



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

1) **Name:** Courtney Anderson **Date:** 10/12/2021
Email: Courtney.Anderson@denvergov.org **Representing (organization or self):**
City Staff Proposal (check box):

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
IECC	International Energy Conservation Code	IFGC	International Fuel Gas Code
IEBC	International Existing Building Code	IMC	International Mechanical Code
IFC	International Fire Code	DGC	Denver Green Code

AMENDMENT PROPOSAL

Please provide all the following items in your amendment proposal.

Denver Green Code Building Thermostat Proposal

Code Sections/Tables/Figures Proposed for Revision:
Instructions: If the proposal is for a new section, indicate (new), otherwise enter applicable code section.
R401.....

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

Add the following sections and renumber the following equations:

Add new definitions as follows:

GRID-FLEXIBLE CONTROL. An automatic control that can receive and automatically respond to demand response requests from, and send information back to, a utility, electrical system operator, or third-party demand response program provider.

Add new section as follows:

GRID-FLEXIBLE CONTROL. An automatic control that can receive and automatically respond to demand response requests from, and send information back to, a utility, electrical system operator, or third-party demand response program provider.

Add new section as follows:

402 Grid Flexibility

402.1 ~~Thermostat Programmable thermostat.~~ The thermostat controlling the primary heating or cooling system of the dwelling unit shall be configured 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).

402.2 Demand responsive controls. The thermostats shall have demand responsive controls that comply with AHRI 1380 and are capable of the following:

1. Automatically increasing the zone operating cooling set points by a minimum of 4°F (2.2°C)
2. Automatically decreasing the zone operating heating set points by a minimum of 4°F (2.2°C) but not less than 68°F (20°C)
3. Automatically decreasing the zone operating cooling set points by a minimum of 2°F (1.1°C)
4. Automatically increasing the zone operation heating set points by a minimum of 2°F (1.1°C)
5. Both ramp-up and ramp-down logic to prevent the building peak demand from exceeding that expected without the DR implementation.

The thermostat shall be capable of performing all other functions provided by the control when the grid-integrated controls are not available.

Exception: Assisted living facilities.

Supporting Information (Required):

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?

This proposal would require thermostats installed in residential buildings using the Denver Green Code be demand response controls capable of automatically adjusting the space conditioning setpoint by no less than 4 degrees in response to a signal from a utility, electrical system operator or other demand response provider.

- Reason: Why is your proposal necessary?

Reason:

Grid flexibility is one of the four foundations of “Denver’s Net Zero Energy (NZE) New Buildings & Homes Implementation Plan.” Grid flexibility is an essential element of decarbonizing the electrical grid. Carbon free energy sources like solar and wind have varying production over the course of the day and the year. Demand responsive controls that can respond to demand response signals enable buildings to shape their loads to better align with available energy production. This could come in the form of curtailing energy use when demand is high or utilizing excess production for building tasks like pre-conditioning spaces or service hot water when demand is lower.

- Substantiation: Why is your proposal valid? (i.e. technical justification)

This proposal requires thermostats to have demand control functionality in homes built to the Denver Green Code. Since this requirement is part of the construction code, it will not require building to participate in any demand response programs. But it will ensure that buildings are capable of participating, ensuring that Denver buildings will be able to help integrate building loads with available production.

This functionality will also present a cost-saving opportunity for buildings in the future. XCEL currently offers an optional demand response program. More and more utilities are moving beyond voluntary programs and are expanding use of time-of-use rates for electricity as a tool for shaping demand. Installing demand-responsive thermostats now will allow building tenants and owners to better control their utility costs.

The ability to adjust by 4 degrees was chosen based on demand flexibility requirements in California's energy code Title 24 Part 6. This will align the requirements with the biggest American market for demand flexible thermostats.

The proposal includes an exemption for thermostats serving health care and assisted living facilities (as can sometimes be found in low-rise R-3 and R-4 occupancies) as these are occupancies where climate control can be related to health care.

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

Hart, Reid, Chandrasekharan Nambiar, Chitra, Tyler, Matthew T., Xie, YuLong, and Zhang, Jian. Relative Credits for Extra Efficiency Code Measures. United States: N. p., 2018. Web. doi:10.2172/1489162.
(https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-28370.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.
None

Referenced Standards:

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

None

Impact:

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

Cost:

The primary cost drivers in thermostats are not the grid-flexible controls but rather other features. Therefore, incremental costs vary. An entry-level grid-integrated thermostat currently available from www.supplyhouse.com costs about \$70, while the same retailer lists a similar non-grid-integrated programmable unit for just over \$35, indicating an incremental cost of about \$35. This cost has dropped over the last decade or more. A 2017 study out of Vermont cited incremental costs for smart thermostats in new construction at roughly \$150 – a decrease in incremental costs of \$115 over just 4 years.

(<https://publicservice.vermont.gov/sites/dps/files/documents/2017%20Tier%20III%20TRM%20Characterizations.pdf>).

Cost of construction: X Increase Decrease No Impact

Cost of design: Increase Decrease No Impact

Restrictiveness: X Increase Decrease No Impact

Departmental Impact (City use only):

This amendment proposal increases/decreases/is neutral to the cost of plans review.

This amendment increases/decreases/is neutral to the cost of inspections.