3.2.2.3.
**Overall Thermal Transmittance of Fenestration**
Forming Part of Sentences 3.2.2.3.(2) to (4)

<table>
<thead>
<tr>
<th>Component</th>
<th>Heating Degree-Days of Building Location, (^{(1)}) in Celsius Degree-Days</th>
<th>Maximum Overall Thermal Transmittance, in W/(m(^2)-K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 4: (^{(2)}) \ (&lt; 3000)</td>
<td>Zone 5: (^{(2)}) \ (3000 to 3999)</td>
<td>Zone 6: (^{(2)}) \ (4000 to 4999)</td>
</tr>
<tr>
<td>All fenestration</td>
<td>2.4</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>(0.42)</td>
<td>(0.39)</td>
</tr>
<tr>
<td>Manitoba</td>
<td>Max U-value W/m(^2)-K</td>
<td>2.0 (0.35)</td>
</tr>
</tbody>
</table>

\(^{(1)}\) Building Location - Max U-value W/m\(^2\)-K.

\(^{(2)}\) Building Location - BTU/hr*ft\(^2\)-F.

---

\(\text{BTU/hr*ft}^2\text{F}\)
3.2.1.4. Allowable Fenestration and Door Area

1) The maximum allowable total vertical fenestration and door area to gross wall area ratio (FDWR), determined in accordance with Article 3.1.1.6., shall be as follows:

\[
\text{FDWR} = 0.40 \text{ for } \text{HDD} \leq 4000, \\
\text{FDWR} = (2000 - 0.2 \cdot \text{HDD}) / 3000 \text{ for } 4000 < \text{HDD} < 7000, \text{ and} \\
\text{FDWR} = 0.20 \text{ for } \text{HDD} \geq 7000,
\]

where 
\[
\text{HDD} = \text{the heating degree-days of the location of the building determined according to Sentence 1.1.4.1.(1).} \\
\text{(See Note A-3.2.1.4.(1).)}
\]

2) The total skylight area shall be less than 5% of the gross roof area as determined in Article 3.1.1.6.
### Table 3.2.2.3.
Overall Thermal Transmittance of Fenestration
Forming Part of Sentences 3.2.2.3.(2) and (3)

<table>
<thead>
<tr>
<th>Component</th>
<th>Heating Degree-Days of Building Location,(^{(1)}) in Celsius Degree-Days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zone 4(^{(2)})</td>
</tr>
<tr>
<td></td>
<td>&lt; 3000</td>
</tr>
<tr>
<td>All fenestration</td>
<td>2.1</td>
</tr>
<tr>
<td>Maximum Overall Thermal Transmittance, (W/(m^2\cdot K))</td>
<td>0.37</td>
</tr>
</tbody>
</table>

**Notes to Table 3.2**

\(^{(1)}\) See Sentence 1.1.4.1 \((1)\).

\(^{(2)}\) See Note A-Table 3.2.2.2.
Commercial Energy Codes in Canada

- Manitoba has modified the NECB 2011
- All provinces are using U-factor for compliance
Commercial Energy Codes in Canada

• British Columbia Step Code
Commercial Energy Codes in Canada

• Ontario SB-10
  – Complicated mix of National Energy Code for Buildings, and ASHRAE 90.1
  – The mix results in a range of U-factors that could comply depending on:
    • Building Type
    • Location (climate zone)
    • For ASHRAE 90.1 frame material type
      – Note Ontario has modified the U-factor requirement under ASHRAE
• Quebec
  – Any building not covered by Part 11
  – From 1983
    • Double Glazed, ½” air space
    • At least a thermally-broken metal frame
Commercial Energy Codes in Canada

British Columbia (max U)
- $U \leq 2.4 \text{ W/m}^2\text{K (0.42)}$
- $U \leq 2.2 \text{ W/m}^2\text{K (0.39)}$
- $U \leq 1.6 \text{ W/m}^2\text{K (0.28)}$

Alberta
- $U \leq 2.2 \text{ W/m}^2\text{K (0.39)}$
- $U \leq 1.6 \text{ W/m}^2\text{K (0.28)}$

Saskatchewan
- $U \leq 1.9 \text{ W/m}^2\text{K (0.33)}$
- $U \leq 1.4 \text{ W/m}^2\text{K (0.25)}$

Manitoba
- $U \leq 2.0 \text{ W/m}^2\text{K (0.35)}$
- $U \leq 1.6 \text{ W/m}^2\text{K (0.28)}$

Nova Scotia
- $U \leq 2.2 \text{ W/m}^2\text{K (0.39)}$

( BTU/hr*ft²*F )
First Ministers adopted the first ever pan-Canadian climate plan, December 9, 2016
Agreement between federal, provincial and territorial governments on climate change

Four Pillars in the Framework
1. Net-zero energy ready code for new buildings
   - Energy Step Codes
2. Energy code for existing buildings
3. Labelling/disclosure of energy use in buildings
4. High efficiency equipment and appliances
   - Market Transformation
   - ENERGY STAR
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4. High efficiency equipment and appliances
   - Market Transformation
   - ENERGY STAR

PAN-CANADIAN FRAMEWORK ON CLEAN GROWTH AND CLIMATE CHANGE
The final public review of the National Energy Codes will be held from October 22 to December 23, 2019.
Energy Step Codes

2017 → 2032

5. Net Zero Ready New Construction

4. R-2000

2/3. BCBC Enhanced Compliance

1. BC Building Code

Net-Zero Energy Ready

Building built to high energy-efficiency standards such that it could – with additional measures – generate enough on-site energy to meet its own energy needs

Courtesy of Zachary May, BC Building Codes and Standards
Energy Step Codes

- Prescriptive and Performance Compliance

The 2020 National Energy Codes are still being finalized and final performance requirements and prescriptive targets have not been set.
First Ministers adopted the first ever pan-Canadian climate plan, December 9, 2016

Agreement between federal, provincial and territorial governments on climate change

Four Pillars in the Framework

1. Net-zero energy ready code for new buildings
   - Energy Step Codes
2. Energy code for existing buildings
3. Labelling/disclosure of energy use in buildings
4. High efficiency equipment and appliances
   - Market Transformation
   - ENERGY STAR
Energy Codes for Existing Buildings

• We have very little information on what is being considered for existing buildings and how it would be implemented
  – Code Commission held a conference call last week

• Fenestration Canada will be working with Codes Canada and NRCan to better understand what is being planned.
PAN-CANADIAN FRAMEWORK ON CLEAN GROWTH AND CLIMATE CHANGE

• First Ministers adopted the first ever pan-Canadian climate plan, December 9, 2016
• Agreement between federal, provincial and territorial governments on climate change
• Four Pillars in the Framework
  1. Net-zero energy ready code for new buildings
     • Energy Step Codes
  2. Energy code for existing buildings
  3. Labelling/disclosure of energy use in buildings
  4. High efficiency equipment and appliances
     • Market Transformation
     • ENERGY STAR
Labelling/Disclosure of Energy Use in Buildings

• We have very little information on what is being considered for existing building labelling

• Fenestration Canada will be working with NRCan to better understand what is being planned.
First Ministers adopted the first ever pan-Canadian climate plan, December 9, 2016

Agreement between federal, provincial and territorial governments on climate change

Four Pillars in the Framework

1. Net-zero energy ready code for new buildings
   - Energy Step Codes
2. Energy code for existing buildings
3. Labelling/disclosure of energy use in buildings
4. High efficiency equipment and appliances
   - Market Transformation
   - ENERGY STAR
**Market Transformation**

- **Aspirational Goals**

<table>
<thead>
<tr>
<th>Short Term by 2022 (Tier 1)</th>
<th>Medium Term by 2025 (Tier 2)</th>
<th>Long Term by 2030 (Tier 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum U-factor 1.61 (ER equivalent of 25)</td>
<td>Maximum U-factor 1.22 W/m²K (0.21) (ER equivalent of 34)</td>
<td>Maximum U-factor 0.82 W/m²K (0.14) (ER equivalent of 44)</td>
</tr>
</tbody>
</table>

( BTU/hr*ft²°F )
Market Transformation

• Natural Resources Canada (NRCan) will be working in three areas with industry to achieve the aspirational goals
  – Continued use of the ENERGY STAR program
  – Identification barriers to achieving the goals and research to address the barriers
  – Finally, possible national regulation of fenestration products

• Fenestration Canada is working closely with NRCan on this effort
First Ministers adopted the first ever pan-Canadian climate plan, December 9, 2016

Agreement between federal, provincial and territorial governments on climate change

Four Pillars in the Framework

1. Net-zero energy ready code for new buildings
   - Energy Step Codes
2. Energy code for existing buildings
3. Labelling/disclosure of energy use in buildings
4. High efficiency equipment and appliances
   - Market Transformation
   - ENERGY STAR
### Windows

**Table D1: Energy Rating Qualifying Criteria for Windows**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Minimum Energy Rating Unitless</th>
<th>Maximum Air Leakage L/s.m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>34</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Table D2: Alternate U-factor Qualifying Criteria for Windows**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Maximum U-factor W/m²K</th>
<th>Minimum Energy Rating Unitless</th>
<th>Maximum Air Leakage L/s.m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.60</td>
<td>16</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>1.40</td>
<td>20</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>1.20</td>
<td>24</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### Doors

**Table E1: Energy Rating Qualifying Criteria for Swinging Doors, Sidelites and Door Transoms**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Minimum Energy Rating Unitless</th>
<th>Maximum Air Leakage L/s.m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>34</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Table E2: Alternate U-factor Qualifying Criteria for Swinging Doors, Sidelites and Door Transoms**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Maximum U-factor W/m²K</th>
<th>Minimum Energy Rating Unitless</th>
<th>Maximum Air Leakage L/s.m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.60</td>
<td>16</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>1.40</td>
<td>20</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>1.20</td>
<td>24</td>
<td>1.5</td>
</tr>
</tbody>
</table>

### Skylights

**Table F1: Qualifying Criteria for Flat-glazed and Domed Skylights**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Maximum U-factor W/m²K</th>
<th>Maximum Air Leakage L/s.m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.60</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>2.40</td>
<td>1.5</td>
</tr>
<tr>
<td>3</td>
<td>2.20</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Table F2: Qualifying Criteria for Tubular Skylights**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Maximum U-factor W/m²K</th>
<th>Maximum Air Leakage L/s.m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>2.60</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Zone 3: ≥ 6000 HDDs
Zone 2: 3500 to <6000 HDDs
Zone 1: <3500 HDDs
New Fenestration Specification V5.0

- Effective January 1, 2020
- Replaces current specification V4.0
- One criteria for all of Canada – no zones
- No minimum Energy Rating on U-factor compliance path
- Maximum air leakage 1.5 L/s/m² (both infiltration and exfiltration)

<table>
<thead>
<tr>
<th>Product</th>
<th>Maximum U-factor W/m²K (Btu/h∙ft²∙F)</th>
<th>OR</th>
<th>Minimum Energy Rating (ER) (unitless)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows and Doors</td>
<td>1.22 (0.21)</td>
<td></td>
<td>34</td>
</tr>
<tr>
<td>Skylights</td>
<td>2.29 (0.40)</td>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>
Provincial Regulations

• Ontario
  – Under the Ontario Electrical Act
    • Residential windows must have a $U \leq 2.0 \text{ W/m}^2\text{K (0.35)}$ or an $ER \geq 17$
    • Requires certification

• British Columbia
  – Under BC Energy Efficiency Act
    • Residential window and sliding glass door
      – Currently $U \leq 1.8 \text{ W/m}^2\text{K (0.32)}$
      – Proposed for 2022 $U \leq 1.61 \text{ W/m}^2\text{K (0.28)}$
    • Requires certification
Thank you