

# ***Building Code Board of Appeals***

## ***Agenda***

**September 25, 2024  
City Hall, Council Chambers  
749 Main Street  
2:00 PM**

*Members of the public are welcome to attend and give comments remotely; however, the in-person meeting may continue even if technology issues prevent remote participation.*

### *Join Zoom Meeting*

<https://louisvilleco.zoom.us/j/87648309739?pwd=VT424qJ4xb6xWcSU9mt16FxaZuetb9.1&from=addon>

*Meeting ID: 876 4830 9739*

*Passcode: 630510*

- *You can log in via your computer. Please visit the City's website here to link to the meeting: [www.louisvilleco.gov/bcboa](http://www.louisvilleco.gov/bcboa)*

*The Board will accommodate public comments during the meeting. Anyone may also email comments to the Board prior to the meeting at [Building@LouisvilleCO.gov](mailto:Building@LouisvilleCO.gov).*

1. Call to Order
2. Roll Call
3. Approval of Agenda
4. Re-Approval of Meeting Minutes from 5/16/24 (with changes from previous meeting and additional documents added)
5. Approval of Meeting Minutes from 8/28/24
6. Public Comments on Items Not on the Agenda
7. Review of Home Hardening Code proposal

Persons planning to attend the meeting who need sign language interpretation, translation services, assisted listening systems, Braille, taped material, or special transportation, should contact the City Clerk's Office at 303 335-4536 or [MeredythM@LouisvilleCO.gov](mailto:MeredythM@LouisvilleCO.gov). A forty-eight-hour notice is requested.

Si requiere una copia en español de esta publicación o necesita un intérprete durante la reunión, por favor llame a la Ciudad al 303.335.4536 o 303.335.4574.

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### ***City of Louisville***

*Building Division 749 Main Street Louisville CO 80027  
303.335.4584 (phone) [www.LouisvilleCO.gov](http://www.LouisvilleCO.gov)*

8. Staff update/discussion of 2021 IECC Energy Code decision from City Council Meeting from 9/17/24
9. Staff update on adoption of 2024 ICC codes
10. Discussion Items for Next Meeting
11. Adjourn

# ***Building Code Board of Appeals***

## ***Meeting Minutes***

**May 16, 2024**

**City Hall, Spruce Room**

**749 Main Street**

**6:30pm**

**Call to Order** – Chairperson Christian Dino called the meeting to order at 6:45pm.

**Roll Call** was taken and the following members were present:

Board Members Present:

Matt Berry  
Christian Dino  
Mason Gatto  
Peter Geise

Board Members Absent:

Steve Knapp

Staff Members Present:

Jenny Lane, Permit Technician  
Chad Root, Chief Building Official

**Approval of Agenda** –

The agenda was approved by all members present.

**Public Comments on Items Not on the Agenda** –

None

**Discussion of changes to the proposed 2021 IECC ordinance**

The Board discussed changes to the proposed 2021 IECC ordinance.

Top discussion items:

- a. Intention of new proposed IECC ordinance is to replace all prior IECC amendments.
- b. Appendix PT (Performance Target): the one we are proposing came from the City of Boulder since Denver's was too extensive and the Code Consultants proposed using Boulder's PT program.
  - a. PT is adopted differently with different municipalities.
  - b. Denver has five PT (PT 103) categories: apartment/multi-family=38, hotel/motel=55, office=43, retail=39, restaurant/bar=175
  - c. Question by Board of how hard is it to meet these numbers?
  - d. Root discussed that he does not know how to meet the numbers or how the numbers were decided.
  - e. Geise pointed out that there are consultant groups that could be hired to do an evaluation for PT compliance and this is what Boulder does; Root agreed that Louisville would need to contract for this work since we do not have the staff or training to check compliance.
  - f. If Board removes the PT compliance then multi-family would need to fall under the IECC code instead of the IBC code.
  - g. Chad explained that the PT is more of an energy auditing system and that City of Boulder has a monitor and escrow that developers and owners have to put in to modify the buildings.
  - h. Board is ok having the PT table be an option, not a requirement.
- c. Discussed insulation minimums; R-3 for pipes
- d. Berry brought up that the code is being manipulated but not necessarily for the better. He proposed for the record that the changes being proposed are not necessarily blessed by the Board nor it is making any significant change or improvement.
- e. EV has been removed from the proposed changes to the 2021 IECC. Not part of energy code and was above the state requirement, so will bring it down to the state code. It was moved to the Land Use code since the charging stations are in the parking lot for commercial/multi-family buildings.
- f. Berry mentioned that structural changes with roof insulation are increasing snow load on existing buildings. SEAC has a committee studying the effect of added insulation on snow load. Berry suggested to wait until the study is complete before making changes to the insulation values.
- g. Occupancy R-2 was requested to be part of the Commercial IBC code instead by multi-family developer.
- h. Commercial buildings can have gas lines and gas appliances installed for heating water and heating spaces; but the electrical conduit must be in

place as well so that a building can be all-electric. Board discussed striking the all-electric requirements since the equipment is either still not available or is too far out to order. Suggested having gas appliances as an option and specifying that the gas appliance would need to be at least 92% efficient.

- i. Exceptions would be fossil fuel for MAU systems or supplementary heat systems.
- j. Commercial gas: electric resistance and storage is currently not allowed. Board would like to change to allow more options.

The Board would like to make clear that they approved these changes with the intent that they are **“replacing code in lieu of”, not just “adding on” to existing code, otherwise there would have been more comments**

Here are the two energy documents requested by the Board to be included with the minutes:

**ORDINANCE NO. \_\_\_\_\_, SERIES 2024**

**AN ORDINANCE AMENDING CHAPTER 15.18.030 OF THE LOUISVILLE MUNICIPAL CODE CONCERNING THE 2021 INTERNATIONAL ENERGY CONSERVATION**

**WHEREAS**, the City Council has adopted from time-to-time certain building and construction standards; and

**WHEREAS**, it is deemed to be in the interest of the public health, safety and general welfare to adopt by reference thereto the 2021 edition of the International Energy Conservation Code; and

**WHEREAS**, the City of Louisville remains committed to its adopted goals to reduce energy consumption, increase clean energy sources, and support the transition to a low-carbon community as outlined in the Sustainability Action Plan and Resolution 25, Series 2019, “A Resolution Setting Clean Energy and Carbon Reduction Goals”; and

**WHEREAS**, reducing building energy consumption is an effective strategy to reduce community-wide energy consumption and increase long-term cost savings for businesses; and

**WHEREAS**, the City Council is committed to environmental, economic and social sustainability, ensuring the International Energy Conservation Code is attainable for current and future business owners and tenants, supporting affordable housing and local businesses development.

**WHEREAS**, the City Council, after proper notice as required by law, has held a public hearing on this ordinance providing for the adoption of said codes; and

**WHEREAS**, the 2021 edition of the International Energy Conservation Code, with amendments, has been submitted to the City Council in writing and the City Council has determined that such codes should be adopted as herein set forth.

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LOUISVILLE, COLORADO:**

Section 15.18.030 of the Louisville Municipal Code, concerning amendments and deletions to the 2021 International Energy Conservation Code, is hereby amended as follows (deleted text in ~~strike through~~ and new text underlined):

1. *Section C101.1 Title*, is amended to insert "the City of Louisville" so the section will read:

**C101.1 Title.** These regulations shall be known as the Energy Conservation Code of the City of Louisville, and shall be cited as such. It is referred to herein as "this code."

2. *Section C103.2 Information on construction documents*, is hereby amended to read as follows:

**C103.2 Information on construction documents.** Construction documents shall be drawn to scale upon suitable material. Electronic media documented are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment herein governed. Details shall include the following as applicable:

1. Energy compliance path.
2. Insulation materials and their *R*-values
3. Fenestration *U*-factor and solar heat gain coefficients (SHGCs).
4. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
5. Mechanical system design criteria.
6. Mechanical and service water heating systems and equipment types, sizes, fuel source and efficiencies.
7. Economizer description.
8. Equipment and system controls.
9. Fan motor horsepower (hp) and controls.

10. Duct sealing, duct and pipe insulation and location.
  11. Lighting fixture schedule with wattage and control narrative.
  12. Location and *daylight* zones on floor plans.
  13. Air barrier and air sealing details, including the location of the air barrier.
  14. Location of pathways for routing of raceways or cable from the solar ready zone to the electrical service panel.
3. *Section C202 General Definitions*, is hereby amended by adding, in alphabetical order, the following definitions:

*All-Electric Building*: A building that contains no combustion equipment for primary heating, ~~or piping or plumbing for combustion equipment, installed within the building or building site.~~

*Combustion Equipment*: Any equipment or appliance used for space heating, service water heating, cooking, clothes drying and/or lighting that uses fuel gas or fuel oil.

~~*Electric Vehicle (EV)*: A vehicle registered for on-road use, primarily powered by an electric motor that draws current from a rechargeable storage source that is charged by being plugged into an electrical current source.~~

~~*Electric Vehicle Supply Equipment (EVSE)*: The electrical conductors and associated equipment external to the electric vehicle that provide a connection between the premises wiring and the electric vehicle to provide electric vehicle charging.~~

~~*Electric Vehicle Capable Space*: A designated parking space that is provided with conduit sized and rated for a minimum 40 amp, 208/240 Volt dedicated branch circuit and shall be no less than 1" in size. Conduit must be continuous from the future or existing electrical panelboard or switchboard location(s) and end at a junction box or receptacle located within close proximity of the parking space. The electrical panel serving the parking space shall have sufficient capacity and physical space for a dual pole, 40 amp breaker. The conduit shall be sealed at the junction or outlet box that is capped off, with the conduit sealed and the cap labeled as "For future electric vehicle charging".~~

~~*Electric Vehicle Ready Space*: A designated parking space that is provided with a dedicated branch circuit with wiring capable of supporting a minimum 40 ampere, 208/240 Volt circuit that terminates at a receptacle, plug, junction box, or an installed electric~~

~~vehicle supply equipment within close proximity of the parking space. There shall be adequate reserved space in an electrical panelboard or switchboard to meet the electric vehicle requirements.~~

~~*Electric Vehicle Supply Equipment (EVSE) Installed Space:* A designated parking space with dedicated electric vehicle supply equipment capable of supplying a minimum 40 amp, dedicated circuit rated at 208/240 Volt from a building electrical panelboard.~~

*Emergency Power System:* A source of automatic electric power of a required capacity and duration to operate required life safety, fire alarm, detection, and ventilation systems in the event of a failure of the primary power. Emergency power systems are those required for electrical loads where interruption of the primary power could result in loss of human life or serious injuries.

*Energy Use Intensity (EUI):* The annual building site energy use per square foot of gross floor area in units of kBtu/sq ft.

*Residential Building:* For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) R-3 and R-4 buildings three stories or less in height above grade plane.

*Standby Power System:* A source of automatic electric power of a required capacity and duration to operate required building, hazardous materials or ventilation systems in the event of a failure of the primary power. Standby power systems are those required for electrical loads where interruption of the primary power could create hazards or hamper rescue or fire-fighting operations.

*Tenant Finish:* The first tenant occupying a space(s) in a core and shell. Multiple tenants may be considered as a tenant finish until the entire space within the core and shell has had a tenant. Once a space within a core and shell has been occupied it becomes an existing building.

4. ~~C401.2. Commercial buildings shall comply with Section C401.2.1~~  
one of the following, as applicable

C401.2.1 Performance targets. New commercial building types included in the scope of Appendix PT shall comply with Appendix PT and/or Sections C403.2.4 and C404.10.

C401.2.2 Core and shell. Core and shell buildings shall comply with the provisions of Section C402.1.3 through C402.5. When mechanical



systems are installed, core and shell buildings shall also meet the provisions in C403.2.4, C404.10, and Section C408.

C401.2.2.1 Core and shell buildings shall submit a letter of agreement to the City stating the tenant spaces included in the scope of Appendix PT shall meet the EUI target established in Table PT103 and shall include these requirements in their lease or purchase agreements.

C401.2.3 Tenant finish. Tenant finishes included in the scope of Appendix PT shall comply with Appendix PT and/or C403.2.4 and C404.10. All other tenant finishes shall comply with the Prescriptive Compliance option, which requires compliance with Sections C401.3, C401.4, C402 through C406, and C408.

C401.2.4 Commercial building, including additions, shall comply with the Prescriptive Compliance option, which requires compliance with Sections C401.3, C401.4, C402 through C406, and C408.

Exception: ~~Additions, alterations~~, Alterations, repairs, and changes of occupancy to existing buildings complying with Chapter 5.

5. *Section C401.2.1 International Energy Conservation Code*, is hereby deleted and replaced to read as follows:

C401.2.1 International Energy Conservation Code

Commercial buildings shall be built all-electric unless the fuel gas options of C403.3.2 and the additional electric infrastructure requirements of C405.14 are met. All buildings must comply with the following:

City of Louisville's Prescriptive Compliance. The Prescriptive Compliance option requires compliance with Sections C401.3, C401.4, C402 through C406, and Section C408.

Core and shell buildings shall be required to comply with the provisions of Section C402.1.3 through C402.5 of the 2021 International Energy Conservation Code.

6. *Section C401.2.2 ASHRAE 90.1*, is hereby deleted in its entirety.
7. A new *Section C401.4 Mandatory Requirements for Commercial Buildings*, is hereby added to read as follows:

C401.4 Mandatory Requirements for Commercial Buildings.  
Commercial buildings must comply with Table C401.4.

**Table C401.4 (Mandatory)  
Requirements for Commercial Buildings**

Title	IECC Section
Air leakage	C402.5
Calculation of heating and cooling loads	C403.1.1
Data centers	C403.1.2
System Design	C403.2
Heating and cooling equipment efficiency	C403.3
Heating and cooling system controls	C403.4, except C403.4.3, C403.4.4, C403.4.5
Economizer fault detection and diagnostics	C403.5.5
Ventilation and exhaust systems	C403.7, except C403.7.4.1
Fan and fan controls	C403.8, except C403.8.6
Large diameter ceiling fans	C403.9
Refrigeration equipment performance	C403.11, except C403.11.3
Construction of HVAC system elements	C403.12
Mechanical systems located outside of the building thermal envelope	C403.13
Service water heating	C404
Electrical power and lighting systems	C405, except C405.3
Maintenance information and system commissioning	C408

8. *Table C402.1.3 Opaque Thermal Envelope Insulation Component Minimum Requirements, R-Value Method*, is hereby deleted and replaced with the following:

**Table C402.1.3 (Mandatory)**

**Opaque Thermal Envelope Insulation Component of an Average Minimum Requirements, R-Value Method in following locations:**

Roof C402.2.1	
Insulation entirely above roof deck	R-49
Metal buildings <sup>a</sup>	R-21 + R-11 LS
Attic and other	R-49
Walls. Above grade C402.2.2	
Mass <sup>d</sup>	R-21
Metal buildings	R-21 + <u>R-10ci</u>

Metal framed	R-21+ R-10ci
Wood framed and other	R-21
Walls, Below grade C402.2.5	
Below-grade wall <sup>b</sup>	R-10
Floors C402.2.3	
Mass <sup>c</sup>	R-21
Joist/framing	R-38
Slab-on-grade floors C402.2.4	
Unheated	R-20 for 24" below
Heated <sup>e</sup>	R-15 for 36" below + R-5 full slab

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m<sup>2</sup>, 1 pound per cubic foot = 16 kg/m<sup>3</sup>.  
 NR = No Requirement, LS = Liner System.

a. Where using *R*-value compliance method, a thermal spacer block shall be provided,

b. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for

heated

slabs.

c. "Mass floors" shall be in accordance with Section C402.2.3.

d. "Mass walls" shall be in accordance with Section C402.2.2.

e. The first value is for perimeter insulation and the second value is for full, under-slab insulation.

9. *Section C402.1.4 Assembly U-factor, C-factor or F-factor-based method*, is hereby deleted in its entirety.

10. *Section C402.1.5 Component performance alternative*, is hereby deleted in its entirety.

11. *Table C402.4 Building Envelope Fenestration Maximum U-Factor and SHGC Requirements*, is hereby deleted and replaced with the following:

Table C402.4  
 Building Envelope Fenestration

Vertical Fenestration	
Maximum U-Factor	0.45
Maximum SHGC	0.33
Maximum Air leakage rate for all fenestration except curtain walls and storefront glazing	.20 cfm/ft <sup>2</sup>
Maximum air leakage rate for curtain walls and storefront glazing	.06 cfm/ft
Skylights	
Maximum U-Factor	0.50

Maximum SHGC	0.40
Maximum Air leakage rate	.20 cfm/ft2

~~12. Section C402.4.1 Maximum area, is hereby deleted and replaced with the following:~~

~~C402.4.1 Minimum area of natural lighting. Not less than eight percent of the floor area shall be glazed.~~

12. Section C402.4.1.2 is deleted and replaced with the following:

C402.4.1 Minimum area of natural lighting. Not less than 8% of wall area for warehouses, and industrial shall be glazed.

~~13. Section C402.4.2 Minimum skylight fenestration area, is hereby deleted and replaced with the following:~~

~~**C402.4.2 Minimum area of natural lighting.** A minimum skylight area of three percent of the roof area shall be provided for all roofs.~~

~~Exception: Roof areas designated for solar ready zones shall not be included in roof area calculation.~~

13. **C403.2 System design.** Mechanical systems shall be designed to comply with Sections C403.2.1 through 403.2.3 C403.2.4. Where elements of a building’s mechanical systems are addressed in Sections C403 through C403.14, such elements shall comply with the applicable provisions of those sections.

14. Section C403.2.4 Space heating equipment is added as follows:

C403.2.4. Heat pump efficiencies:

a. Ductless System

1. 14.3 SEER2
2. 7.5 HSPF2
3. Or EnergyStar Cold Climate certified

b. Ducted System

1. 15.2 SEER2
2. 9 HSPF2
3. Or EnergyStar Cold Climate certified

1. *Section C403.3.2 HVAC equipment performance requirements*, is hereby ~~deleted in its entirety and replaced~~ amended by adding the following at the beginning of the section with remainder of section to remain to read as follows:

C403.3.2 When HVAC fuel fired equipment is permitted to be installed, equipment shall meet the minimum efficiency requirements of Tables C403.3.2(1) through C403.3.2(16) when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of AHRI 400. The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

~~HVAC/fuel fired equipment performance requirements. Unless built all electric, all new combustion equipment shall comply with the more efficient HVAC equipment performance of Sections C406.2, C406.2.3, and C406.2.4 and the additional electric infrastructure requirements in Section C405.14. A mechanical compliance certificate demonstrating compliance with section C406.2.3 and/or C406.2.4 shall be required for all HVAC, fuel fired and Service Water Heating equipment.~~

~~The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein. (Tables C403.2.(1) through (16) are expressly retained and remain applicable to HVAC equipment performance.)~~

**Exceptions:**

1. ~~Factory, laboratory, and high hazard occupancy combustion equipment, except for HVAC and domestic water heating.~~
2. ~~Commercial Kitchens.~~
3. ~~Other combustion equipment approved by the Building Official based on demonstration by the applicant that compliance~~

~~with this section is not feasible and the equipment proposed is the most efficient appliance reasonably available.~~

16. *Section C403.4.1 Thermostatic controls*, is hereby deleted and replaced with the following:

**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, no fewer than one humidity control device shall be provided for each humidity control system. Occupancy sensors shall be provided on the thermostat to setback in accordance with C403.4.2.1

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.

17. *Section C403.12.1 Duct and plenum insulation and sealing*, is hereby deleted and replaced with the following:

**C403.12.1 Duct and plenum insulation and sealing.** All supply and return air ducts and plenums shall be insulated with not less than R-12. Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the International Mechanical Code.

18. *Section C403.12.3 Piping insulation*, is hereby amended to read as follows:

**C403.12.3 Piping insulation.** Piping serving as part of a heating or cooling system shall be thermally insulated to R-3.

19. *Section C404.4 Insulation of piping*, is hereby amended to read as follows:

**C404.4 Insulation of piping.** Piping from a water heater to the termination of the heated water fixture supply pipe shall be insulated to R-3. On both the inlet and outlet piping of a storage water heater or heated water storage tank, the piping to a heat trap or the first 8 feet

(2438 mm) of piping, whichever is less, shall be insulated. Piping that is heat traced shall be insulated to R-3 or the heat trace manufacturer's instructions.

39. *Section C405.4.3 Gas lighting, is hereby amended to read as follows:*

**C405.4.3 Gas lighting.** Gas-fired lighting appliances shall not be permitted.

40. A new *Section C405.14 Additional electric infrastructure, is hereby added to read as follows:*

**Section C405.14 Additional electric infrastructure.** All *combustion equipment* and end-uses shall be installed in accordance with this section.

**C405.14.1 Electric infrastructure for dwelling and sleeping units.** *Combustion equipment* and end-uses serving individual dwelling units or sleeping units shall comply with Section R404.5.

**C405.14.2 Combustion equipment.** *Combustion equipment* shall be provided with conduit that is continuous between a junction box located within 3 feet (914 mm) of the appliance or equipment and an electrical panel. The junction box, conduit and bus bar in the electrical panel shall be rated and sized to accommodate a branch circuit with sufficient capacity for an equivalent electric appliance, equipment or end use with an equivalent equipment capacity. The electrical junction box and electrical panel shall have labels stating, "For Future Electric Equipment".

Exception: Industrial and manufacturing uses are exempt from Section C405.14.

41. *Section C502.1.1 General, is hereby amended to read as follows:*

Additions to an existing building, building system or portion thereof shall conform to the provisions of Section C401.2.4 as those provisions relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

43. Section C503.2 Building Envelope is amended with exception remaining to read as follows:

New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 through C402.5. Existing ceilings, roofs, all wall types, or floors exposed during construction shall comply with Table C402.1.3.

44. *Section C505.1 General*, is hereby amended to read as follows:

**C505.1 General.** Where the use in a space changes from one use in Table C405.3.2(1) or C405.3.2(2) to another use in Table C405.3.2(1) or C405.3.2(2), the installed lighting wattage shall comply with Section C405.3. Where the space undergoing a change in occupancy or use is in a building with a fenestration area that exceeds the limitations of Section C402.4.1, the space is exempt from Section C402.4.1 provided that there is not an increase in fenestration area.

Exception: Egress doors with fenestration are allowed to bring total fenestration percentages over the allowed maximum amount of vertical fenestration.

## **APPENDIX PT MODELING TO A PERFORMANCE TARGET**

**PT101 Scope.** This section establishes criteria for demonstrating compliance with a performance target, and is required for new hotels (occupancy R-1), multifamily (occupancy R-2), offices, primary and secondary schools, and warehouses. All end use load components within and associated with the building and their building sites shall be modeled.

**PT102 Mandatory requirements.** The requirements in this section are mandatory requirements and shall be required in addition to the provisions of ASHRAE 90.1 Appendix G.

**PT103 Performance target.** Projects of the types listed in Table PT103 shall demonstrate that the proposed design reaches a fixed energy use intensity (EUI) less than or equal to the values in Table PT103, calculated utilizing the energy modeling procedures of Appendix G of ASHRAE 90.1. For *buildings* with multiple occupancy types, the modeled performance target shall be a weighted average of the floor area of each occupancy type.

Exception: Energy used for electric vehicle charging, data centers, and process loads shall be excluded from compliance modeling.



**TABLE PT103  
PERFORMANCE TARGETS**

<b>BUILDING TYPE</b>	<b>PERFORMANCE TARGET (kBtu/ft<sup>2</sup>)</b>
Hotel (Occupancy R-1)	32
Multifamily (Occupancy R-2)	32
Office, small (> 0 - 5,000 ft <sup>2</sup> )	19
Office, medium (5,000 – 50,000 ft <sup>2</sup> )	23
Office, large (>50,000 ft <sup>2</sup> )	28
School, primary	34
School, secondary	31
Warehouse	11

**PT104 Renewable Energy.** On-site renewable energy generated by a system installed as part of this project that is used by the building shall be subtracted from the proposed design energy consumption prior to calculating the proposed building performance.

**PT105 Performance documentation.** Documentation to verify compliance with this section shall be provided to the code official.

**PT105.1 Projected compliance report.** Permit submittals shall include a report documenting the proposed design is projected to meet the EUI target. The compliance report shall include the following specific information beyond the information required in ASHRAE 90.1 Appendix G:

1. Address of the building.
2. An inspection checklist documenting the building component characteristics of the proposed design.
3. Name of individual completing the report.
4. Name and version of compliance software tool.
5. Documentation of the reduction in energy use associated with on-site energy.

**PT105.2 Construction plan requirements.** Construction plans shall depict all component characteristics of the proposed design utilized for the EUI in accordance with ASHRAE 90.1 Appendix G.

45. *Section R101.1 Title*, is amended to insert "the City of Louisville" so the section will read:

**R101.1 Title.** These regulations shall be known as the Energy Conservation Code of the City of Louisville and shall be cited as such. It is referred to herein as "this code."

46. *Section R103.2 Information on construction documents*, is amended to read as follows:

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1. Energy compliance path.
2. Insulation materials and their *R*-values
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4. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
5. Mechanical system design criteria.
6. Mechanical and service water heating systems and equipment types, sizes, fuel source and efficiencies.
7. Equipment and system controls.
8. Duct sealing, duct and pipe insulation and location.
9. Air sealing detail.
10. Location of pathways for routing of raceways or cable from the solar ready zone to the electrical service panel.

47. *Section R202 General Definitions*, is hereby amended by adding, in alphabetical order, the following definitions:

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~~*Electric Vehicle (EV):* A vehicle registered for on-road use, primarily powered by an electric motor that draws current from a rechargeable storage source that is charged by being plugged into an electrical current source.~~

~~*Electric Vehicle Supply Equipment (EVSE):* The electrical conductors and associated equipment external to the electric vehicle that provide a connection between the premises wiring and the electric vehicle to provide electric vehicle charging.~~

~~*Electric Vehicle Capable Space:* A designated parking space that is provided with conduit sized and rated for a minimum 40 amp, 208/240-Volt dedicated branch circuit and shall be no less than 1” in size. Conduit must be continuous from the future or existing electrical panel board or switchboard location(s) and end at a junction box or receptacle located within close proximity of the parking space. The electrical panel serving the parking space shall have sufficient capacity and physical space for a dual-pole, 40-amp breaker. The conduit shall be sealed at the junction or outlet box that is capped off, with the conduit sealed and the cap labeled as “For future electric vehicle charging”.~~

~~*Electric Vehicle Ready Space:* A designated parking space that is provided with a dedicated branch circuit with wiring capable of supporting a minimum 40-ampere, 208/240-Volt circuit that terminates at a receptacle, plug, junction box, or an installed electric vehicle supply equipment within close proximity of the parking space. There shall be adequate reserved space in an electrical panel board or switchboard to meet the electric vehicle requirements.~~

~~*Residential Building.* For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) and R-3 and R-4 buildings three stories or less in height above grade plane.~~

48. *Section R401.2 Application*, is hereby deleted and replaced with the following:

**R401.2 Application.** New Residential buildings shall be built using appendix RB or RC and shall be built all-electric unless the fuel gas options of R403.7 and additional electric infrastructure requirements of R404.5 are met. All residential buildings shall comply with the R401.2.1 City of Louisville's Prescriptive Compliance or R406 Energy Rating

~~Index with a maximum rating index of 50 before the installation of solar panels~~

Exceptions:

1. New residential buildings certified through the Passive House Institute US, Inc. (PHIUS) program
2. Additions shall comply with R401.2.1 and Chapter 5
3. ~~Additions, a~~Alterations, repairs and changes of occupancy to existing buildings complying with Chapter 5.

49. *Section R401.2.1 Prescriptive Compliance Option*, is hereby deleted and replaced with the following:

**R401.2.1 City of Louisville’s Prescriptive Compliance.** The City of Louisville’s Prescriptive compliance requires compliance with Sections R401 through R404.

50. *Section R401.2.2 Total Building Performance Option*, is hereby deleted in its entirety.

51. *Section R401.2.4 Tropical Climate Region*, is hereby deleted in its entirety.

52. *Section R401.2.5 Additional Energy Efficiency*, is hereby amended to read as follows:

**Section R401.2.5 Additional Energy Efficiency.** Building shall comply with one of the additional efficiency options and shall be installed in according to Section R408.2.

53. A new *Section R401.4 Mandatory requirements for residential buildings*, is hereby added to read as follows:

**R401.4 Mandatory requirements for residential buildings.** Residential building must comply with the following sections from the 2021 International Energy Conservation Code found in Table R401.4 and Section R401.2.

**Table R401.34**  
**Mandatory requirements for residential buildings**

Title	IECC Section
Vapor retarder	R402.1.1
Eave baffle	R402.2.3
Access hatches and doors	R402.2.4.1
Crawl space wall insulation	R402.4.1.2
Maximum fenestration U-factor and SHGC	R402.5

Mechanical Controls	R403.1
Ducts	R403.3 except R403.3.2, R403.3.3, and R403.6
Mechanical system piping insulation	R403.4
Heated water circulation and temperature maintenance systems	R403.5.1
Drain Water heat recovery units	R403.5.3
Mechanical ventilation	R403.6 including E403.6.1
Equipment sizing and efficiency rating	R403.7
Systems serving multiple dwelling units	R403.8
Snow melt and ice systems	R403.9
Energy consumption of pools and spas	R403.10
Portable spas	R403.11
Residential pools and permanent residential spas	R403.12
Lighting equipment	R404.1
Interior lighting controls	R404.2

54. *Section R402.1 General*, is hereby amended to read as follows:

**R402.1 General.** The building thermal envelope shall comply with the requirements of Section R402.1.1 and R402.1.2.

55. *Section R402.1.2 Insulation and fenestration*, is hereby deleted and replaced with the following:

**R402.1.2 Insulation and fenestration.** New and replacement Assemblies shall have R-value of insulation materials equal to or greater than that specified in Table R402.1.2 unless an alternative path is specified while using HERS energy rating index of 50.

Exception: New Construction complying with R401.2 or exception 1

56. *Section R402.1.2.1 Fenestration* is hereby added to read as following:

R402.1.2.1 Fenestration. New and replacement assemblies shall not exceed the value specified in Table R402.1.2.

Exception: New Construction complying with R401.2 or exception 1

Table R402.1.2

Average Insulation and Fenestration Requirements by Component

Roof	R-60
------	------

Above grade walls	R-21
Below grade walls	R-19
Floors	R-38
Non heated slab on grade	R-10 for 4ft
Heated slab on grade	R-15 for 4 ft + R-5 under full slab
Fenestration U-Factor	.30
Fenestration SHGC	.33
Skylight U-Factor	.50
Skylight SHGC	.40
Hot Water Pipes	<u>R-3</u>
Warm Air Ducts	<u>R-8</u>

55. Section R402.1.5 Total UA alternative, is hereby deleted in its entirety.

56. Section R402.3.3 Glazed fenestration exemption, is hereby amended to read as follows:

**R402.3.3 Glazed fenestration exemption.** Not greater than 15 square feet (1.4 m<sup>2</sup>) of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements in Section R402.1.2.

57. *Section R402.4.1.2 Testing*, is hereby deleted and replaced to read as follows:

**Section R402.4.1.2 Testing.** All new buildings or dwelling units that are heated or cooled, and additions over 500 square feet shall be tested for air leakage.

58. *Section R402.5 Maximum fenestration U-factor and SHGC*, is hereby deleted and replaced with the following:

**Section R402.5 Maximum fenestration U-factor and SHGC.** The maximum U-factor and solar heat gain coefficient (SHGC) for fenestration shall not be required in storm shelters complying with ICC 500.

59. *Section R403.3.1 Ducts located outside conditioned space*, is hereby deleted and replaced with the following:

**R403.3.1 Ducts located outside conditioned space.** All supply and return ducts shall be insulated to a minimum R-8 if located outside a conditioned space.

60. *Section R403.5.2 Hot water pipe insulation*, is hereby deleted and replaced with the following:

**R403.5.2 Hot water pipe insulation.** All service hot water piping shall be insulated to a minimum R-3.

62. *Section R403.7 Equipment sizing and efficiency rating*, is hereby deleted and replaced with the following:

**R403.7 Equipment sizing and efficiency rating.** All new buildings and additions greater than 500 square feet with heating and cooling equipment shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies. In addition to complying with Sec. R404.6 Additional Electric Infrastructure, new and replacement electrical heating and cooling equipment shall have an efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the equipment is installed. New gas heating equipment shall comply with the following efficiencies:

1. Gas furnaces shall have a minimum of 95% efficiency.
2. Gas boilers shall have a minimum of 95% AFUE.
3. On demand water heaters shall have a greater than .92 uniform energy factor.

4. Heat pump efficiencies:

c. Ductless System

1. 14.3 SEER2
2. 7.5 HSPF2
3. Or EnergyStar Cold Climate certified

d. Ducted System

1. 15.2 SEER2
2. 9 HSPF2
3. Or EnergyStar Cold Climate certified

Exception: Solid fuel stoves/gas fireplaces, outdoor fire pits, gas stoves and ovens.

63. *Section R404.1.1 Fuel gas lighting equipment*, is hereby amended to read as follows:

**R404.1.1 Fuel gas lighting equipment.** Fuel gas lighting systems shall not be installed.

65. A new *Section R404.5 Additional electric infrastructure*, is hereby added to read as follows:

**R404.5 Additional electric infrastructure.** *Combustion equipment* shall be installed in accordance with this section.

R404.5.1 Combustion equipment and end-uses. *Combustion equipment* shall be provided with a dedicated, appropriately phased circuit that shall have a minimum amperage requirement for a comparable electric appliance, equipment or end use, an electrical receptacle or junction box that is connected to the electric panel, and conductors of adequate capacity within 6 feet (1829 mm) of the appliance or equipment.

Each such circuit shall be accessible with no obstructions. A reserved circuit breaker space shall be installed in the electrical panel adjacent to the circuit breaker for the branch circuit and labeled for each circuit. Both ends of the unused conductor or conduit shall be labeled “For Future Electric Equipment” and be electrically isolated.

66. *Section R405 Total building performance*, is deleted in its entirety.

67. *Section R406.3 Building thermal envelope*, is hereby deleted in its entirety and replaced with the following:

**R406.3 Building thermal envelope.** ~~Building and portions thereof shall comply with Table R406.3.~~ The building thermal envelope shall be greater or equal to the levels of efficiency and SHGC in Table R402.1.2.

68. *Section R406.3.1 On-site renewables are not included*, is deleted in its entirety.



69. *Section R406.3.2 On-site renewables are included*, is deleted in its entirety.

70. *Section ~~406.3.2~~ R407 Tropical Climate Region Compliance Path*, is deleted in its entirety.

71. Section R502.1.1 General, is hereby amended to read as follows:

Additions to an existing building, building system or portion thereof shall conform to the provisions of R401.2.1 as those provisions relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code where the addition alone complies, where the existing building and addition comply with this code as a single building, or where the building with the addition does not use more energy than the existing building. Additions shall be in accordance with Section R502.2 or R502.3.

72. Section R503.1.1 Building Envelope is amended to read as follows:

Building envelope assemblies that are part of the alteration shall comply with Section R401.2.1

Section R503.1.1 Building envelope Exception 2 is deleted in its entirety and replaced with the following.

2. Section R402.4.1.2 Testing

73. *Section R505.1 General* is hereby amended to remove the exception.

74. *Section R505.1.1 Unconditioned space*, is hereby deleted and replaced with the following:

**R505.1.1 Unconditioned space.** Any unconditioned or low-energy space that is altered to become a conditioned space shall comply with Section R503.

75. RC102.1 General is amended to read as follows.

RC102.1 General. New residential buildings shall comply with Sections RC102.2 through RC102.9.

76. RC102.2 Energy Rating Index zero energy score is amended to read as follows.

RC102.2 Energy Rating Index zero energy score.

Compliance with this section requires that the rated design be shown to have a Home Energy Rating System (HERS) score of 50 before solar and 0 with solar when compared to the Energy Rating Index (ERI) reference design determined in accordance with RESNET/ICC 301 for both of the following:

1. ERI value not including on-site power production (OPP) calculated in accordance with RESNET/ICC 301 HERS
2. ERI value including on-site power production calculated in accordance with RESNET/ICC 301 HERS with the OPP in Equation 4.1.2 of RESNET/ICC 301 HERS adjusted in accordance with Equation RC-1.

Adjusted OPP = OPP + CREF + REPC (Equation RC-1)

where:

CREF = Community Renewable Energy Facility power production—the yearly energy, in kilowatt hour equivalent (kWheq), contracted from a community renewable energy facility that is qualified under applicable state and local utility statutes and rules, and that allocates bill credits to the rated home.

REPC = Renewable Energy Purchase Contract power production—the yearly energy, in kilowatt hour equivalent (kWheq), contracted from an energy facility that generates energy with photovoltaic, solar thermal, geothermal energy or wind systems, and that is demonstrated by an energy purchase contract or lease with a duration of not less than 15 years.

RC102.2.1 HERS Score. Buildings shall comply with the scores in Table RC102.2.1.

Table RC102.2.1.

<u>HERS SCORE NOT INCLUDING OPP</u>	<u>HERS SCORE INCLUDING OPP</u>
<u>50</u>	<u>0</u>

76. RC102.3 through RC102.9 are added to Appendix RC to read as follows.

RC102.3 Mandatory Sections. All projects shall comply with all sections within Table RC102.3.

Table RC102.3

Mandatory requirements for residential buildings

<u>Title</u>	<u>IECC Section</u>
<u>Vapor retarder</u>	<u>R402.1.1</u>
<u>Eave baffle</u>	<u>R402.2.3</u>
<u>Access hatches and doors</u>	<u>R402.2.4.1</u>

<u>Crawl space wall insulation</u>	<u>R402.4.1.2</u>
<u>Maximum fenestration U-factor and SHGC</u>	<u>R402.5</u>
<u>Mechanical Controls</u>	<u>R403.1</u>
<u>Ducts</u>	<u>R403.3 except R403.3.2, R403.3.3, and R403.6</u>
<u>Mechanical system piping insulation</u>	<u>R403.4</u>
<u>Heated water circulation and temperature maintenance systems</u>	<u>R403.5.1</u>
<u>Drain Water heat recovery units</u>	<u>R403.5.3</u>
<u>Mechanical ventilation</u>	<u>R403.6 including E403.6.1</u>
<u>Equipment sizing and efficiency rating</u>	<u>R403.7</u>
<u>Systems serving multiple dwelling units</u>	<u>R403.8</u>
<u>Snow melt and ice systems</u>	<u>R403.9</u>
<u>Energy consumption of pools and spas</u>	<u>R403.10</u>
<u>Portable spas</u>	<u>R403.11</u>
<u>Residential pools and permanent residential spas</u>	<u>R403.12</u>
<u>Lighting equipment</u>	<u>R404.1</u>
<u>Interior lighting controls</u>	<u>R404.2</u>

RC102.4 Building Envelope. The building thermal envelope shall be greater or equal to the levels of efficiency and SHGC in Table R402.1.2.

RC102.5 Verification by approved agency.

Verification of compliance with Section R102.4 as outlined in Sections of this appendix shall be completed by an approved third party. Verification of compliance with Section R102.3 shall be completed by the authority having jurisdiction or an approved third-party inspection agency in accordance with Section R105.4.

RC102.6 Documentation.

Documentation of the software used to determine the ERI and the parameters for the residential building shall be in accordance with Sections RC102.6.1 through RC102.6.4

RC102.6.1 Compliance software tools.

Software tools used for determining HERS shall be Approved Software Rating Tools in accordance with RESNET/ICC 301.

RC102.6.2 Compliance report.

Compliance software tools shall generate a report that documents that the home and the HERS score of the rated design complies with RC102. Compliance documentation shall be created for the proposed design and shall be submitted with the application for the building permit. Confirmed compliance documents of the built dwelling unit shall be created and submitted to the code official for review before a certificate of occupancy is issued. Compliance reports shall include information in accordance with Sections RC102.6.3 and RC102.6.4.

RC102.7 Additional documentation.

The code official shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the ERI reference design.
2. A certification signed by the builder providing the building component characteristics of the rated design.
3. Documentation of the actual values used in the software calculations for the rated design.

RC102.8 Specific approval.

Performance analysis tools meeting the applicable subsections of Section RC102 shall be approved. Documentation demonstrating the approval of performance analysis tools in accordance with Section RC102 shall be provided.

RC102.9 Input values.

Where calculations require input values not specified by Sections RC 102, those input values shall be taken from HERS RESNET/ICC 301.

**INTRODUCED, READ, PASSED ON FIRST READING, AND ORDERED PUBLISHED** this \_\_\_\_\_ day of \_\_\_\_\_, 2024.

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Chris Leh, Mayor

ATTEST:

\_\_\_\_\_  
Meredyth Muth, City Clerk

APPROVED AS TO FORM:

\_\_\_\_\_  
Kelly PC, City Attorney

**PASSED AND ADOPTED ON SECOND AND FINAL READING**, this \_\_\_\_\_  
day of \_\_\_\_\_, 2024.

\_\_\_\_\_  
Chris Leh, Mayor

ATTEST:

\_\_\_\_\_  
Meredyth Muth, City Clerk

**ORDINANCE NO. \_\_\_\_\_, SERIES 2024**

**AN ORDINANCE AMENDING CHAPTER 15.18.030 OF THE LOUISVILLE  
MUNICIPAL CODE CONCERNING THE  
2021 INTERNATIONAL ENERGY CONSERVATION**

**WHEREAS**, the City Council has adopted from time-to-time certain building and construction standards; and

**WHEREAS**, it is deemed to be in the interest of the public health, safety and general welfare to adopt by reference thereto the 2021 edition of the International Energy Conservation Code; and

**WHEREAS**, the City of Louisville remains committed to its adopted goals to reduce energy consumption, increase clean energy sources, and support the transition to a low-carbon community as outlined in the Sustainability Action Plan and Resolution 25, Series 2019, “A Resolution Setting Clean Energy and Carbon Reduction Goals”; and

**WHEREAS**, reducing building energy consumption is an effective strategy to reduce community-wide energy consumption and increase long-term cost savings for businesses; and

**WHEREAS**, the City Council is committed to environmental, economic and social sustainability, ensuring the International Energy Conservation Code is attainable for current and future business owners and tenants, supporting affordable housing and local businesses development.

**WHEREAS**, the City Council, after proper notice as required by law, has held a public hearing on this ordinance providing for the adoption of said codes; and

**WHEREAS**, the 2021 edition of the International Energy Conservation Code, with amendments, has been submitted to the City Council in writing and the City Council has determined that such codes should be adopted as herein set forth.

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF  
THE CITY OF LOUISVILLE, COLORADO:**

Section 15.18.030 of the Louisville Municipal Code, concerning amendments and deletions to the 2021 International Energy Conservation Code, is hereby amended as follows (deleted text in ~~strikethrough~~ and new text underlined):

15. *Section C101.1 Title*, is amended to insert "the City of Louisville" so the section will read:

**C101.1 Title.** These regulations shall be known as the Energy Conservation Code of the City of Louisville, and shall be cited as such. It is referred to herein as "this code."

16. *Section C103.2 Information on construction documents*, is hereby amended to read as follows:

**C103.2 Information on construction documents.** Construction documents shall be drawn to scale upon suitable material. Electronic media documented are permitted to be submitted when *approved by the code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment herein governed. Details shall include the following as applicable:

15. Energy compliance path.
16. Insulation materials and their *R*-values
17. Fenestration *U*-factor and solar heat gain coefficients (SHGCs).
18. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
19. Mechanical system design criteria.
20. Mechanical and service water heating systems and equipment types, sizes, fuel source and efficiencies.
21. Economizer description.
22. Equipment and system controls.
23. Fan motor horsepower (hp) and controls.
24. Duct sealing, duct and pipe insulation and location.
25. Lighting fixture schedule with wattage and control narrative.
26. Location and *daylight* zones on floor plans.
27. Air barrier and air sealing details, including the location of the air barrier.
28. Location of pathways for routing of raceways or cable from the solar ready zone to the electrical service panel.

17. *Section C202 General Definitions*, is hereby amended by adding, in alphabetical order, the following definitions:

*All-Electric Building:* A building that contains no combustion equipment for primary heating, ~~or piping or plumbing for combustion equipment, installed within the building or building site.~~

*Combustion Equipment:* Any equipment or appliance used for space heating, service water heating, cooking, clothes drying and/or lighting that uses fuel gas or fuel oil.

~~*Electric Vehicle (EV):* A vehicle registered for on-road use, primarily powered by an electric motor that draws current from a rechargeable storage source that is charged by being plugged into an electrical current source.~~

~~*Electric Vehicle Supply Equipment (EVSE):* The electrical conductors and associated equipment external to the electric vehicle that provide a connection between the premises wiring and the electric vehicle to provide electric vehicle charging.~~

~~*Electric Vehicle Capable Space:* A designated parking space that is provided with conduit sized and rated for a minimum 40 amp, 208/240 Volt dedicated branch circuit and shall be no less than 1" in size. Conduit must be continuous from the future or existing electrical panelboard or switchboard location(s) and end at a junction box or receptacle located within close proximity of the parking space. The electrical panel serving the parking space shall have sufficient capacity and physical space for a dual-pole, 40-amp breaker. The conduit shall be sealed at the junction or outlet box that is capped off, with the conduit sealed and the cap labeled as "For future electric vehicle charging".~~

~~*Electric Vehicle Ready Space:* A designated parking space that is provided with a dedicated branch circuit with wiring capable of supporting a minimum 40-ampere, 208/240 Volt circuit that terminates at a receptacle, plug, junction box, or an installed electric vehicle supply equipment within close proximity of the parking space. There shall be adequate reserved space in an electrical panelboard or switchboard to meet the electric vehicle requirements.~~

~~*Electric Vehicle Supply Equipment (EVSE) Installed Space:* A designated parking space with dedicated electric vehicle supply equipment capable of supplying a minimum 40-amp, dedicated circuit rated at 208/240 Volt from a building electrical panelboard.~~

*Emergency Power System:* A source of automatic electric power of a required capacity and duration to operate required life safety, fire alarm, detection, and ventilation systems in the event of a failure of the primary power. Emergency power systems are those required for electrical loads where interruption of the primary power could result in loss of human life or serious injuries.



*Energy Use Intensity (EUI):* The annual building site energy use per square foot of gross floor area in units of kBtu/sq ft.

*Residential Building:* For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) R-3 and R-4 buildings three stories or less in height above grade plane.

*Standby Power System:* A source of automatic electric power of a required capacity and duration to operate required building, hazardous materials or ventilation systems in the event of a failure of the primary power. Standby power systems are those required for electrical loads where interruption of the primary power could create hazards or hamper rescue or fire-fighting operations.

*Tenant Finish:* The first tenant occupying a space(s) in a core and shell. Multiple tenants may be considered as a tenant finish until the entire space within the core and shell has had a tenant. Once a space within a core and shell has been occupied it becomes an existing building.

18. *C401.2.* Commercial buildings shall comply with ~~Section C401.2.1~~ one of the following, as applicable

C401.2.1 Performance targets. New commercial building types included in the scope of Appendix PT shall comply with Appendix PT and/or Sections C403.2.4 and C404.10.

C401.2.2 Core and shell. Core and shell buildings shall comply with the provisions of Section C402.1.3 through C402.5. When mechanical systems are installed, core and shell buildings shall also meet the provisions in C403.2.4, C404.10, and Section C408.

C401.2.2.1 Core and shell buildings shall submit a letter of agreement to the City stating the tenant spaces included in the scope of Appendix PT shall meet the EUI target established in Table PT103 and shall include these requirements in their lease or purchase agreements.

C401.2.3 Tenant finish. Tenant finishes included in the scope of Appendix PT shall comply with Appendix PT and/or C403.2.4 and C404.10. All other tenant finishes shall comply with the Prescriptive Compliance option, which requires compliance with Sections C401.3, C401.4, C402 through C406, and C408.

C401.2.4 Commercial building, including additions, shall comply with the Prescriptive Compliance option, which requires compliance with Sections C401.3, C401.4, C402 through C406, and C408.

Exception: ~~Additions, alterations,~~ Alterations, repairs, and changes of occupancy to existing buildings complying with Chapter 5.

19. *Section C401.2.1 International Energy Conservation Code*, is hereby deleted and replaced to read as follows:

C401.2.1 International Energy Conservation Code

Commercial buildings shall be built all-electric unless the fuel gas options of C403.3.2 and the additional electric infrastructure requirements of C405.14 are met. All buildings must comply with the following:

City of Louisville's Prescriptive Compliance. The Prescriptive Compliance option requires compliance with Sections C401.3, C401.4, C402 through C406, and Section C408.

Core and shell buildings shall be required to comply with the provisions of Section C402.1.3 through C402.5 of the 2021 International Energy Conservation Code.

20. *Section C401.2.2 ASHRAE 90.1*, is hereby deleted in its entirety.

21. A new *Section C401.4 Mandatory Requirements for Commercial Buildings*, is hereby added to read as follows:

C401.4 Mandatory Requirements for Commercial Buildings.  
Commercial buildings must comply with Table C401.4.

Table C401.4 (Mandatory)  
Requirements for Commercial Buildings

Title	IECC Section
Air leakage	C402.5
Calculation of heating and cooling loads	C403.1.1
Data centers	C403.1.2
System Design	C403.2
Heating and cooling equipment efficiency	C403.3
Heating and cooling system controls	C403.4, except C403.4.3, C403.4.4, C403.4.5
Economizer fault detection and diagnostics	C403.5.5

Ventilation and exhaust systems	C403.7, except C403.7.4.1
Fan and fan controls	C403.8, except C403.8.6
Large diameter ceiling fans	C403.9
Refrigeration equipment performance	C403.11, except C403.11.3
Construction of HVAC system elements	C403.12
Mechanical systems located outside of the building thermal envelope	C403.13
Service water heating	C404
Electrical power and lighting systems	C405, except C405.3
Maintenance information and system commissioning	C408

22. Table C402.1.3 *Opaque Thermal Envelope Insulation Component Minimum Requirements, R-Value Method*, is hereby deleted and replaced with the following:

Table C402.1.3 (Mandatory)  
 Opaque Thermal Envelope Insulation Component of an Average Minimum Requirements, R-Value Method in following locations:

Roof C402.2.1	
Insulation entirely above roof deck	R-49
Metal buildings <sup>a</sup>	R-21 + R-11 LS
Attic and other	R-49
Walls. Above grade C402.2.2	
Mass <sup>d</sup>	R-21
Metal buildings	R-21 + <u>R-10ci</u>
Metal framed	R-21+ <u>R-10ci</u>
Wood framed and other	R-21
Walls, Below grade C402.2.5	
Below-grade wall <sup>b</sup>	R-10
Floors C402.2.3	
Mass <sup>c</sup>	R-21
Joist/framing	R-38
Slab-on-grade floors C402.2.4	
Unheated	R-20 for 24" below
Heated <sup>c</sup>	R-15 for 36" below + R-5 full slab

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m<sup>2</sup>, 1 pound per cubic foot = 16 kg/m<sup>3</sup>.

NR = No Requirement, LS = Liner System.

a. Where using R-value compliance method, a thermal spacer block shall be provided,

b. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for

heated

slabs.

c. "Mass floors" shall be in accordance with Section C402.2.3.

d. "Mass walls" shall be in accordance with Section C402.2.2.

e. The first value is for perimeter insulation and the second value is for full, under-slab insulation.

23. *Section C402.1.4 Assembly U-factor, C-factor or F-factor-based method*, is hereby deleted in its entirety.

24. *Section C402.1.5 Component performance alternative*, is hereby deleted in its entirety.

25. *Table C402.4 Building Envelope Fenestration Maximum U-Factor and SHGC Requirements*, is hereby deleted and replaced with the following:

Table C402.4  
Building Envelope Fenestration

Vertical Fenestration	
Maximum U-Factor	0.45
Maximum SHGC	0.33
Maximum Air leakage rate for all fenestration except curtain walls and storefront glazing	.20 cfm/ft <sup>2</sup>
Maximum air leakage rate for curtain walls and storefront glazing	.06 cfm/ft
Skylights	
Maximum U-Factor	0.50
Maximum SHGC	0.40
Maximum Air leakage rate	.20 cfm/ft <sup>2</sup>

~~12. *Section C402.4.1 Maximum area*, is hereby deleted and replaced with the following:~~

~~C402.4.1 Minimum area of natural lighting. Not less than eight percent of the floor area shall be glazed.~~

26. *Section C402.4.1.2* is deleted and replaced with the following:

C402.4.1 Minimum area of natural lighting. Not less than 8% of wall area for warehouses, and industrial shall be glazed.

13. ~~Section C402.4.2 Minimum skylight fenestration area, is hereby deleted and replaced with the following:~~

**C402.4.2 Minimum area of natural lighting.** A minimum skylight area of three percent of the roof area shall be provided for all roofs.

**Exception:** Roof areas designated for solar ready zones shall not be included in roof area calculation.

27. **C403.2 System design.** Mechanical systems shall be designed to comply with Sections C403.2.1 through ~~403.2.3~~ C403.2.4. Where elements of a building's mechanical systems are addressed in Sections C403 through C403.14, such elements shall comply with the applicable provisions of those sections.

28. Section C403.2.4 Space heating equipment is added as follows:

**C403.2.4 Space heating equipment.** Fossil-fuel warm air furnaces appliances and electric resistance space heating equipment shall not be permitted for space heating in new construction unless gas appliances are a minimum of 95%

C403.2.4. Heat pump efficiencies:

e. Ductless System

1. 14.3 SEER2
2. 7.5 HSPF2
3. Or EnergyStar Cold Climate certified

f. Ducted System

1. 15.2 SEER2
2. 9 HSPF2
3. Or EnergyStar Cold Climate certified

**Exceptions:**

2. **Emergency backup.** Where it is required by an applicable law or regulation to provide space heating with an emergency power system or a standby power system.
3. **Certain make-up air systems.** Electric resistance in make-up air systems where energy recovery ventilation is prohibited by the International Mechanical Code.
4. **Supplementary heat.** Electric resistance and natural gas/ propane heat used for supplementary heat in accordance with Section C403.4.1.1
5. **Electric resistance budget.** In addition to any exceptions in this section, Up to 5 W of electric resistance space heating per square foot of conditioned floor area in the building, not including supplementary heat.
6. **Integrated units.** Electric resistance heating elements, natural gas, propane supplemental heating integrated into heat pump equipment.

7. *Heated plenums.* Electric resistance in heated plenums.
8. *Temporary systems.* Temporary electric resistance heating systems are permitted where serving future tenant spaces that are unfinished and unoccupied, provided that the heating equipment is sized and controlled to achieve interior space temperatures no higher than needed to prevent freezing.
9. *Freeze protection.* Electric resistance in heating systems intended for freeze protection.
10. *Outdoor systems.* Equipment used for outdoor heating.
11. *Specific conditions.* Portions of buildings that require fossil fuel or electric resistance space heating for specific conditions approved by the Building Official for research, health care, process or other specific needs that cannot practicably be served by heat pump or other space heating systems. This does not constitute a blanket exception for any occupancy type.
12. *Replacements.* Replacement fuel-fired appliances.
13. *Backup heat.* For back up heat to operate when the heat pump cannot adequately heat the space/buildings due to extreme cold weather.
14. *Where cfm/sq. ft. ventilation requirements result in conditions where the Building Official determines that space heating requirements cannot reasonably be met without combustion space heating systems.*

15. *Section C403.3.2 HVAC equipment performance requirements*, is hereby ~~deleted in its entirety and replaced~~ amended by adding the following at the beginning of the section with remainder of section to remain ~~to read as follows~~:

C403.3.2 When HVAC fuel fired equipment is permitted to be installed, equipment shall meet the minimum efficiency requirements of Tables C403.3.2(1) through C403.3.2(16) when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of AHRI 400. The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

~~HVAC/fuel fired equipment performance requirements. Unless built all electric, all new combustion equipment shall comply with the more efficient HVAC equipment performance of Sections C406.2, C406.2.3, and C406.2.4 and the additional electric infrastructure requirements in Section C405.14. A mechanical compliance certificate demonstrating compliance with section C406.2.3 and/or C406.2.4 shall be required for all HVAC, fuel fired and Service Water Heating equipment.~~

~~The efficiency shall be verified through certification under an approved certification program or, where a certification program does not exist, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein. (Tables C403.2.(1) through (16) are expressly retained and remain applicable to HVAC equipment performance.)~~

**Exceptions:**

1. Factory, laboratory, and high hazard occupancy combustion equipment, except for HVAC and domestic water heating.

2. Commercial Kitchens.

3. Other combustion equipment approved by the Building Official based on demonstration by the applicant that compliance with this section is not feasible and the equipment proposed is the most efficient appliance reasonably available.

16. *Section C403.4.1 Thermostatic controls*, is hereby deleted and replaced with the following:

**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, no fewer than one humidity control device shall be provided for each humidity control system. Occupancy sensors shall be provided on the thermostat to setback in accordance with C403.4.2.1

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:

3. 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).
4. The perimeter system heating and cooling supply is controlled by thermostats located within the *zones* served by the system.

17. *Section C403.12.1 Duct and plenum insulation and sealing*, is hereby deleted and replaced with the following:

**C403.12.1 Duct and plenum insulation and sealing.** All supply and return air ducts and plenums shall be insulated with not less than R-12. Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the International Mechanical Code.

18. *Section C403.12.3 Piping insulation*, is hereby amended to read as follows:

**C403.12.3 Piping insulation.** Piping serving as part of a heating or cooling system shall be thermally insulated to R-3.

19. *Section C404.4 Insulation of piping*, is hereby amended to read as follows:

**C404.4 Insulation of piping.** Piping from a water heater to the termination of the heated water fixture supply pipe shall be insulated to R-3. On both the inlet and outlet piping of a storage water heater or heated water storage tank, the piping to a heat trap or the first 8 feet (2438 mm) of piping, whichever is less, shall be insulated. Piping that is heat traced shall be insulated to R-3 or the heat trace manufacturer's instructions.

39. *Section C405.4.3 Gas lighting*, is hereby amended to read as follows:

**C405.4.3 Gas lighting.** Gas-fired lighting appliances shall not be permitted.

40. A new *Section C405.14 Additional electric infrastructure*, is hereby added to read as follows:

**Section C405.14 Additional electric infrastructure.** All *combustion equipment* and end-uses shall be installed in accordance with this section.

**C405.14.1 Electric infrastructure for dwelling and sleeping units.** *Combustion equipment* and end-uses serving individual dwelling units or sleeping units shall comply with Section R404.5.

**C405.14.2 Combustion equipment.** *Combustion equipment* shall be provided with conduit that is continuous between a junction box located



within 3 feet (914 mm) of the appliance or equipment and an electrical panel. The junction box, conduit and bus bar in the electrical panel shall be rated and sized to accommodate a branch circuit with sufficient capacity for an equivalent electric appliance, equipment or end use with an equivalent equipment capacity. The electrical junction box and electrical panel shall have labels stating, “For Future Electric Equipment”.

Exception: Industrial and manufacturing uses are exempt from Section C405.14.

41. Section C502.1.1 General, is hereby amended to read as follows:

Additions to an existing building, building system or portion thereof shall conform to the provisions of Section C401.2.4 as those provisions relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

43. Section C503.2 Building Envelope is amended with exception remaining to read as follows:

New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 through C402.5. Existing ceilings, roofs, all wall types, or floors exposed during construction shall comply with Table C402.1.3.

44. Section C505.1 General, is hereby amended to read as follows:

**C505.1 General.** Where the use in a space changes from one use in Table C405.3.2(1) or C405.3.2(2) to another use in Table C405.3.2(1) or C405.3.2(2), the installed lighting wattage shall comply with Section C405.3. Where the space undergoing a change in occupancy or use is in a building with a fenestration area that exceeds the limitations of Section C402.4.1, the space is exempt from Section C402.4.1 provided that there is not an increase in fenestration area.

Exception: Egress doors with fenestration are allowed to bring total fenestration percentages over the allowed maximum amount of vertical fenestration.

**PT101 Scope.** This section establishes criteria for demonstrating compliance with a performance target, and is required for new hotels (occupancy R-1), multifamily (occupancy R-2), offices, primary and secondary schools, and warehouses. All end use load components within and associated with the building and their building sites shall be modeled.

**PT102 Mandatory requirements.** The requirements in this section are mandatory requirements and shall be required in addition to the provisions of ASHRAE 90.1 Appendix G.

**PT103 Performance target.** Projects of the types listed in Table PT103 shall demonstrate that the proposed design reaches a fixed energy use intensity (EUI) less than or equal to the values in Table PT103, calculated utilizing the energy modeling procedures of Appendix G of ASHRAE 90.1. For *buildings* with multiple occupancy types, the modeled performance target shall be a weighted average of the floor area of each occupancy type.

Exception: Energy used for electric vehicle charging, data centers, and process loads shall be excluded from compliance modeling.

**TABLE PT103  
PERFORMANCE TARGETS**

<b>BUILDING TYPE</b>	<b>PERFORMANCE TARGET (kBTU/ft<sup>2</sup>)</b>
<u>Hotel (Occupancy R-1)</u>	<u>32</u>
Multifamily (Occupancy R-2)	32
Office, small ( $\geq 0$ - 5,000 ft <sup>2</sup> )	19
Office, medium (5,000 – 50,000 ft <sup>2</sup> )	23
Office, large (>50,000 ft <sup>2</sup> )	28
School, primary	34
School, secondary	31
Warehouse	11

**PT104 Renewable Energy.** On-site renewable energy generated by a system installed as part of this project that is used by the building shall be subtracted from the proposed design energy consumption prior to calculating the proposed building performance.

**PT105 Performance documentation.** Documentation to verify compliance with this section shall be provided to the code official.

**PT105.1 Projected compliance report.** Permit submittals shall include a report documenting the proposed design is projected to meet the EUI target. The compliance report shall include the following specific information beyond the information required in ASHRAE 90.1 Appendix G:

6. Address of the building.
7. An inspection checklist documenting the building component characteristics of the proposed design.
8. Name of individual completing the report.
9. Name and version of compliance software tool.
10. Documentation of the reduction in energy use associated with on-site energy.

**PT105.2 Construction plan requirements.** Construction plans shall depict all component characteristics of the proposed design utilized for the EUI in accordance with ASHRAE 90.1 Appendix G.

45. *Section R101.1 Title*, is amended to insert "the City of Louisville" so the section will read:

**R101.1 Title.** These regulations shall be known as the Energy Conservation Code of the City of Louisville and shall be cited as such. It is referred to herein as "this code."

46. *Section R103.2 Information on construction documents*, is amended to read as follows:

**R103.2 Information on construction documents.** Construction documents shall be drawn to scale upon suitable material. Electronic media documented are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment herein governed. Details shall include the following as applicable:

11. Energy compliance path.
  12. Insulation materials and their *R*-values
  13. Fenestration *U*-factor and solar heat gain coefficients (SHGCs).
  14. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
  15. Mechanical system design criteria.
  16. Mechanical and service water heating systems and equipment types, sizes, fuel source and efficiencies.
  17. Equipment and system controls.
  18. Duct sealing, duct and pipe insulation and location.
  19. Air sealing detail.
  20. Location of pathways for routing of raceways or cable from the solar ready zone to the electrical service panel.
47. *Section R202 General Definitions*, is hereby amended by adding, in alphabetical order, the following definitions:

*All-Electric Building*: A building that contains no combustion equipment for primary heating, ~~or plumbing or piping for combustion equipment, installed within the building or building site.~~

*Combustion Equipment*: Any equipment or appliance used for space heating, service water heating, cooking, clothes drying and/or lighting that uses fuel gas or fuel oil.

~~*Electric Vehicle (EV)*: A vehicle registered for on road use, primarily powered by an electric motor that draws current from a rechargeable storage source that is charged by being plugged into an electrical current source.~~

~~*Electric Vehicle Supply Equipment (EVSE)*: The electrical conductors and associated equipment external to the electric vehicle that provide a connection between the premises wiring and the electric vehicle to provide electric vehicle charging.~~

~~*Electric Vehicle Capable Space*: A designated parking space that is provided with conduit sized and rated for a minimum 40-amp, 208/240-Volt dedicated branch circuit and shall be no less than 1" in size. Conduit must be continuous from the future or existing electrical panel board or switchboard location(s) and end at a junction box or receptacle located within close proximity of the parking space. The electrical panel serving the parking space shall have sufficient capacity and physical space for a dual pole, 40-amp breaker. The conduit shall be sealed at the junction or outlet box that is capped off, with the conduit sealed and the cap labeled as "For future electric vehicle charging".~~

~~*Electric Vehicle Ready Space:* A designated parking space that is provided with a dedicated branch circuit with wiring capable of supporting a minimum 40-ampere, 208/240-Volt circuit that terminates at a receptacle, plug, junction box, or an installed electric vehicle supply equipment within close proximity of the parking space. There shall be adequate reserved space in an electrical panel board or switchboard to meet the electric vehicle requirements.~~

*Residential Building.* For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) and R-3 and R-4 buildings three stories or less in height above grade plane.

48. *Section R401.2 Application*, is hereby deleted and replaced with the following:

**R401.2 Application.** New Residential buildings shall be built using appendix RB or and RC and shall be built all-electric unless the fuel gas options of R403.7 and additional electric infrastructure requirements of R404.5 are met. All residential buildings shall comply with the R401.2.1 City of Louisville's Prescriptive Compliance or R406 Energy Rating Index with a maximum rating index of 50 before the installation of solar panels

Exceptions:

4. New residential buildings certified through the Passive House Institute US, Inc. (PHIUS) program
5. Additions shall comply with R401.2.1 and Chapter 5
6. ~~Additions, a~~Alterations, repairs and changes of occupancy to existing buildings complying with Chapter 5.

49. *Section R401.2.1 Prescriptive Compliance Option*, is hereby deleted and replaced with the following:

**R401.2.1 City of Louisville's Prescriptive Compliance.** The City of Louisville's Prescriptive compliance requires compliance with Sections R401 through R404.

50. *Section R401.2.2 Total Building Performance Option*, is hereby deleted in its entirety.

51. *Section R401.2.4 Tropical Climate Region*, is hereby deleted in its entirety.

52. *Section R401.2.5 Additional Energy Efficiency*, is hereby amended to read as follows:

**Section R401.2.5 Additional Energy Efficiency.** Building shall comply with one of the additional efficiency options and shall be installed in according to Section R408.2.

53. A new *Section R401.4 Mandatory requirements for residential buildings*, is hereby added to read as follows:

**R401.4 Mandatory requirements for residential buildings.** Residential building must comply with the following sections from the 2021 International Energy Conservation Code found in Table R401.4 and Section R401.2.

**Table R401.34  
Mandatory requirements for residential buildings**

Title	IECC Section
Vapor retarder	R402.1.1
Eave baffle	R402.2.3
Access hatches and doors	R402.2.4.1
Crawl space wall insulation	R402.4.1.2
Maximum fenestration U-factor and SHGC	R402.5
Mechanical Controls	R403.1
Ducts	R403.3 except R403.3.2, R403.3.3, and R403.6
Mechanical system piping insulation	R403.4
Heated water circulation and temperature maintenance systems	R403.5.1
Drain Water heat recovery units	R403.5.3
Mechanical ventilation	R403.6 including E403.6.1
Equipment sizing and efficiency rating	R403.7
Systems serving multiple dwelling units	R403.8
Snow melt and ice systems	R403.9
Energy consumption of pools and spas	R403.10
Portable spas	R403.11
Residential pools and permanent residential spas	R403.12
Lighting equipment	R404.1
Interior lighting controls	R404.2

54. *Section R402.1 General*, is hereby amended to read as follows:

**R402.1 General.** The building thermal envelope shall comply with the requirements of Section R402.1.1 and R402.1.2.

55. *Section R402.1.2 Insulation and fenestration*, is hereby deleted and replaced with the following:

**R402.1.2 Insulation and fenestration.** New and replacement Assemblies shall have R-value of insulation materials equal to or greater than that specified in Table R402.1.2 unless an alternative path is specified while using HERS energy rating index of 50.

Exception: New Construction complying with R401.2 or exception 1

56. Section R402.1.2.1 Fenestration is hereby added to read as following:

R402.1.2.1 Fenestration. New and replacement assemblies shall not exceed the value specified in Table R402.1.2.

Exception: New Construction complying with R401.2 or exception 1

Table R402.1.2

Average Insulation and Fenestration Requirements by Component

Roof	R-60
Above grade walls	R-30 or R-20 & R-5 ci
Below grade walls	R-19
Floors	R-38
Non heated slab on grade	R-10 for 4ft
Heated slab on grade	R-15 for 4 ft + R-5 under full slab
Fenestration U-Factor	.30
Fenestration SHGC	.33
Skylight U-Factor	.50
Skylight SHGC	.40
Hot Water Pipes	R-3
Warm Air Ducts	R-8

55. Section R402.1.5 Total UA alternative, is hereby deleted in its entirety.

56. Section R402.3.3 Glazed fenestration exemption, is hereby amended to read as follows:

**R402.3.3 Glazed fenestration exemption.** Not greater than 15 square feet (1.4 m<sup>2</sup>) of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements in Section R402.1.2.

57. *Section R402.4.1.2 Testing*, is hereby deleted and replaced to read as follows:

**Section R402.4.1.2 Testing.** All new buildings or dwelling units that are heated or cooled, and additions over 500 square feet shall be tested for air leakage.

58. *Section R402.5 Maximum fenestration U-factor and SHGC*, is hereby deleted and replaced with the following:

**Section R402.5 Maximum fenestration U-factor and SHGC.** The maximum U-factor and solar heat gain coefficient (SHGC) for fenestration shall not be required in storm shelters complying with ICC 500.

59. *Section R403.3.1 Ducts located outside conditioned space*, is hereby deleted and replaced with the following:



**R403.3.1 Ducts located outside conditioned space.** All supply and return ducts shall be insulated to a minimum R-8 if located outside a conditioned space.

60. *Section R403.5.2 Hot water pipe insulation,* is hereby deleted and replaced with the following:

**R403.5.2 Hot water pipe insulation.** All service hot water piping shall be insulated to a minimum R-3.

62. *Section R403.7 Equipment sizing and efficiency rating,* is hereby deleted and replaced with the following:

**R403.7 Equipment sizing and efficiency rating.** All new buildings and additions greater than 500 square feet with heating and cooling equipment shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies. In addition to complying with Sec. R404.6 Additional Electric Infrastructure, new and replacement electrical heating and cooling equipment shall have an efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the equipment is installed. New gas heating equipment shall comply with the following efficiencies:

1. Gas furnaces shall have a minimum of 95% efficiency.
2. Gas boilers shall have a minimum of 95% AFUE.
3. On demand water heaters shall have a greater than .92 uniform energy factor.

**4. Heat pump efficiencies:**

**g. Ductless System**

1. 14.3 SEER2
2. 7.5 HSPF2
3. Or EnergyStar Cold Climate certified

**h. Ducted System**

1. 15.2 SEER2
2. 9 HSPF2
3. Or EnergyStar Cold Climate certified

Exception: Solid fuel stoves/gas fireplaces, outdoor fire pits, gas stoves and ovens.

63. *Section R404.1.1 Fuel gas lighting equipment, is hereby amended to read as follows:*

**R404.1.1 Fuel gas lighting equipment.** Fuel gas lighting systems shall not be installed.

65. A new *Section R404.5 Additional electric infrastructure*, is hereby added to read as follows:

**R404.5 Additional electric infrastructure.** *Combustion equipment* shall be installed in accordance with this section.

R404.5.1 Combustion equipment and end-uses. *Combustion equipment* shall be provided with a dedicated, appropriately phased circuit that shall have a minimum amperage requirement for a comparable electric appliance, equipment or end use, an electrical receptacle or junction box that is connected to the electric panel, and conductors of adequate capacity within 6 feet (1829 mm) of the appliance or equipment.

Each such circuit shall be accessible with no obstructions. A reserved circuit breaker space shall be installed in the electrical panel adjacent to the circuit breaker for the branch circuit and labeled for each circuit. Both ends of the unused conductor or conduit shall be labeled “For Future Electric Equipment” and be electrically isolated.

66. *Section R405 Total building performance*, is deleted in its entirety.

67. *Section R406.3 Building thermal envelope*, is hereby deleted in its entirety and replaced with the following:

**R406.3 Building thermal envelope.** ~~Building and portions thereof shall comply with Table R406.3.~~ The building thermal envelope shall be greater or equal to the levels of efficiency and SHGC in Table R402.1.2.

68. *Section R406.3.1 On-site renewables are not included*, is deleted in its entirety.

69. *Section R406.3.2 On-site renewables are included*, is deleted in its entirety.

70. *Section ~~406.3.2~~ R407 Tropical Climate Region Compliance Path*, is deleted in its entirety.

71. *Section R502.1.1 General*, is hereby amended to read as follows:

Additions to an existing building, building system or portion thereof shall conform to the provisions of R401.2.1 as those provisions relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code where the addition alone complies, where the existing building and addition comply with this code as a single building, or where the building with the addition does not use more energy than the existing building. Additions shall be in accordance with Section R502.2 or R502.3.

72. *Section R503.1.1 Building Envelope* is amended to read as follows:

Building envelope assemblies that are part of the alteration shall comply with Section R401.2.1

*Section R503.1.1 Building envelope Exception 2* is deleted in its entirety and replaced with the following.

3. *Section R402.4.1.2 Testing*

73. *Section R505.1 General* is hereby amended to remove the exception.

74. *Section R505.1.1 Unconditioned space*, is hereby deleted and replaced with the following:

**R505.1.1 Unconditioned space.** Any unconditioned or low-energy space that is altered to become a conditioned space shall comply with Section R503.

75. *RC102.1 General* is amended to read as follows.

*RC102.1 General.* New residential buildings shall comply with Sections RC102.2 through RC102.9.

76. RC102.2 Energy Rating Index zero energy score is amended to read as follows.

RC102.2 Energy Rating Index zero energy score.

Compliance with this section requires that the rated design be shown to have a Home Energy Rating System (HERS) score of 50 before solar and 0 with solar when compared to the Energy Rating Index (ERI) reference design determined in accordance with RESNET/ICC 301 for both of the following:

3. ERI value not including on-site power production (OPP) calculated in accordance with RESNET/ICC 301 HERS
4. ERI value including on-site power production calculated in accordance with RESNET/ICC 301 HERS with the OPP in Equation 4.1.2 of RESNET/ICC 301 HERS adjusted in accordance with Equation RC-1.

Adjusted OPP = OPP + CREF + REPC (Equation RC-1)

where:

CREF = Community Renewable Energy Facility power production—the yearly energy, in kilowatt hour equivalent (kWheq), contracted from a community renewable energy facility that is qualified under applicable state and local utility statutes and rules, and that allocates bill credits to the rated home.

REPC = Renewable Energy Purchase Contract power production—the yearly energy, in kilowatt hour equivalent (kWheq), contracted from an energy facility that generates energy with photovoltaic, solar thermal, geothermal energy or wind systems, and that is demonstrated by an energy purchase contract or lease with a duration of not less than 15 years.

RC102.2.1 HERS Score. Buildings shall comply with the scores in Table RC102.2.1.

Table RC102.2.1.

<u>HERS SCORE NOT INCLUDING OPP</u>	<u>HERS SCORE INCLUDING OPP</u>
<u>50</u>	<u>0</u>

76. RC102.3 through RC102.9 are added to Appendix RC to read as follows.

RC102.3 Mandatory Sections. All projects shall comply with all sections within Table RC102.3.

Table RC102.3

Mandatory requirements for residential buildings

<u>Title</u>	<u>IECC Section</u>
<u>Vapor retarder</u>	<u>R402.1.1</u>

<u>Eave baffle</u>	<u>R402.2.3</u>
<u>Access hatches and doors</u>	<u>R402.2.4.1</u>
<u>Crawl space wall insulation</u>	<u>R402.4.1.2</u>
<u>Maximum fenestration U-factor and SHGC</u>	<u>R402.5</u>
<u>Mechanical Controls</u>	<u>R403.1</u>
<u>Ducts</u>	<u>R403.3 except R403.3.2, R403.3.3, and R403.6</u>
<u>Mechanical system piping insulation</u>	<u>R403.4</u>
<u>Heated water circulation and temperature maintenance systems</u>	<u>R403.5.1</u>
<u>Drain Water heat recovery units</u>	<u>R403.5.3</u>
<u>Mechanical ventilation</u>	<u>R403.6 including E403.6.1</u>
<u>Equipment sizing and efficiency rating</u>	<u>R403.7</u>
<u>Systems serving multiple dwelling units</u>	<u>R403.8</u>
<u>Snow melt and ice systems</u>	<u>R403.9</u>
<u>Energy consumption of pools and spas</u>	<u>R403.10</u>
<u>Portable spas</u>	<u>R403.11</u>
<u>Residential pools and permanent residential spas</u>	<u>R403.12</u>
<u>Lighting equipment</u>	<u>R404.1</u>
<u>Interior lighting controls</u>	<u>R404.2</u>

RC102.4 Building Envelope. The building thermal envelope shall be greater or equal to the levels of efficiency and SHGC in Table R402.1.2.

RC102.5 Verification by approved agency.

Verification of compliance with Section R102.4 as outlined in Sections of this appendix shall be completed by an approved third party. Verification of compliance with Section R102.3 shall be completed by the authority having jurisdiction or an approved third-party inspection agency in accordance with Section R105.4.

RC102.6 Documentation.

Documentation of the software used to determine the ERI and the parameters for the residential building shall be in accordance with Sections RC102.6.1 through RC102.6.4

RC102.6.1 Compliance software tools.

Software tools used for determining HERS shall be Approved Software Rating Tools in accordance with RESNET/ICC 301.

RC102.6.2 Compliance report.

Compliance software tools shall generate a report that documents that the home and the HERS score of the rated design complies with RC102. Compliance documentation shall be created for the proposed design and shall be submitted with the application for the building permit. Confirmed compliance documents of the built dwelling unit shall be created and submitted to the code official for review before a certificate of occupancy is issued. Compliance reports shall include information in accordance with Sections RC102.6.3 and RC102.6.4.

RC102.7 Additional documentation.

The code official shall be permitted to require the following documents:

4. Documentation of the building component characteristics of the ERI reference design.
5. A certification signed by the builder providing the building component characteristics of the rated design.
6. Documentation of the actual values used in the software calculations for the rated design.

RC102.8 Specific approval.

Performance analysis tools meeting the applicable subsections of Section RC102 shall be approved. Documentation demonstrating the approval of performance analysis tools in accordance with Section RC102 shall be provided.

RC102.9 Input values.

Where calculations require input values not specified by Sections RC 102, those input values shall be taken from HERS RESNET/.

**INTRODUCED, READ, PASSED ON FIRST READING, AND ORDERED PUBLISHED** this \_\_\_\_\_ day of \_\_\_\_\_, 2024.

\_\_\_\_\_  
Chris Leh, Mayor

ATTEST:

\_\_\_\_\_  
Meredyth Muth, City Clerk

APPROVED AS TO FORM:

\_\_\_\_\_  
Kelly PC, City Attorney

**PASSED AND ADOPTED ON SECOND AND FINAL READING**, this \_\_\_\_\_  
day of \_\_\_\_\_, 2024.

\_\_\_\_\_  
Chris Leh, Mayor

ATTEST:

\_\_\_\_\_  
Meredyth Muth, City Clerk

**Discussion Items for Next Meeting –**

None at this time.

Next meeting has not been determined.

**Adjourn** – The meeting was adjourned at 8:45pm.

**Discussion Items for Next Meeting –**

None at this time.

Next meeting has not been determined.

**Adjourn** – The meeting was adjourned at 8:45pm.



# ***Building Code Board of Appeals***

## ***Meeting Minutes***

**August 28, 2024**

**City Hall, Council Chambers**

**749 Main Street**

**2:00pm**

**Call to Order** – Chairperson Christian Dino called the meeting to order at 2:02pm.

**Roll Call** was taken and the following members were present:

Board Members Present:

Matt Berry  
Christian Dino  
Mason Gatto  
Peter Geise

Board Members Absent:

Steve Knapp

Staff Members Present:

Rob Zuccaro, Director of Community Development  
Chad Root, Chief Building Official  
Jenny Lane, Senior Permit Technician

**Approval of Agenda** –

The agenda was approved by all members present.

**Approval of Meeting Minutes from 5/16/24**

**Dino** requested changes to the meeting minutes:

Add to meeting minutes that the Board would like to make clear that they approved these changes with the intent that they are **“replacing code in lieu of”, not just “adding on” to existing code, otherwise there would have been more comments**

He also stated that the Board would like to have the document that was worked on in meeting added as part of the meeting minutes.

Minutes approved by all members with changes forthcoming.

### **Public Comments on Items Not on the Agenda**

None.

### **Discussion of Home Hardening Code**

**Zuccaro** stated that City Council requested the BCBOA discuss the development or adoption of a WUI code and/or City-wide Home Hardening Code. The suggestion is to implement this with the 2024 upgrade codes. Residents suggested it be implemented earlier since there are homes under construction now. Based on feedback from this meeting, staff will work on code language and bring back to the Board again.

### **Root and Board discussion of proposed code:**

Fire dept letter regarding Home Hardening should be included with this document.

General consensus is that the suggestions are cost-effective and not too strict.

### **Roof:**

- Only applies to full replacement or new construction.
- Must use Class A shingles
- Just shingles/covering material only; NOT a full class A assembly.
- No Shake/wood shingles
- Solar panels: require mesh screen between solar panel and roof to keep organic material from accumulating. 1/8" for screen size screens provide barrier to items getting inside property. 1/8" might be too small to allow air flow for certain equipment. Maybe only eave vents? Not roof vents.
- Would not require closed attic; this option would limit insulation in attic to spray foam since blown in insulation is designed to allow for vented attic space. Would limit what consumer can use and spray foam is more expensive.
- Vented screens; if no closed cell foam or closed roof system, screens need to be vented

### **Windows:**

- Only full replacement or new construction (still allow vinyl windows)

**Siding:**

- Full replacement or new construction; if one side, ok to replace like for like
- Potentially require replacement if more than 50% will be replaced.

**Decks:**

- Full replacement or new construction.
- Decking surface only, not deck framing. Top section finished material is easy to maintain, will be too difficult to maintain underneath material. (per Fire Marshal, Jennifer Henderson)
- Suggestion: require screening under a certain height.

**Fences:**

- Fire resistant fencing within 5 feet of house required
- No cedar fencing within 5 feet of house
- Per **Zuccaro**: State wildfire code board is working on a draft; no state code is in place yet
- City of Louisville has law that allows fire-resistant fencing regardless of neighborhood fence

**Gutters:**

- Metal gutters and/or gutter guards required

**Defensible Space:**

- Urban defensible space should not be in Home Hardening Code
- Majority of these requirements should be part of future WUI code adoption
- Potentially have small requirements for new construction since we would have time to review and require specific landscaping:
  - o No mulch or landscaping within 24" of house
- City-wide within 5 feet of home but too complex; potentially require as part of city-wide WUI code in the future that no landscaping within five feet of the house

**Additions:**

- What would be the threshold for requiring a new material?
- Decking and Siding will be the most difficult to require new material if it doesn't match the old. Is there a percentage or should be full replacement?
- Exceptions for historic, etc.?
- Concrete siding vs pressed board comparison?
- If addition is less than 25% not required?

Maybe percentage of 50% for all requirements – rare to have someone do less than that; if they are doing 50% then they will probably do all of it.

**Fire Marshal, Jennifer Henderson:** A roof or decking material are the most common catching points in a fire, so requiring fire resistant material in those areas are important. Also requiring gutter guards would help prevent embers from entering the gutters. Suggest these are always required – not part of exception. Maintenance is the biggest problem; keeping penetrations to a minimum to prevent embers from catching parts of the house on fire.

**Dino:** would like to adopt this version as a band aid, but to repeal it once WUI code is adopted.

**Root:** once adopted any new applications would have to use this new code.

**Zuccaro:** next BCBOA meeting; council will meet; then present back to BCBOA  
Matt: IBC and IRC reference for each item on the list.

**Root:** Implement some of these items into the 2024 codes. For now, it needs to be an amendment to existing code. Otherwise we would be adding this as an amendment to the 2018 code, which would not make sense.

**Zuccaro:** staff will need to make sure that code sections do not contradict each other.

**Discussion Items for Next Meeting –**

Review of new proposed Home Hardening Code and update on energy code amendments.

Sept 17 – Staff will present energy code changes to City Council.

Three policy changes, should they be removed. Net zero RC and EUI and commercial heat pump requirement. Dino requested that if a code section is replaced not to renumber the code sections.

Next meeting date and time has not been determined, but should take place after the City Council meeting on Sept 17<sup>th</sup>.

**Adjourn** – The meeting was adjourned at 3:43pm.

**Review of Home Hardening Code proposal**

**ORDINANCE NO. \_\_\_\_\_**

**SERIES 2024**

**AN ORDINANCE ADOPTING THE 2024 CITY OF LOUISVILLE FIRE  
HARDENING CODE FOR STRUCTURES**

**WHEREAS**, the City Council has adopted the Louisville Fire Hardening Code for Structures in the City in order to reduce threats from wildfires and to mitigate structure fires from spreading to adjacent residential and commercial structures; and

**WHEREAS**, it is deemed to be in the interest of the public health, safety and general welfare for the residence of Louisville to adopt such code; and

**WHEREAS**, the City Council, after proper notice as required by law, has held a public hearing on this ordinance providing for the adoption of said codes.

**NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LOUISVILLE, COLORADO:**

**Section 1.** A new Chapter 15.70 is hereby added to the Louisville Municipal Code to read as follows:

Chapter 15.70 – Fire Hardening Code for Structures.

Sec. 15.70.010. - Applicability

This Chapter provides minimum city-wide building and construction standards for residential and commercial structures in order to decrease threats from wildfires and the spread of fire between structures. The provisions in this code shall apply to all new construction, additions, and replacement of building materials as specified below.

Sec. 15.70.020. – Construction Standards

1. **Class A Roof Covering** tested with ASTM E108 or UL 790 are required on all new structures, additions and replacement roofs where the replaced roof is 50% or greater in the City of Louisville Colorado. Example of a Class A roof covering is metal, membrane, asphalt, tile, clay, concrete, stone and slate shingles Etc.
2. **Fire Resistant Siding and Eaves** are required on all new structures, additions and where 50% or more of the siding or eave is replaced. Siding and eaves shall be fire and Ignition resistant with a maximum flame spread rating of 25 or less. Heavy timber and log construction is also acceptable.
  - a.
3. **Fire and Ignition Resistant Deck surface, Steps and Guardrails** are required on all new decks and all replacement decks, steps and guardrails. The deck surface, step surface and guardrails shall be fire and Ignition resistant with a maximum flame spread rating of 25.
  - a. For decks six feet or lower to the ground, the surface below the deck shall be gravel placed over a sheet of 6 mil plastic or concrete slab to prevent vegetation growth under the deck.

4. **Fire and Ignition Resistant Fencing within 5 Ft of a structure-** New construction and all replacement fences within 5 feet of the structure must be fire and ignition resistant with a maximum flames spread index of 25.
5. **Roof/Attic Vents, Crawlspace Vents and Solar Panels Screens-**New structures and all replacement vents shall have the following:
  - a. 1/8-inch metal mesh for attic vents, roof vents, eave vents and foundation vents. Mechanical and plumbing vents do not need to be screened.
  - b. Solar panels on the roof shall be screened with metal mesh to prevent debris from building up under solar panels. The bottom portion of the screen must be removable to clean out debris from under panels.

**Exception:**

1. Solar Panels that are 2 feet or great above the roof do not need to be screened.

6. **Metal Gutters with Gutter Guards-** New structures and replacement Gutters shall be made of metal and shall have an approved ignition resistant means to prevent accumulation of debris in gutter.
7. **Lithium Energy Storage Systems (ESS).** Energy storage systems shall not be installed inside the building envelope of a commercial structure, primary residence, Accessory Dwelling Unit (ADU) or an attached garage. The ESS can be installed on an exterior wall or in an exterior shed attached to the building envelope. The ESS shall have electrical disconnects within 3 to 6 ft of the ESS..

**Exceptions:**

1. Installation in garages attached to a residence or ADU that have One Hour Fire rated walls and ceiling and an approved Fire Suppression systems. The ESS shall be installed on the wall farthest away from the residence inside the garage.
2. Commercial Buildings with a 1 hour rated room where mechanical ventilation is separate than the rest of the building

Exceptions to the City of Louisville Structure Hardening Code are below:

1. **Historic Home Exceptions-** Historic homes and Building may be exempted by the Building Official from Roofing, Siding requirements of the fire hardening code if demonstrated that there is no practical means meet the intent of the Code and maintain historic features.

2. Single Family Homes- Homes that are fully sprinklered with a min of a NPFA13-R system and are greater than 35 feet from any property line,.
3. Permitted Temporary structures such as tents and membrane structures not to exceed a 180 days

**Section 2.** If any article, section, paragraph, sentence, clause, or phrase of this ordinance is held to be unconstitutional or invalid for any reason, such decision shall not affect the validity or constitutionality of the remaining portions of this ordinance. The City Council hereby declares that it would have passed this ordinance and each part or parts hereof irrespective of the fact that any one part or parts be declared unconstitutional or invalid.

**Section 3.** The repeal or modification of any provision of any prior ordinance by this ordinance shall not release, extinguish, alter, modify, or change in whole or in part any penalty, forfeiture or liability, either civil or criminal, which shall have been incurred under such provision, and each provision shall be treated and held as still remaining in force for the purpose of sustaining any judgment, decree, or order which can or may be rendered, entered, or made in such actions, suits, proceedings, or prosecutions.

**Section 4.** All other ordinances or portions thereof inconsistent or conflicting with this ordinance or any portion hereof are hereby repealed to the extent of such inconsistency or conflict.

**INTRODUCED, READ, PASSED ON FIRST READING, AND ORDERED PUBLISHED** this \_\_\_\_\_ day of \_\_\_\_\_, 2024.

\_\_\_\_\_  
Christopher M. Leh, Mayor

ATTEST:

\_\_\_\_\_  
Meredyth Muth, City Clerk

APPROVED AS TO FORM:

\_\_\_\_\_  
Light | Kelly, P.C., City Attorney

**PASSED AND ADOPTED ON SECOND AND FINAL READING**, this \_\_\_\_\_  
day of \_\_\_\_\_, 2024.

\_\_\_\_\_  
Christopher M. Leh, Mayor

ATTEST:

\_\_\_\_\_  
Meredyth Muth, City Clerk