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

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

Acronym	Code Name	Acronym	Code Name
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.

Code Sections/Tables/Figures Proposed for Revision:
Instructions: If the proposal is for a new section, indicate (new), otherwise enter applicable code section.
C406.9

Proposal:
Instructions: Show the proposal using ~~strikeout~~, underline format.
Place an "X" next to the choice that best defines your proposal: X Revision XNew Text X Delete/Substitute __ Deletion

Add the following sections and renumber the following equations:

TABLE C406.1
Additional Energy Efficiency Credits for Denver

Sub-section / Occupancy:	Group B	Group R and I	Group E	Group M	Other$_a$ Occupancies
C406.2.1: 5% Heating Eff Imprv.	**NA**	**1**	**2**	**2**	**2**
C406.2.2: 5% Cooling Eff Imprv.	**2**	**1**	**1**	**2**	**2**
C406.2.3: 10 % Heating Eff Imprv.	**1**	**2**	**4**	**4**	**3**
C406.2.4: 10 % Cooling Eff Imprv.	**5**	**1**	**2**	**3**	**3**
C406.3: Reduced Light Power	**8**	**2**	**9**	**14**	**8**
C406.4: Enh. Digital Light Ctrl	**2**	**NA**	**2**	**3**	**3**
C406.5.1: On-site Renewable Egy.	**9**	**7**	**6**	**7**	**7**
C406.6: Dedicated OA Sys (DOAS)	**3**	**5**	**NA**	**3**	**4**
C406.7.2: Recovered/Renew SWH$_b$	**NA**	**14**	**1**	**NA**	**14**
C406.7.3: Eff fossil fuel SWH$_b$	**NA**	**9**	**3**	**NA**	**9**
C406.7.4: Heat Pump SWH$_b$	**NA**	**5**	**1**	**NA**	**5**
C406.8: Enhanced Envelope Perf	**7**	**5**	**3**	**5**	**5**
C406.9.1: Reduced Air Infiltration	**4**	**5**	**NA**	**2**	**4**

C406.9.2: Further Reduced Air Infiltration	**7**	**8**	**NA**	**3**	**7**
C406.10 Energy Monitoring	**3**	**1**	**3**	**4**	**3**
C406.11 Fault Detection	**1**	**1**	**1**	**1**	**1**

a. Other occupancy groups include all Groups except for Groups B, R, I, E, and M
b. For occupancy groups listed in C406.7.1 and schools with showers or full-service kitchens

C406.9 Reduced air infiltration. Air infiltration shall be verified by whole-building pressurization testing conducted in accordance with ASTM E779 or ASTM E1827 by an independent third party. The measured air leakage rate of the building envelope shall ~~not exceed 0.25 cfm/ft2 (2.0 L/s x m2)~~ be tested under a pressure differential of 0.3 inches water column (75 Pa), with the calculated surface area being the sum of the above- and below-grade building envelope. A report that includes the tested surface area, floor area, air by volume, stories above grade, and leakage rates shall be submitted to the code official and the building owner.**Exception:** For buildings having over 250,000 square feet (25 000 m2) of conditioned floor area, air leakage testing need not be conducted on the whole building where testing is conducted on representative above-grade sections of the building. Tested areas shall total not less than 25 percent of the conditioned floor area and shall be tested in accordance with this section.

C406.9.1 Reduced air infiltration. Air infiltration shall be verified in accordance with Section C406.9. The air leakage shall not exceed 0.25 cfm/ft2 (2.0 L/s x m2).

C406.9.2 Further reduced air infiltration. Air infiltration shall be verified in accordance with Section C406.9. The air leakage shall not exceed 0.15 cfm/ft2 (1.2 L/s x m2). Credits for this section shall not be combined with credits for Section C406.9.1.

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 add an additional credit to the C406 credits approach to give credits for air tightness that is better than the existing credit option (C406.9): 0.25 to 0.15 cfm/sf.

Reason: Why is your proposal necessary?

Through the loss of conditioned air, air leakage can be a significant source of energy waste in buildings. It contributes to higher heating and cooling costs for building owners and occupants, and increased risk related to comfort and durability. This is particularly true in less temperate climates like Denver's.

This proposal adds an additional credit option for achieving 0.15 cfm/sf. Achieving the energy goals laid out for the 2021 code cycle in the "Denver's Net Zero Energy (NZE) New Buildings & Homes Implementation Plan" will require 30-50 credits from Section C406. Therefore, it is important to ensure that additional credits are available to Denver projects.

This infiltration rate is still higher than the very tight infiltration rates used in Passive House (0.08 cfm/sf @ 75 Pa), so it is a proven attainable level of tightness.

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

The proposal removes the testing criteria from C406.9 and creates two new subsections. One subsection has the existing test criteria and the other subsection adds the additional testing criteria (this subsection includes language to make it clear that the two options are mutually exclusive, not additive). The existing testing credit option has been relabeled in Table C406.1 to match the corresponding new subsection and a new row with the new leakage option.

The values for the new air infiltration option were extrapolated from the existing credits as relevant modeling is not available. 0.15 cfm/sf represents a reduction from the code minimum 0.40 CFM/sf that is 167% of the reduction of the existing 0.25 cfm/sf. Therefore, the credit values were estimated as being 167% of the credit values for the 0.25 cfm/sf option.

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

Thornton, Brian A, Rosenberg, Michael I, Richman, Eric E, Wang, Weimin, Xie, YuLong, Zhang, Jian, Cho, Heejin, Mendon, Vrushali V, Athalye, Rahul A, and Liu, Bing. Achieving the 30% Goal: Energy and Cost Savings Analysis of ASHRAE Standard 90.1-2010. United States: N. p., 2011. Web. doi:10.2172/1015277.

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 proposal will reduce the cost of construction by allowing projects to claim more compliance credit for buildings that are tighter than the prescriptive baseline.

Cost of construction:	___ Increase	__X_ Decrease	___ No Impact
Cost of design:	___ Increase	_X__ Decrease	___ No Impact
Restrictiveness:	___ Increase	_X__ 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.