Submit a comment

Proposed Change 1834

Code Reference(s):	**NBC20 Div.B 9.36.8. (first printing)**
Subject:	Prescriptive Trade-off Path
Title:	Interpolation of Energy Conservation Points
Description:	This proposed change permits interpolation of energy conservation points for energy conservation measures with values that fall between those listed in NBC Tables 9.36.8.5. to 9.36.8.7.

This change could potentially affect the following topic areas:

- ☐ Division A
- ☐ Division C
- ☐ Building operations
- ☐ Small Buildings
- ☐ Fire Protection
- ☐ Accessibility
- ☑ Building Envelope
- ☐ Heating, Ventilating and Air Conditioning
- ☑ Division B
- ☐ Design and Construction
- ☑ Housing
- ☐ Large Buildings
- ☐ Occupant safety in use
- ☐ Structural Requirements
- ☑ Energy Efficiency
- ☐ Plumbing
- ☐ Construction and Demolition Sites

Problem

There is insufficient granularity for energy conservation points provided in tabulated form for above-ground opaque building assemblies, below-ground opaque building assemblies, and fenestration and doors. In the absence of interpolation, when the energy conservation measure falls between two listed values in NBC Tables 9.36.8.5. to 9.36.8.7., Code users receive the lower number of points.

Crediting the Code user with a lower number of points requires the Code user to compensate by selecting an additional energy conservation measure to comply with the target tier, thereby incurring additional cost.

Justification

The linear interpolation of energy conservation points provides granularity by assigning points to values that fall between those listed in the relevant NBC tables. Therefore, Code users are credited with energy conservation points that better reflect the energy savings of their chosen energy conservation measure.

By accumulating the accurate number of energy conservation points through interpolation, Code users can more easily demonstrate compliance with the target tier.

PROPOSED CHANGE

NBC20 Div.B 9.36.8. (first printing)

[9.36.8.] 9.36.8. Tiered Energy Performance Compliance: Prescriptive Path

[9.36.8.1.] 9.36.8.1. Scope

[9.36.8.2.] 9.36.8.2. Compliance

[9.36.8.3.] 9.36.8.3. Definitions

[9.36.8.4.] 9.36.8.4. Building Envelope – General

[9.36.8.5.] 9.36.8.5. Energy Conservation Measures for Above-Ground Opaque Building Assemblies

[1] 1) Except as permitted by Articles 9.36.2.5. and 9.36.2.11., and Sentence 9.36.2.6.(3), the effective thermal resistance of above-ground opaque *building* assemblies or portions thereof shall be not less than that shown for the applicable heating degree-days of the *building* location in Table 9.36.2.6.-B.

[2] 2) Above-ground walls that comply with one of the energy conservation measures prescribed in Table 9.36.8.5. shall be credited with the corresponding energy conservation points stipulated therein.

[3] 3) The effective thermal resistance of *rim joists* shall be not less than that of the above-ground walls.

[4] 4) Where the top of a section of *foundation* wall is on average greater than or equal to 600 mm above the adjoining ground level, the effective thermal resistance of the above-ground portion of that section of wall shall be not less than that of the above-ground walls.

[5] 5) Except for tubular daylighting devices, the effective thermal resistance of skylight shafts shall be not less than that of the above-ground walls.

[6] 6) Except as provided in Sentence (7), where above-ground walls are

constructed using two or more wall assemblies with different calculated effective thermal resistance values, the above-ground wall assembly with the lowest effective thermal resistance value shall be used to determine the applicable energy conservation points from Table 9.36.8.5.

[7] 7) The effective thermal resistance of one or more of the above-ground wall assemblies referred to in Sentence (6) is permitted to be less than that required to meet an energy conservation measure target listed in Table 9.36.8.5. for the wall or walls to be credited with the energy conservation points listed for that target, provided

[a] a) the effective thermal resistance of one or more of the other above-ground wall assemblies is increased to more than the energy conservation measure target listed in Table 9.36.8.5. to account for the wall assemblies that do not meet the target, and

[b] b) the sum of the results of each individual above-ground wall assembly area divided by its respective effective thermal resistance is less than or equal to the total area of all above-ground wall assemblies divided by the effective thermal resistance target listed in Table 9.36.8.5. that is to be credited.

(See also Note A-9.36.2.11.(2).)

Table [9.36.8.5.] 9.36.8.5.
Energy Conservation Measures and Points for Above-Ground Walls (1)
Forming Part of Sentences [9.36.8.5.] 9.36.8.5.([2] 2), ([6] 6) and ([7] 7)

Energy Conservation Measures for Above-Ground Walls – Minimum Effective RSI Values, $(m^2 \times K)/W$ (2)	Heating Degree-Days of *Building* 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					
2.97	2.0	–	–	–	–	–
3.08	3.2	1.4	1.6	2.1	–	–
3.69	7.4	5.4	6.2	6.7	5.4	5.2
3.85	8.2	6.0	6.9	7.4	6.2	6.0
3.96	8.9	6.8	7.7	8.2	7.0	6.8
4.29	10.2	8.1	9.2	9.7	8.6	8.4
4.40	10.8	8.7	9.9	10.3	9.3	9.1

Energy Conservation Measures for Above-Ground Walls – Minimum Effective RSI Values, $(m^2 \times K)/W$ (2)	Heating Degree-Days of *Building* 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					
4.57	11.4	9.3	10.6	11.1	10.1	9.9
4.73	11.9	9.7	11.1	11.5	10.6	10.4
4.84	12.3	10.2	11.6	12.1	11.2	10.9
5.01	12.9	10.7	12.2	12.7	11.8	11.6
5.45	14.0	11.9	13.6	14.0	13.3	13.1

Notes to Table [9.36.8.5.] 9.36.8.5.:

(1) See also Subsection 9.25.5.

(2) For intermediate values of minimum effective RSI, linear interpolation of energy conservation points is permitted.

[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 (1)		**Heating Degree-Days of *Building* Location, in Celsius Degree-Days**					
Maximum U-values, W/(m^2×K) (2)	Minimum Energy Ratings (3)	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					
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

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-value, 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".

[9.36.8.7.] 9.36.8.7. Energy Conservation Measures for Opaque Building Assemblies Below-Grade or in Contact with the Ground

[1] 1) Opaque *building* assemblies below-grade or in contact with the ground shall be designed and constructed in accordance with Sentences 9.36.2.8.(2) to (10) and this Article.

[2] 2) Except as permitted by Article 9.36.2.5., the effective thermal resistance of *foundation* walls shall be not less than that shown for the applicable heating degree-days of the *building* location in Table 9.36.2.8.-B.

[3] 3) *Foundation* walls that comply with one of the energy conservation measures prescribed in Table 9.36.8.7. shall be credited with the corresponding energy conservation points stipulated therein.

[4] 4) Where *foundation* walls are constructed with more than one effective thermal resistance (RSI) value, the lowest effective RSI value of any of these walls shall be used to determine the applicable energy conservation points from Table 9.36.8.7.

Table [9.36.8.7.] 9.36.8.7.
Energy Conservation Measures and Points for Opaque Building Assemblies Below-Grade or In Contact with Ground
Forming Part of Sentences [9.36.8.7.] 9.36.8.7.([3] 3) and ([4] 4)

Energy Conservation Measures for *Foundation* Walls – Minimum Effective RSI Values, $(m^2 \times K)/W$ (1)	**Heating Degree-Days of *Building* 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					
2.98	1.7	–	–	–	–	–
3.09	1.8	0.2	0.2	0.2	0.2	–
3.46	2.2	0.6	0.8	0.6	0.7	–
3.90	2.6	1.2	1.4	1.1	1.3	–

Note to Table [9.36.8.7.] 9.36.8.7.:

(1) For intermediate values of minimum effective RSI, linear interpolation of energy conservation points is permitted.

[9.36.8.8.] 9.36.8.8. Energy Conservation Measures Relating to Airtightness

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

[9.36.8.10.] 9.36.8.10. Energy Conservation Measures for Service Water Heating Equipment

[9.36.8.11.] 9.36.8.11. Energy Conservation Points for Building Volume

Impact analysis

This proposed change would permit Code users to use linear interpolation to be credited for the appropriate number of energy conservation points for an energy conservation measure with a value between two targets listed in NBC Tables 9.36.8.5. to 9.36.8.7. This proposed change would facilitate compliance with the target energy tier by allowing the Code user to accumulate more energy conservation points through interpolation.

The cost of each percentage of energy savings based on other energy conservation measures varies between $170 and $470, approximately. It is expected that allowing interpolation will result in relative cost savings.

Enforcement implications

This proposed change could be enforced using 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. (first printing)

[9.36.8.1.] 9.36.8.1. ([1] 1) no attributions

[9.36.8.2.] 9.36.8.2. ([1] 1) no attributions

[9.36.8.2.] 9.36.8.2. ([1] 1) [F90,F91,F92,F93,F95,F96,F98,F99,F100-OE1.1]

[9.36.8.4.] 9.36.8.4. ([1] 1) no attributions

[9.36.8.5.] 9.36.8.5. ([1] 1) no attributions

[9.36.8.5.] 9.36.8.5. ([2] 2) [F92-OE1.1]

[9.36.8.5.] 9.36.8.5. ([3] 3) [F92-OE1.1]

[9.36.8.5.] 9.36.8.5. ([4] 4) no attributions

[9.36.8.5.] 9.36.8.5. ([4] 4) [F92-OE1.1]

[9.36.8.5.] 9.36.8.5. ([5] 5) no attributions

[9.36.8.5.] 9.36.8.5. ([5] 5) [F92-OE1.1]

[9.36.8.5.] 9.36.8.5. ([6] 6) [F92-OE1.1]

[9.36.8.5.] 9.36.8.5. ([7] 7) [F92-OE1.1]

[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]

[9.36.8.7.] 9.36.8.7. ([1] 1) no attributions

[9.36.8.7.] 9.36.8.7. ([2] 2) [F92-OE1.1]

[9.36.8.7.] 9.36.8.7. ([3] 3) [F92-OE1.1]

[9.36.8.7.] 9.36.8.7. ([4] 4) no attributions

[9.36.8.8.] 9.36.8.8. ([1] 1) no attributions

[9.36.8.8.] 9.36.8.8. ([2] 2) [F90-OE1.1]

[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]

[9.36.8.10.] 9.36.8.10. ([1] 1) no attributions

[9.36.8.10.] 9.36.8.10. ([2] 2) no attributions

[9.36.8.10.] 9.36.8.10. ([3] 3) [F96-OE1.1]

[9.36.8.11.] 9.36.8.11. ([1] 1) [F95-OE1.1]

[9.36.8.11.] 9.36.8.11. ([2] 2) [F95-OE1.1]