



The standard reference design and proposed design shall be configured and analyzed as specified by Table 407.4.1(1). Table 407.4.1(1) shall include by reference all notes contained in Table C402.1.4. The proposed design roof, wall and floor assemblies shall meet the applicable maximum U-factor requirements of Table 407.4.1(6).

**Exception.** Buildings with data centers or computer rooms that have a design continuous load greater than 750 kW are exempt from the insulation requirements of Table 407.4.1(6).

**TABLE C407.4.1(6) MINIMUM INSULATION REQUIREMENTS FOR PROPOSED DESIGN**

<u>Component</u>	<u>Assembly</u>	<u>Maximum U-Factor<sup>a</sup></u>
<u>Roof</u>	<u>Insulation entirely above deck</u>	<u>0.048</u>
<u>Roof</u>	<u>Metal Building</u>	<u>0.055</u>
<u>Roof</u>	<u>Attic and other</u>	<u>0.027</u>
<u>Wall</u>	<u>Mass</u>	<u>0.090</u>
<u>Wall</u>	<u>Metal Building</u>	<u>0.069</u>
<u>Wall</u>	<u>Metal Framed</u>	<u>0.064</u>
<u>Wall</u>	<u>Wood Framed and Other</u>	<u>0.064</u>
<u>Floors, above grade</u>	<u>Mass or framed</u>	<u>0.074</u>

**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:** This proposal establishes mandatory minimum insulation requirements for opaque assemblies by construction type that are used as a “backstop”, which limits the amount that projects can trade off envelope efficiency for other measures that either have less resilience and are more easily upgraded in an alteration or retrofit. This should be added to both the Denver Building Code as an IECC Amendment and to the Denver Green Building Code.

Mandatory minimum insulation levels can be based on either a recent historical Standard or on requirements for a climate zone with more moderate requirements. The insulation requirements in this proposal are based on the 2009 IECC requirements for Denver’s climate zone. The requirements are by induction at least as cost-effective as the prescriptive opaque envelope requirements, since a prescriptive insulation level would meet the proposed mandatory minimum requirements.

**Reason:** Currently, projects can comply with the Standards with minimal insulation level performance method. This measure is not a direct increase in initial building performance but will improve performance of existing buildings by ensuring a minimum level of insulation is installed.

**Substantiation:** Mandatory minimum insulation requirements have been in place in California's Title 24 Building Energy Efficiency Standards since 2013 and have been widely accepted. The new requirement is cost-effective for the Denver Building Code. The mandatory insulation levels can be set to establish base efficiency levels for new construction. For instance, a minimum level of continuous insulation is recommended for steel-framed walls, to address thermal bridging. Projects that avoid continuous insulation but meet compliance today may have a substandard envelope for the life of the building, because it is difficult and costly to retrofit the building envelope. The proposed mandatory minimum insulation requirements are cost effective because the current code requirements, which are as or more stringent, are cost effective.

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

2013 Title 24 Building Efficiency Standards, California Energy Commission. <https://ww2.energy.ca.gov/2012publications/CEC-400-2012-004/CEC-400-2012-004-CMF-REV2.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.

None.

**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:         x   Increase    \_\_\_ Decrease    \_\_\_ No Impact