

# Public Review

## BC Building Code 2023

Proposed change to reduce risk of overheating in dwelling units

**Topic:** Overheating

**Code change number:** BCBC2023-PR-04-OH

**Code reference:** BC Building Code 2018 – Part 6 and Part 9 of Division B

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## Description of the proposed change

Work on implementing overheating provisions into the National Building Code (NBC) is currently underway. Due to recent extreme heat events in British Columbia resulting in numerous heat-related deaths, the Province will introduce requirements in the BC Building Code in advance of the changes to the NBC, to limit risks associated with overheating in new homes.

This proposed change establishes a summer design temperature that a living space in a dwelling unit must be capable of maintaining by the addition of mechanical cooling or, where achievable, by passive design measures.

## Justification

In 2021, over a period of six days, 619 heat-related deaths occurred during a heat wave in British Columbia, which saw record temperatures reaching over 40 °C. The British Columbia Coroners Service struck a review panel, which reported that 91% of the deaths occurred in various types of housing (39% in multi-unit buildings; 34% in detached buildings; 10% in social housing, single room occupancy, or supportive housing; and, 7% in senior or long-term care homes) and that most occurred in homes without adequate cooling such as air conditioners or fans. Further, the report noted that individuals aged 70+ accounted for 67% of the deaths, 56% of decedents lived alone and that heat-related death was higher for those with specific chronic disease.

BC Centre for Disease Control identified in a report to the Chief Coroner of British Columbia titled: [“Extreme Heat and Human Mortality: A Review of Heat-Related](#)

[Deaths in B.C. in Summer 2021](#) that people were most in danger when indoor temperatures remained above 26 degrees throughout the heat event.

## Impact analysis

Considering an upper design temperature at the design stage can maximize energy and equipment efficiency and can save costly future retrofits. Passive cooling measures should be explored at the design stage and, where necessary, mechanical cooling systems installed to provide a safe and healthy living space.

Some living spaces in a dwelling unit may be more challenging than others to control indoor temperature, so it is the designer's choice which living space (minimum of one) is capable of maintaining the design temperature.

Designers are permitted to use historical climate data found in the BC Codes, which is not a projection or assumption of future extreme weather events. As such, some future extreme weather events may exceed the capacity of cooling systems.

## Proposed National Building Code content and B.C. specific code content

### Legend

Black Text – 2020 National Building Code content

Green Text – Proposed BC specific content

Red Text – 2020 National Building Code content removed

### **1.1.3.1. Climatic and Seismic Values**

- 1)** Except as provided in Sentences (2) and (4) the climatic and seismic values required for the design of *buildings* under this Code shall be in conformance with the values established by the *authority having jurisdiction*.
- 2)** Where they have not been established by the *authority having jurisdiction*, the climatic values required for the design of *buildings* shall be in conformance with Sentences (3) and (5) and the values listed in Appendix C. (See Note A-1.1.3.1.(2).)

3) The outside winter design temperatures determined from Appendix C shall be those listed for the January 2.5% values. (See Note A-1.1.3.1.(2).)

4) Where they have not been established by the *authority having jurisdiction*, the seismic values required for the design of *buildings* under Part 4 and Part 9 shall be in conformance with Appendix C. (See Note A-1.1.3.1.(4).)

5) The outside summer design temperatures determined from Appendix C shall be those listed for the July 2.5% dry values.

## 6.2.1. General

### 6.2.1.1. ~~Good Engineering Practice~~ Design, Construction and Installation

(See Note A-6.2.1.1.)

1) Heating, ventilating and air-conditioning systems, including mechanical refrigeration equipment, shall be designed, constructed and installed in conformance with good engineering practice such as that described in, but not limited to,

- a) the ASHRAE Handbooks and Standards,
- b) the HRAI Digest,
- c) the Hydronics Institute Manuals,
- d) the NFPA Standards,
- e) the SMACNA Manuals,
- f) the Industrial Ventilation Manual published by the ACGIH,
- g) CSA B214, "Installation Code for Hydronic Heating Systems,"
- h) CAN/CSA-Z317.2, "Special Requirements for Heating, Ventilation, and Air-Conditioning (HVAC) Systems in Health Care Facilities,"
- i) EPA 625/R-92/016, "Radon Prevention in the Design and Construction of Schools and Other Large Buildings," and
- j) ASHRAE Guideline 12, "Minimizing the Risk of Legionellosis Associated with Building Water Systems."

2) Indoor design temperatures for residential *buildings* shall be those established in Article 9.33.3.1.

## 9.33.2. Required Heating and Cooling Systems

### 9.33.2.1. Required Heating and Cooling Systems

1) Residential *buildings* intended for use in the winter months on a continuing basis shall be equipped with heating facilities conforming to this Section.

2) Except where determination according to Article 9.33.5.1. or good engineering practice according to Article 6.2.1.1. can show it to be unnecessary, dwelling units intended for use in the summer months on a continuing basis shall be equipped with cooling facilities conforming to this Section. (See Note A-9.33.2.1.(2).)

### 9.33.3. Design Temperatures

#### 9.33.3.1. Indoor Design Temperatures

1) At the outside winter design temperature, required heating facilities shall be capable of maintaining an indoor air temperature of not less than

- a) 22°C in all living spaces,
- b) 18°C in unfinished *basements*,
- c) 18°C in common *service rooms*, ancillary spaces and *exits* in houses with a *secondary suite*, and
- d) 15°C in heated crawl spaces.

2) At the outside summer design temperature, required cooling facilities shall be capable of maintaining an indoor air temperature of not more than 26°C in at least one living space in each *dwelling unit*.

### 9.33.5. Heating and ~~Air-conditioning~~ Cooling Appliances and Equipment

#### 9.33.5.1. Capacity of Heating and Cooling Appliances

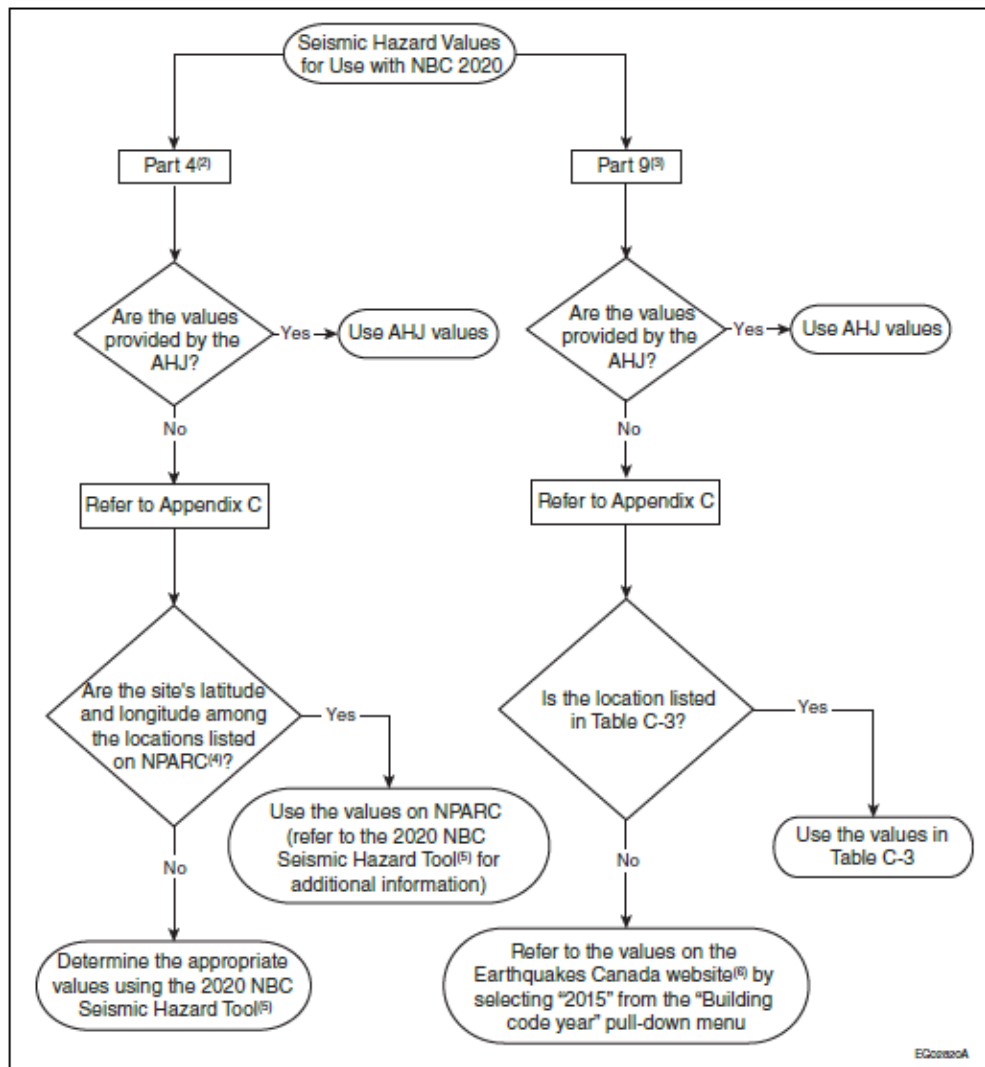
1) The required capacity of heating and cooling *appliances* located in a *dwelling unit* and serving only that *dwelling unit*, shall be determined in accordance with CSA F280, "Determining the Required Capacity of Residential Space Heating and Cooling Appliances," except that the design temperatures shall conform to Subsection 9.33.3.

### Notes to Part 1

**A-1.1.3.1.(2) Climatic Values.** Climatic values for municipalities not listed in Appendix C can be obtained at [www.climate.weather.gc.ca](http://www.climate.weather.gc.ca) or by e-mail from the Engineering Climate Services Unit of Environment and Climate Change Canada at [scg-ecs@ec.gc.ca](mailto:scg-ecs@ec.gc.ca).

**A-1.1.3.1.(3) Winter Design Temperatures.** The 2.5% values referred to in Sentence 1.1.3.1.(3) are the least restrictive temperatures that can be used. A designer may choose to use the 1% values given in Appendix C, which are in excess of the Code minimums but are considered acceptable.

**A-1.1.3.1.(4) Seismic Values.** Figure A-1.1.3.1.(4) illustrates how to determine the seismic hazard values to be used in the application of the Part 4 and Part 9 seismic provisions.



**Figure A-1.1.3.1.(4)**  
**Determining seismic hazard values for use in Part 4 and Part 9**

**Notes to Figure A-1.1.3.1.(4):**

- (1) The abbreviations used in the figure have the following meanings:  
 AHJ = authority having jurisdiction  
 NPARC = NRC Publications Archive
- (2) See also the section entitled "Seismic Hazard for Part 4" in Appendix C.
- (3) See also the section entitled "Seismic Hazard for Part 9" in Appendix C.
- (4) The seismic hazard values available on NPARC at <https://doi.org/10.4224/nqzr-dz38> were generated from the 2020 National Building Code of Canada Seismic Hazard Tool. This subset of values on NPARC is provided as a static, archival record for Code users.
- (5) The 2020 National Building Code of Canada Seismic Hazard Tool is available at <https://doi.org/10.23687/b1bd3cf0-0672-47f4-8bfa-290ae75fde9b>.
- (6) Refer to the "2015 – 2005 National Building Code of Canada seismic hazard values" page on NRC's Earthquakes Canada website.

**A-9.33.2.1.(2) Cooling.** Passive cooling designs can also be used to help reduce cooling loads to achieve the indoor design temperature specified in Sentence 9.33.3.1.(2).