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Proposed Change 1836

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|---------------------------|---|
| Code Reference(s): | NBC20 Div.B 9.36.8.9. (first printing) |
| Subject: | Prescriptive Trade-off Path |
| Title: | Gas-Fired Furnaces |
| Description: | This proposed change introduces Sentence 9.36.8.9.(5) and Table 9.36.8.9.-B to assign energy conservation points to gas-fired furnaces. |

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 type="checkbox"/> Building Envelope | <input checked="" type="checkbox"/> Energy Efficiency |
| <input checked="" type="checkbox"/> Heating, Ventilating and Air Conditioning | <input type="checkbox"/> Plumbing |
| | <input type="checkbox"/> Construction and Demolition Sites |

Problem

The National Building Code of Canada (NBC) does not currently assign energy conservation points to gas-fired furnaces in the prescriptive trade-off path in Section 9.36. This proposed change would establish the number of energy conservation points assigned to gas-fired furnaces with performance levels that exceed the minimum performance required by Energy Performance Tier 1.

Failure to assign energy conservation points to gas-fired furnaces as specified would prevent Code users from accumulating the energy conservation points associated with the energy savings gained from installing a high-efficiency gas-fired furnace, unless the performance compliance path is used.

In order to accumulate energy conservation points for higher performance tiers, more options in terms of energy conservation measures are required than are currently provided in the Code.

Justification

The choice of gas-fired furnace contributes to a building's energy savings. Code users who choose to install high-efficiency gas-fired furnaces will benefit from the additional energy savings provided by the equipment when complying with the prescriptive trade-off path in Section 9.36.

By assigning energy conservation points to gas-fired furnaces exceeding the minimum performance required for Tier 1, Code users would benefit from this additional option for demonstrating compliance with a higher energy performance tier in the prescriptive trade-off path.

Additionally, this proposed change adds granularity for energy conservation points provided in tabulated form for gas-fired furnaces 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 minimum performance of the chosen gas-fired furnace falls between two values listed in proposed NBC Table 9.36.8.9.

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.

PROPOSED CHANGE

NBC20 Div.B 9.36.8.9. (first printing)

[9.36.8.9.] 9.36.8.9. Energy Conservation Measures for HVAC Systems

- [1] 1)** HVAC systems, equipment and installations shall be designed and constructed in accordance with Articles 9.36.3.2. to 9.36.3.8. and this Article.
- [2] 2)** Where HVAC systems, equipment or techniques other than those described in Articles 9.36.3.2. to 9.36.3.8. and this Article are used, the *building* shall be designed and constructed in accordance with the NECB.
- [3] 3)** Ventilation systems serving *buildings* to which this Subsection applies shall be equipped with a heat-recovery ventilator conforming to Article 9.36.3.9.
- [4] 4)** Heat-recovery ventilators that comply with one of the energy conservation measures prescribed in Table 9.36.8.9. shall be credited with the corresponding energy conservation points stipulated therein.

**Table [\[9.36.8.9.-A\]](#) 9.36.8.9.
Energy Conservation Measures and Points for Ventilation Systems
Forming Part of Sentence [\[9.36.8.9.\]](#) 9.36.8.9.([4] 4)**

| Energy Conservation Measures for Ventilation Systems – Sensible Heat-Recovery Efficiency, SRE ⁽¹⁾ | Heating Degree-Days of <i>Building</i> Location, 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 |
| | Energy Conservation Points | | | | | |
| 60% ≤ SRE < 65% | 0.7 | 0.7 | 0.7 | 0.6 | 0.8 | 0.4 |
| 65% ≤ SRE < 75% | 2.1 | 2.1 | 2.2 | 1.7 | 2.3 | 1.2 |
| 75% ≤ SRE < 84% | 3.4 | 3.2 | 3.5 | 2.7 | 3.7 | 1.8 |

Note to Table [\[9.36.8.9.-A\]](#) 9.36.8.9.:

- (1) SRE = sensible recovery efficiency measured at an outside air test temperature of 0°C

[5] --) Gas-fired furnaces that comply with one of the energy conservation measures prescribed in Table 9.36.8.9.-B shall be credited with the corresponding energy conservation points stipulated therein.

**Table [\[9.36.8.9.-B\]](#)
Energy Conservation Measures and Points for Gas-fired Furnaces ⁽¹⁾
Forming Part of Sentence [\[9.36.8.9.\]](#) 9.36.8.9.([4] 4)**

| <u>Energy Conservation Measures for Space Heating Equipment</u> ^{(2) (3)} | <u>Heating Degree-Days of <i>Building</i> Location, in Celsius Degree-Days</u> | | | | | |
|--|--|--------------------------------|--------------------------------|---------------------------------|---------------------------------|--------------------------|
| | <u>Zone 4 < 3000</u> | <u>Zone 5 3000 to 3999</u> | <u>Zone 6 4000 to 4999</u> | <u>Zone 7A 5000 to 5999</u> | <u>Zone 7B 6000 to 6999</u> | <u>Zone 8 ≥ 7000</u> |
| | <u>Energy Conservation Points</u> | | | | | |
| <u>Annual Fuel Utilization Efficiency (AFUE)</u> | | | | | | |
| <u>96%</u> | <u>0.4</u> | <u>0.4</u> | <u>0.4</u> | <u>0.5</u> | <u>0.5</u> | <u>0.5</u> |
| <u>98%</u> | <u>1.1</u> | <u>1.3</u> | <u>1.3</u> | <u>1.4</u> | <u>1.5</u> | <u>1.6</u> |

Notes to Table [9.36.8.9.-B] :

- (1) Includes both natural gas and propane.
- (2) For intermediate values of minimum AFUE, linear interpolation of energy conservation points is permitted.
- (3) Gas-fired furnaces must be equipped with a high-efficiency constant torque or constant airflow fan motor.

Impact analysis

This proposed change would improve the affordability of complying with the energy performance tiers through the prescriptive path by increasing the number of measures eligible for points and allowing Code users to obtain credit for the energy savings associated with installing a high-efficiency gas-fired furnace.

Upgrading to higher efficiency gas-fired furnace does not result in substantial increase in energy savings relative to the increase in incremental cost of equipment. When choosing to install a higher efficiency gas-fired furnace, Code users would benefit from receiving the assigned energy conservation points for that equipment to contribute to demonstrating compliance with a higher energy tier of the prescriptive trade-off path.

As demonstrated by Table 1., Code users who choose to install higher efficiency gas furnaces would be credited with between 0.4 and 1.6 energy conservation points, which represents the percentage energy savings, and would incur a cost of between \$1,124 and \$2,120.

Table 1. Comparison of Costs and Energy Savings of Gas-Fired Furnaces by Region

| AFUE | Energy Savings (%) | Incremental cost compared to a 95% AFUE ⁽¹⁾ furnace ⁽²⁾ (\$) | | | | | | |
|------|--------------------|--|-------|-----------|-------|-------|-----------------|-----------------|
| | | BC | AB | SK and MB | ON | QC | Atlantic Canada | Northern Canada |
| 96% | 0.4–0.5 | 1,179 | 1,179 | 1,194 | 1,174 | 1,231 | 1,142 | 1,124 |
| 98% | 1.1–1.6 | 2,069 | 2,069 | 2,084 | 2,063 | 2,120 | 2,031 | 2,014 |

Source: furnacestore.ca; prices listed include retail markup and Canada-wide free shipping.

Notes to Table 1.:

- (1) AFUE = annual fuel utilization efficiency
- (2) Equipment used was the Goodman Gas Furnace – Upflow, Modulating Variable Speed and 60,000 BTU / 3 Ton Blower.

Enforcement implications

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

Who is affected

Designers, engineers, architects, builders and building officials.

OBJECTIVE-BASED ANALYSIS OF NEW OR CHANGED PROVISIONS

NBC20 Div.B 9.36.8.9. (first printing)

[9.36.8.9.] 9.36.8.9. ([1] 1) no attributions

[9.36.8.9.] 9.36.8.9. ([2] 2) no attributions

[9.36.8.9.] 9.36.8.9. ([3] 3) no attributions

[9.36.8.9.] 9.36.8.9. ([3] 3) [F95,F100-OE1.1]

[9.36.8.9.] 9.36.8.9. ([4] 4) [F95-OE1.1]

[9.36.8.9.] -- ([5] --) [F95-OE1.1]