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2020 Public review on proposed changes to codes: Find out what it means for you

Proposed Changes to Part 9 Energy Efficiency Provisions

With Chris McLellan, Natural Resources Canada

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Energy Efficiency for Housing: Proposed Changes to the 2020 NBC

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Canada

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- 2020 National Building Code – Proposed 9.36 Energy Code Overview
- Proposed Change Forms for 2020:
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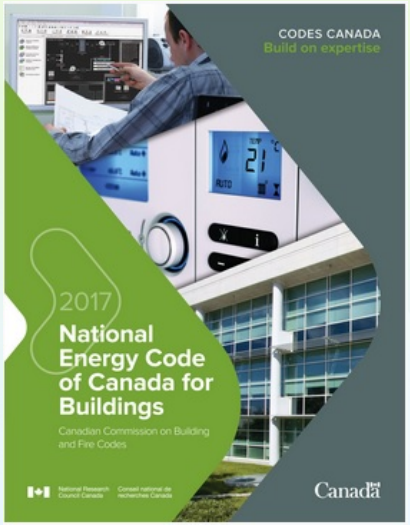
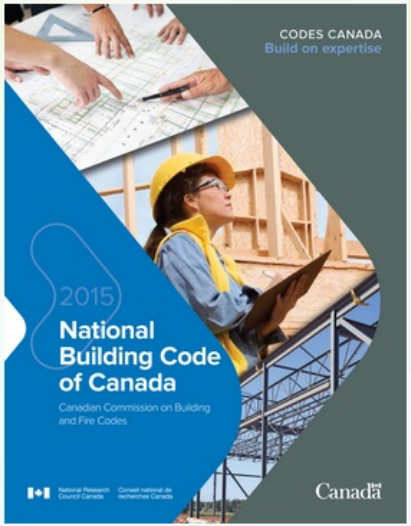
  - Airtightness Testing (PCF 1610)
  - Alignment with EnerGuide for Performance Modelling (PCF 1608)
  - HVAC (PCF 1596) and Service Water Heating (PCF 1597)
  - EnerGuide as an Alternate Compliance Path (PCF 1620)

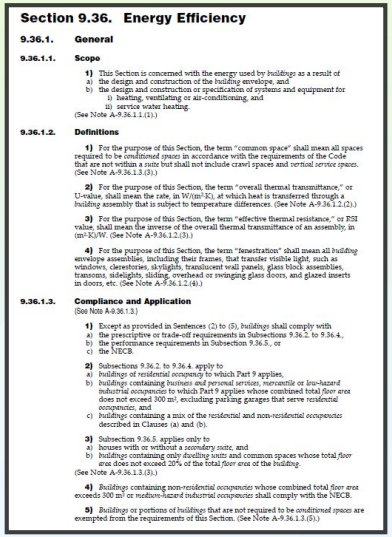
Energy Efficiency in the National Codes

"Part 3"
large buildings



"Part 9"
Housing and Small Buildings





Section 9.36. Energy Efficiency

9.36.1. General

9.36.1.1. Scope

1) This Section is concerned with the energy used by *buildings* as a result of
a) the design and construction of the *building* envelope, and
b) the design and construction or specification of systems and equipment for
i) heating, ventilating or air-conditioning, and
ii) service water heating.
(See Note A-9.36.1.1.(1).)

9.36.1.2. Definitions

1) For the purpose of this Section, the term "common space" shall mean all spaces required to be *conditioned spaces* in accordance with the requirements of the Code that are not within a *suite* but shall not include crawl spaces and *vertical service spaces*. (See Note A-9.36.1.3.(3).)

2) For the purpose of this Section, the term "overall thermal transmittance," or U-value, shall mean the rate, in W/(m²·K), at which heat is transferred through a *building* assembly that is subject to temperature differences. (See Note A-9.36.1.2.(2).)

3) For the purpose of this Section, the term "effective thermal resistance," or ESI value, shall mean the inverse of the overall thermal transmittance of an assembly, in (m²·K)/W. (See Note A-9.36.1.2.(3).)

4) For the purpose of this Section, the term "fenestration" shall mean all *building* envelope assemblies, including their frames, that transfer visible light, such as windows, clerestories, skylights, translucent wall panels, glass block assemblies, transoms, sidelights, sliding, overhead or swinging glass doors, and glazed inserts in doors, etc. (See Note A-9.36.1.2.(4).)

9.36.1.3. Compliance and Application
(See Note A-9.36.1.3.)

1) Except as provided in Sentences (2) to (5), *buildings* shall comply with
a) the prescriptive or trade-off requirements in Subsections 9.36.2. to 9.36.4.,
b) the performance requirements in Subsection 9.36.5., or
c) the NECB.

2) Subsections 9.36.2. to 9.36.4. apply to
a) *buildings* of *residential occupancy* to which Part 9 applies,
b) *buildings* containing *business and personal services*, *mercantile* or *low-hazard industrial occupancies* to which Part 9 applies whose combined total *floor area* does not exceed 300 m², excluding parking garages that serve *residential occupancies*, and
c) *buildings* containing a mix of the *residential* and non-*residential occupancies* described in Clauses (a) and (b).

3) Subsection 9.36.5. applies only to
a) houses with or without a *secondary suite*, and
b) *buildings* containing only *dwelling units* and common spaces whose total *floor area* does not exceed 20% of the total *floor area* of the *building*.
(See Note A-9.36.1.3.(3).)

4) *Buildings* containing non-*residential occupancies* whose combined total *floor area* exceeds 300 m² or *medium-hazard industrial occupancies* shall comply with the NECB.

5) *Buildings* or portions of *buildings* that are not required to be *conditioned spaces* are exempted from the requirements of this Section. (See Note A-9.36.1.3.(5).)

2020 National Building Code – Overview of Proposed Changes to Section 9.36 Energy Code

- Direction given by the CCBFC in the Long-Term Energy Strategy to develop a tiered energy code:
  - Laying out a pathway to “net zero energy ready”,
  - Focused on reducing loads, silent on on-site electricity generation.
- Development falls under SCEE, whose scope covers both NBC 9.36 and the NECB.
- Public review running in this quarter, closes March 13, 2020.

Proposed 9.36 Energy Code Tiers

- Baseline is current 9.36 performance*, plug/lighting loads are not included.
- Tier 1 - 0% improvement
- Tier 2 - 10% improvement
- Tier 3 - 20% improvement
- Tier 4 - 40% improvement
- Tier 5 - 70% improvement

2020 National Building Code – 9.36 Overview

- 9.36.1 General – Scope, application, compliance, definitions
  - PCF 1611 Prescriptive Tiers, PCF 1617 Performance Tiers
- 9.36.2 Building Envelope
  - PCF 1610 Measuring Airtightness
- 9.36.3 HVAC
  - PCF 1596 HVAC Efficiency
- 9.36.4 Service Water Heating
  - PCF 1597 SWH Efficiency
- 9.36.5 Performance Compliance
  - PCF 1608 Alignment with EnerGuide
  - PCF 1620 EnerGuide as an Alternate Compliance Path

2020 National Building Code – 9.36 Overview

- 9.36.6 Performance Requirements for Energy Performance Improvement
  - PCF 1617 Performance Tiers
  - Applies to houses, and MURBS with ≤20% common space floor area
- 9.36.7 Prescriptive Requirements for Energy Performance Improvement
  - PCF 1611 Prescriptive Tiers
  - Applies to buildings of residential occupancy
- 9.36.8 Measuring Airtightness
  - PCF 1610 Measuring Airtightness

Prescriptive Requirements for Energy Performance Improvement – PCF 1611

- Prescriptive approach uses a points-based system, similar to ENERGY STAR BOPS.
- Builders choose from a list of energy conservation measures (ECMS), each ECM receives points.
- Choose enough ECMs to reach the compliance target: 10% Tier 2 needs 10 points.
- Currently have ECMs for above and below grade wall insulation, tested airtightness, water heaters, HRV performance, small dwellings.
- HRVs are mandatory.

Prescriptive Requirements for Energy Performance Improvement – PCF 1611

Energy Performance Improvement Tier	Percentage Improvement over Prescriptive Baseline	Minimum Energy Conservation Points Required
1	≥ 0% (compliance with 9.36.2. to 9.36.4.)	0
2	10%	10
3	20%	Reserved
4	40%	Reserved

Prescriptive Options: Walls

Above-Ground Opaque Building Assembly	Energy Conservation Measure, Increased thermal insulation	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						
Walls	RSI 2.97 effective	2.0						R22 nominal
	RSI 3.08 effective	3.2	1.4	1.6	2.1			R24 nominal
	RSI 3.69 effective	7.4	5.4	6.2	6.7	5.4	5.2	R28 nominal
	RSI 3.85 effective	8.2	6.0	6.9	7.4	6.2	6.0	R22 nominal + R5 continuous
	RSI 3.96 effective	8.9	6.8	7.7	8.2	7.0	6.8	R24 nominal + R5 continuous
	RSI 4.29 effective	10.2	8.1	9.2	9.7	8.6	8.4	R22 nominal + R7.5 continuous
	RSI 4.40 effective	10.8	8.7	9.9	10.3	9.3	9.1	R24 nominal + R7.5 continuous
	RSI 4.57 effective	11.4	9.3	10.6	11.1	10.1	9.9	R28 nominal + R5 continuous
	RSI 4.73 effective	11.9	9.7	11.1	11.5	10.6	10.4	R22 nominal + R10 continuous
	RSI 4.84 effective	12.3	10.2	11.6	12.1	11.2	10.9	R24 nominal + R10 continuous
	RSI 5.01 effective	12.9	10.7	12.2	12.7	11.8	11.6	R28 nominal + R7.5 continuous
	RSI 5.45 effective	14.0	11.9	13.6	14.0	13.3	13.1	R28 nominal + R10 continuous

Modelled Assembly: 2”x6” and 2”x8” 16”o.c, vinyl siding, 7/16” OSB, ½” gypsum, plus insulation shown below

Prescriptive Options: Airtightness

Energy Conservation Measures for Airtightness – Airtightness Levels	Heating Degree-Days of *Building* Location, in Celsius Degree-					
	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					
Airtightness Levels from Table 9.36.6.3.-A (PCF 1610)						
1	-	-	-	-	-	-
2	2.0	3.4	3.5	4.6	6.1	6.1
3	4.0	6.7	7.0	9.3	12.1	12.1
4	5.9	10.1	10.5	13.9	18.0	18.0
5	7.6	13.0	13.4	17.8	22.7	22.7

Table A is intended for single detached houses and whole buildings with more than 1 dwelling (guarded test)

2.5 ACH@50PA
2.0 ACH@50PA
1.5 ACH@50PA
1.0 ACH@50PA
0.6 ACH@50PA

Prescriptive Options: Airtightness

Energy Conservation Measures for Airtightness – Airtightness Levels	Heating Degree-Days of *Building* Location, in Celsius Degree-					
	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					
Airtightness Levels from Table 9.36.6.3.-B (PCF 1610)						
1	-	-	-	-	-	-
2	2.2	3.0	3.5	4.6	4.1	4.6
3	4.0	6.0	6.9	9.1	8.2	9.3
4	6.0	9.1	10.4	13.6	12.3	14.2
5	7.7	11.6	13.3	17.4	15.6	18.2
6	7.7	11.6	13.3	17.4	15.6	18.2

Table B is Intended for attached dwellings that are being tested independently (Unguarded test method)

3.0 ACH@50PA
2.5 ACH@50PA
2.0 ACH@50PA
1.5 ACH@50PA
1.0 ACH@50PA
0.6 ACH@50 Pa

Prescriptive Options– Summary

- Building Envelope:
  - Above-ground walls
  - Windows
  - Foundation walls
  - Measured airtightness
- HVAC and DHW
  - HRV efficiency
  - Water heaters
- House size
  - Small houses receive a 10 point credit

Performance Requirements for Energy Performance Improvement – PCF 1617

- Performance path is the only path currently proposed to go beyond 10%
- Philosophical shift away from flexibility
- Performance tiers are based on total energy (space conditioning and water heating)
- New “building envelope” metric
- New - Airtightness testing is mandatory
- New “peak cooling” metric to limit over-heating
- Relaxations are given for small houses

Tiered Performance Path for ≥ 230 m^3

Tier	Overall Energy Performance Improvement	Envelope Performance Improvement	Airtightness Level
1	≥0%	N/A	Test only
2	≥10%	≥5%	2.5 / 3.0 ACH
3	≥20%	≥10%	2.5 / 3.0 ACH
4	≥40%	≥20%	1.5 / 2.0 ACH
5	≥70%	≥50%	1.5 / 2.0 ACH

Tiered Performance Path - Metrics

- Overall energy:
  - Same approach as currently used in 9.36.5
  - Compares space heating (and space cooling if installed) and water heating energy to that of a reference house.
- Energy performance of “building envelope”:
  - Intent is to enforce an “envelope first” approach.
  - As proposed, this is the same as Overall Energy less a portion of DHW energy.
- “Peak cooling load”
  - Intent is to reduce the risk of over-heating from glazing.
- Mandatory airtightness testing with compliance targets.

Measuring Airtightness - PCF 1610

- Updated CGSB 149.10-2019 airtightness testing standard was published November 2019, and is referenced.
  - Multi-point testing for use in energy models (as is currently done).
  - Single/two-point testing is now permitted for compliance to a mandated target.
- Can now demonstrate compliance to the prescriptive air sealing “checklist” of 9.36.2.10 by testing and meeting a Level 1 airtightness target (2.5/3.0 ACH) in the tiered prescriptive path.

Measuring Airtightness - PCF 1610

- Two tables of airtightness levels in ACH and corresponding NLA and NLR values, similar to ENERGY STAR.
- Table A (for guarded tests) intended for detached houses (or for MURB whole building testing) sets Level 1 at 2.5 ACH , down to 0.6 ACH.
- Table B (for unguarded tests) intended for attached units sets Level 1 at 3.0 ACH, down to 0.6 ACH.

Alignment with EnerGuide for Performance Modelling – PCF 1608

- Aligns modelling assumptions in NBC 9.36.5 with current version of EnerGuide.
- Updates these assumptions (eg. number of occupants, hot water loads, plug and lighting loads) to reflect current Canadian statistics.
- Reduces administrative burden where labelling and code compliance are desired.
- Encourages use of NRCan tools and energy advisor network.

HVAC (PCF 1596) and Service Water Heating (PCF 1597)

- Updates to HVAC and SWH performance to align with upcoming Energy Efficiency Regulations.
- Notable items:
  - Gas furnaces go from 92% AFUE to 95% AFUE.
- Additional equipment is now included.

EnerGuide as an Alternate Compliance Path - PCF 1620

- Permits demonstrating compliance to the performance tiers using the tools and processes of EnerGuide ,
- Enables builders, Energy Advisors and AHJs to use tools and services with the stamp of the Government of Canada to support codes.
- NRCan will continue to roll out new services, for example data sharing and house file QA, for AHJs.
- ERS v15 is referenced, but we intend to release updates to ERS as required.
- NOTE: Heat pumps are treated differently in ERS as compared to 9.36.5!

Thank You.

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Questions?

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