



# DENVER AMENDMENT PROPOSAL FORM FOR PROPOSALS TO THE 2019 DENVER BUILDING CODE AMENDMENTS AND THE 2021 INTERNATIONAL CODES

**DENVER**  
THE MILE HIGH CITY

## 2021 CODE DEVELOPMENT CYCLE

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2) One proposal per this document is to be provided with clear and concise information.

Is a separate graphic file provided ( "X" to answer): \_\_\_ Yes or \_\_\_ No

3) Highlight the code and acronym that applies to the proposal

<u>Acronym</u>	<u>Code Name</u>	<u>Acronym</u>	<u>Code Name</u>
DBC-AP	Denver Building Code–Administrative Provisions	IPC	International Plumbing Code
IBC	International Building Code	IRC	International Residential Code
<b>IECC</b>	<b>International Energy Conservation Code</b>	IFGC	International Fuel Gas Code
IEBC	International Existing Building Code	IMC	International Mechanical Code
IFC	International Fire Code	DGC	Denver Green Code

Please provide all the following items in your amendment proposal.

**Code Sections/Tables/Figures Proposed for Revision (DRAFT):**

**Instructions:** If the proposal is for a new section, indicate (new), otherwise enter applicable code section.

R403.1, C403.4.1

**Proposal:**

**Instructions:** Show the proposal using ~~strikeout~~, underline format.

**Place an "X" next to the choice that best defines your proposal:** \_\_\_ Revision \_\_\_ New Text  Delete/Substitute \_\_\_ Deletion

**R403.1 Controls.** Not less than one thermostat shall be provided for each separate heating and cooling system.

**R403.1.1 Programmable thermostat.** The thermostat controlling the primary heating or cooling system of the *dwelling unit* shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day and different days of the week. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures of not less than 55°F (13°C) to not greater than 85°F (29°C). The thermostat shall be programmed initially by the manufacturer with a heating temperature setpoint of not greater than 70°F (21°C) and a cooling temperature setpoint of not less than 78°F (26°C).

R403.1.1.1 Heat Pump Programmable Controls. Thermostats capable of user configuration of supplemental heat operation shall have: (a) a factory default setting that disables use of supplemental heat based on space temperature differential from thermostat setting, and (b) default setting that restricts supplemental resistance heating to outside air temperatures of 20F or below.

**C403.4.1 Thermostatic controls.** The supply of heating and cooling energy to each *zone* shall be controlled by individual thermostatic controls capable of responding to temperature within the *zone*. Where humidification or dehumidification or both is provided, not fewer than one humidity control device shall be provided for each humidity control system.

**Exception:** Independent perimeter systems that are designed to offset only building envelope heat losses, gains or both serving one or more perimeter *zones* also served by an interior system provided that both of the following conditions are met:

1. The perimeter system includes not fewer than one thermostatic control *zone* for each building exposure having exterior walls facing only one orientation (within  $\pm 45$  degrees) (0.8 rad) for more than 50 contiguous feet (15 240 mm).
2. The perimeter system heating and cooling supply is controlled by thermostats located within the *zones* served by the system.

C403.4.1.1 Heat Pump Programmable Controls. Thermostats capable of user configuration of supplemental heat operation shall have: (a) a factory default setting that disables use of supplemental heat based on space temperature differential from thermostat setting, and (b) default setting that restricts supplemental resistance heating to outside air temperatures of 20F or below.

**Supporting Information:**

All proposals must include a written explanation and justification as to how they address physical, environmental, and/or customary characteristics that are specific to the City and County of Denver. The following questions must be answered for a proposal to be considered.

- Purpose: What does your proposal achieve?
- Reason: Why is your proposal necessary?
- Substantiation: Why is your proposal valid? (i.e. technical justification)

**Purpose:** Split and packaged heat pumps can be connected to smart thermostats that provide a wide variety of control options. Limiting operation of supplemental electric resistance heat will reduce energy use during winter months. The measure will also lower peak demand during winter months, where electricity consumption is expected to rise due to electrification.

**Reason:** many thermostats used with split systems, particularly those in multifamily and hotel spaces, have a wide variety of control settings to address user comfort. The ecobee thermostat, for instance, has a setting that enables supplemental electric resistance heat whenever the space temperature is more than 2F (adjustable) below the thermostat setting. Therefore, if a tenant or occupant returns and pushes the thermostat setting very warm to instantly enable heating, supplemental resistance heating will turn on. This is a common configuration for hotel split and packaged terminal heat pumps, to provide an “instant boost” of heat to maximize comfort. As a result, the units can use wasteful resistance heating even when it is quite mild outside.

**Substantiation:** Thermostat manufacturers can easily adjust default settings on thermostats to address these issues. Users are not likely to adjust the settings. For a more aggressive approach, supplemental resistance heating can be disabled altogether above outside air temperatures of 35-40F. Some guests and occupants used to gas heating may feel that the heating supply air isn’t hot enough, if the 90-95F supply air is not as warm as they are used to, and close to skin temperature.

A recent commissioning site visit to a newly constructed multi-family apartment building in Oakland, California confirmed that this is an issue with heat pump control settings.

**Bibliography and Access to Materials** (as needed when substantiating material is associated with the amendment proposal):

Kramer, Hannah et. al. 2020. Building Analytics and Monitoring-based Commissioning: Industry Practice, Costs, and Savings, Lawrence Berkeley National Laboratory, March 2020.

2019 Title 24 Building Efficiency Standards, California Energy Commission.

2017 Pacific Gas & Electric Company. Economizer Fault Detection and Diagnostics (FDD) for Built-Up Air Handlers – Final Report, August 2017. <https://title24stakeholders.com/wp-content/uploads/2016/11/203A5B1.pdf>

**Other Regulations Proposed to be Affected**

**\*For proposals to delete content from the 2019 Denver Green Code in conjunction with adding it to other mandatory Denver codes and/or regulations, only.**

Please identify which other mandatory codes or regulations are suggested to be updated (if any) to accept relocated content.

**Referenced Standards:**

List any new referenced standards that are proposed to be referenced in the code.

**Impact:**

How will this proposal impact cost and restrictiveness of code? ("X" answer for each item below)

Cost of construction:    \_\_\_ Increase    \_\_\_ Decrease\*    \_x\_ No Impact

Cost of design:        \_\_\_ Increase    \_\_\_ Decrease    \_x\_ No Impact

Restrictiveness:       \_\_\_ Increase    \_\_\_ Decrease    \_x\_ No Impact