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## Proposed Change 1889

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<b>Code Reference(s):</b>	<b>NBC20 Div.B 9.36.8.6. (first printing)</b>
Subject:	Prescriptive Trade-off Path
Title:	Energy Conservation Points for Fenestration and Doors
Description:	This proposed change assigns additional energy conservation points for higher-performing fenestration and doors.

This change could potentially affect the following topic areas:

- |  |   |
|--|---|
| <input type="checkbox"/> Division A                                | <input checked="" type="checkbox"/> Division B              |
| <input type="checkbox"/> Division C                                | <input checked="" type="checkbox"/> Design and Construction |
| <input type="checkbox"/> Building operations                       | <input checked="" type="checkbox"/> Housing                 |
| <input type="checkbox"/> Small Buildings                           | <input type="checkbox"/> Large Buildings                    |
| <input type="checkbox"/> Fire Protection                           | <input type="checkbox"/> Occupant safety in use             |
| <input type="checkbox"/> Accessibility                             | <input type="checkbox"/> Structural Requirements            |
| <input checked="" type="checkbox"/> Building Envelope              | <input checked="" type="checkbox"/> Energy Efficiency       |
| <input type="checkbox"/> Heating, Ventilating and Air Conditioning | <input type="checkbox"/> Plumbing                           |
|  | <input type="checkbox"/> Construction and Demolition Sites  |

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### Problem

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For the purposes of demonstrating compliance with the prescriptive trade-off path, the National Building Code of Canada (NBC) 2020 does not currently assign energy conservation points for fenestration and doors available on the market that have overall thermal transmittance values (U-values) lower than 1.22 W/(m<sup>2</sup>×K). Since the energy savings associated with these more efficient products are credited in the performance path, this creates an inconsistency between the prescriptive and performance compliance paths.

Failure to assign energy conservation points to these higher-performing components would prevent the Code users who choose to install more efficient fenestration and doors from claiming points for the associated energy savings when complying with the prescriptive trade-off path.

In order to meet the energy conservation points for higher tiers, more options in terms of lower U-values are required than the Code currently provides.

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## Justification

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This proposed change assigns energy conservation points to higher-performing fenestration and doors that are available on the market. With this proposed change, Code users who choose to install more efficient fenestration and doors would benefit from an equivalent credit in the prescriptive trade-off path for compliance as in the performance path.

This proposed change also increases the number of trade-off options available to Code users for compliance with higher tiers.

Additionally, this proposed change adds granularity for energy conservation points provided in tabulated form for fenestration and doors by allowing interpolation. If this proposed change did not permit interpolation, Code users would only be able to claim the lower of two point values when the energy conservation measure falls between two values listed in proposed Table 9.36.8.6.

Failure to add additional energy conservation measures to the Code could prevent Code users from accumulating sufficient points to comply with higher tiers, as required by their respective jurisdictions.

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## PROPOSED CHANGE

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### NBC20 Div.B 9.36.8.6. (first printing)

#### **[9.36.8.6.] 9.36.8.6. Energy Conservation Measures for Fenestration and Doors**

- [1] 1)** Except as provided in Sentences (2) to (4), fenestration and doors that comply with one of the energy conservation measures prescribed in Table 9.36.8.6. shall be credited with the corresponding energy conservation points stipulated therein, provided all fenestration and doors comply with that energy conservation measure.
- [2] 2)** Where the individual doors or windows have more than one overall thermal transmittance value (U-value), an average U-value is permitted to be used to determine the applicable energy conservation points from Table 9.36.8.6., provided the requirements of Sentence (3) are met.
- [3] 3)** The U-value of one or more doors or fenestration is permitted to be greater than that required in Table 9.36.8.6., provided
  - [a] a) the traded doors and fenestration are located in the same orientation,
  - [b] b) the U-value of one or more of the other doors and fenestration is decreased to less than the energy conservation measure target in Table 9.36.8.6. to account for the doors and windows that do not meet the target, and
  - [c] c) the sum of each individual door or fenestration area multiplied by its respective U-value is less than or equal to the total area of all fenestration and doors multiplied by the U-value target in Table 9.36.8.6. that is to be credited.(See also Note A-9.36.2.11.(3).)
- [4] 4)** Where the fenestration and doors make up not more than 17% of the total above-ground wall area, including openings, in a given orientation, the

fenestration and doors in that orientation need not comply with Sentence (1) and are not subject to the provisions of Sentences (2) and (3), provided they meet or exceed the minimum Energy Rating stated in Table 9.36.8.6. that is to be credited. (See Note A-9.36.8.6.(4).)

**Table [9.36.8.6.] 9.36.8.6.**  
**Energy Conservation Measures and Points for Fenestration and Doors**  
**Forming Part of Article 9.36.8.6.**

Energy Conservation Measures for Fenestration and Doors <sup>(1)</sup>		Heating Degree-Days of <i>Building Location</i> , in Celsius Degree-Days					
Maximum U-values, $W/(m^2 \times K)$ <sup>(2)</sup>	Minimum Energy Ratings <sup>(3)</sup>	Zone 4	Zone 5	Zone 6	Zone 7A	Zone 7B	Zone 8
		< 3000	3000 to 3999	4000 to 4999	5000 to 5999	6000 to 6999	≥ 7000
		Energy Conservation Points					
1.61	25	1.9	1.8	-	-	-	-
1.44	29	3.8	3.6	1.6	1.8	-	-
1.22	34	6.9	7.0	4.6	5.5	3.2	3.4
<u>1.05</u>	<u>40</u>	<u>10.8</u>	<u>11.7</u>	<u>8.8</u>	<u>8.9</u>	<u>6.1</u>	<u>5.9</u>
<u>0.94</u>	<u>42</u>	<u>12.3</u>	<u>13.4</u>	<u>10.5</u>	<u>10.7</u>	<u>8.0</u>	<u>7.8</u>
<u>0.82</u>	<u>44</u>	<u>14.0</u>	<u>15.2</u>	<u>12.4</u>	<u>12.6</u>	<u>10.1</u>	<u>9.8</u>

**Notes to Table [9.36.8.6.] 9.36.8.6.:**

- (1) Except skylights and glass block assemblies.
- (2) For intermediate values of maximum U-values, linear interpolation of energy conservation points is permitted.
- (3) ~~See Sentence (4).~~ Energy Ratings shall be determined in accordance with CSA A440.2, "Fenestration energy performance".

## Impact analysis

This proposed change would make complying with the energy performance tiers more affordable by providing additional options to accumulate sufficient energy conservation points.

It should be noted that the costs listed in Table 1 are estimates that depend on various factors. One major assumption made during analysis was the cost data, which was obtained for a specific region and adjusted for other regions using the location factors provided by RSMeans. The following location factors were used for the cost estimation based on 2023 values.

Table 1: Location Factors by Region

Region	Location Factor
BC	0.98–1.05
AB	1.02–1.09
SK and MB	0.88–1.07
ON	1.01–1.15
QC	1.06–1.17
Atlantic Canada	0.88–1.05
Northern Canada	1.03–1.12

Table 2 provides an estimate of the incremental cost of fenestration for different U-values in different regions.

Table 2: Incremental Costs and Corresponding Energy Savings of Fenestration by Region

U-Values	Min. Energy Rating	Energy Savings (%)	Incremental Cost of Fenestration (\$/m <sup>2</sup> )						
			BC	AB	SK and MB	ON	QC	Atlantic Canada	Northern Canada
1.05	40	5.9–11.7	70–75	73–78	63–76	72–82	76–84	63–75	74–80
0.94	42	7.8–13.4	83–89	86–92	74–90	85–97	90–99	74–89	87–95
0.82	44	9.8–15.2	95–104	101–108	87–106	100–114	105–116	87–104	102–111

The incremental costs were calculated using a reference fenestration U-value of 1.61 W/(m<sup>2</sup>×K) for Winnipeg, Manitoba, which was obtained from the Task Group on Prescriptive Trade-off Path in Section 9.36. The source of the costing data was CanmetENERGY's Housing Technology Assessment Platform for 2019. The costing data were adjusted for 2023 using the Bank of Canada's Inflation Calculator. The incremental costs for other regions were based on the costing data for Manitoba and adjusted using the residential location factors provided by RSMeans.

With this proposed change, the Code users who choose to install higher-efficiency fenestration would be credited between 5.9 and 15.2 energy conservation points, which represents the percentage energy savings, and would incur an additional cost of between \$63 and \$116 per m<sup>2</sup> of fenestration compared to the cost of fenestration required to meet the Code minimum.

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## Enforcement implications

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This proposed change could be enforced using the existing Code enforcement infrastructure.

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## Who is affected

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Designers, engineers, architects, builders and building officials.

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## OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

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### NBC20 Div.B 9.36.8.6. (first printing)

**[9.36.8.6.]** 9.36.8.6. (**[1]** 1) [F92-OE1.1]

**[9.36.8.6.]** 9.36.8.6. (**[2]** 2) no attributions

**[9.36.8.6.]** 9.36.8.6. (**[3]** 3) no attributions

**[9.36.8.6.]** 9.36.8.6. (**[3]** 3) [F92-OE1.1]

**[9.36.8.6.]** 9.36.8.6. (**[4]** 4) [F92-OE1.1]