Boulder County

# Community Planning & Permitting

Courthouse Annex • 2045 13th Street • Boulder, Colorado 80302
Mailing Address: P.O. Box 471 • Boulder, Colorado 80306
303-441-3930 • www.BoulderCounty.gov

**BOARD OF REVIEW HEARING PACKET**

**Wednesday, January 8, 2025 at 2:00 P.M.**
**Caribou Conference Room – 2nd Floor Courthouse Annex**
**2045 13th Street, Boulder 80302**

This will be a hybrid hearing held both in person and virtually in Teams.
The meeting room capacity is 40, seating will be limited.
To join the meeting virtually, visit https://bouldercounty.gov/events/board-of-review-bor-public-meeting-20250108/ for the link.
To join the meeting by phone, dial 720-400-7859 and the conference ID is: 147 138 396#

For special assistance, contact our ADA Coordinator (303-441-1386 or ADA@bouldercounty.gov) at least 48 hours in advance.

**HEARING PACKET**

PACKET CONTENTS - BOR-24-0001: Building Code Update & Amendments

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If you have comments regarding any of these items, you may mail them to the Community Planning & Permitting Department (PO Box 471, Boulder, CO 80306) or email to buildingcodeupdate@bouldercounty.gov. Please include the docket number "BORC-24-0001" in the subject line.

1. **Call to order**

2. **Roll call of members present by the Secretary of the Board**

3. **Approval of the Minutes Summary**
   Minutes of the December 19, 2024, public hearing – Building Code update and amendments to the 2021 International Code series.

4. **Public Hearing**
   BORC-24-0001: Building Code Update & Amendments
   Review and finalize recommendations for the proposed building code adoption of the 2021 i-Codes and amendments. The Board to consider a motion to recommend approval authorizing Ron Flax, Deputy Director/Chief Building Official, to present these recommendations to the Board of County Commissioners for final approval. Public input will be taken.
   Upcoming building code update hearings
   - Board of County Commissioners Hearing – January 23, 2025, at 9am hybrid in the BOCC Hearing Room

5. **Other items**

6. **Adjournment**

**Boulder County**
**Board of Review**

Minutes
December 19, 2024
3:00 PM
2045 13th Street, Boulder, CO 80302
Hybrid Hearing via Microsoft Teams

On December 19th, the Boulder County Board of Review met to review and discuss the proposed items to be considered for inclusion into the building code adoption and amendments to the 2021 International Code series.

The meeting convened at 3:07pm and was recorded. This recording is available upon request.

Board Members Present: Michael Daley (in-person), Joseph Prinster (in-person), and Stephen Titus (in-person).

Staff Present: Ron Flax (Chief Building Official/CP&P Deputy Director – in-person), Kathy Gissel (Permit & License Operations Manager – in-person), Heather Dodge (Plans Examiner – in-person), Erica Rogers (Senior Assistant County Attorney – virtual), Kyle McCatty (Wildfire Mitigation Specialist Supervisor, in-person), Michelle Huebner (Plans Examiner Supervisor – in-person), Chad Hagen (Plans Examiner – virtual), Jie Huang (Plans Examiner – in-person) and Dale Case (CP&P Director – Virtual).

1. **Call to Order**
   Ron Flax called the meeting to order.

2. **Roll call of members present by the Secretary of the Board**
   Present: Mike Daley and Joseph Prinster
   Absent: Stephen Titus

   Note: Stephen Titus joined the hearing at 3:23pm.

3. **Approval of the Previous Minutes**
   Approval of the November 7, 2024, Board of Review Public Meeting minutes – Introductory of the proposed building code update and amendments to the 2021 International Code series.
   Motion: Mike Daley moved to approve the minutes
   Second: Joseph Prinster

Vote: Motion approved by unanimous vote

4. **Public Hearing**
   BOR-24-0001 – BOULDER COUNTY BUILDING CODE UPDATE & AMENDMENTS TO THE 2021 INTERNATIONAL CODE SERIES

   Ron Flax led a discussion on the proposed building code update and amendments to the 2021 International Code series with the Board of Review. He addressed public comments that were emailed in prior to the hearing, and no additional public comments were brought forward in the hearing.

   The Board of Review brought forward a variety of topics and recommended some changes to the proposed building code amendments. Topics and recommended changes included amending the definition of a crawl space; amending section N1110.2.2 to include an alternative pathway for additions greater than 500 square feet but less than 1,000 square feet to achieve compliance; modification to table N1106.5 to allow the use of backup systems county-wide without penalty; and discussed several topics related to "seasonal cabins" in Boulder County finding it difficult to not be able to meet the strict health and safety requirements of the building code.

   For a detailed account of the discussion and recommended changes, please refer to the hearing recording available on our Board of Review Website.

5. **Other items**
   Ron Flax scheduled one additional Board of Review Hearing with the board to review the suggested edits made to the amendments and to have the board make a motion to recommend approval so that he can take the code updates to the Board of County Commissioners for approval. The next hearing was scheduled for January 8, 2025 @ 2pm.

6. **Adjourned**
   The hearing was adjourned at 5:24pm.

| | |
|---|---|
| **From:** | Luke Griess |
| **To:** | Building Code Update |
| **Subject:** | [EXTERNAL] BORC-24-0001 |
| **Date:** | Thursday, November 14, 2024 9:12:25 AM |
| **Attachments:** | DOE ZERH V2 National Program Requirements - DEC 2022.pdf |

Hello,

I wanted to provide some feedback on the upcoming energy code changes for Boulder County.

In particular, I don't think that the DOE ZERH certification requirement adds a lot of value. It is my understanding that as the code is currently written, nearly all homes will be required to be DOE ZERH certified.

To achieve this certification, you first have to meet Energy Star certification as a prerequisite, which does seem to add some value. But many of the energy efficiency requirements in Energy Star are already going to be met by homes that are required to meet a HERS 50. However, then you add another layer on that with the DOE ZERH certification, which simply adds to the cost of the project with very little benefit, considering most of the measures in the DOE ZERH are already either covered by the Energy Star requirement, or by the Boulder County Code itself.

The biggest requirement in DOE ZERH is that homes be PV ready. For Energy Raters, DOE ZERH requires that we ensure that the home has a plan in place for future solar. This is redundant and unnecessary in my opinion, given that this is already required in the county code.

DOE ZERH also requires that all ducts be within conditioned space. This presents a challenge, as no ducts or air handlers can be installed in attic spaces. This means that almost all 2nd floor attics will now need to be conditioned so that they can house duct systems, or ceilings will need to be soffited to ensure the ducts are inside the conditioned space. I think that it is reasonable enough to allow ducts in attic space, as long as they are properly insulated and sealed and meet the stringent duct leakage to outside requirements of the code.

Also, all appliances must be Energy Star certified. We see many high end appliances that do not have this certification, largely because they are European or specialty appliances. But their energy efficiency is typically on par with Energy Star appliances. However, they will not be allowed under the DOE ZERH requirements.

The EPA Indoor airPlus requirements also need to be met for DOE ZERH. These requirements are also quite redundant to standard building practices in the area already, while some are very difficult to actually verify for the rater, as there are materials requirements that state all wood products, paints and finishes, carpets and adhesives be certified low emission. This information is often difficult to gather from the builders or to determine for ourselves as the rater, given the astronomical number of different products/materials that go into building a home. And if this requirement were actually fully verified and enforced on all new construction, I think it's likely that many homes would not be able to be certified.

The rest of the DOE ZERH requirements, in my opinion, bring little to no value. To meet a HERS 50 or lower and to meet Energy Star, we are already required to exceed the DOE ZERH efficiency minimums for envelope, mechanical systems, electrification, lighting, etc. So we

as raters have to charge the builders/homeowners more for all of the paperwork and verification time to certify for this, while it's very difficult to describe to them what added value this certification brings to the  home.

From what I've seen, both in this area and nationally, the DOE ZERH program has not really gained much traction. In the past decade, the only homes that we have been certifying for this are homes that are required to do it because they are over 5000 sf in Boulder County.

I've attached the DOE ZERH V2 national checklist for your reference.

Thank you,

SHS Logo

Luke Griess
VP of Services
Scott Home Services, LLC
*"We Are Team Scott"*

303-373-2424
luke@teamscott.com
scotthomeinspection.com
teamscott.com

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# U.S. DOE Zero Energy Ready Home
# Single Family Homes National Program Requirements
Version 2

The following homes are eligible for qualification under the DOE Zero Energy Ready Home (ZERH) Single Family program: Dwellings[1] (e.g., single-family homes, duplexes) and Townhomes.[2] These homes may be site-built or modular construction.[3]

To determine the required version and revision of DOE ZERH program requirements to use based on a project's location, building type, and permit date[4], partners must reference the DOE ZERH implementation timelines information posted on the DOE ZERH program requirements website. Partners are advised to check the DOE ZERH website and IRS Guidance on the 45L tax credit for further information about tax credit eligibility. Also note 45L tax credit eligibility is based on a project's Acquisition Date.

To qualify for the DOE ZERH Single Family program, an eligible home shall meet the minimum requirements specified below, be verified and field-tested by an approved Rater[5], and meet all applicable codes.[6] Note that compliance with these guidelines does not imply compliance with all local code requirements that may be applicable to the home to be built. In cases where local codes overlap with and/or exceed the ZERH program requirements, these local requirements shall be met. In any jurisdiction where 2021 IECC Appendix RC Zero Energy Residential Building Provisions have been adopted as a code requirement, homes must comply with both the Energy Rating Index (ERI) requirements of Appendix RC and meet the DOE ZERH Target Home ERI requirements described below, to achieve DOE ZERH certification. The builder and the Rater must both have signed a DOE ZERH partner agreement for a home to be certified.

## DOE Zero Energy Ready Home Certification Process

1. Projects must meet the Mandatory requirements listed in Exhibit 1.
2. Projects conduct energy modeling using an approved software rating tool from a DOE-recognized Home Certification Organization for ZERH Certifications (HCO for ZERH) to establish the home's Energy Rating Index (ERI) value. The home's ERI value must be equal to or lower than the ERI of the DOE ZERH Target Home as defined in Exhibit 2. The ERI value for the Target Home shall be automatically generated by the approved software rating tool.[7]
3. Construct the home using the measures specified in the design that result in an ERI value at or below the DOE ZERH ERI Target, calculated above, ***and*** incorporate the mandatory requirements listed in Exhibit 1. On-site power generation may not be used to meet the Target ERI.
4. Use a Rater operating under a DOE-recognized HCO for ZERH to verify that all requirements have been met in accordance with the Mandatory Requirements and with the inspection procedures for minimum rated features in ANSI / RESNET / ICC Standard 301-2019, Appendix B.[8,9] Rater must review all items in the ZERH Single Family V2 Rater Checklist.[10] For modular homes, a Rater must verify in the plant any requirement that is not readily verifiable on-site. Submit the home to the HCO for ZERH for final certification and follow the HCO for ZERH's certification and oversight procedures, including those for quality assurance, recordkeeping, and reporting. The Rater is required to keep electronic or hard copies of completed checklists required for the DOE ZERH certification, including those required for prerequisite certifications.
5. The submission of qualifying DOE ZERH projects to DOE occurs through the HCO for ZERH.

### Exhibit 1: DOE Zero Energy Ready Home Mandatory Requirements

| Component | Mandatory Requirements |
|---|---|
| **1. ZERH V2 National Rater Field Checklist** | ☐ Rater completes the DOE ZERH – Single Family Homes Version 2 National Rater Field Checklist |
| **2. ENERGY STAR Single Family** | ☐ Certified under ENERGY STAR Single Family New Homes Version 3.2 [11] |

| | |
|---|---|
| **New Homes Baseline** | |
| **3. Envelope** | ☐ Ceiling, wall, floor, & slab insulation meet or exceed 2021 IECC UA[12,13,14]<br>☐ Windows meet high performance requirements based on climate zone [15]<br>*Advisory*: DOE is monitoring the implementation of ENERGY STAR product specifications for residential windows (V7.0), and plans to adopt these in a future program version update[16] |
| **4. Duct System** | ☐ All heating and cooling distribution ducts and heating and cooling air-handling equipment are located within the thermal and air barrier boundary [17] |
| **5. Water Heating Efficiency** | ☐ Hot water delivery systems meet efficient design requirements [18]<br>***or***<br>☐ Water heater and fixtures meet efficiency criteria[19] |
| **6. Lighting & Appliances** | ☐ All builder-supplied and -installed refrigerators, dishwashers, clothes washers, and clothes dryers are ENERGY STAR qualified [20, 21]<br>☐ 100% of builder-installed lighting fixtures and lamps (bulbs) provided are LEDs [22].<br>☐ All installed bathroom ventilation and ceiling fans are ENERGY STAR qualified[23] |
| **7. Indoor Air Quality** | ☐ Certified under EPA Indoor airPLUS [24]<br>☐ Energy efficient balanced ventilation (HRV or ERV) is provided in Climate Zones 6-8 [25] |
| **8. Renewable Ready** | ☐ Provisions of the DOE Zero Energy Ready Home PV-Ready Checklist Version 2 are Completed [26] |
| **9. Electric Vehicle Ready** | ☐ One parking space is provided per dwelling unit that includes a powered 208/240V, 40A receptacle installed in garage or within 3 feet of driveway or dedicated parking space. The electric service panel identifies the branch circuit as “Electric Vehicle Charging.” [27] |
| **10. Heat Pump Water Heater Ready** | ☐ Individual branch circuit outlet is installed, energized, and terminates within 3 feet of each installed fossil fuel water heater, and a space located within the home or garage that is at least 3’ x 3’ wide and 7’ high shall be available surrounding or within 3 feet of the installed fossil fuel water heater, to facilitate future heat pump water heater installation.[28] |
| **11. Heat Pump Space Heating Ready** | ☐ Individual branch circuit outlet is installed or conduit is installed to facilitate future wiring for a heat pump installation. Circuit or conduit labeled as “For future heat pump.” [29] |

## Exhibit 2: DOE Zero Energy Ready Home Target Home [30]

| **HVAC Equipment[31]** | | | |
|---|---|---|---|
| | **Very Hot & Hot Climates** (2021 IECC Climate Zones 1,2) | **Warm & Mixed Climates** (2021 IECC Climate Zones 3, 4A, 4B) | **Cold & Very Cold Climates** (2021 IECC Climate Zones 4C, 5,6,7,8) |
| Furnace AFUE | 80% | CZ3: 92%; CZ4: 95% | 95% |
| SEER | 18 | 16 | 16 (ASHP); 14 (A/C) |
| HSPF | 9.2 | 9.2 | 9.5 |
| Boiler AFUE | 80% | CZ3: 92%; CZ4: 95% | 95% |
| Whole-House Mechanical Ventilation System Efficiency | 2.9 cfm/W<br>no heat exchange | 2.9 cfm/W<br>no heat exchange | 1.2 cfm/W; balanced with heat exchange, 65% ASRE |
| **HVAC Grading** | | | |

| | | |
|---|---|---|
| • **Airflow Deviation:** Grade I, -7.5% | • **Watt Draw Efficiency**: Grade I, 0.45 cfm/W | • **Refrigerant Grade** (as applicable): Grade III |

**Insulation and Infiltration**

- Insulation levels modeled to 2021 IECC Prescriptive values and achieve Grade 1 installation, per ANSI / RESNET / ICC Standard 301
- Infiltration – SF Detached Dwelling units[32] (ACH50): CZs 1-2: 2.75 │CZ 3,4A, 4B: 2.25 │ CZs 4C, 5-7: 2.0 │ CZ 8: 1.5
- Infiltration – SF Attached Dwelling units (duplexes, townhouses) (ACH50): 3.0 (all Climate Zones)

**Windows**

| 2021 IECC Climate Zone | 1 – 2 | 3 | 4A, 4B | 4C, 5 | 6 – 8 |
|---|---|---|---|---|---|
| U-Value | 0.40 | 0.30 | 0.30 | 0.27 | 0.25 |
| SHGC | 0.23 | 0.25 | 0.40 | Any | Any |

**Doors**

| Door Type | Opaque | ≤ ½-Lite | > ½-Lite | |
|---|---|---|---|---|
| Climate Zone | All | All | 1 – 3 | 4 - 8 |
| Door U-Value | 0.17 | 0.25 | 0.30 | 0.30 |
| Door SHGC | Any | 0.25 | 0.25 | 0.40 |

**Water Heater**

DHW equipment modeled at the following applicable efficiency levels based on Uniform Energy Factor (UEF):

- Electric Systems: UEF = 2.57
- Gas / Propane Systems: UEF = 0.95

**Ducts and Thermostat**[33]

- All ducts and air handlers modeled within conditioned space, uninsulated, with no leakage to the outside
- Programmable thermostat

**Lighting & Appliances**

- For purposes of calculating the DOE ZERH Target Home ERI, homes shall be modeled with an ENERGY STAR dishwasher, ENERGY STAR refrigerator; ENERGY STAR ceiling fans (if used), and ENERGY STAR lamps (bulbs) or fixtures in 100% of Qualifying Light Fixture Locations as defined by ANSI / RESNET / ICC Standard 301-2019.

## Endnotes:

[1] A dwelling, as defined by ANSI/RESNET/ICC 301, is any building that contains one or two dwelling units used, intended, or designed to be built, used, rented, lease, let, or hired out to be occupied, or that are occupied for living purposes. A dwelling unit, as defined by ANSI/RESNET/ICC 301 is a single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

[2] A Townhouse, as defined by ANSI/RESNET/ICC 301, is defined as a single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides. Townhomes are also eligible to participate in the DOE Zero Energy Ready Home Multifamily Version 2 program.

[3] A modular home is a prefabricated home that is made of modules or sections that are manufactured and substantially assembled in a manufacturing plant. These pre-built sections are transported to the building site and constructed by a builder to meet all applicable building codes for site-built homes.

[4] The Rater may define the 'permit date' as either the date that the permit was issued or the date of the contract on the home. In cases where permit or contract dates are not available, Providers have discretion to estimate permit dates based on other construction schedule factors. These assumptions should be both defensible and documented.

[5] The Rater is defined as the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater or Approved Inspector, as defined by ANSI / RESNET / ICC Standard 301, or an equivalent designation as determined by a DOE-recognized Home Certification Organization for ZERH (HCO for ZERH). All Raters for DOE ZERH projects must successfully complete a DOE ZERH orientation course. The Rater shall also have a signed partnership agreement in place with the DOE ZERH program.

[6] Where requirements of the local codes, covenants, manufacturers' installation instructions, or engineering documents overlap with the requirements of these guidelines, DOE offers the following guidance:

a. In cases where the overlapping requirements exceed the DOE ZERH Single Family guidelines, these overlapping requirements shall be met;
b. In cases where overlapping requirements conflict with a requirement of these DOE ZERH Single Family program requirements, then the home is exempt from the conflicting requirement within these guidelines. However, certification shall only be allowed if the Rater has determined that no equivalent option is available that could meet the intent of the conflicting requirement of these guidelines. Note that a home must still meet the Target Home Energy Rating Index Target. Therefore, other efficiency measures may be needed to compensate for the omission of the conflicting requirement.

[7] The software program shall automatically determine, without relying on a user-configured Target Home, the ERI target for each rated home by following the DOE Zero Energy Ready Home Target Home Procedure, Version 2.

[8] In the event that a Rater is not able to determine whether an item is consistent with the intent of a provision, (e.g., an alternative method of meeting a checklist requirement has been proposed), then the Rater shall consult their Provider. The term 'Provider' refers to an Approved Rating Provider, as defined by ANSI / RESNET / ICC Standard 301-2019, that is approved by a DOE-recognized HCO for ZERH. If the Provider also cannot make this determination, then the Rater or Provider shall report the issue to DOE prior to project completion at: zerh@doe.gov and will receive an initial response within 5 business days. If DOE believes the current program guidelines are sufficiently clear to determine whether the intent has been met, then this guidance will be provided to the Partner and enforced beginning with the house in question. However, if DOE believes the program guidelines require revisions to make the intent clear, then this guidance will be provided to the Partner but only enforced for homes permitted after a specified transition period following the release of the revised guidelines, typically 60 days in length. This process will allow DOE to make formal policy decisions as Partner questions arise and to disseminate these policy decisions through the ZERH Policy Record and the periodic release of revised program documents to ensure consistent application of the program guidelines.

[9] Sampling of those requirements for ENERGY STAR Single Family New Homes (ESSFNH) and Indoor airPLUS qualification is allowed to the extent permitted by their respective program requirements and allowances for sampling. Rater-only sampling of features specific to the DOE ZERH Single Family Home qualification may be conducted in accordance with an HCO for ZERH-approved Sampling Protocol.

[10] Raters are expected to use their experience and discretion to verify that the overall intent of each checklist item has been met (i.e., identifying major defects that undermine the intent of the checklist item versus identifying minor defects that the Rater may deem acceptable).

[11] In some states, an earlier version of ENERGY STAR Single Family New Homes such as Version 3.1 may be required by the ENERGY STAR Residential New Construction program. However, compliance with DOE Zero Energy Ready Home V2 requires compliance with ESSFNH V3.2.

[12] Building envelope assemblies, including exterior walls and unvented attic assemblies (where used), shall comply with the relevant vapor retarder provisions of the 2021 International Residential Code (IRC).

[13] The total building envelope UA shall be less than or equal to the UA value that results from multiplying the U factors in the 2021 International Energy Conservation Code (IECC) – Table R402.1.2 by the same assembly areas as the home being certified. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method. The performance of components (i.e., fenestration, ceilings, walls, floors, slabs) can be traded off using the UA approach. However, note that the DOE ZERH Mandatory window provisions (Exhibit 1) and Items 3.1 through 3.3 of the ESSFNH National Rater Field Checklist must be met regardless of the UA tradeoffs calculated.

For jurisdictions designated by a code official as having Very Heavy Termite Infestation, the slab edge insulation value and depth shall be adjusted in the UA calculation. The code-required insulation level and depth shall be set to the insulation level and depth found in the Rated Home for the purpose of determining compliance with this ZERH requirement.

[14] Slab edge insulation allowances permitted by the most recent version and revision of the ENERGY STAR Single Family New Homes program are permitted. A list of currently exempted details is available at www.energystar.gov/slabedge. Note that projects using these exempted details must still achieve the Target ERI and the total building envelope UA requirement, which assume the use of slab edge insulation per the 2021 IECC prescriptive values.

[15] Windows shall meet the performance criteria below based on climate zone:

| **Window Specs Required for DOE ZERH Projects** | **IECC CZ 1-2** | | **IECC CZ 3,4A, 4B** | | **IECC CZ 4C, 5 (SHGC values listed below may be paired with the U-value in the same row)** | | **IECC CZ 6-8** | |
|---|---|---|---|---|---|---|---|---|
| | U-Value | SHGC | U-value | SHGC | U-Value | SHGC | U-Value | SHGC |
| | ≤ 0.40 | ≤ 0.23 | [CZ 3]<br>≤ 0.30<br>[CZ 4]<br>≤ 0.30 | [CZ 3]<br>≤ 0.25<br>[CZ 4]<br>≤ 0.40 | ≤ 0.27<br>= 0.28<br>= 0.29<br>= 0.30 | Any<br>≥ 0.32<br>≥ 0.37<br>≥ 0.42 | ≤ 0.25 | Any |

The following exceptions apply:

a. An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;
b. An area-weighted average of fenestration products ≥ 50% glazed shall be permitted to satisfy the SHGC requirements;
c. 15 square feet of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above;

d. One side-hinged opaque door assembly up to 24 square feet in area shall be exempt from the U-factor requirements and shall be excluded from area-weighted averages calculated using a) and b), above;
e. Fenestration utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true South and directly coupled to thermal storage mass that has a heat capacity > 20 btu / $ft^3$x°F and provided in a ratio of at least 3 sq. ft. per sq. ft. of South facing fenestration. Generally, thermal mass materials will be at least 2 in. thick.
f. For project sites located at an elevation ≥ 5,000 feet above sea level and located in Climate Zones 5 – 8, windows with a maximum U factor of 0.30 (with any SHGC) may be used to satisfy this program requirement. For project sites located at an elevation ≥ 8,000 feet above sea level and located in Climate Zones 5 – 8, windows with a maximum U factor of 0.32 (with any SHGC) may be used to satisfy this program requirement.

If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U factor and SHGC value from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest U-factor and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating).

[16] More information on the ENERGY STAR V7.0 residential window specification may be found here: https://www.energystar.gov/products/res_windows_doors_skylights/partners DOE may initially consider phase in of the ENERGY STAR V7.0 window specifications prioritizing Climate Zones 7 and 8, due to the significant benefit of advanced windows in these very cold climate zones.

[17] Exceptions:
a. Up to 10 ft. of total duct length is permitted to be outside of the home/unit's thermal and air barrier boundary.
b. Ducts (but not air handlers) may be located in a vented attic if minimum R-8 duct insulation is used, duct leakage to outdoors is measured ≤ 3 CFM25 per 100 $ft^2$ of conditioned floor area, and:
    - In Moist (A) climate zones (per 2021 IECC Figure R301.1), an additional 1.5 in. (min.) of closed-cell spray foam encapsulates the ducts and ductwork is buried under 2 in. (min.) of blown-in insulation; OR
    - In Dry (B) and Marine (C) climate zones (per 2021 IECC Figure R301.1), ductwork is buried under at least 3.5 in. of blown-in insulation.
c. Systems which meet the criteria for "Ducts Located in Conditioned Space" as defined by 2021 IECC Section R403.3.2.
d. Jump ducts which do not directly deliver conditioned air from the heating/cooling equipment may be located in attics if all joints, including boot-to-drywall, are air sealed and the jump duct is fully buried under the attic insulation
e. Ducts and air-handling equipment may be located within an uninsulated and unvented crawl space or basement when the applicable dehumidification requirements of the Indoor airPLUS program (Version 1) are met
f. Ducts and air-handling equipment associated with rooftop make-up air units or dedicated outdoor air systems (DOAS) that provide ventilation, and may also provide supplemental heating and cooling, are permitted to be outside of the building's thermal and air barrier boundary.

This provision does not apply to equipment or ductwork that only provides ventilation.

Ducts located in unvented attic assemblies meeting the requirements of Section 806.5 of the 2021 IRC satisfy this provision.

[18] Hot water delivery systems meet the following efficiency requirements:

To minimize water wasted while waiting for hot water, the hot water distribution system shall store no more than 0.5 gallons (1.9 liters) of water in any piping/manifold between the hot water source and any hot water fixture. System options include manifold-fed systems; structured plumbing systems; core plumbing layouts, and on-demand recirculation systems. The following requirements apply to recirculation systems:

a. Recirculation systems must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom which is located beyond a 0.5 gallon stored-volume range from the water heater.
b. Recirculation systems which operate based on "adaptive" scheduling, meaning that they "learn" the hot water demand profile in the home and adapt their operation to anticipate this profile, are permitted at this time, and do not require the use of occupant-controlled switches or occupancy sensors.
c. Recirculation systems that are activated based **solely** on a timer and/or temperature sensor are not eligible.

To verify that the system stores no more than 0.5 gallons (1.9 liters), verifiers shall either use the Calculation method or the Field Verification method. In the Calculation method, the verifier shall calculate the stored volume between the hot water source and the furthest fixture using the piping or tubing inside diameter and the length of the piping/tubing. In the case of on-demand recirculation systems, the 0.5-gallon (1.9 liter) storage limit shall be measured from the point where the branch feeding the furthest fixture branches off the recirculation loop, to the fixture itself. An Excel-based tool is available on the DOE ZERH website for this calculation.

Using the Field Verification method, no more than 0.6 gallons (2.3 liters) of water shall be collected from the hot water fixture before hot water is delivered. Only the fixture with the greatest stored volume between the fixture and the hot water source (or recirculation loop) needs to be tested. To field-verify that the system meets the 0.6-gallon (2.3 liter) limit, verifiers shall first initiate operation of on-demand recirculation systems, if present, and let such systems run for at least 40 seconds. Next, a bucket or flow measuring bag (pre-marked for 0.6 gallons) shall be placed under the hot water fixture. The hot water shall be turned on completely and a digital temperature sensor used to record the initial temperature of the water flow. Once the water reaches the pre-marked line at 0.6 gallons (approximately 24 seconds for a lavatory faucet), the water shall be turned off and the ending temperature of the water flow (not the collection bucket) shall be recorded. The temperature of the water flow must increase by ≥ 10 °F in comparing the final to the initial temperature reading. Under the DOE ZERH Single Family program, the approved verifier must confirm compliance with these requirements.

For production builders with house plans that offer an optional bathroom that does not include a shower or tub, the hot water distribution to this bathroom, when included, is not required to be evaluated under this requirement.

[19] Water heaters and fixtures meet the following efficiency criteria:

a. Gas water heaters, if present, shall have a Uniform Energy Factor ≥ 0.87
b. Electric water heaters, if present, shall have a Uniform Energy Factor ≥ 2.2
c. All showerheads and bathroom sink faucets and aerators shall be WaterSense labeled.
d. The hot water distribution system shall store no more than 1.2 gallons between the hot water source and the furthest fixture. In the case of on-demand recirculation systems, the hot water source is

considered as the point at which the branch feeding the fixture branches off the recirculation loop. This storage limit shall be verified by either 1) a calculation using the piping or tubing interior diameter and the system length based on plans, or 2) by a field verification test, using the protocol described in the prior endnote, which demonstrates a minimum temperature rise of 10 °F by the time 1.4 gallons of water is delivered to the furthest hot water fixture.

Projects using this compliance option are not permitted to use hot water recirculation systems which operate continuously or operate based solely on a timer or temperature sensor.

[20] For products in categories which are not covered by ENERGY STAR product criteria, such as combination all-in-one clothes washer-dryers, these products are exempt.

[21] Due to industry supply chain challenges, DOE is temporarily allowing the use of non-ENERGY STAR certified refrigerators. Any project utilizing this temporary alternative must account for the non-ENERGY STAR certified refrigerator in the energy model and achieve an ERI value equal to or lower than the ERI of the DOE ZERH Target Home. DOE advises partners that this alternative may be rescinded in a future program update.

[22] Up to 5% of lighting, for task or decorative lighting, may be exempt from this provision. The Target Home specification for lighting will remain at 100% regardless of whether this exemption is used (Exhibit 2).

[23] This provision does not apply to H/ERVs that are used to provide exhaust ventilation for bathrooms.

[24] Homes permitted on or before 12/31/2023 must certify under the Indoor airPLUS Version 1 program requirements. For homes permitted after 12/31/2023, DOE may consider a revision to these program requirements that specifies if an updated version of Indoor airPLUS must be used. See the Indoor airPLUS program site for information on program updates: https://www.epa.gov/indoorairplus/indoor-airplus-program-documents

[25] An HRV or ERV is required to provide whole-house mechanical ventilation for homes in Climate Zones 6 – 8 and must meet or exceed the following specifications: ≥ 65% SRE (@ 32 °F) and ≥ 1.2 CFM/Watt.

[26] The DOE ZERH Single Family program requires that the provisions of the PV-Ready Version 2 Checklist are completed, unless one or more of the exceptions below applies in which case the PV-Ready features in the Checklist are not required. The exceptions are:

a. The home already includes an on-site PV system.
b. The home receives renewable energy from a community solar system, and there is a legally binding agreement in place for the provision of this energy to the home with a duration ≥ 15 years and written to survive a full or partial transfer of ownership of the property.
c. The location has significant natural shading (e.g., trees, tall buildings impacting the south-facing roof).
d. The home as designed does not have at least 600 square feet of roof area oriented in between 110 degrees to 270 degrees of true north.

The Rater shall document which, if any, exceptions apply.

[27] If the addition of the 40-amp Electric Vehicle Charging branch circuit increases the electrical service to the next nominal size (i.e., from 200-amp to 400-amp service), connecting the circuit to the electrical panel is not required. The conductor shall be labeled as “electrical vehicle charging.” The Rater shall retain a copy of the electrical sizing calculations or statement from the electrical designer for their records but need not evaluate the documentation.

Homes without a private driveway or garage are exempt from this requirement.

[28] The individual branch circuit shall have a rating not less than 240V/30A or 120V/20A. The 3' x 3' x 7' volume may contain the existing water heater. An exception to the requirement for the 3' x 3' x 7' space is provided when the installed water heater is an electric tankless system or a fossil fuel tankless water heater.

Homes utilizing an electric water heater are exempt from this requirement.

[29] If a branch circuit outlet is installed, it shall be in compliance with 2021 IRC Section E3702.11 based on heat pump space heating equipment sized in accordance with 2021 IECC R403.7, and shall terminate within three feet of each fossil fuel space heater. Alternatively, code-compliant wiring conduit to facilitate future wiring for a heat pump installation may be installed and shall terminate within three feet of each fossil fuel space heater.

Homes utilizing electric heating systems as the primary heating for the home are exempt from this requirement.

[30] Compliance with DOE ZERH Version 2 program requirements is based on climate zones as defined in the 2021 IECC. Climate Zones as defined by the 2021 IECC may be viewed online: https://codes.iccsafe.org/content/IECC2021P1/chapter-3-re-general-requirements. Note that some locations have shifted to a different climate zone in the 2021 IECC as compared to prior versions of the IECC.

[31] HVAC System Type for the Target Home shall be the same as the Rated Home, with the following exceptions. The Target Home is configured with an air-source heat pump when the Rated Home has an air-source or ground-source heat pump, electric strip heat, or baseboard heat. Applicable efficiency levels are based on Exhibit 2.

[32] Envelope leakage shall be determined by using Standard ANSI/RESNET/ICC 380-2019.

[33] In homes with heat pumps with electric resistance back-up heating, programmable thermostats shall have "Adaptive Recovery" technology to prevent the excessive use of electric back-up heating.

| | |
|---|---|
| **From:** | Building Code Update |
| **To:** | Mowgli Gunn |
| **Cc:** | Building Code Update |
| **Subject:** | RE: Sculptural Building Codes |
| **Date:** | Monday, November 18, 2024 11:32:09 AM |

Mowgli,

The CU Boulder Campus does not follow the Boulder County Building Codes. They are regulated by the State of Colorado.

I recommend reaching out to the CU Boulder Facilities Management Team:
https://www.colorado.edu/fm/

- Ron

**Ron Flax**
**Deputy Director / Chief Building Official**
Boulder County Community Planning & Permitting
2045 13th St., Boulder, CO 80302
Direct: 720-564-2643 | Main: 303-441-3930
rflax@bouldercounty.gov
(He/Him/His)

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**From:** Mowgli Gunn <Mowgli.Gunn@colorado.edu>
**Sent:** Thursday, November 14, 2024 9:23 AM
**To:** Building Code Update <buildingcodeupdate@bouldercounty.gov>
**Subject:** [EXTERNAL] Sculptural Building Codes

Hello,
My name is Mowgli and I am a student at CU Boulder. I am founding an Art in Public Spaces Club on campus and have a sculpture proposal for campus that I am working on. While engineering this piece I will be referencing the City of Boulder Building Codes.

I wanted to verify that for snow and Seismic loads I can refer to IBC 2015 and for calculating wind loads I can refer to ASCE - 7? If not, which editions does the city currently use? Is there a consolidated document with up-to-date Minimum Design Loads?

Best,
Mowgli

**From:** Guy Stevenson
**To:** Building Code Update
**Subject:** [EXTERNAL] Re: Buildsmart Checklist updated
**Date:** Monday, November 18, 2024 4:43:19 PM

---

Thanks, Ron, I really appreciate that!

Guy Stevenson
Stevenson Designs
303-447-0774

> On Nov 18, 2024, at 4:17 PM, Building Code Update <buildingcodeupdate@bouldercounty.gov> wrote:
>
> Guy,
>
> We are working on the supporting documents that should help clarify the updates to BuildSmart. As soon as they are ready, we will share them.
>
> Thanks for your participation in this process!
>
> - Ron
>
> **Ron Flax**
> **Deputy Director / Chief Building Official**
> Boulder County Community Planning & Permitting
> 2045 13th St., Boulder, CO 80302
> Direct: 720-564-2643 | Main: 303-441-3930
> rflax@bouldercounty.gov
> (He/Him/His)
>
> ---
>
> **From:** Guy Stevenson <guy@guystevensondesigns.com>
> **Sent:** Friday, November 8, 2024 12:38 PM
> **To:** Building Code Update <buildingcodeupdate@bouldercounty.gov>
> **Subject:** [EXTERNAL] Buildsmart Checklist updated
>
> Sat in on the meeting yesterday concerning the new energy code, very helpful, thanks! Wondering if we could see the updated “Buildsmart Checklist”? The vast majority of the projects we work on are additions and remodels that are driven by the Checklist. Thanks!

Thanks,
Guy Stevenson
Stevenson Designs
303-447-0774

**From:** Chris Krauss
**To:** Building Code Update
**Subject:** [EXTERNAL] RE: 2021 I-Code Adoption & Boulder County Snow Map
**Date:** Wednesday, November 20, 2024 12:50:18 PM

---

Hi Ron,

Thanks for the reply and for the informative meeting yesterday. Please feel free to reach out if you'd like any assistance when it comes time to dive into the wind and snow maps, or any other structural items pertaining to code adoptions. I'm an active member of SEAC and we are conveniently located in Central Boulder with easy access to County Offices. Contact me any time with questions!

Have a great day!

Chris Krauss, PE, SE
Ascent Group, Inc.
1711 Pearl Street, Suite 300
Boulder, CO 80302
(303) 865-4946

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**From:** Building Code Update <buildingcodeupdate@bouldercounty.gov>
**Sent:** Monday, November 18, 2024 11:29
**To:** Chris Krauss <c.krauss@ascentgrp.com>
**Cc:** Building Code Update <buildingcodeupdate@bouldercounty.gov>
**Subject:** RE: 2021 I-Code Adoption & Boulder County Snow Map

Chris,

Thanks for reaching out. The code adoption process that we are currently working on does not include any updates to the wind and snow maps. Our hope is the updates that you mention that will be happening statewide will give us the opportunity to update our maps in alignment with this work. We might take the issue up sooner depending on the speed of the statewide process. The last time we did a code update, we also separated out the wind and snow issues from the rest of the code update and it seemed that this allowed for much more time for focused discussion of the structural issues. This will be something that we look at once we are complete with the adoption of the 2021 I-codes.

Thanks again for your participation in this process!

- Ron

**Ron Flax**
**Deputy Director / Chief Building Official**

Boulder County Community Planning & Permitting
2045 13th St., Boulder, CO 80302
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rflax@bouldercounty.gov
(He/Him/His)

---

**From:** Chris Krauss <c.krauss@ascentgrp.com>
**Sent:** Thursday, November 14, 2024 11:03 AM
**To:** Building Code Update <buildingcodeupdate@bouldercounty.gov>
**Subject:** [EXTERNAL] 2021 I-Code Adoption & Boulder County Snow Map

Good morning,

I was reviewing the Building Code Update Draft online prior to Tuesday's informational meeting, and noticed the wind and snow maps are not yet included. Will there be changes to the Boulder County Ground Snow map? Although the current Ground Snow map indicates that it's based on the 2016 SEAC study, we have discovered over the years that there are locations in the Boulder County Foothills where the SEAC study returns substantially higher ground snow loads than the mapped values, potentially resulting in unconservative structural designs when the BoCo map is followed. Two such examples are listed below:

Gold Hill (townsite):
Boulder County Pg = 50 lb/sq ft
SEAC k=14, A=8,250'; Pg = 78 lb/sq ft

Eldora (townsite):
Boulder County Pg = 55 lb/sq ft
SEAC k=12, A=8,700'; Pg = 79 lb/sq ft

Values on the plains seem to match pretty well. For what it's worth, this will all go away in future code updates as Colorado's "Case Study" snow area is eliminated and all ground snow load values will be available via the site-specific ASCE7 Hazard Tool. For reference, the ASD ground snow load values for use with ASCE7-22 and IBC**2024** at the Gold Hill townsite and Eldora townsite are 70.7 lb/sq ft and 143.5(!!) lb/sq ft, respectively.

I'm planning to attend Tuesday's meeting and look forward to the information presented. Please let me know if you have questions or if there's anything I can to do assist in this process.

Regards,

**Christopher J. Krauss, PE, SE**
**Principal**

ASCENT GROUP
STRUCTURAL ENGINEERING

1711 Pearl Street, #300
303.865.4946 Direct
303.499.3022 Office
www.ascentgrp.com

**From:** Building Code Update
**To:** ellen berry; Building Code Update
**Subject:** RE: [EXTERNAL] BORC-24-0001
**Date:** Tuesday, November 26, 2024 3:30:48 PM

---

Hello Ellen,

Thank you for reaching out. The proposed building code update and amendments can be found on our Building Code Amendment website, https://bouldercounty.gov/property-and-land/land-use/building/building-code-amendments/, under the November 7, 2024 meeting materials section.

We are hoping to tie into the existing Article 19 provisions so that folks who are rebuilding after the Marshall Fire will have the ability to re-build using the existing building codes and not have to transition to the new codes if they do not want to (as long as the Article 19 provisions are still in effect).

Best Regards,
Kathy

Kathy Gissel ¦ Permit & License Operations Manager
Marijuana & Secure Transportation Co-Authority
Permit and Licensing Programs
Boulder County Community Planning & Permitting
Service Hours: 8:00a.m. – 4:30p.m. Monday, Wednesday - Friday, and 10:00 a.m.–4:30 p.m. Tuesday
Mailing Address: P.O. Box 471 ¦ Boulder, CO 80306
Physical Address: 2045 13th Street ¦ Boulder, CO 80302
Direct: 720.564.2626 ¦ Main: 303.441.3930
*My working hours: 7am – 5:30pm, Monday through Thursday

-----Original Message-----
From: ellen berry <cmdanceellen@gmail.com>
Sent: Thursday, November 7, 2024 11:14 AM
To: Building Code Update <buildingcodeupdate@bouldercounty.gov>
Subject: [EXTERNAL] BORC-24-0001

Hello -

Is there any description of what updates are proposed as part of this update? Anything?
Is it the IRC or IECC or some BOCO hybrid?

Thanks - the residents of UBC are very interested to hear what is suggested.

Ellen Berry
UBC Marshall Fire advocate

**From:** Building Code Update
**To:** Joe Barsugli; Building Code Update
**Subject:** RE: [EXTERNAL] question about HERS /ERI requirements and backup
**Date:** Tuesday, November 26, 2024 3:34:31 PM

---

Hello Joe,

Thank you for reaching out to us with your question, we value your feedback. All emails will be included in our meeting and hearing packets for our boards to review and consider while making decisions.

To stay informed about the updates, please sign up for our Building Code email news notifications by clicking on the orange button located on the Boulder County Building Code Amendments webpage at https://bouldercounty.gov/property-and-land/land-use/building/building-code-amendments/. You will also be able to access additional building code and amendment update resources on this webpage as well.

Upcoming Meeting and Hearings
Board of Review Public Meeting
December 5, 2024 @ 3pm

Board of Review Public Hearing
December 19, 2024 @ 3pm

Board of County Commissions Public Hearing
January 16, 2025 @ 9am

Additional meeting and hearing details, as well as how to join, will be available approximately 1 week prior to each date and can be found on the Boulder County Building Code Amendments webpage at https://bouldercounty.gov/property-and-land/land-use/building/building-code-amendments/.

We appreciate your participation in shaping the future of our local building codes.
Boulder County Community Planning and Permitting Staff

-----Original Message-----
From: Joe Barsugli <joe.barsugli@gmail.com>
Sent: Thursday, November 7, 2024 4:15 PM
To: Building Code Update <buildingcodeupdate@bouldercounty.gov>
Subject: [EXTERNAL] question about HERS /ERI requirements and backup

While incentivizing electrification is good, how will multi-day planned electric outages due to wildfire risk (as happened recently with Xcel
energy) be dealt with if there is no backup (below 7000')? This is a major source of anxiety for Boulder homeowners as the unreliable electric grid is not limited to the mountains.

Joe Barsugli

Boulder CO

**From:** Building Code Update
**To:** gdg@zplane.com
**Cc:** Building Code Update
**Subject:** RE: [EXTERNAL] Re: Boulder County Building Code Update
**Date:** Wednesday, December 4, 2024 10:55:46 AM

---

Glenn,

If you provide written comments prior to the meeting these will be provided to the Board of Review for their consideration. The benefit of attending the meeting (either in person or online) is that you will be able to any subsequent discussion that your comments solicit. The meeting will be recorded, and this recording will be posted on the Board of Review website. https://bouldercounty.gov/property-and-land/land-use/building/board-of-review/

Thanks again for your participation in this project.

- Ron

Ron Flax
Deputy Director / Chief Building Official
Boulder County Community Planning & Permitting
2045 13th St., Boulder, CO 80302
Direct: 720-564-2643 | Main: 303-441-3930
rflax@bouldercounty.gov
(He/Him/His)

-----Original Message-----
From: gdg@zplane.com <gdg@zplane.com>
Sent: Tuesday, December 3, 2024 1:11 PM
To: Flax, Ron <rflax@bouldercounty.gov>
Cc: Building Code Update <buildingcodeupdate@bouldercounty.gov>
Subject: [EXTERNAL] Re: Boulder County Building Code Update

Hi Ron,

Thanks for your response and explanation.

I do appreciate the real-world difficulties in maintaining multiple versions of large, complex documents. In my experience, fascist version control software and in-document version identification (on every page) is the only practical solution.

The example discrepancy between [1] and [2] that I pointed out was only one of several that I happened to have noticed, but rather than calling them all out here -- which honestly doesn't seem to be a worthwhile expenditure of my time -- I'm just going to ignore [2] and base my comments strictly on [1]. Unfortunate, because a properly redlined version of [1] would really have been a better starting point for commentation. But... so be it.

I will forward my comments to the "buildingcodeupdate" address that you supplied (Cc-ed again here.)

As an aside: If I provide comments via email to the above address on or prior to the December 5 meeting date, is there any additional benefit to attending the meeting?

Thanks,

Glenn Golden
868 Brook Rd.
Boulder, CO 80302
gdg@zplane.com  <---- hard of hearing, preferred contact method

========== BEGIN ORIGINAL MESSAGE ==========
Flax, Ron <rflax@bouldercounty.gov> [2024-12-03 18:40:30 +0000]:
> Glenn,
>
> Sorry to hear that you were having difficulty with submitting comments. The correct email to use is: buildingcodeupdate@bouldercounty.gov<mailto:buildingcodeupdate@bouldercounty.gov> I have copied the correct email on this message, so your email will become part of the record.
>
> The documents for this project have been difficult to manage, and I apologize for the challenge you have been experiencing. The document titled "Building Code update draft for Board of Review, Nov. 7, 2024" is the most recent draft that we have submitted for review by the Board of Review and are currently soliciting comments from the public. The document titled "Building Code update draft redline, Nov. 7, 2024" is a copy of a slightly earlier working draft that captures edits and updates that have been proposed. We did our best to fully capture all changes that were made, but as you have found, it is challenging to follow. Additionally, there were some edits for which the redline version seems to have omitted some of the recent edits. This is especially true for the Energy Chapter as we moved many things around and made a number of significant changes which was hard to track. We were also working from several document sources during this project which further complicated the administrative task of tracking the changes to each version. For the specific section you mention, the redline version should indicate the following: "For buildings complying with Sections N1106 crawl space wall insulation shall be installed in accordance with the proposed design or rated design." - since this is the text that is being proposed.
>
> I appreciate your taking the time to bring this to our attention. Hopefully, there are not very many other examples of discrepancies between these documents.
>
> I recognize the value of your time and your participation in this process is truly appreciated.
>
> Please let us know if you have any further comments or questions on this process or the proposed draft code.
>
> Thank you,
>
>
> * Ron
>
> Ron Flax
> Deputy Director / Chief Building Official
> Boulder County Community Planning & Permitting
> 2045 13th St., Boulder, CO 80302
> Direct: 720-564-2643 | Main: 303-441-3930
> rflax@bouldercounty.gov<mailto:rflax@bouldercounty.org>
> (He/Him/His)
========== END ORIGINAL MESSAGE ==========

**Comments on *Building Code update draft presented to Board of Review, Nov. 7, 2024***

Glenn D. Golden [gdg@zplane.com]
(Homeowner/resident of unincorporated Boulder county)

$Id: comments.html,v 1.7 2024/12/05 14:01:19 gdg Exp $

---

## 1 Overview

What follows are various comments pertaining to Reference [1], as solicited in [2].

Page numbers referred to below are those of the PDF file [1], not the numbers shown at the bottom center of each document page, since those are non-sequential.

## 2 Comments related to "multi-layered glazed panels"

### 2.1 Section R390.3, p. 43:

a. First of all, thank you for finally defining this term, +1 on that. The lack of definition of this term in the previous version of this document caused me a good deal of lost time during a recent window replacement project. And in at least one case known to me, a BoCo inspector's (mistaken) idea of the semantics of that phrase differed from the contractor's (correct) understanding, leading the inspector to require an expensive (and unjustified) change-out of the entire glazing install. Great example of why clear, carefully written definitions are the bedrock of any standards or specification document.
b. Suggest changing the definition phrase from **multi-layered glazed panels** to simply **multi-layered glazing**, since (afaict from a quick PDF-based search) it is the latter phrase -- and only the latter phrase -- that actually ever appears anywhere in the document (in R390.4.9).
c. In place of the phrase "air gap", suggest "insulating gap", or "air or gas gap". Most such assemblies will not have "air" between the glazed panels.

## 3 Comments related to "U-factor" and "U-value"

### 3.1 Throughout document:

a. The terms **U-factor** and **U-value** both appear throughout the document, and seem to be used interchangeably. Suggest going with **U-value**, and using it consistently in place of **U-factor**. Why that choice? Because the reciprocal term **R-value** *is* used consistently throughout the document (i.e. **R-factor** is not present, at least as far as I could tell via a quick PDF-based text search.) So you might as well use the **-value** suffix for both terms, which at least renders them consistent with each other within the document.

### 3.2 Section N1101.5, p. 50, list item #4:

a. The term "*U-factor*" is in italic font; it should be in roman font to be consistent with the typography used elsewhere in the document for that term. (But suggest changing it to "U-value" anyway, per comment 3.1.a)

### 3.3 Section N1101.6, p. 57:

a. "*U-FACTOR*" is in italic font. Should be roman. (But suggest changing it to "U-VALUE" anyway, per comment 3.1.a)
b. The word "co-efficient" should not be hyphenated.
c. The phrase "equal to" would be better simply as "defined as". This paragraph is a definition, not an equation.
d. "Btu" should be "BTU".
e. "ft2" should be $\mathrm{ft}^2$.
f. "m2" should be $\mathrm{m}^2$.
g. Even with the above typographical fixes, the expression given for IP units is mathematically nonsensical, per conventional precedence of arithmetic operators. It would need to be re-parenthesized as $\mathrm{BTU}/(\mathrm{h}\cdot\mathrm{ft}^2\cdot{}^\circ\mathrm{F})$ to render it mathematically correct, and even that would not be very satisfactory from the perspective of intuitive understanding.

   I would opine that an intuitively clearer and more conventional way to express it is simply as $(\mathrm{BTU}/\mathrm{h})/\mathrm{ft}^2/{}^\circ\mathrm{F}$ which, when read from left to right, agrees nicely with the common parlance expression for heat transmittance, i.e. heat flow [$\mathrm{BTU}/\mathrm{h}$] per unit area [$\mathrm{ft}^2$] per unit temperature differential [$^\circ\mathrm{F}$].

   Expressing it this way also provides the potential side advantage of meshing nicely with the definition for R-value; see comments pertaining to R-value in Section 4, further below.

h. Re the SI expression: For the same reasons as above, I would opine again that $\mathrm{W}/\mathrm{m}^2/\mathrm{K}$ is clearer and more intuitively accessible than $\mathrm{W}/(\mathrm{m}^2\cdot\mathrm{K})$, even though they are both mathematically correct and equivalent.

   I would also suggest using $^\circ\mathrm{C}$ rather than $\mathrm{K}$ here as a useful improvement in scrutability for ordinary homeowners (who, after all, comprise at least some portion of the intended audience for this document). Relatively few homeowners will be familiar with $\mathrm{K}$ for kelvins; almost all will understand $^\circ\mathrm{C}$.

   Note that replacing $\mathrm{K}$ with $^\circ\mathrm{C}$ has no effect on any numerical U-values appearing within the document; by definition, use of the term **U-value** always implies a *differential* temperature, and since one differential $^\circ\mathrm{C}$ is equal to one differential kelvin, the use of absolute temperature scale in this definition is entirely unnecessary. Imo, there is no justification, technical or otherwise, for using $\mathrm{K}$ in this particular context. It's a pedantic usage which accomplishes nothing technically and may even be obscuring for some readers.

## 4 Comments related to "R-value"

### 4.1 Section N1101.6, p. 56

a. Same typographical errors as in the U-value definition: "ft2", "m2", and "Btu" should be replaced by $\mathrm{ft}^2$, $\mathrm{m}^2$, and $\mathrm{BTU}$.

b. The expression for IP units happens to be mathematically correct here ($\mathrm{h} \cdot \mathrm{ft}^2 \cdot {}^\circ\mathrm{F}/\mathrm{BTU}$), but unnecessarily obscure because it syntactically separates the time ($\mathrm{h}$) and energy ($\mathrm{BTU}$) components of the heat flow units ($\mathrm{BTU}/\mathrm{h}$) for no real reason.

In addition, the awkward language attempting to describe R-value as "the inverse" of transmittance introduces an unnecessary asymmetry vs. the U-value definition by including the phrase "under steady state conditions", which isn't present in the U-value definition. The alert reader may legitimately wonder why the R-value definition goes to the trouble of explicitly calling out 'steady-state conditions', yet the U-value definition does not. Imo, the on-the-ground reality is that within the context of this document, the qualifying phrase 'steady-state conditions' is pedantic and unnecessary.

c. My suggestion for fixing up this entire definition would be to simply define R-value as the reciprocal (not "inverse") of U-value, and give the resulting physical units as reciprocals of the U-value units. Why flog yourselves maintaining near-identical text in two separate definitions when it is not necessary to do so?

Suggested text:

> **R-VALUE (THERMAL RESISTANCE).** Reciprocal of **U-VALUE** (thermal transmittance) as defined herein. $1/((\mathrm{BTU}/\mathrm{h})/\mathrm{ft}^2/{}^\circ\mathrm{F})$ $[1/(\mathrm{W}/\mathrm{m}^2/{}^\circ\mathrm{C})]$.

This takes care of both 4.1.a and 4.1.b above, and provides both IP and SI physical units expressions which are syntactically identical to the reciprocals of the physical units given in the U-value definition.

## 5 References


[1] *Building Code update draft presented to Board of Review, Nov. 7, 2024*, local filename **draft_20241107.pdf**, downloaded on 2024.12.03 at 08:31 MT from https://assets.bouldercounty.gov/wp-content/uploads/... 2024/11/cpp-building-code-update-draft-for-board-of-review-20241107.pdf

[2] *"Boulder County Colorado Daily Digest Bulletin"*, email received from `bouldercounty@public.govdelivery.com`, dated Nov 28, 2024, 14:37:09 UTC.

| | |
|---|---|
| **From:** | AJ Chamberlin |
| **To:** | Building Code Update; Commissioner Levy; Commissioner Loachamin; Commissioner Stolzmann |
| **Subject:** | [EXTERNAL] Changes to the code |
| **Date:** | Thursday, December 5, 2024 12:35:14 PM |

I am emailing all Board review members, county commissioners and the general public from what I can see and advise on some recommended changes.

1) The permitting department is understaffed. The process for getting a permit takes way too long.
2) The permitting department needs to be able to help laypeople through the process and I very much miss the accepted use of the service desk. Please bring that back.
3) The EZ action items need to be expanded to include more items without triggering the blower test, or HERS test, etc. The cost of making any changes these days at minimum costs over $150k. That $150k should be expanded to $300k and increased yearly by the cost of inflation before exorbitant requirements to the code and HERS are made.
4) A time period from Initial application to approval should be 3 weeks or less. All applications may be online but the planners must be available to help the customers through the process.
5) Hot Tubs. Many hot tubs are needing repair and there are few good service people. Sometimes that means almost starting over. That should NOT trigger bringing old hot tubs to current codes.
6) Additional contractors as necessary for pool maintenance as MR Pool and the like are less than steller. So to require that all pools be maintained to a certain standard without the service industry in place to do so seems unrealistic. This should not trigger updated codes.
7) Items that should be exempt from needing permits should include
   a) pump houses for the hot tubs. And the sq ft should not incease house size restrictions.
   b) bath remodels
   c) floor covering changes
   d) All our houses are getting older and to have to update to new codes just to freshen up a home is conducive ive to what the people of the county want

Best Regards,

AJ Chamberlin
Rising Phoenix Construction Testing and Design, LLC
PO Box 1559
Boulder, CO 80306

303-588-8999

**From:** PED
**To:** Building Code Update
**Cc:** Huebner, Michelle
**Subject:** [EXTERNAL] BORC-24-0001 - INDOOR AIR QUALITY Comments
**Date:** Thursday, December 19, 2024 10:21:05 AM

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In my opinion, a fundamental measure of the quality of a residence is the quality of the indoor air and the potable water that the occupant inhales or ingests. Addressing the quality at the point of consumption appears to be absent throughout the document. The document appears to focus on the technical aspects of construction and factual/structural information, but it seems to overlook comprehensive focus on the essential purpose of such a document: to create a structure and living environment that is safe, efficient, and **healthy** for its occupants.

As a Marshall Fire victim whose house remains standing but is contaminated, I looked for provisions in the code that address the specific issues and challenges we have encountered in remediating or fire contaminated house and preparing it for re-occupancy. However, I did not find significant coverage of the overall indoor air quality of a residence, regardless of whether it is new, reconstructed, remodeled, or renovated. Additionally, I did not note any provisions that specifically address the quality of the potable water at it's point of dispersal - faucets, taps, etc.. While the document does address Radon, I found limited information concerning the numerous other harmful or lethal contaminants that can pose risks to occupants, such as lead, formaldehyde, combustion fumes, and others.

The detail of the overall document is amazing but it seems to overlook a "rubber meets the road" focus to ensure we create a **HEALTHY** environment for the occupants. If a detailed delineation of air and water quality (standards for PPM/PPB for chemicals and compounds) is not appropriate in this document, I would recommend the incorporation of such by reference - say to OSHA or similar external standards and documents.

Peter Dente
539 Bari Court
Bouder, CO 80303

720-352-6539

| | |
|---|---|
| **From:** | Michael Chase |
| **To:** | Flax, Ron |
| **Cc:** | Building Code Update; Huebner, Michelle; Michael.Chase@COMtrix.Com; Case, Dale |
| **Subject:** | Re: [EXTERNAL] Boulder County Residential Generator Permitting and Ordinance 92-28 |
| **Date:** | Thursday, December 19, 2024 3:38:24 PM |

Mr. Flax,

Thank you for your thorough response. I have a few questions...

(1) What is the period of the "code cycle" -- is this an annual process? When does it begin/complete? Is there public participation in this process?

(2) Who enforces "Code Compliance" (text below), is it your staff ( e.g., Martin Laws, et. al. ) or is it the BCSO?

(3) Will new language on the Building Permit for residential generators contain this vital citation of 92-28, i.e.:

- *[ 92-28 p3, C. ] "Sound from a non-vehicular source shall be measured at a distance of **ten** feet from the property line of the property where such sound is radiating"*
- *[ 92-28 p4, C. ] "Sound from a non-vehicular source* [e.g., a **generator**] *located in a residential area, shall not exceed the following limits:*
  - *7:00 a.m.-7 p.m. of the same day: 55 dB(A)*
  - *7:00 p.m.-7 a.m. of the following day: **50 dB(A)**"*

(4) Is this the current proposed language to be added to the building permit ( as seen in this email chain )?

> *PLEASE NOTE: The operation of the generator must meet the County's adopted noise ordinance 92-28. The issuance of the permit does not ensure that the operation and placement of the generator will be compliant with the noise ordinance, and failure to comply with the noise ordinance may result in fines or other measures, such as removal or relocation of the equipment. Please research the ordinance and the manufacturer's specifications when determining the type and location of the equipment to avoid any future legal action and to be a good neighbor.*

Bottom line..., I'm still hoping the final inspection procedure does a dB(A) measurement at the closest property line ( per 92-28 ) to see if there is, or is not, compliance with 92-28. This five (5) minute measurement would anticipate any obstructions, vegetation, terrain, etc. and would yield a definitive observation/opinion for the record. This just makes sense.

Regards,

Michael Chase

On 12/19/2024 1:56 PM, Building Code Update wrote:

> Mr. Chase,
>
> Thank you for your input regarding noise from generators. As we looked into your comments and this topic more generally, it became clear that this topic can quickly get somewhat complex. This was especially true when considering the real-life variables regarding generator placement and how the associated topography and vegetation can have a substantial impact on how noise propagates from these devices. Since in some locations across Boulder County that have less stable electric utilities generators can be an important safety feature of a home, we need to make sure that we are not overly restricting their use. That said, we also have a responsibility to ensure that all residents are complying with Boulder County Ordinance 92-28 with regards to generator noise.
>
> With this in mind, staff is not recommending any modifications to the Building Code on this topic during this **code cycle**, but instead will be adding information on all Building Permits for generators that clearly describe the noise regulations so that installers and homeowners are clear regarding their responsibilities. This will also make it easier for **Code Compliance** to enforce on any noise complaints related to these devices in the future.
>
> We also plan to look at this issue more closely and perhaps will bring additional code requirements forward in the next code cycle.
>
> Thank you again for participating in this process. We really appreciate your feedback.
>
> - Ron

**Ron Flax**
**Deputy Director / Chief Building Official**
Boulder County Community Planning & Permitting
2045 13th St., Boulder, CO 80302
Direct: 720-564-2643 | Main: 303-441-3930
rflax@bouldercounty.gov
(He/Him/His)

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**From:** Michael Chase <Michael.Chase@COMtrix.Com>

**Date:** Wednesday, December 11, 2024 at 5:56 PM
**To:** Case, Dale <dcase@bouldercounty.gov>
**Cc:** Michael.Chase@COMtrix.Com <Michael.Chase@COMtrix.Com>
**Subject:** Re: [EXTERNAL] Boulder County Residential Generator Permitting and Ordinance 92-28

Mr. Case,

I've attached a six page .pdf document that outlines what I would like to discuss at our meeting this Friday 15:00.

I admit, it is rather presumptive, but I think it should be discussed none the less.

I don't make the rules, you folks do. This is my input into the rule making process as an unincorporated Boulder County resident.

Regards,

Michael Chase

4062 Pleasant Ridge Rd 80301

On 12/11/2024 11:32 AM, Case, Dale wrote:

> Hi Michael,
> I'm sorry to have missed you this morning. I can meet on Friday at that time. Our physical office is closed on Fridays, so you will need to call me so I can let you in.
> Dale 720-564-2604
>
> ---
>
> **From:** Michael Chase <Michael.Chase@COMtrix.Com>
> **Sent:** Wednesday, December 11, 2024 9:26 AM
> **To:** Case, Dale <dcase@bouldercounty.gov>
> **Cc:** Michael.Chase@COMtrix.Com
> **Subject:** Fwd: [EXTERNAL] Boulder County Residential Generator Permitting and Ordinance 92-28
>
> Mr. Case,
>
> Is it possible to meet at 15:00 on Friday, 13 Dec. 2024 for about 15-30 minutes?
>
> Regards,
>
> Michael Chase
> -------- Forwarded Message --------
> **Subject:**Re: [EXTERNAL] Boulder County Residential Generator Permitting and Ordinance 92-28

**Date:**Fri, 6 Dec 2024 10:57:40 -0700
**From:**Michael Chase <Michael.Chase@COMtrix.Com>
**To:**Case, Dale <dcase@bouldercounty.gov>
**CC:**Michael.Chase@COMtrix.Com

Mr. Case,

Thank you for the very rapid reply. This is good news.

Yes, I'd like to have a 15-30 minute meeting to discuss 92-28. How about 09:00 on Wednesday 11 December to open?

Any of the dates/times you proposed will work, I'm totally flexible should you desire to pick a date/time.

Regards,

Michael Chase

On 12/5/2024 4:32 PM, Case, Dale wrote:

> Hi Michael,
> I'm happy to meet. The language that will be added to generator building permits is highlighted/ bold below:
>
> Backup Generator
> All work to comply with the provisions of the Boulder County Building Code to include: the 2015 IBC, 2015 IMC, 2015 IPC, 2015 IFGC, 2015 IECC, 2023 NEC, and the Boulder County Amendments.
> Install and label per 2023 NEC
> Label at main electrical service disconnect the location of the generator disconnect switch as per 2023 NEC 702.7(A)
> Install backup generator including minimum clearances per generator installation manual.
> Provide installation manual at time of final inspection.
> Install additional shutdown of prime mover for generators larger

than 15kw. The additional shutdown means shall be located outside the equipment room or generator enclosure. Refer to 2017 NEC 445.18(B).
Verify main electrical service grounding electrode system (GES) and upgrade to code if necessary
Prior to backfilling trench, schedule an underground electric inspection
Prior to backfilling trench and connecting to generator, schedule an underground, and or rough, gas pipe inspection. An air pressure test is required on gas piping at 1 ½ times the maximum working pressure, but no less than 3 lbs, and hold for a minimum of 10 minutes, as per 2015 IRC 2417.4.1 and 2417.4.2. Paint exposed metal gas piping to protect from corrosion as per 2015 IRC 2415.9
Refer to one-line drawing for additional conditions.

**PLEASE NOTE: The operation of the generator must meet the County's adopted noise ordinance 92-28. The issuance of the permit does not ensure that the operation and placement of the generator will be compliant with the noise ordinance, and failure to comply with the noise ordinance may result in fines or other measures, such as removal or relocation of the equipment. Please research the ordinance and the manufacturer's specifications when determining**

**the type and location of the equipment to avoid any future legal action and to be a good neighbor.**

Again, if you would like to meet to discuss the issue further, I'm open to it. We will also look to put similar notifications on the website and general info page as those are updated over the next several months.
Please feel free to call me or give me some possible meeting dates in the next two weeks. I have time the morning or later afternoon of the 11th and **the afternoon of the 13th**. The week of the 16th I have time the morning of the 16th, afternoon on the 17th, before 10am on the 19th.

Thank you again for your suggestion.

Dale Case, AICP
he, him
Director
Community Planning & Permitting
720-564-2604
website

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**From:** Michael Chase <Michael.Chase@COMtrix.Com>
**Sent:** Thursday, December 5, 2024 11:22 AM
**To:** Case, Dale <dcase@bouldercounty.gov>
**Cc:** Weinheimer, Carey <cbweinheimer@bouldercounty.gov>; Michael.Chase@COMtrix.Com
**Subject:** [EXTERNAL] Boulder County Residential Generator Permitting and Ordinance 92-28

12/05/24

To: Mr. Dale Case ( Director, Boulder County Land Use Department // DCase@BoulderCounty.Gov )

cc: Mr. Carey Weinheimer ( Undersheriff / Policy // CBWeinheimer@BoulderCounty.Gov )

Mr. Case,

As you may be aware, I've established a dialog with the BCSO Undersheriff, Carey Weinheimer that addresses noise enforcement with regard to residential generator installations, ordinance 92-28, and the building permit process in Boulder County.

Mr. Weinheimer was kind enough to communicate that the Boulder County permitting staff will/has address the residential generator permitting process so that it can better anticipate the dB(A) arithmetic in Boulder County Ordinance 92-28 to better serve the BSCO's mission and well-being of the citizens of Boulder County.

I'd like to meet with you, or someone from the Planning/Permitting staff, to see what is planned ( or has been done ) to change/improve the existing permitting process for residential generators with regard to 92-28.

Would you, or staff, be so kind to arrange such a 30 minute meeting in the near future?

I thank you for your efforts to bring the 92-28 issues to light in generator permitting, and I think the BSCO could say the same.

Respectfully,

Michael Chase

4062 Pleasant Ridge Rd. Boulder

303.589.1100 (c)

Michael.Chase@COMtrix.Com

Attachments:
DaleCase.2024.12.05.pdf

BCSO.2024.11.21.pdf

GeneratorPermitQuestions.pdf

# Board of Review Copy

## *Editors Notes:*

*Code clarifying notes are added in italics above code text or in parentheses. Example:*

*Note: The administrative provisions of the first chapters of all of the adopted model codes are combined into one Chapter 1 for the Boulder County Building Code, based upon Chapter 1 of the IBC, except as may be noted under the amendments to Chapter 1 under the individual adopted model codes.*

*Code text is in serif typeface - Example:*

**101.1 Title.**

These regulations shall be known as the Boulder County Building Code, hereinafter referred to as "this code."

*The Code titles are outlined by Book Title, Chapter Heading, Section Headings, and subsections therein.*

*Terms italicized in code text, other than ICC published document titles, are defined in each of the adopted codes or elsewhere in the publish codes. The Boulder County Building Code amendments may also define terms or amend defined terms and these definitions may also be noted in italics. The terms selected to be italicized have definitions that the user should read carefully to better understand the code. Where italicized, the definition applies. If not italicized, common-use definitions apply.*

# Boulder County

## Boulder County Building Code Amendments

Resolutions <TBD>: Amendments to Boulder County Building Code

Effective <TBD>:  | Updated <TBD>

### Community Planning & Permitting Department

Courthouse Annex Building • 2045 13th Street • PO Box 471 • Boulder, CO 80302

Building Safety & Inspection Services:

Phone: 303-441-3930 • Email: building@bouldercounty.gov • www.boco.org/CPP-Building

Office Hours: 8 a.m. to 3 p.m. Monday, Wednesday, Thursday - 10 a.m. to 3 p.m. Tuesday

## ADOPTION OF MODEL CODES BY REFERENCE, WITH DELETIONS AND AMENDMENTS

The following publications shall hereby be adopted as the Boulder County Building Code by reference, with deletions and amendments as indicated.

1. **2021 INTERNATIONAL BUILDING CODE (the "IBC"), including specifically Appendix Chapters C, E, H, I, J, and K;**

2. **2021 *INTERNATIONAL RESIDENTIAL CODE* (the "IRC"), including specifically Appendix Chapters AE, AF, AH, AJ, AM, AO, AQ, AR, AS, AT, AU, and AX; and Appendix RD.**

3. **2021 *INTERNATIONAL EXISTING BUILDING CODE* (the "IEBC"), including specifically Appendix Chapter Appendix B;**

4. **2021 INTERNATIONAL MECHANICAL CODE (the "IMC");**

5. **2021 INTERNATIONAL PLUMBING CODE (the "IPC");**

6. **2021 INTERNATIONAL GAS CODE (the "IFGC");**

7. **CURRENT VERSION ADOPTED BY THE COLORADO STATE ELECTRICAL BOARD OF THE NATIONAL ELECTRICAL CODE (the "NEC");**

8. **2021 INTERNATIONAL ENERGY CONSERVATION CODE (the "IECC"), including appendixes CB, CD, RB, and RD;**

9. **2021 INTERNATIONAL GREEN CONSTRUCTION CODE (the "IgCC") including Normative Appendixes A, B, C, and D; and Informative Appendixes E, F, G, H, I, J, K, L, M, and N;**

10. **2021 INTERNATIONAL CODE COUNCIL PERFORMANCE CODE (the "ICCPC");**

11. **2021 INTERNATIONAL SWIMMING POOL AND SPA CODE (the "ISPSC"); and**

12. **2023 Colorado Model Electric Ready and Solar Ready Code,**

All International Codes as published by the International Code Council (ICC), 4051 West Flossmoor Road, Country Club Hills, IL 60478-5795; and the NEC, as published by the National Fire Protection Association, One Batterymarch Park, Quincy, MA 02169-7471; with additions, deletions and amendments as follows:

# Table of Contents:



*Terms italicized in code text, other than document titles, are defined in each of the adopted codes or elsewhere in the publish codes. The Boulder County Building Code amendments may also define terms or amend defined terms and these definitions may also be noted in italics. The terms selected to be italicized have definitions that the user should read carefully to better understand the code. Where italicized, the definition applies. If not italicized, common-use definitions apply.*

# Administrative Provisions, Boulder County Building Code


*Note: The administrative provisions of the first chapters of all of the adopted model codes are combined into one Chapter 1 for the Boulder County Building Code, based upon Chapter 1 of the IBC, except as may be noted under the amendments to Chapter 1 under the individual adopted model codes.*

# BOULDER COUNTY BUILDING CODE

## CHAPTER 1: SCOPE AND ADMINISTRATION

## PART 1—SCOPE AND APPLICATION

### SECTION 101: SCOPE AND GENERAL REQUIREMENTS

**101.1 Title.**
These regulations shall be known as the *Boulder County Building Code*, hereinafter referred to as "this code."

**101.2 Scope.**
The provisions of this code shall apply to the construction, *alteration*, relocation, enlargement, replacement, *repair*, equipment, use and occupancy, location, maintenance, removal, deconstruction and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.

**Exception:**

1. Detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress, and their accessory structures not more than three stories above grade plane in height, shall comply with the *International Residential Code*.
2. The following shall be permitted to be constructed in accordance with the *International Residential Code* where provided with an automatic sprinkler system complying with Section P2904:
    a. Live/work units located in townhouses and complying with the requirements of Section 508.5 of the *International Building Code*.
    b. Owner-occupied lodging houses with five or fewer guestrooms.
    c. A care facility with five or fewer persons receiving custodial care within a dwelling unit.
    d. A care facility with five or fewer persons receiving medical care within a dwelling unit.
    e. A care facility for five or fewer persons receiving care that are within a single-family dwelling.

**101.2.1 Application of fire code.**
Where work regulated by this code is also regulated by the construction requirements for existing buildings in Chapter 11 of the International Fire Code, such work shall comply with applicable requirements in both codes.

**101.2.2 Appendices.**
Provisions in appendices shall not apply unless specifically adopted.

**101.3 Purpose.**
The purpose of this code is to establish the minimum requirements to provide a reasonable level of safety, health and general welfare through structural strength, means of egress, stability, sanitation, light and ventilation, energy conservation, and for providing a reasonable level of life safety and property protection from the hazards of fire, explosion or dangerous conditions, and to provide a reasonable level of safety to fire fighters and emergency responders during emergency operations.

**101.4 Referenced codes.**
The provisions of the *International Building Code* shall apply to the construction, alteration, relocation, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, deconstruction, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures.
The other codes listed in Sections 101.4.1 through 101.4.13 and referenced elsewhere in this code shall be considered to be part of the requirements of this code to the prescribed extent of each such reference.

**101.4.1 Residential.**
The provisions of the *International Residential Code* for One- and Two-Family Dwellings shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal, deconstruction, and demolition of detached one- and two- family dwellings and *townhouses* not more than three stories in height with a separate means of egress and their accessory structures as IRC Section R202.

**101.4.2 Gas.**
The provisions of the *International Fuel Gas Code* shall apply to the installation of gas piping from the point of delivery, gas appliances and/or related accessories as covered in this code. These requirements apply to gas piping systems extending from the point of delivery to the inlet connections of appliances and the installation and operation of residential and commercial gas appliances and related accessories.

**101.4.3 Mechanical.**
The provisions of the *International Mechanical Code* shall apply to the installation, *alterations*, *repairs* and replacement of mechanical systems, including equipment, appliances, fixtures, fittings and/or appurtenances, including ventilating, heating, cooling, air-conditioning and refrigeration systems, incinerators and other energy-related systems.

**101.4.4 Plumbing.**
The provisions of the *International Plumbing Code* shall apply to the installation, *alteration*, *repair* and replacement of plumbing systems, including equipment, appliances, fixtures, fittings and appurtenances, and where connected to a water or sewage system and all aspects of a medical gas system.

**101.4.5 Property maintenance.**
The *International Property Maintenance Code* is not adopted.

**101.4.6 Fire prevention.**
The *International Fire Code* is not adopted but may be utilized to the extent that it is referenced in other codes and may be adopted by county fire protection districts in accordance with C.R.S. § 32-1-1002(1)(d). The provisions of the *International Fire Code* shall apply to matters affecting or relating to structures, processes, and premises from the hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices; from conditions hazardous to life, property or public welfare in the occupancy of structures or premises; and from the construction, extension, *repair, alteration* or removal of fire suppression, *automatic sprinkler systems,* and alarm systems or fire hazards in the structure or on the premises from occupancy or operation.

**101.4.7 Energy.**
The provisions of the *International Energy Conservation Code* shall apply to all matters governing the design and construction of buildings for energy efficiency.

**Exception:**

Buildings subject to the *International Residential Code* shall comply with the amended Chapter 11 of the *International Residential Code*, the Boulder County BuildSmart Code.

**101.4.8 Existing buildings.**
The provisions of the *International Existing Building Code* shall apply to matters governing the repair, alteration, change of occupancy, addition to and relocation of existing buildings.

**101.4.9 Electrical.**
The provisions of the *National Electrical Code*, as adopted by the Colorado State Electrical Board, shall apply to the installation, alterations, repairs and replacement of electrical systems, including the installation of electrical conductors, equipment, and raceways; signaling and communications conductors, equipment and raceways; and optical fiber cables and raceways.

**101.4.10 Green construction.**
The provisions of the *International Green Construction Code* shall apply to the design, construction, addition, alteration, change of occupancy, relocation, replacement, repair, equipment, building site, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures and to the site on which the building is located for new buildings or complexes of buildings on the same property with 25,000 square feet or greater in total building floor area and additions and alterations to existing buildings that were constructed under the *International Green Construction Code*.

**101.4.11 Performance.**
The provisions of the *International Code Council Performance Code* shall apply only for use as a guide and a tool to evaluate proposals for modifications and for alternate materials, design and methods of construction and equipment in accordance with Sections 104.10 and 104.11, respectively, of the IBC, IRC and IEBC, and other modifications and alternate materials, methods and equipment provisions, as applicable, of the other adopted codes.

**101.4.12 Swimming pools and spas.**
The provisions of the *International Swimming Pool and Spa Code* shall apply to the construction, alteration, movement, renovation, replacement, repair, and maintenance or use of aquatic recreation facilities, pools and spas.

**101.4.13 Electric Ready / Solar Ready Code.**
The provisions of the Colorado Model Electric Ready and Solar Ready Code shall regulate the design and construction of buildings to prepare new buildings for solar photovoltaic or solar thermal, electric vehicle charging infrastructure, and electrification of building systems. This code is intended to provide flexibility and balance upfront construction costs with the future cost to retrofit buildings to accommodate these systems. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

## SECTION 102: APPLICABILITY

**102.1 General.**
Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this code specify different materials, methods of construction, or other requirements, the most restrictive shall govern.

**102.2 Other laws.**
The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

*Note: There are hundreds of floodplain requirements interwoven into the International Codes. Boulder County's floodplain requirements are located in Section 4-400 of the Boulder County Land Use Code and are administered by the Boulder County Community Planning and Permitting Department, Floodplain Management Program.*

**102.2.1 Flood hazard areas.**
Where conflicts occur between any provisions of this code and Section 4-400 of the Boulder County Land Use Code,

"Floodplain Overlay District," the provisions of Section 4-400 of the Boulder County Land Use Code shall apply.

**102.3 Application of references.**
References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

**102.4 Referenced codes and standards.**
The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections 102.4.1 and 102.4.2.

**102.4.1 Conflicts.**
Where conflicts occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

**102.4.2 Provisions in referenced codes and standards.**
Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code or the International Codes listed in Section 101.4, the provisions of this code or the International Codes listed in Section 101.4, as applicable, shall take precedence over the provisions in the referenced code or standard.

**102.5 Partial invalidity.**
In the event that any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

**102.6 Existing structures and installations.**
The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as otherwise specifically provided in this code, the *International Existing Building Code* or the *International Fire Code*.

**102.6.1 Buildings not previously occupied.**
A building or portion of a building that has not been previously occupied or used for its intended purpose in accordance with the laws in existence at the time of its completion shall comply with the provisions of the *International Building Code* or *International Residential Code*, as applicable, for new construction or with any current permit for such occupancy.

**102.6.2 Buildings previously occupied.**
The legal occupancy of any building existing on the date of adoption of this code shall be permitted to continue without change, except as otherwise specifically provided in this code, or the *International Fire Code* or as is deemed necessary by the *building official* for the general safety and welfare of the occupants and the public.

*Amend to add 102.6.3.*

**102.6.3 Additions, alterations, or repairs.**
Additions, alterations, or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with the requirements of this code, unless otherwise stated. Additions, alterations, repairs and relocations shall not cause an existing structure to become unsafe or adversely affect the performance of the building less compliant with the provisions of this code than the existing building or structure was prior to the *addition*, *alteration* or *repair*. An existing building together with its *additions* shall comply with the height limits of this code. Where the *alteration* causes the use or occupancy to be changed to one not within the scope of this code, the provisions of the *International Existing Building Code* shall apply.

**102.6.4 Existing swimming pool or spa installations.**
Any pool or spa and related mechanical, electrical and plumbing systems lawfully in existence at the time of the adoption of this code shall be permitted to have their use and maintenance continued if the use, maintenance or repair is in accordance with the original design and no hazard to life, health or property is created.

**102.6.4.1 Maintenance.**
Pools and spas and related mechanical, electrical and plumbing systems, both existing and new, and parts thereof, shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. Devices or safeguards that are required by this code shall be maintained in compliance with the edition of the code under which they were installed.
The owner, or the owner's authorized agent, shall be responsible for maintenance of systems. To determine compliance with this provision, the code official shall have the authority to require any system to be reinspected.

**102.6.4.2 Additions, alterations, renovations or repairs to any pool, spa or related system.**
Additions, alterations, renovations or repairs to any pool, spa or related system shall conform to that required for a new system without requiring the existing systems to comply with the requirements of this code. Additions, alterations, or repairs shall not cause existing systems to become unsafe, insanitary or overloaded.
Minor additions, alterations, renovations and repairs to existing systems shall be permitted in the same manner and arrangement as in the existing system, provided that such repairs or replacement are not hazardous and are *approved*.

**102.6.4.3 Historic buildings.**
The provisions of this code relating to the construction, alteration, repair, enlargement, restoration, relocation or moving of pools, spas or systems shall not be mandatory for existing pools, spas or systems identified and classified by the state or local jurisdiction as part of a historic structure where such pools, spas or systems are judged by the code official to be safe and in the public interest of health, safety and welfare regarding any proposed construction, alteration, repair, enlargement, restoration, relocation or moving of such pool or spa.

**102.6.4.4 Moved pools and spas.**
Except as determined by Section 102.2, systems that are a part of a pool, spa or system moved into or within the jurisdiction shall comply with the provisions of this code for new installations.

# PART 2—ADMINISTRATION AND ENFORCEMENT

## SECTION 103: DIVISION OF BUILDING SAFETY & INSPECTION SERVICES

**103.1 Creation of enforcement agency.**
The Building Safety and Inspection Services Division is created and the official in charge shall be known as the *building official*. The function of the agency shall be the implementation, administration and enforcement of the provisions of this code.

**103.2 Appointment.**
The *building official* shall be appointed by the chief appointing authority of the jurisdiction.

**103.3 Deputies.**
In accordance with the prescribed procedures of this jurisdiction and with the concurrence of the appointing authority, the *building official* shall have the authority to appoint a deputy *building official*, other related technical officers, inspectors, plan examiners and other employees. Such employees shall have powers as delegated by the *building official*.

## SECTION 104: DUTIES AND POWERS OF *BUILDING OFFICIAL*

**104.1 General.**
The *building official* is hereby authorized and directed to enforce the provisions of this code. The *building official* shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

**104.2 Applications and permits.**
The *building official* shall receive applications, review *construction documents* and issue *permits* for the erection,

*alteration*, demolition, moving of buildings and structures, inspect the premises for which such *permits* have been issued and enforce compliance with the provisions of this code.

**104.2.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas.**
Applications for reconstruction, rehabilitation, *repair*, *alteration*, *addition* or other improvement of existing buildings or structures located in *flood hazard areas*, the *building official* shall determine if the proposed work constitutes substantial improvement or *repair* of *substantial damage*. Where the *building official* determines that the proposed work constitutes *substantial improvement* or *repair* of *substantial damage*, and where required by this code, the *building official* shall require the building to meet the requirements of Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code* and established in Table R301.2, as applicable.

**104.3 Notices and orders.**
The *building official* shall issue necessary notices or orders to ensure compliance with this code.

**104.4 Inspections.**
The *building official* shall make the required inspections, or the *building official* shall have the authority to accept reports of inspection by *approved agencies* or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such *approved agency* or by the responsible individual. The *building official* is authorized to engage such expert opinion as deemed necessary to report on unusual technical issues that arise, subject to the approval of the appointing authority.

**104.5 Identification.**
The *building official* shall carry proper identification when inspecting structures or premises in the performance of duties under this code.

**104.6 Right of Entry.**
When the *building official* or his authorized representative has reasonable cause to believe that a violation of this code is likely to exist in a structure or on a premises and that entry into the structure or upon the premises is necessary to verify the violation, the *building official* or his authorized representative shall first make a reasonable effort to locate the owner or other person having charge or control of the structure or premises, or portion thereof desired to be inspected, and request consent to enter and inspect. If such person cannot be located or if entry is refused, the *building official* or his authorized representative may seek entry by submitting a sworn affidavit to the proper court of jurisdiction, setting forth facts sufficient to support a reasonable belief that the violation is likely to exist, and that further investigation of the structure or premises is warranted. Any subsequent entry and inspection shall be conducted in accordance with an administrative search warrant if issued by the court. The foregoing provisions of this subsection notwithstanding, consent to enter or an administrative search warrant shall not be required in the following circumstances:

1. To conduct inspections during regular county business hours under an applied for or issued building permit, for work authorized under that permit prior to the issuance of a final Certificate of Occupancy.
2. To make observations of the structure or premises in plain view from public property or from portions of the structure or premises which are open or accessible to the public, or in which the owner or occupant otherwise lacks a reasonable expectation of privacy.
3. In emergency situations in which the *building official* or his authorized representative has reason to believe that the public health or safety is in imminent danger and could be jeopardized by any delay in securing entry.

**104.7 Department records.**
The *building official* shall keep official records of applications received, *permits* and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official records for the period required for retention of public records.

**104.8 Liability.**
This code shall not be construed to relieve or lessen the responsibility of any person owning, operating or controlling any building or structure in the unincorporated area of Boulder County for any damages or injuries to persons or property caused in whole or in part by defects or other conditions which may be subject to inspection or regulation under this code. Neither Boulder County, the Boulder County Board of County Commissioners, the Boulder County Community Planning

and Permitting Department or any division thereof, the *building official*, or any other employee or authorized representative of Boulder County who is charged or connected with the enforcement of this code, shall be liable in damages for any act or omission in the course or context of the discharge of duties under this code or any provisions related to it, and nothing in this code or in its administration or enforcement shall be considered in any way to be a waiver by Boulder County or any of its officials or employees of the protection to which they are entitled under the Colorado Governmental Immunity Act, C.R.S. §24-10-101, et seq., as amended. Any claim or suit brought against the *building official* or any other employee or authorized representative of Boulder County which is alleged to have arisen out of or as a result of any act or omission in the enforcement of any provision of this code, and which occurred within the scope of employment of such official, employee or representative, shall be defended by Boulder County until final termination of such proceedings, and any judgment resulting there from shall be assumed by Boulder County.

**104.9 Approved materials and equipment.**
Materials, equipment and devices *approved* by the *building official* shall be constructed and installed in accordance with such approval.

**104.9.1 Used materials and equipment.**
Materials that are reused shall comply with the requirements of this code for new materials. Used equipment and devices shall not be reused unless *approved* by the *building official*.

**104.10 Modifications.**
Where there are practical difficulties involved in carrying out the provisions of this code, the *building official* shall have the authority to grant modifications for individual cases, upon application of the *owner* or the owner's authorized agent, provided that the *building official* shall first find that special individual reason makes the strict letter of this code impractical, the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, *accessibility*, life and fire safety or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

**104.10.1 Flood hazard areas.**
The *building official* shall not grant modifications to any provision required in flood hazard areas as established by IBC Section 1612.3 or IRC Section R322 unless a determination has been made that:
1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of this code inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

*See also Section 102.2.1 of this chapter.*

**104.10.2 Performance code.**
The provisions of the ICC Performance Code for Buildings and Facilities may be used by the *building official* as a guide and a tool to evaluate proposals for modifications.

**104.11 Alternative materials, design and methods of construction and equipment.**
The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design, or method of construction shall be approved where the *building official* finds that the proposed alternative meets all of the following:
1. The alternative material, design or method of construction is satisfactory and complies with the intent of the

provisions of this code,

2. The material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code as it pertains to the following.
   2.1. Quality.
   2.2. Strength.
   2.3. Effectiveness.
   2.4. Fire resistance.
   2.5. Durability.
   2.6. Safety.

Where the alternative material, design, or method of construction is not approved, the *building official* shall respond in writing, stating the reasons why the alternative was not approved.

**104.11.1 Research reports.**
Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.

**104.11.2 Tests.**
Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *building official* shall have the authority to require tests as evidence of compliance to be made without expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *building official* shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

**104.11.3 Performance code.**
The provisions of the ICC Performance Code for Buildings and Facilities may be used by the *building official* as a guide and a tool to evaluate proposals for alternative materials, design, and methods of construction and equipment.

## SECTION 105: PERMITS

**105.1 Required.**
Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be performed, shall first make application to the *building official* and obtain the required permit.

**105.1.1 Annual permit.**
Instead of an individual permit for each alteration to an already approved electrical, gas, mechanical or plumbing installation, the *building official* is authorized to issue an annual permit upon application therefor to any person, firm or corporation regularly employing one or more qualified trade persons in the building, structure or on the premises owned or operated by the applicant for the permit.

**105.1.2 Annual permit records.**
The person to whom an annual *permit* is issued shall keep a detailed record of *alterations* made under such annual *permit*. The *building official* shall have access to such records at all times or such records shall be filed with the *building official* as designated.

**105.2 Work exempt from permit.**
Exemptions from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction. *Permits* shall not be required for the following:

**Building:**

1. One-story detached accessory structures, other than storm shelters, used as a storage shed, playhouse for private use, greenhouse, chicken coop, agricultural loafing shed, or similar uses, provided that:
   a. the floor area of any structure does not exceed 120 square feet (11 $m^2$), except agricultural loafing sheds, which may not exceed 200 square feet.
   b. the structure height does not exceed 12 feet,
   c. the structure does not have any utilities, and
   d. the structure does not violate the conditions of any existing land use approval or conservation easement.
   e. The number of allowed detached accessory structures which may be constructed without a building permit shall be determined by the size of the subject parcel:
      i. One detached accessory structure may be constructed without a building permit on parcels 0.5 acres or less in size.
      ii. Two detached accessory structures may be constructed without a building permit on parcels greater than 0.5 acre and less than ten acres.
      iii. Three detached accessory structures may be constructed without a building permit on parcels 10 acres and larger.
2. Fences not over 6 feet (2134 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge or impounding Class I, II or IIIA liquids.
4. Water tanks supported directly on grade if the capacity is not greater than 5,000 gallons (18 925 L) and the ratio of height to diameter or width is not greater than 2:1.
5. Sidewalks and driveways not more than 30 inches (762 mm) above adjacent grade, and not over any basement or *story* below and are not part of an *accessible route* and not subject to a grading permit.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work, in one- and two-family *dwellings* and their accessory structures.

   **Exception:**

Cabinets and countertops with plumbing or electrical as part of remodels in one- and two-family dwellings and their accessory structures are required to have a building permit.

7. Temporary motion picture, television and theater stage sets and scenery.
8. Prefabricated *swimming pools* where the pool walls are entirely above the adjacent grade and the capacity does not exceed 5,000 gallons accessory to a Group R-3 occupancy and one- and two-family *dwellings* and their accessory structures as regulated by the *International Residential Code* that are less than 24 inches (610 mm) deep, are not greater than 5,000 gallons (18 925 L) and are installed entirely above ground.
9. Shade cloth structures constructed for nursery or agricultural purposes, not including service systems.
10. Swings and other playground equipment accessory to detached one- and two-family *dwellings*.
11. Window awnings in one- and two-family *dwellings* and their accessory structures as regulated by the *International Residential Code*, Group R-3, and U occupancies, supported by an exterior wall that which do not project more than 54 inches (1372 mm) from the *exterior wall* and do not require additional support.
12. Nonfixed and movable fixtures, cases, racks, counters and partitions not over 5 feet 9 inches (1753 mm) in height.
13. Antennas and/or their supporting structures other than buildings, accessory to residential use less than ten feet in height and lower than the structure height limit in the zoning district in which located, or which were constructed or erected prior to July 1, 1988.
14. Temporary emergency noncommercial telecommunication-sites operated by a governmental agency, or by a volunteer public safety agency officially sanctioned by a governmental agency for that purpose, for public safety communication uses, for a period not to exceed six months.
15. Residential decks for one- and two-family *dwellings* and their accessory structures as regulated by the *International Residential Code*, not exceeding 200 square feet (18.58 $m^2$) in area, that are not more than 30 inches (762 mm) above *grade* at any point, are not attached to a *dwelling* do not serve the exit door required by Section R311.4.
16. *Roof covering repair*, shingle repair or replacement, not exceeding one square (100 square feet of area) (9.29 $m^2$) of covering per *building* or *structure*.

**Electrical:**

1. **Repairs and maintenance:** Minor repair work, including the replacement of lamps or the connection of *approved* portable electrical equipment to *approved* permanently installed receptacles.
2. **Radio and television transmitting stations:** The provisions of this code shall not apply to electrical equipment used for radio and television transmissions but do apply to equipment and wiring for a power supply and the

installations of towers and antennas.
3. **Temporary testing systems:** A *permit* shall not be required for the installation of any temporary system required for the testing or servicing of electrical equipment or apparatus.

**Gas:**
1. Portable heating appliances.
2. Replacement of any minor part that approval of equipment or make such equipment unsafe.

**Mechanical:**
1. Portable heating appliances.
2. Portable ventilation appliances and equipment.
3. Portable cooling unit.
4. Steam, hot or chilled water piping within any heating or cooling equipment regulated by this code.
5. Replacement of any part that does not alter approval of equipment or make such equipment unsafe.
6. Portable evaporative cooler.
7. Self-contained refrigeration system containing 10 pounds (4.54 kg) or less of refrigerant or that are actuated by motors of 1 horsepower (746 W) or less.
8. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid, in one- and two-family *dwellings* and their accessory structures.

**Plumbing:**
1. The stopping of leaks in drains, water, soil, waste or vent pipe, provided, however, that if any concealed trap, drain pipe, water, soil, waste, or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code.
2. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures and the removal and reinstallation of water closets, provided that such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

**105.2.1 Emergency repairs.**
Where *equipment* replacements and repairs must be performed in an emergency situation, the *permit* application shall be submitted within the next working business day to the *building official*.

**105.2.2 Public service agencies.**
A *permit* shall not be required for the installation, *alteration* or repair of generation, transmission, distribution or metering or other related equipment that is under the ownership and control of public service agencies by established right.

**105.3 Application for permit.**
To obtain a permit, the applicant shall first file an application therefor in writing on a form furnished by the department of building safety for that purpose. Such application shall:
1. Identify and describe the work to be covered by the permit for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by construction documents and other information as required in Section 107.
5. State the valuation of the proposed work.
6. Be signed by the applicant, or the applicant's authorized agent.
7. Give such other data and information as required by the *building official.*

**105.3.1 Action on application.**
The *building official* shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the construction documents do not conform to the requirements of pertinent laws, the *building official* shall reject such application in writing, stating the reasons therefor. If the *building official* is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the *building official* shall issue a permit therefor as soon as practicable.

**105.3.2 Time limitation of application.**
An application for a permit for any proposed work shall be deemed to have been abandoned 180 days after the date of filing, unless such application has been pursued in good faith or a permit has been issued; except that the *building official* is authorized to grant one or more extensions of time for additional periods not exceeding 90 days each. The extension shall be requested in writing and justifiable cause demonstrated.

**105.4 Validity of permit.**
The issuance or granting of a permit shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or of any other ordinance of the jurisdiction. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid. The issuance of a permit based on construction documents and other data shall not prevent the *building official* from requiring the correction of errors in the construction documents and other data. The *building official* is authorized to prevent occupancy or use of a structure where in violation of this code or of any other ordinances of this jurisdiction.

**105.5 Expiration.**
Every permit issued shall become invalid unless the work on the site authorized by such permit is commenced within 180 days after its issuance, or if the work authorized on the site by such permit is suspended or abandoned for a period of 180 days after the time the work is commenced. The *building official* is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

**105.6 Suspension or revocation.**
The *building official* is authorized to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

**105.7 Placement of permit.**
The building permit or copy shall be kept on the site of the work until the completion of the project.

**105.8 Responsibility.**
It shall be the duty of every person who performs work for the installation or repair of building, structure, electrical, gas, mechanical, or plumbing systems, for which this code is applicable, to comply with this code.

**105.9 Preliminary inspection.**
Before issuing a permit, the *building official* is authorized to examine or cause to be examined buildings, structures, and sites for which an application has been filed.

**105.10 Premises Identification During Construction.**
The approved permit number and street address number shall be displayed and be plainly visible and legible from the public street or road fronting the property on which any new building is being constructed and where any permit is issued.

## SECTION 106: FLOOR AND ROOF DESIGN LOADS

**106.1 Live loads posted.**
In commercial or industrial buildings and structures, for each floor or portion thereof designed for live loads exceeding 50 psf (2.40 kN/m$^2$), such design live loads shall be conspicuously posted by the owner or the owner's authorized agent in that part of each story in which they apply, using durable signs. It shall be unlawful to remove or deface such notices.

**106.2 Issuance of certificate of occupancy.**
A certificate of occupancy required by Section 111 shall not be issued until the floor load signs, required by Section 106.1, have been installed.

**106.3 Restrictions on loading.**
It shall be unlawful to place, or cause or permit to be placed, on any floor or roof of a building, structure or portion thereof, a load greater than is permitted by this code.

# SECTION 107: CONSTRUCTION DOCUMENTS

**107.1 General.**
Submittal documents consisting of *construction documents*, statement of *special inspections*, geotechnical report, and other data shall be submitted as electronic PDF files submitted to Boulder County Building Safety & Inspection Services through the Boulder County Permit Records & Online Application Submittals webpage or in a digital format where allowed by the *building official,* with each *permit* application. The *construction documents* shall be prepared by a r*egistered design professional* where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a *registered design professional*.

**Exception:**
The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that review of construction documents is not necessary to obtain compliance with this code.

**107.2 Construction documents.**
*Construction documents* shall be in accordance with Sections 107.2.1 through 107.2.12.

**107.2.1 Information on construction documents.**
*Construction documents* shall be dimensioned and drawn on suitable material. Electronic media documents are permitted to be submitted where *approved* by the *building official. Construction documents* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail pertinent data and features of the building, systems, and equipment that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the *building official.*

**107.2.1.1 Manufacturer's installation instructions.**
Manufacturer's installation instructions, as required by this code, shall be available on the job site at the time of inspection.

**107.2.2 Fire protection system shop drawings.**
Shop drawings for the *fire protectio*n *systems* shall be submitted to indicate conformance to this code and the *construction documents* and shall be *approved* prior to the start of system installation. Shop drawings shall contain all information as required by the referenced installation standards in Chapter 9 standards in Chapter 9 of the *International Building Code*, or automatic sprinkler systems regulated for one- and two-family dwellings and their accessory structures as regulated by the *International Residential Code* section P2904.

**107.2.3 Means of egress.**
The *construction documents* shall show in sufficient detail the location, construction, size and character of all portions of the *means of egress* including the path of the exit discharge to the public way in compliance with the provisions of this code. In other than occupancies in Groups R-2, R-3, and I-1, the construction documents shall designate the number of occupants to be accommodated on every floor, and in all rooms and spaces.

**107.2.4 Exterior wall envelope.**
Construction documents for all buildings shall describe the exterior wall envelope in sufficient detail to determine compliance with this code. The *construction documents* shall provide details of the *exterior wall envelope* as required, including flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves or parapets, means of drainage, water-resistive barrier and details around openings. The *construction documents* shall include manufacturer's installation instructions that provide supporting documentation that the proposed penetration and opening details described in the *construction documents* maintain the weather resistance of the *exterior wall envelope*. The supporting documentation shall fully describe the *exterior wall* system that was tested, where applicable, as well as the test procedure used.

**107.2.5 Energy conservation.**
Details shall include, but are not limited to, the following as applicable:
1. Energy compliance path.

2. Insulation materials and their R-values.
3. Fenestration U-factors 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 sources, and efficiencies.
7. Economizer description. (not required for one- and two- family dwelling or their accessory structures)
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. (not required for one- and two- family dwelling or their accessory structures)
12. Location of daylight zones on floor plans (not required for one- and two- family dwelling or their accessory structures).
13. Air barrier and air sealing details, including the location of the air barrier.
14. Details of additional electric infrastructure, including branch circuits, conduit, or pre-wiring, and panel capacity in compliance with the provisions of this code.
15. Location of pathways for routing of raceways or cable from the solar ready zone to the electrical service panel.
16. Location of designated EVSE spaces, EV-ready spaces, and EV-capable spaces in parking facilities, as applicable.

**107.2.5.1 Building thermal envelope depiction.**
The building thermal envelope shall be represented on the construction drawings.

**107.2.6 Exterior balconies and elevated walking surfaces.**
Where balconies or other elevated walking surfaces have weather-exposed surfaces, and the structural framing is protected by an impervious moisture barrier, the construction documents shall include details for all elements of the impervious moisture barrier system. The construction documents shall include manufacturer's installation instructions.

**107.2.7 Site plan.**
The construction documents submitted with the application for permit shall be accompanied by a site plan showing to scale the size and location of new construction and existing structures on the site, distances from lot lines, the established street grades and the proposed finished grades and, as applicable, flood hazard areas, floodways, and design flood elevations; and it shall be drawn in accordance with an accurate boundary line survey. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The *building official* is authorized to waive or modify the requirement for a site plan where the application for permit is for alteration or repair or where otherwise warranted.

**107.2.7.1 Design flood elevations.**
Where design flood elevations are not specified, they shall be established in accordance with county floodplain regulations. See Section 102.2.1 of this chapter.

**107.2.7.2 Site Plans in Hillside Areas.**
When a building site is located in a hillside area and, in the opinion of the *building official*, is located in an area subject to geologic hazards the *building official* may require that a detailed site plan be submitted as a prerequisite to the issuance of a building permit. Such site plans, when required, shall be prepared by an architect or a civil engineer and shall be based on an accurate topographic map prepared by a land surveyor. The site plans shall bear the seal and signature of the responsible architect or civil engineer and the land surveyor. The topographic map shall encompass the building site and shall be drafted at a scale no smaller than 1 inch equal to 20 feet (1:240) and at a contour interval less than or equal to two (2) feet. Such site plans, at a minimum, shall show:
1. A grading plan showing existing and proposed contour lines reflecting the proposed grading as well as the locations and pertinent elevations of finished floors of all structures, basements, driveways, level areas, septic disposal fields and retaining walls.
2. The locations of all water wells (whether on-site or off) within 250 feet of any septic disposal field.
3. All property lines within 100 feet of the building site.
4. Setbacks of cut slopes, fill slopes, retaining walls, and structures from property lines.
5. At least one critical cross section oriented through the structural site and drafted at equal horizontal and vertical levels.

**107.2.8 Structural** information**.**
The *construction documents* shall provide the information specified in IBC Section 1603 or in IRC Section R301, as applicable.

**107.2.8.1 Information on braced wall design.**
For buildings and structures utilizing braced wall design, and where required by the *building official,* braced wall lines shall be identified on the *construction documents.* Pertinent information including, but not limited to, bracing methods, location and length of *braced wall panels* and foundation requirements of braced wall panels at top and bottom shall be provided.

**107.2.9 Relocatable buildings.**
Construction documents for relocatable buildings shall comply with Section 3113 of the *International Building Code.*

**107.2.10 Water and Sanitation Requirements.**
Every building or addition thereto shall be provided with water and sanitation facilities in accordance with the provisions of this code. Water supplies and sewerage facilities shall be in conformance with regulations and requirements of the Boulder County Public Health Department, Colorado Department of Public Health and Environment and the Colorado Division of Water Resources Office or any supplier recognized thereby. When applicable, evidence of same shall be submitted to the *building official* prior to the issuance of the building permit.

**107.2.11 Reports.**
When, in the opinion of the *building official*, certain geologic hazards or constraints, including but not limited to, landslides, rock falls, flash flooding, mudslides, avalanches, subsidence and/or soil creep exist or may exist with respect to a specific building proposal, a soil and/or geologic investigation may be required prior to the issuance of a building permit. Such investigation, when required, shall be documented by submittal to the *building official* of an acceptable written report which is signed by a soils engineer and/or an engineering geologist within his field of expertise. Said report(s) shall contain specific recommendations regarding the building location and design. The relationships of (1) site grading, structural integrity, and septic drain fields and (2) the geologic hazards or constraints shall be considered in the report(s).

**107.2.12 Construction document details for Colorado Model Electric Ready and Solar Ready provisions.**
Details shall include, but are not limited to, the following as applicable:
1. Location and size of the solar-ready zone.
2. Structural design loads of roof dead load and roof live load.
3. Pathways for routing of conduit from the solar-ready zone to the electrical service panel.
4. Number and location of EV capable light spaces.
5. Number and location of EV capable spaces.
6. Number and location of EV ready spaces.
7. Number and location of EVSE installed spaces.
8. Locations of conduit and termination points serving the aforementioned parking spaces.
9. Location for condensate drainage where combustion equipment for space heating and water heating is installed.

**107.3 Examination of documents.**
The *building official* shall examine or cause to be examined the accompanying submittal documents and shall ascertain by such examinations whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances.

**107.3.1 Approval of construction documents.**
When the *building official* issues a permit, the construction documents shall be approved, in writing or by stamp, as "Reviewed for Code Compliance." One set of construction documents so reviewed shall be retained by the *building official*. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the *building official* or a duly authorized representative.

**107.3.2 Previous approvals.**
This code shall not require changes in the construction documents, construction or designated occupancy of a structure for

which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

**107.3.3 Phased approval.**
The *building official* is authorized to issue a permit for the construction of foundations or any other part of a building or structure before the construction documents for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such permit for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a permit for the entire structure will be granted.

**107.3.4 Design professional in responsible charge.**
Where it is required that documents be prepared by a registered design professional, the *building official* shall be authorized to require the owner or the owner's authorized agent to engage and designate on the building permit application a registered design professional who shall act as the registered design professional in responsible charge. If the circumstances require, the owner or the owner's authorized agent shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original registered design professional in responsible charge. The *building official* shall be notified in writing by the owner or the owner's authorized agent if the registered design professional in responsible charge is changed or is unable to continue to perform the duties. The registered design professional in responsible charge shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

**107.3.4.1 Deferred submittals.**
Deferral of any submittal items shall have the prior approval of the *building official*. The registered design professional in responsible charge shall list the deferred submittals on the construction documents for review by the *building official*.

Documents for deferred submittal items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the *building official* with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design of the building. The deferred submittal items shall not be installed until the deferred submittal documents have been approved by the *building official*.

**107.4 Amended construction documents.**
Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.

**107.5 Retention of construction documents.**
One set of *approved construction documents* shall be retained by the *building official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

## SECTION 108: TEMPORARY STRUCTURES AND USES

**108.1 General.**
The *building official* is authorized to issue a *permit* for temporary structures and temporary uses, equipment and systems. Such *permits* shall be limited as to time of service but shall not be permitted for more than 180 days. The *building official* is authorized to grant extensions for demonstrated cause.

**108.2 Conformance.**
Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, light, ventilation and sanitary requirements of this code as necessary to ensure the public health, safety and general welfare.

**108.3 Temporary power.**
The *building official* is authorized to give permission to temporarily supply and use power in part of an electric installation before such installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or

power in NFPA 70.

**108.4 Termination of approval.**
The *building official* is authorized to terminate such *permit* for a temporary structure or use, equipment, or system, and to order the same to be discontinued.

## SECTION 109: FEES

**109.1 Payment of fees.**
A permit shall not be valid until the fees prescribed by law have been paid, nor shall an amendment to a *permit* be released until the additional fee, if any, has been paid.

**109.2 Schedule of permit fees.**
Where a *permit* is required, a fee for each *permit* shall be paid as required, in accordance with the schedule as established by the Boulder County Board of County Commissioners in a separate adopting resolution. For building permit, plan review, grading permit and other fees, please refer to the Boulder County Land Use Department publication, "***Boulder County Building Permit Fees.***"

**109.3 Permit valuations.**
The applicant for a *permit* shall provide an estimated *permit* value at time of application. *Permit* valuations shall reflect the total value of work, including materials and labor, for which the *permit* is being issued, such as electrical, gas, mechanical, plumbing equipment and permanent systems. If, in the opinion of the *building official*, the valuation is underestimated on the application, the *permit* shall be denied, unless the applicant can show detailed estimates to meet the approval of the *building official*. Final building *permit* valuation shall be set by the *building official*.

**109.4 Work commencing before permit issuance.**
Any person who commences any work before obtaining the necessary *permits* shall be subject to a fee established by the *building official* that shall be in addition to the required *permit* fees.

**109.4.1 Investigation.**
Whenever any work for which a permit is required by this code has been commenced without first obtaining said permit, a special investigation shall be made before a permit may be issued for such work.

**109.4.2 Investigation Fee.**
An investigation fee in addition to the permit fee shall be collected whether or not a permit is then or subsequently issued. The investigation fee shall be equal to the amount of the permit fee required by this code. The payment of such investigation fee shall not exempt any person from compliance with all other provisions of this code nor from any penalty prescribed by law.

**109.5 Related fees.**
The payment of the fee for the construction, *alteration*, removal or demolition for work done in connection to or concurrently with the work authorized by a building *permit* shall not relieve the applicant or holder of the *permit* from the payment of other fees that are prescribed by law.

**109.6 Refunds.**
The *building official* may authorize refunding of any fee paid here under which was erroneously paid or collected. The *building official* may authorize refunding of not more than 80 percent of the permit fee paid when no work has been done under a permit issued in accordance with this code. The *building official* may authorize refunding of not more than 80 percent of the plan review fee paid when an application for a permit for which a plan review fee has been paid is withdrawn or canceled before any plan reviewing is done. The *building official* shall not authorize refunding of any fee paid except on written application filed by the original permittee not later than 180 days after the date of fee payment.

## SECTION 110: INSPECTIONS

**110.1 General.**

Construction or work for which a *permit* is required shall be subject to inspection by the *building official* and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the *owner* or the owner's authorized agent to cause the work to remain visible and able to be accessed for inspection purposes. Neither the *building official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

**110.2 Preliminary inspection.**
Before issuing a *permit*, the *building official* is authorized to examine or cause to be examined buildings, structures and sites for which an application has been filed.

**110.3 Required inspections.**
The *building official* upon notification, shall make the inspections set forth in Sections 110.3.1 through 110.3.12.

*Please refer to the Boulder County Land Use Department publication, "Required Inspections and Procedures" for specific inspection requirements.*

**110.3.1 Footing and foundation inspection.**
Footing and foundation inspections shall be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms shall be in place prior to inspection. Materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with ASTM C 94, the concrete need not be on the job.

**110.3.2 Concrete slab and under-floor inspection.**
Footing and foundation inspections shall be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms shall be in place prior to inspection. Materials for the foundation shall be on the job, except where concrete is ready mixed in accordance with ASTM C 94, the concrete need not be on the job.

Inspection of the foundation shall be made after poles or piers are set or trenches or basement areas are excavated, and any required forms erected and any required reinforcing steel is in place and supported prior to the placing of concrete. The foundation inspection shall include excavations for thickened slabs intended for the support of bearing walls, partitions, structural supports, or equipment and special requirements for wood foundations.

**110.3.3 Lowest floor elevation.**
In *flood hazard areas*, upon placement of the lowest floor, including the basement, and prior to further vertical construction, the elevation certification required in Section 1612.4 of the *International Building Code* or Section R322 of the *International Residential Code* submitted to the *building official.*

**110.3.4 Frame inspection.**
Framing and masonry construction inspections shall be made after the roof deck or sheathing, all framing, *fireblocking, draftstopping,* and bracing are in place, and pipes, chimneys. and vents to be concealed are complete and the rough electrical, plumbing, mechanical, heating wires, pipes and ducts are *approved*. Rough inspection of plumbing, mechanical, gas and electrical systems shall be made prior to covering or concealment, before fixtures or appliances are set or installed, and prior to framing inspection.

**110.3.5 Types IV-A, IV-B and IV-C connection protection inspection.**
In buildings of Types IV-A, IV-B and IV-C construction, where connection fire-resistance ratings are provided by wood cover calculated to meet the requirements of Section 2304.10.1, inspection of the wood cover shall be made after the cover is installed, but before any other coverings or finishes are installed.

**110.3.6 Lath, gypsum board and gypsum panel product inspection.**
Lath, gypsum board and gypsum panel product inspections shall be made after lathing, gypsum board and gypsum panel products, interior and exterior, are in place, but before any plastering is applied or gypsum board and gypsum panel

product joints and fasteners are taped and finished.

**Exception:**
Gypsum board and gypsum panel products that are not part of a fire-resistance-rated assembly or a shear assembly are not required to be inspected.

**110.3.7 Weather-exposed balcony and walking surface waterproofing.**
Where balconies or other elevated walking have weather-exposed surfaces, and the structural framing is protected by an impervious moisture barrier, all elements of the impervious moisture barrier system shall not be concealed until inspected and *approved*.

**Exception:**
Where *special inspections* are provided in accordance with Section 1705.1.1, Item 3.

**110.3.8 Fire- and smoke-resistant penetrations.**
Protection of joints and penetrations in *fire-resistance-rated* assemblies, *smoke barriers* and smoke partitions shall not be concealed from view until inspected and *approved*.

**110.3.9 Energy efficiency inspections.**
Inspections shall be made to determine compliance with IBC Chapter 13, amended IRC Chapter 11, IECC C104.2, or IECC R104.2 shall include, but not be limited to, inspections for: envelope insulation R- and U-values, fenestration U-factor, duct system *R-value*, and HVAC and water-heating equipment efficiency.

**Exception:**
Insulation inspections for projects exceeding 500 sq. ft. of conditioned floor area (CFA) must be performed by an approved third-party energy rater. For projects of 500 sq. ft. of conditioned floor area (CFA) or less, an insulation inspection will be performed by building official upon request, and the insulation installer shall post an insulation certificate in accordance with IRC Section N1101.14.

**110.3.9.1 Required inspections.**
The code official or his or her designated agent, upon notification, shall make the inspections set forth in Sections 110.3.9.1.1 through 110.3.9.1.6.

**110.3.9.1.1 Footing and foundation inspection.**
Inspections associated with footings and foundations shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications.

**110.3.9.1.2 Framing and rough-in inspection.**
Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation; fenestration properties such as U-factor and SHGC and proper installation; and air leakage controls as required by the code; and *approved* plans and specifications.

**110.3.9.1.3 Plumbing rough-in inspection.**
Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications as to types of insulation and corresponding R-values and protection against freezing, and required controls.

**110.3.9.1.4 Mechanical rough-in inspection.**
Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding R-value, system air leakage control, programmable thermostats, dampers, whole-house ventilation, and minimum fan efficiency.

**110.3.9.1.5 Electrical system.**
Inspections shall verify lighting system controls, components, meters and additional electric infrastructure, as required by the code, *approved* plans and specifications.

*Add section 110.3.9.2 for required inspections specified in the Colorado Model Electric Ready and Solar Ready Code*

**110.3.9.2 Required Inspections for compliance to Colorado Model Electric Ready and Solar Ready requirements.**
The code official, his or her designated agent, or an *approved* agency, upon notification, shall make the inspections set forth in Sections 110.3.9.2.1 through 110.3.9.2.1.

**110.3.9.2.1 Solar-Ready.**
Inspections shall verify all of the following as required by this code, *approved* plans, and specifications:
The location and size of the solar-ready zone or the capacity of an installed on-site renewable energy system. Electrical capacity and reserved physical space for circuit breakers in the main electrical service panel that are properly labeled.

**110.3.9.2.2 Electric Vehicle-Ready.**
Inspections shall verify all of the following as required by this code, *approved* plans, and specifications:
1. EV power infrastructure requirements.
2. Electrical equipment associated with each parking space type, including branch circuits, conduit and/or raceway, junction boxes, receptacles, and EVSE are properly labeled and installed.
3. Electrical capacity and reserved physical space for circuit breakers in the main electrical service panel that are properly labeled, if applicable.

**110.3.9.2.3 Electric-Ready.**
Inspections shall verify all of the following as required by this code, *approved* plans, and specifications:
1. Branch circuits, conduit and/or raceway, wiring, junction boxes, and receptacles for future electric equipment or appliances are properly labeled and installed, as applicable.
2. Reserved physical space for future electric equipment or appliances.
3. Electrical capacity and reserved physical space for circuit breakers in the main electrical service panel that are properly labeled.

**110.3.9.2.4 Final Inspection.**
The final inspection shall include verification of the installation and proper labeling of all requirements of this code.

**110.3.10 Other inspections.**
In addition to the inspections specified in Sections 110.3.1 through 110.3.9, the *building official* is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by the department of building safety.

**110.3.11 Special inspections.**
For *special inspections*, see IBC Chapter 17.

**110.3.12 Final inspection.**
The final inspection shall be made after all work required by the building *permit* is completed.

**110.3.12.1 Flood hazard documentation.**
If located in a *flood hazard area*, documentation of the elevation of the lowest floor as required in IBC Section 1612.4 or IRC Section R322.1.10 shall be submitted to the *building official* prior to the final inspection. See also Section 102.2.1 of this chapter.

**110.4 Inspection agencies.**
The *building official* is authorized to accept reports of *approved* inspection agencies, provided that such agencies satisfy the requirements as to qualifications and reliability.

**110.5 Inspection requests.**
It shall be the duty of the holder of the building permit or their duly authorized agent to notify the *building official* when work is ready for inspection. It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

**110.6 Approval required.**
Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of

the *building official.* The *building official* upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *building official.*

## SECTION 111: CERTIFICATE OF OCCUPANCY

**111.1 Use and change of occupancy.**
A building or structure shall not be used or occupied, in whole or in part, and a *change of occupancy* of a building or structure or portion thereof shall not be made, until the *building official* has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Certificates presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid.

**Exception:**

1. Certificates of occupancy are not required for work exempt from permits under Section 105.2.
2. Certificates of Occupancy are not required for Utility and Miscellaneous Group U occupancies constructed under the International Building Code and additions, remodels and accessory structures subject to the *International Residential Code* in accordance with the exception to Section 101.2 of this chapter.

**111.2 Certificate issued.**
After the *building official* inspects the building or structure and does not find violations of the provisions of this code or other laws that are enforced by the department of building safety, the *building official* shall issue a certificate of occupancy that contains the following:

1. The building *permit* number.
2. The address of the structure.
3. The name and address of the *owner* or the owner's authorized agent.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code.
6. The name of the *building official.*
7. The edition of the code under which the *permit* was issued.
8. The use and occupancy, in accordance with the provisions of IBC Chapter 3, if applicable.
9. The type of construction as defined in IBC Chapter 6, if applicable.
10. The design occupant load, if applicable.
11. Where an automatic sprinkler system is provided, whether the sprinkler system is required.
12. Any special stipulations and conditions of the building permit.

**111.3 Temporary occupancy.**
The *building official* is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the *permit*, provided that such portion or portions shall be occupied safely. The *building official* shall set a time period during which the temporary certificate of occupancy is valid.

**111.4 Revocation.**
The *building official* is authorized to suspend or revoke a certificate of occupancy or completion issued under the provisions of this code, in writing, wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of the provisions of this code or other ordinance of the jurisdiction.

## SECTION 112: SERVICE UTILITIES

**112.1 Connection of service utilities.**
A person shall not make connections from a utility, source of energy, fuel, or power, or a water system or sewer system to any building or system that is regulated by this code for which a *permit* is required, until *approved* by the *building official.*

**112.2 Temporary connection.**

The *building official* shall have the authority to authorize the temporary connection of the building or system to the utility, source of energy, fuel, or power, or the water system, or sewer system for the purpose of testing system, or for use under a temporary approval.

**112.3 Authority to disconnect service utilities.**
The *building official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards in case of emergency where necessary to eliminate an immediate hazard to life or property or where such utility connection has been made without the approval required by Section 112.1 or 112.2. The *building official* shall notify the serving utility, and wherever possible the *owner* or the owner's authorized agent, and occupant of the building, structure, or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnecting, the *owner*, or the owner's authorized agent, or occupant of the building, structure or service system shall be notified in writing, as soon as practical thereafter.

## SECTION 113: MEANS OF REVIEW

**113.1 General.**
In order to hear and decide appeals of orders, decisions or determinations made by the *building official* relative to the application and interpretation of this code, there shall be and is hereby created a board of review. The board of review shall be appointed by the applicable governing authority and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *building official.*

**113.2 Appeals.**
Appeals to the Board of Review may be taken by a person aggrieved by his inability to obtain a building permit or by an officer or department, board, or bureau of the County affected by the grant or refusal of the building permit because of non-compliance with the Boulder County Building Code. Any person, officer or department, board or bureau may appeal to the Board of Review from the decision of any enforcement of the provisions of the Building Code. Such appeals must be made within fourteen (14) days from the date of grant or refusal of the building permit or administrative decision. Such appeals shall be in writing directed to the Secretary of the Board of Review and shall state the basis for appeal.

**113.3 Interpretations, alternate materials and methods of construction, and modifications.**
The Board of Review, in appropriate cases and subject to appropriate principles, standards, rules, conditions, and safeguards set forth in the building code may make interpretations of the terms of the building code in harmony with their general purpose and intent. The Board of Review may also approve of alternate materials or methods of construction or modifications provided the Board finds that the alternate material or method of construction or modification meets the standards found under Sections 104.10 and 104.11 of this code.

**113.4 Limitations on authority.**
An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equivalent or better form of construction is proposed. The board shall have no authority relative to interpretation of the administrative provisions of this code and shall not have authority to waive requirements of this code.

**113.5 Amendments to the code.**
The Board of Review is authorized to formulate suggested amendments to the Building Code for consideration of the Board of County Commissioners.

**113.6 Additional authority.**
The Board of Review may adopt substantive rules and regulations based upon the provisions of the Building Code adopted by the Board of County Commissioners. In no case, however, shall these rules become effective unless the Board of Review thereon has conducted a public hearing. Notice of the hearing stating its time and place and where the text of the proposed substantive rules and regulations may be inspected shall be given in the same manner as provided in the initial adoption of the code.

**113.7 Administration.**

The *building official* shall take immediate action in accordance with the decision of the board.

**113.8 Qualifications.**
The board of review shall consist of members who are qualified by experience and training to pass on matters pertaining to building construction and are not employees of the jurisdiction.

## SECTION 114: VIOLATIONS

**114.1 Unlawful acts.**
It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, *repair*, move, remove, demolish or occupy any building, structure or equipment regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code.

**114.2 Notice of violation.**
The *building official* is authorized to serve a notice of violation or order on the person responsible for the erection, construction, *alteration*, extension, *repair*, moving, removal, demolition or occupancy of a building or structure in violation of the provisions of this code, or in violation of a *permit* or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

**114.3 Prosecution of violation.**
If the notice of violation is not complied with promptly, the *building official* is authorized to request the legal counsel of the jurisdiction to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful occupancy of the building or structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

**114.4 Violation penalties.**
Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the *approved construction documents* or directive of the *building official* or of a *permit* or certificate issued under the provisions of this code, shall be subject to penalties as prescribed by law.

## SECTION 115: STOP WORK ORDER

**115.1 Authority.**
Where the *building official* finds any work regulated by this code being performed in a manner contrary to the provisions of this code or in a dangerous or unsafe manner, the *building official* is authorized to issue a stop work order.

**115.2 Issuance.**
The stop work order shall be in writing and shall be given to the *owner* of the property, the owner's authorized agent or the person performing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work is authorized to resume.

**115.3 Emergencies.**
Where an emergency exists, the *building official* shall not be required to give a written notice prior to stopping the work.

**115.4 Failure to comply.**
Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to fines established by the *authority having jurisdiction*.

## SECTION 116: UNSAFE STRUCTURES AND EQUIPMENT

**116.1 Unsafe conditions.**
Structures or existing equipment that are or hereafter become unsafe, insanitary or deficient because of inadequate *means*

*of egress* facilities, inadequate light and ventilation, or that constitute a fire hazard, or are otherwise dangerous to human life or the public welfare, or that involve illegal or improper occupancy or inadequate maintenance, shall be deemed an unsafe condition. Unsafe structures shall be taken down and removed or made safe, as the *building official* deems necessary and as provided for in this section. A vacant structure that is not secured against unauthorized entry shall be deemed unsafe.

**116.2 Record.**
The *building official* shall cause a report to be filed on an unsafe condition. The report shall state the occupancy of the structure and the nature of the unsafe condition.

**116.3 Notice.**
If an unsafe condition is found, the *building official* shall serve on the *owner*, agent or person in control of the structure, a written notice that describes the condition deemed unsafe and specifies the required repairs or improvements to be made to abate the unsafe condition, or that requires the unsafe structure to be demolished within a stipulated time. Such notice shall require the person thus notified to declare immediately to the *building official* acceptance or rejection of the terms of the order.

**116.4 Method of service.**
Such notice shall be deemed properly served where a copy thereof is served in accordance with one of the following methods:
1. A copy is delivered to the *owner* personally.
2. A copy is sent by certified or registered mail addressed to the *owner* at the last known address with the return receipt requested.
3. A copy is delivered in any other manner as prescribed by local law.

If the certified or registered letter is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice. Service of such notice in the foregoing manner on the owner's agent or on the person responsible for the structure shall constitute service of notice on the *owner*.

**116.5 Restoration or abatement.**
Where the structure or equipment determined to be unsafe by the *building official* is restored to a safe condition, the owner, the owner's authorized agent, operator or occupant of a structure, premises or equipment deemed unsafe by the *building official* shall abate or cause to be abated or corrected such unsafe conditions either by *repairs*, rehabilitation, demolition or other *approved* corrective action. **To** the extent that repairs, *alterations*, or *additions* are made or a change of occupancy occurs during the restoration of the structure, such *repairs*, *alterations*, *additions*, and change of occupancy shall comply with the requirements of the *International Existing Building Code* and *International Residential Code*, as applicable.

## SECTION 117: CONTRACTOR LICENSING

***Note:*** *The contractor licensing provisions of Boulder County are adopted by the Board of County Commissioners under a separate adopting resolution. Please refer to the Boulder County Land Use Department publication, "Boulder County Contractor License" for requirements and details.*

# Amendments to the International Building Code ("IBC")

*Adopt the 2021 International Building Code®, including specifically Appendix Chapters C, E, H, I, J, and K;, published by the International Code Council, modeled from the 2021 International Building Code® ("IBC"), with amendments to the following:*

## IBC CHAPTER 1: SCOPE AND ADMINISTRATION

*IBC Chapter 1 is deleted in its entirety and replaced by the preceding Chapter 1, the administrative provisions of the Boulder County Building Code.*

## IBC CHAPTER 2: DEFINITIONS

*Note: Section 201 is adopted as published. Section 202 is adopted as published with the following definitions are added to those that are published in Chapter 2.*

**ARCHITECT.** Architect is a person licensed under the provisions of Title 12, Article 4, CRS.

**AUTHORITY HAVING JURISDICTION**. A designated official of the county, special authority, or special district that has code enforcement responsibilities and employs a building inspector or certified fire inspector.

**BUILDING SITE.** Building Site is all that area or those areas encompassed by horizontal radii of 150 feet measured outwardly from exterior structural walls, water wells, of the limits of artificial grading, on-site sewage disposal systems, or slope retaining devices, except where limited by the parcel.

**CIVIL ENGINEER.** Civil Engineer is a person licensed under the provisions of Title 12, Article 25, Part I, CRS, and who is experienced and knowledgeable in the practice of civil engineering.

**CIVIL ENGINEERING.** Civil Engineering is the application of the knowledge of the forces of nature, principles of mechanics, and the properties of materials to the evaluation, design, and construction of civil works for the beneficial uses of mankind.

**COUNTY GEOLOGIST.** County Geologist is either (1) a staff member employed by the County under the Class Title Geologist and who performs the duties assigned there under or (2) any geologist who may be retained by the County to perform the duties of said Class Title. In either case, the County Geologist shall be a professional geologist as defined in 34-1-201 CRS.

**ENGINEERING GEOLOGIST.** Engineering Geologist is a professional geologist as defined in 34-1-201 CRS, and who is experienced and knowledgeable in the practice of engineering geology.

**ENGINEERING GEOLOGY.** Engineering Geology is the application of geologic knowledge and principles in the investigation and evaluation of naturally occurring rock and soil for use in the design of civil works for the purpose of assuring that geological features and processes affecting the planning, location, design, construction, operation and maintenance of civil works are recognized and adequately interpreted.

**FIRE CODE OFFICIAL.** The *fire chief* or other designated authority charged with the administration and enforcement of the code, or a duly authorized representative.

**HILLSIDE AREA.** Hillside Area is an area which exhibits a predominant ground slope with a gradient of five (5) horizontal to one (1) vertical or steeper (20% or steeper).

**LAND SURVEYOR.** Land Surveyor is a person licensed under the provisions of Title 12, Article 25, Part 2, CRS.

**MANUFACTURED HOME.** Manufactured Home shall mean manufactured home as defined in the Boulder County Land Use Code.

**SOIL ENGINEER.** Soil Engineer is a person licensed under the provisions of Title 12, Article 25, Part 2, CRS, and who is experienced and knowledgeable in the practice of soil engineering.

**SOIL ENGINEERING.** Soil Engineering is the application of the principles of soil mechanics in the investigation, evaluation and design of civil works involving the use of earth materials and the inspection and testing of the construction thereof.

# IBC CHAPTER 7: FIRE AND SMOKE PROTECTION FEATURES

## SECTION 723: REQUIREMENTS BASED ON LOCATION IN WILDFIRE ZONES

*Adopt Chapter 7 as published, except to add section 723 to Chapter 7 to reference the wildfire zone requirements for buildings constructed under the IBC.*

**723.1. General – Ignition Resistant Construction.**
Unless more restrictive requirements, such as those imposed through review and approval processes required by the Boulder County Land Use Code, apply, the ignition-resistant construction and defensible space requirements of Section R390 of the amendments to the IRC shall be applicable to all new buildings, additions and repairs.

# IBC CHAPTER 15: ROOF ASSEMBLIES AND ROOFTOP STRUCTURES

## IBC SECTION 1502: ROOF DRAINAGE

*Adopt IBC Chapter 15 as published, except to amend as follows:*

*Delete IBC section 1502.1 and replace as follows, to add the local 100 year 1-hour rainfall rate.*

**1502.1 General.** Design and installation of roof drainage systems shall comply with this section, Section 1611 of this code, and Chapter 11 of the *International Plumbing Code*. The 100-year, 1-hour rainfall rate to be used to size roof drainage components shall be 2.4 inches per hour.

## IBC SECTION 1504: PERFORMANCE REQUIREMENTS

**R1504.8.1 Impact resistance of asphalt shingles.** Asphalt shingles shall be Class 4 impact resistant, tested in accordance with UL 2218, and installed in accordance with the manufacturer's installation instructions.

**Exceptions**

1. When an owner wishes to replace existing asphalt shingles that are less than class 4 impact resistant with tiles of a similar color or style, and there are no class 4 impact resistance shingles available of similar color or style, the *building official* may approve alternate materials that are less than class 4 impact resistant, so long as the replacement shingles are the highest class of impact resistant shingles available that match the color or style of the existing shingles. If no impact resistant materials are available, the *building official* may approve non-impact resistant materials that meet all other applicable requirements of this Code.
2. For repairs or additions to existing asphalt singles that are less than class 4 impact resistant, the owner may use the same or similar materials regardless of impact resistance of the new shingles.

## IBC SECTION 1505: FIRE CLASSIFICATION

*Revise by adding text and delete table 1505.1 with footnotes in its entirely. All related references shall be referred to Section 1505.1.*

**[BF] 1505.1 General.**
Roof assemblies shall be divided into the classes defined in this section. Class A, B and C roof assemblies and roof

coverings required to be listed by this section shall be tested in accordance with **ASTM E108** or **UL 790**. In addition, fire-retardant-treated wood roof coverings shall be tested in accordance with **ASTM D2898**. Roof coverings in Wildfire Zones shall comply with section 723.1 and IRC amendment R390.

**Exception:**
Skylights and sloped glazing that comply with Chapter 24 or Section 2610.

## SECTION 1507: REQUIREMENTS FOR ROOF COVERINGS

**1507.2.9.4. Impact resistance of asphalt shingles.**
Asphalt shingles shall be Class 4 impact resistant and be tested in accordance with UL 2218 or FM 4473 and installed in accordance with the manufacturer's installation instructions.

**Exception:**
When the owner is repairing or adding to existing asphalt singles that are less than class 4 impact resistant, the owner may use the same or similar materials as the current existing asphalt shingles, even if that same or similar material is not impact resistant.

# IBC CHAPTER 16: STRUCTURAL DESIGN

*Adopt Chapter 16 as published except amend as follows.*

*Amend Table 1607.1, Minimum Uniformly Distributed Live Loads and Minimum Concentrated Live Loads, to add agriculture materials stored, by adding line to table to reference uniform load for hay/straw as referenced from the American Institute of Steel Construction Table 17-12: Densities of Common Materials.*

### IBC Table 1607.1: MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, $L_0$, AND MINIMUM CONCENTRATED LIVE LOADS

38. Utility Occupancies - Agriculture storage
Hay or straw is 20 lbs./cubic foot (uniform)

## IBC SECTION 1608: SNOW LOADS

*Delete section 1608.2 entirely and amend to read as follows. See "**Boulder County Ground Snow Load Map**," as amended.*

**1608.2 Ground snow loads.**
Snow loads shall be determined by the *building official* utilizing the Boulder County map, "Boulder County Ground Snow Load Map," as amended. Snow loads are based upon the report, "2016 Colorado Design Snow Loads," prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016.
For snow loads, the snow loading importance factor ($I_S$) for risk category IV buildings shall be computed in accordance with Equation 1.4 below in accordance with the recommendations in the report "***2016 Colorado Design Snow Loads***," prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016. For risk category III buildings, $I_S$ shall be taken from the average of Equation 1.4 and the value 1.0.

**(Equation 1.4)**

$I_S = 1.15 \leq 1.66 - 0.056 \times A \leq 1.4$

where:

$A$ = the site altitude in thousands of feet.

## IBC SECTION 1609: WIND LOADS

*Delete section 1609.3 entirely and replace it with the following:*

**1609.3 Basic design wind speed.**

The basic design wind speed, V, in mph, for the determination of the wind loads shall be determined by the report titled "Colorado Front Range Gust Map", presented to the Structural Engineer's Association of Colorado (SEAC), March 16, 2006, general meeting, authored by Jon A. Peterka with technical assistance of SEAC's Wind Load Committee. Published report at SEAC website is dated November 18, 2013. The basic design wind speed, V, for use in the design of Risk Category II buildings and structures shall be obtained from Boulder County Wind Speed Map. The basic design wind speed, V, for use in the design of Risk Category I, III, and IV buildings and structures shall be obtained from the "Colorado Front Range Gust Map" report.

*Note: See "**Boulder County Wind Speed Map**," as amended.*

# IBC CHAPTER 18: FOUNDATIONS AND RETAINING WALLS

## IBC SECTION 1805: DAMPPROOFING AND WATERPROOFING

*Amend to add Section 1805.5 to read as follows:*

**1805.5 Gutters and downspouts.**
Gutters, downspouts, and downspout extensions are required on all buildings.

**Exceptions:**

1. Post framed buildings.
2. Buildings where, in the opinion of the *building official* the gutters will become damaged by sliding snow.
3. Roofs with eaves or overhangs of six feet or greater.
4. Roofs that are constructed with internal roof drains.
5. Buildings where an *approved* alternate means of drainage is designed by a soils engineer or other qualified registered design professional.

# IBC CHAPTER 30: ELEVATORS AND CONVEYING SYSTEMS

*This chapter is deleted in its entirety.*

*Elevator and conveyance system repairs, installations, and inspections are governed by the Colorado Department of Labor and Employment, Division of Oil and Public Safety, under the Elevator and Escalator Certification Act, Colorado Revised Statutes section 9-5.5-101 through 9-5.5-120, or most recent State of Colorado Elevator and Escalator requirements.*

*Adopt Chapter 31, section 3113: Relocatable Buildings, with the note: Manufactured buildings shall also comply with code and amendments to correlate with the requirements of the Colorado Department of Local Affairs, Division of Housing.*

*Note: Adoption of IBC Appendix C, as published.*

# IBC APPENDIX CHAPTER C: GROUP U – AGRICULTURAL BUILDINGS

*Note: Adoption of IBC Appendix E, as published.*

# IBC APPENDIX CHAPTER E: SUPPLEMENTARY ACCESSIBILITY REQUIREMENTS

*Note: Adoption of IBC Appendix H, as published, except as noted as follows.*

# IBC APPENDIX CHAPTER H: SIGNS

*Adopt as published, except where there are specific conflicts with the Boulder County Land Use Code, that code shall prevail as to references of sign area, sign height, and sign site locations. Appendix H references to structural design loads, electrical design, combustible construction are adopted as referenced herein.*

*Note: Adoption of IBC Appendix I, as published.*

## IBC APPENDIX CHAPTER I: PATIO COVERS

*Note: Adoption of IBC Appendix J, as published.*

## IBC APPENDIX CHAPTER J: GRADING

*Note: Add the following exemptions and exception to Section J103.2, with the remainder of the section to remain as published:*

**J103.2 Exemptions.**
A grading permit shall not be required for the following:
1. Grading of 50 cubic yards or less.
2. Grading associated with *approved* agricultural grading.
   **Exception:**
   Irrigation ponds and stock ponds to be constructed at a depth of more than 24" must obtain a grading permit prior to construction.

*Note: Adopt IBC Appendix N, as published.*

## IBC APPENDIX CHAPTER N: REPLICABLE BUILDINGS

# Amendments to the *International Residential Code*

*Adopt the **2021 International Residential Code**, including specifically **Appendix RD and Appendixes Chapters** AE, AF, AJ, AM, AO, AQ, AR, AS, AT, AU, and AX, published by the International Code Council, modeled from the 2021 International Residential Code ("IRC"), with amendments to the following:*

## Part I—Administrative

### IRC CHAPTER 1: SCOPE AND ADMINISTRATION

*IRC Chapter 1 is deleted, except as noted as follows. The remainder of the administrative provisions are found under the preceding Chapter of the Boulder County Building code. Section R101.1 is amended as follows:*

#### IRC SECTION R101: GENERAL

**R101.1 Title.**
These provisions shall be known as the Residential Code for One- and Two-family Dwellings of Boulder County and shall be cited as such and will be referred to herein as "this code."

*Adopt Section R107.2 for Existing Structures as follows:*

**R102.7 Existing structures.**
The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code or the International Fire Code, or as is deemed necessary by the *building official* for the general safety and welfare of the occupants and the public.

**R102.7.1 Additions, alterations or repairs.**
Additions, alterations or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with the requirements of this code, unless otherwise stated. Additions, alterations, repairs and relocations shall not cause an existing structure to become less compliant with the provisions of this code than the existing building or structure was prior to the addition, alteration or repair. An existing building together with its additions shall comply with the height limits of this code. Where the alteration causes the use or occupancy to be changed to one not within the scope of this code, the provisions of the *International Existing Building Code* shall apply.

## Part II—Definitions

### IRC CHAPTER 2: DEFINITIONS

*Adopt IRC Chapter 2 as published, except amend IRC Section 202 by amending or adding the following definitions.*

#### IRC SECTION R202: DEFINITIONS

**R202.1 Definitions are amended or adopted as follows:**

**AREA, CARPORT OR ROOF PROJECTION COVER.** Carport area or a horizontal projection of roof or floor above, where a cover is provided with open sides below the cover, the area is measured to the drip edge of the roof projection on the open sides of the structure and to the outside wall sheathing of any shared exterior walls.

Covered area open on any side on a detached accessory structure.

**AREA, FLOOR.** The area of the building, existing or new, under consideration including basements and attached garages calculated without deduction for corridors, stairways, closets, the thickness of interior walls, columns, or other

features as measured from the exterior face of the exterior walls. This includes framed wall braced and unbraced wall sheathing.

**AUTHORITY HAVING JURISDICTION.** A designated official of the county, special authority, or special district that has code enforcement responsibilities and employs a building inspector or certified fire inspector.

**BASE FLOOD.** The flood having a 1-percent chance of being equaled or exceeded in any given year.

**BASE FLOOD ELEVATION.** The elevation of the base flood, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the Flood Insurance Rate Map (FIRM).

*Note: Delete definition of Basement in IRC Section 202 as published and amend as follows.*

**BASEMENT.** That portion of a building that is partially or completely below grade (see *story above grade plane*). An under-floor space below the first story of the building that does not meet the definition of story above grade plane and has a ceiling height measured from the basement floor to the bottom of the floor joists above of 6 feet 8 inches or more.

**BEDROOM.** See *sleeping room*.

*Note: Delete definition of Crawl Space in IRC Section 202 as published and amend as follows.*

**CRAWL SPACE.** An under floor space below the first story floor of the building that does not meet the definition of story above grade plane, that has a ceiling height measured from the crawlspace grade or floor to the bottom of the floor joists above of less than 5-feet, and that does not contain interior stairs, fixed-in-place ladder systems, windows, wall and ceiling finish materials, trim or finished flooring.

**Exception:**
In newly constructed areas, an area of under floor space below the first story, not larger than 200 square feet, may have a ceiling height as measured from the crawlspace grade or floor to the bottom of the joists above of less than 6-feet 8-inches for the installation of mechanical equipment and automatic fire sprinkler installations. This area shall not contain interior stairs, fixed-in-place ladder systems, windows, wall and ceiling finish materials, trim or finished flooring.

**DESIGN FLOOD ELEVATION.** The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

**FIRE CODE OFFICIAL.** The *fire chief* or other designated authority charged with the administration and enforcement of the code, or a duly authorized representative.

**FLOOD, DESIGN**. See "Design flood."

**[BS] FLOOD DAMAGE-RESISTANT MATERIALS.** Any construction material capable of withstanding direct and prolonged contact with floodwaters without sustaining any damage that requires more than cosmetic repair.

**FLOOD ELEVATION, DESIGN**. See "Design flood elevation."

**FLOOD HAZARD AREA.** The greater of the following two areas:
1. The area within a floodplain subject to a 1 percent or greater chance of flooding in any given year.
2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

**FLOOD HAZARD AREAS, SPECIAL.** See "Special flood hazard area."

**FLOOD INSURANCE RATE MAP (FIRM).** An official map of a community on which the Federal Emergency Management Agency (FEMA) has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

**FLOOD INSURANCE STUDY**. The official report provided by the Federal Emergency Management Agency containing the Flood Insurance Rate Map (FIRM), the Flood Boundary and Floodway Map (FBFM), the water surface elevation of the base flood and supporting technical data.

**FLOOD or FLOODING.** A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation or runoff of surface waters from any source.

**FLOODWAY.** The channel of the river, creek or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

**RECONSTRUCTED DWELLING.** A dwelling which has been completely deconstructed, deconstructed to the foundation level, or deconstructed to the first-floor level. For the purposes of *this* code, a reconstructed dwelling shall be considered a new dwelling.

**REMODEL/RENOVATION.** Work within the spaces of an existing dwelling that requires a building permit but does not increase the floor area of the dwelling. For additional definition, please see the definition *Alteration.*

**SLEEPING ROOM.** Any room used or intended to be used for sleeping purposes and *habitable space* with a closet however unless otherwise determined at the sole discretion of the *building official.*

# Part III—Building Planning and Construction

## IRC CHAPTER 3: BUILDING PLANNING

### IRC SECTION R301: DESIGN CRITERIA

*Adopt Chapter 3 as published except amend as follows. Amend Table R301.2 by adding complete footnote references. Adopt Table R301.2(1) as follows:*

#### TABLE R301.2(1): CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

**GROUND SNOW LOAD = Varies**
See Boulder County map, "*Boulder County Ground Snow Load Map*," as amended.

**WIND DESIGN / WIND SPEED = Varies**
The references from the basic wind speed map Figure R301.2(2) are replaced by the Boulder County map, "***Boulder County Wind Speed Map***," as amended. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.

**TOPOGRAPHIC EFFECTS = No**
In accordance with Section R301.2.1.5, where there is local historical data documenting structural damage to buildings due to topographic wind speed-up effects).

**SPECIAL WIND REGION = YES**
In accordance with Figure R301.2(2), per local data, there is local historical data documenting unusual wind conditions.

**WINDBORNE DEBRIS ZONE = NO**
In accordance with Section R301.2.1.5, Boulder County does not recognize any wind-borne debris wind zone(s).

**SEISMIC DESIGN CATEGORY = B**
The seismic design category determined from Section R301.2.2.1.

#### SUBJECT TO DAMAGE FROM:

**WEATHERING = Severe**
Where weathering requires a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code, the frost line depth strength required for weathering shall govern. The weathering column shall be filled in with the weathering index, "negligible," "moderate" or "severe" for concrete as determined from Figure R301.2(1). The grade of masonry units shall be determined from ASTM C34, **ASTM C55, ASTM C62, ASTM C73, ASTM C90, ASTM C129, ASTM C145, ASTM C216 or ASTM C652**.

**FROST LINE DEPTH = 30 inches**
Where the frost line depth requires deeper footings than indicated in Figure R403.1(1), the frost line depth strength required for weathering shall govern.

**TERMITE = Slight to Moderate**
The need for protection depending on whether there has been a history of local subterranean termite damage, per R318.

**ICE BARRIER UNDERLAYMENT REQUIRED = YES**
In accordance with Sections R905.1.2, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, ice barrier is required.

**FLOOD HAZARDS = YES**
Refer to Section 4-400 of the Boulder County Land Use Code, "Floodplain Overlay District," for Boulder County's floodplain regulations and official floodplain overlay district maps.

**ANTICIPATED SNOW DEPTH:**
Plains (Wildfire Zone 2: East County) = **12 inches**
Mountains (Wildfire Zone 1: West County) = **24 inches**
For reference to Plains-East County and Mountains-West County refer to Figure 390.2: Wildfire Zone Map.

**AIR FREEZING INDEX = 1000**
The 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F).

**MEAN ANNUAL TEMPERATURE = 50 degrees Fahrenheit**
The mean annual temperature from the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)

## MANUAL J DESIGN CRITERIA:

Information to establish the design criteria using Table 1a or 1b from ACCA Manual J or established criteria determined by the jurisdiction.

**WINTER DESIGN TEMPERATURE = 1 degree Fahrenheit**
Factor to establish the design criteria using Table 10A from **ACCA Manual J** or established criteria determined by the jurisdiction.

**ELEVATION = Varies**

**ALTITUDE CORRECTION = Varies with elevation.**

**COINCIDENT WET BULB = 59 degrees Fahrenheit**

**INDOOR WINTER DESIGN DRY-BULB TEMPERATURE = 72 degrees Fahrenheit**

**OUTDOOR WINTER DESIGN DRY-BULB TEMPERATURE = 1 degree Fahrenheit**

**HEATING TEMPERATURE DIFFERENCE = 66 degrees Fahrenheit**

**LATITUDE = Varies**

**DAILY RANGE = High**

**INDOOR SUMMER DESIGN RELATIVE HUMIDITY = 50 %**

**SUMMER DESIGN GAINS =** Varies based on climate data for location.

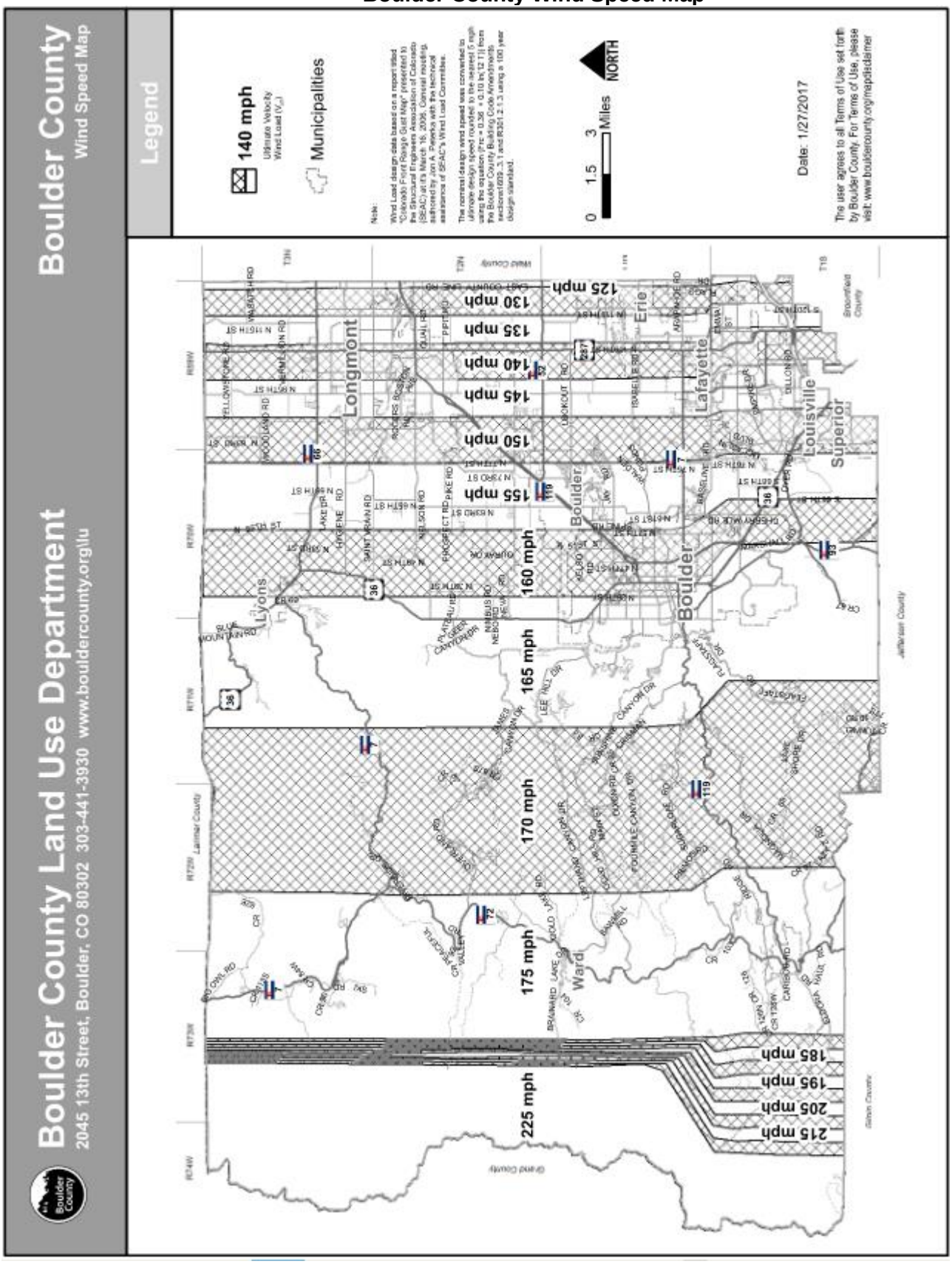
**INDOOR SUMMER DESIGN DRY-BULB TEMPERATURE = 75 degrees Fahrenheit**

**OUTDOOR SUMMER DESIGN DRY-BULB TEMPERATURE = 91° F.**

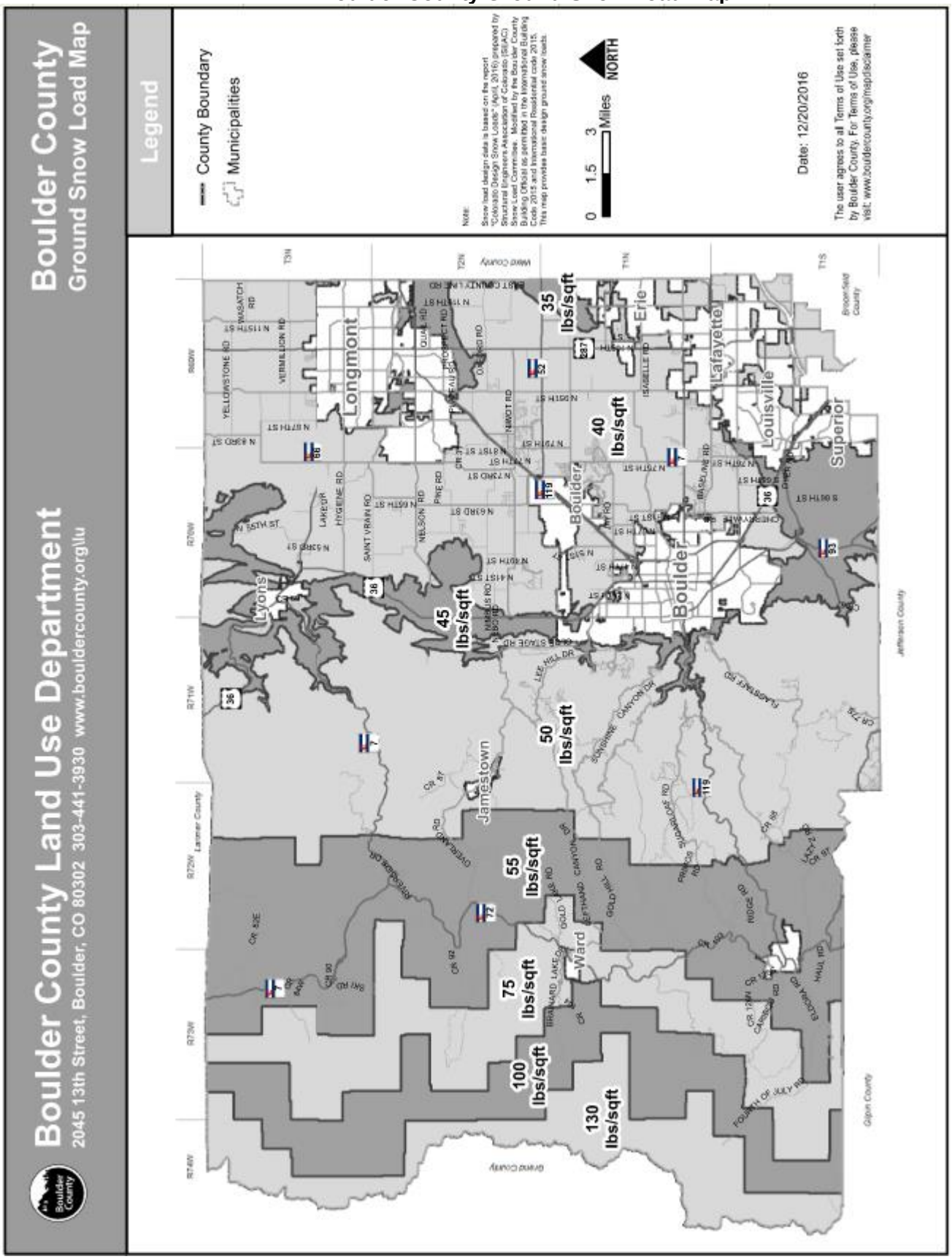
**COOLING TEMPERATURE DIFFERENCE = 18 degrees Fahrenheit**

*****INSERT Wind and Snow MAPS*****

## Boulder County Wind Speed Map



## Boulder County Ground Snow Load Map



*Amend all references IRC references to Figure R301.2(2) to refer to the **Boulder County Wind Speed Map**, as determined from the Colorado Front Range Gust Map – ASCE 7-10 compatible, published by the Structural Engineers Association of Colorado, dated November 18, 2013.*

*Adopt Section R301.2.1 to include the **Boulder County Wind Speed Map**, as amended. Amend R301.2.1 and replace with the following:*

**R301.2.1 Wind design criteria.**
Buildings, structures, and portions thereof shall be constructed in accordance with the wind provisions of this code using the design wind speed as determined from "Boulder County Wind Speed Map". Where IRC R301.2(2) is referenced, refer to Boulder County Wind Speed Map. The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section R301.2.1.1. Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where not otherwise specified, the wind loads listed in Table R301.2.1(1) adjusted for height and exposure using Table R301.2.1(2) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.4. Metal roof shingles shall be designed for wind speeds in accordance with Section R905.4.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section R802.11 from the roof assembly to the foundation. Where ultimate design wind speeds in Figure R301.2(2) are less than the lowest wind speed indicated in the prescriptive provisions of this code, the lowest wind speed indicated in the prescriptive provisions of this code shall be used.

*Amend R301.2.3, **Boulder County Ground Snow Load Map** with the following:*

**R301.2.3 Snow Loads.**
Ground snow loads shall be determined by the *building official* utilizing the Boulder County map, "***Boulder County Ground Snow Load Map***," as amended. Snow loads are based upon the report, "***2016 Colorado Design Snow Loads***," prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016. Wood-framed construction, cold formed, steel-framed construction and masonry and concrete construction, and structural insulated panel construction in regions with ground snow loads 70 pounds per square foot (3.35 kPa) or less, shall be in accordance with Chapters 5, 6 and 8. Buildings in regions with ground snow loads greater than 70 pounds per square foot (3.35 kPa) shall be designed in accordance with accepted engineering practice.

*See Boulder County map, "**Boulder County Ground Snow Load Map**," as amended.*

*Adopt IRC Sections R301.2.4 through R302.12 as published. Delete IRC Section R302.13 and replace as follows;*

**R302.13 Fire protection of floors.**
Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) *wood structural panel* membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.

**Exceptions:**

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other *approved* equivalent sprinkler system.
2. Floor assemblies located directly over a *crawlspace* not intended for storage or for the installation of fuel-fired or electric-powered heating *appliances*.
3. Portions of floor assemblies shall be permitted to be unprotected where complying with each of the following:
   3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 $m^2$) per story.
   3.2. Fireblocking in accordance with **Section R302.11.1** is installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or *structural composite lumber* equal to or greater than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other *approved* floor assemblies demonstrating equivalent fire performance.

Crawlspace height of 36 inches or more, are reviewed as used for storage, exception 2 is not applicable.

## IRC SECTION R303: LIGHT, VENTILATION, AND HEATING

*Amend section R303.4 as follows:*

**R303.4 Mechanical ventilation.**
Where the air infiltration rate of a dwelling *unit* is 5 air changes per hour (ACH) or less where tested with a blower door at a pressure of 0.2 inch w.c. (50 Pa) in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827 Section N1102.4.1.2, the *dwelling unit* shall be provided with balanced whole-house mechanical ventilation in accordance with Section M1505, or with other *approved* means of ventilation.

*New construction shall comply with N1102.4.1 Existing construction shall be in accordance with N1103.6.2.*

*Amend section R303.10 to read as follows:*

**R303.10 Required heating.**
When the winter design temperature in Table R301.2 is below 60°F (16°C), every dwelling unit shall be provided with heating facilities capable of maintaining a minimum room temperature of 68°F (20°C) at a point 3 feet above the floor and 2 feet from exterior walls in all habitable rooms at the design temperature. The installation of one or more portable space heaters shall not be used to achieve compliance with this section.

**Exception:**
Appliances relying on biofuels that are capable of maintaining the required temperature may be used to meet the requirements of this section. Permanently installed automatic space heating or other *approved* methods must be used to prevent pipes from freezing when outdoor temperatures are below freezing and the dwelling is vacant.

*Delete IRC Section R313 in its entirety and replace as follows:*

## IRC SECTION R313: AUTOMATIC FIRE SPRINKLER SYSTEMS

**R313.1 Townhouse Automatic Fire Sprinkler Systems.**
An automatic sprinkler system shall be installed in townhouses.

**R313.1.1 Additions to existing townhouses.**
An automatic sprinkler system shall be installed throughout existing townhouses with additions when the sum of the total floor area of the addition plus the existing townhouse is increased to 4,800 sq. ft. or greater.

**Exceptions:**
1. One-time additions not exceeding 200 square feet in floor area, and
2. Carport additions which are exempt from the definition of "Residential Floor Area" in Section 18-189D of the Boulder County Land Use Code.

**R313.1.2 Design and installation.**
Automatic sprinkler system for townhouses shall be designed and installed in accordance with Section P2904 or NFPA 13D. Systems shall be installed with a fire department connection (FDC) and other associated devices when required by the fire code official.

**R313.2 One- and two-family dwellings automatic fire sprinkler systems.**
An automatic sprinkler system shall be installed in one- and two-family dwellings.

**Exception:**
An automatic sprinkler system shall not be required for federally certified manufactured dwellings or Colorado Department of Local Affairs, Division of Housing, state-certified factory-built dwellings that are certified to editions of the IRC prior to the 2012 edition.

**R313.2.1 Additions to existing one- and two-family dwellings.**
An automatic sprinkler system shall be installed throughout existing one- and two-family dwellings with additions when

the sum of the total floor area of the addition plus the existing one- and two-family dwelling is increased to 4,800 sq. ft. or greater. The floor area of detached structures having floor areas of 120 square feet or greater that are located less than 50 feet from the dwelling shall be included in the floor area calculated for the dwelling.

**Exceptions:**

1. One-time additions not exceeding 200 square feet in floor area, and
2. Carport additions which are exempt from the definition of "Residential Floor Area" in Section 18-189D of the Boulder County Land Use Code.

**R313.2.2 Remodels/renovations to existing one- and two-family dwellings.**
An automatic sprinkler system shall be installed throughout existing one- and two-family dwellings with a floor area of 4,800 sq. ft. or greater where renovations or remodeling work for which a building permit is required takes place in more than 50% of the area within the structure.

**R313.2.3 Design and installation.**
Automatic sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D. Systems shall be installed with a fire department connection (FDC) and other associated devices when required by the fire code official.

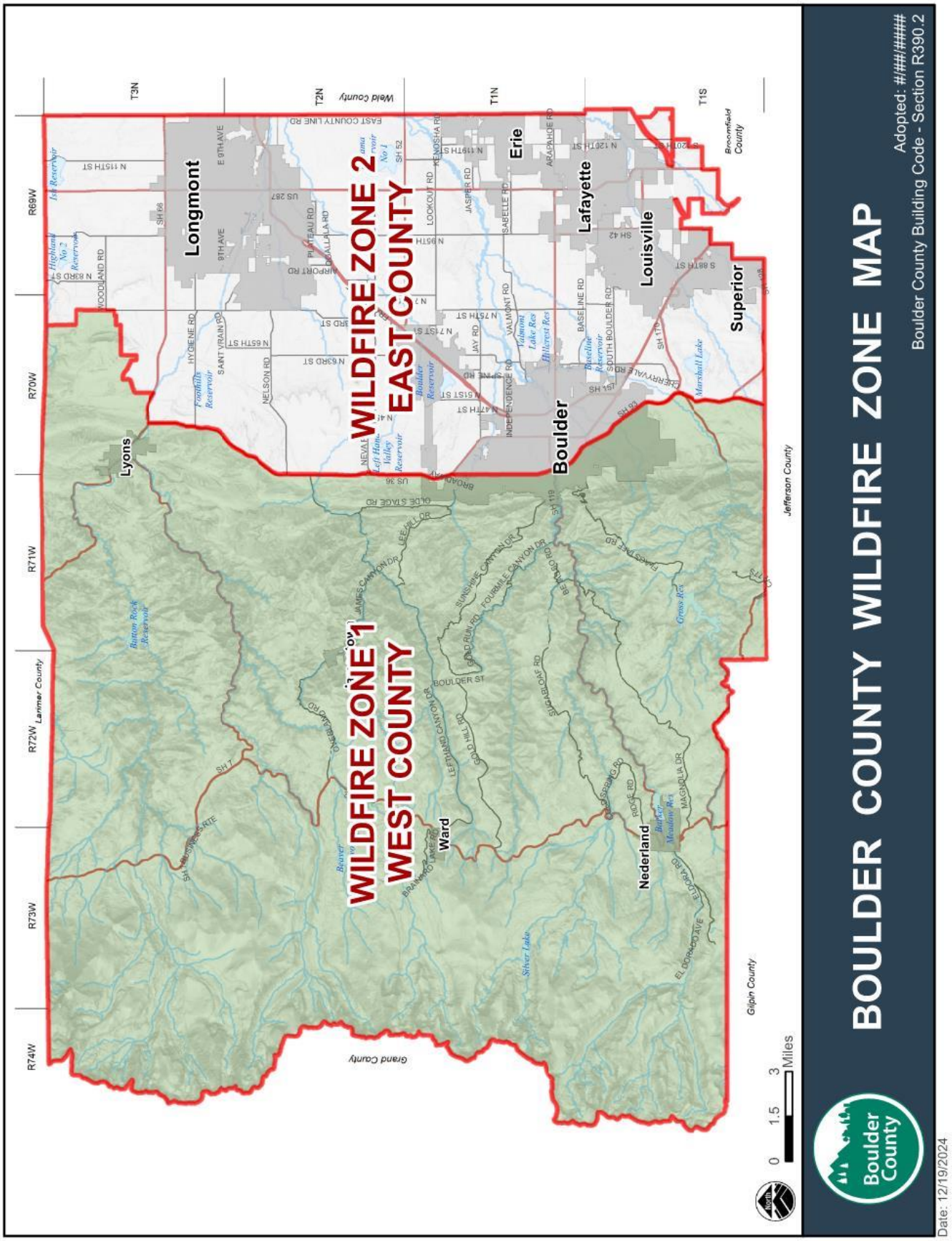
## IRC SECTION R321: ELEVATORS AND PLATFORM LIFTS

*Add IRC Section R321.4, as follows:*

**R321.4 Permits and inspections.**
Each residential conveyance must be applied for on a separate building permit. Inspections shall be performed by an inspector who has obtained ASME QEI-1 certification. The inspection report(s) must be sent to the Building Safety & Inspection Services Division for review and approval at the completion of the work and prior to the use of the conveyance.

*IRC Section R331 through R389 reserved for future code amendments. Add BCBC amendment IRC section R390 to require ignition-resistant construction and defensible space in wildfire hazard areas (Renumbered from IRC Section R327 to identify as Section R390).*

## FIGURE R390.2: WILDFIRE ZONE MAP



**R390.1 Requirements based on locations in wildfire zones.**

**R390.1.1 General.**
Unless other more restrictive requirements, such as those requiring an *approved* wildfire mitigation plan imposed through Site Plan Review or other review processes required by the Boulder County Land Use Code, apply, this section shall be applicable to all new buildings, *additions*, *alterations*, and *repairs*, including buildings designed and constructed in accordance with the *International Building Code*® and *International Wildland-Urban Interface Code*.

**Exceptions:**

1. One-time additions not exceeding 200 square feet in floor area.
2. Accessory structures not exceeding 120 square feet (11 $m^2$) in floor area located not less than 50 feet (15 240 mm) from buildings containing habitable spaces.
3. Agricultural buildings not exceeding 200 square feet (18.58 $m^2$) not less than 50 feet (15 240 mm) from buildings containing habitable spaces.

**R390.2 Wildfire Zones Defined.**
For the purpose of this code, the unincorporated portion of Boulder County is divided into wildfire zones, which shall be known and designated as Wildfire Zone 1-West County and Wildfire Zone 2-East County. The wildfire zones shall include such territory or portions of the unincorporated county as shown in Figure R390.2, the **Wildfire Zone Map**.

**R390.2.1 Buildings Located in More Than One Wildfire Zone.**
A building or structure that is located partly in one wildfire zone and partly in another shall be considered to be in the wildfire zone in which the more restrictive conditions apply.

**R390.2.2 Moved Buildings.**
Any building or structure moved within or into any wildfire zone shall be made to comply with all the requirements for new buildings in that wildfire zone.

**R390.3 Definitions.**
The following words and terms shall, for the purpose of this Section, have the meanings shown herein.

**DEFENSIBLE SPACE.** An area either natural or manmade, where material capable of allowing a fire to spread unchecked has been treated, cleared or modified to slow the rate and intensity of an advancing wildfire and to create an area for fire suppression operations to occur.

**DEFENSIBLE SPACE STANDARD.** The Colorado State Forest Service publication, "Protecting Your Home from Wildfire: Creating Wildfire-Defensible Zones, 2012 Quick Guide" is an *approved* standard for meeting the *defensible space* requirements of Section R390.4.12 or for the creation of a *wildfire mitigation plan*, and can be found online at https://assets.bouldercounty.gov/wp-content/uploads/2024/01/cpp-wildfire-mitigation-co-state-creating-defensible-zones.pdf.

**FIRE-RETARDANT-TREATED WOOD.** Wood products that, when impregnated with chemicals by a pressure process or other means during manufacture, exhibit reduced surface-burning characteristics and resist propagation of fire, as defined in IBC 202 and IRC R202. Wood meeting the requirements of Section R802.1.5 of the *International Residential Code*® or Section 2303.2 of the *International Building Code*®.

**HEAVY TIMBER CONSTRUCTION (Type IV, HT).** Construction with wood framing members, columns, flooring and roof decks sized in accordance with *International Building Code*® Section 602.4.

**IGNITION-RESISTANT BUILDING MATERIAL.** Ignition-resistant building materials shall comply with any one of the following:

1. **Extended ASTM E 84 testing.** Material shall be tested on all sides with the extended ASTM E 84 (UL 723) test or ASTM E 2768, except panel products shall be permitted to test only the front and back faces. Panel products shall be tested with a ripped or cut longitudinal gap of 1/8 inch (3.2 mm). Materials that, when tested in accordance with the test procedures set forth in ASTM E 84 or UL 723 for a test period of 30 minutes, or with ASTM E 2768, comply with the following:

1.1. Flame spread. Material shall exhibit a flame spread index not exceeding 25 and shall not show evidence of progressive combustion following the extended 30-minute test.
1.2. Flame front. Material shall exhibit a flame front that does not progress more than 10-½ feet (3200 mm) beyond the centerline of the burner at any time during the extended 30-minute test.
1.3. Weathering. *Ignition-resistant building material*s shall maintain their performance in accordance with this Section under conditions of use. Materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in the following standards, as applicable to the materials and the conditions of use:
1.3.1. Method A "Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing" in ASTM D 2898, for fire-retardant-treated wood, wood-plastic composite, and plastic lumber materials.
1.3.2. ASTM D 7032 for wood-plastic composite materials.
1.3.3. ASTM D 6662 for plastic lumber materials.
1.4. Identification. All materials shall bear identification showing the fire test results.

**Exception:**
Materials comprised of a combustible core and a noncombustible exterior covering, comprised of either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap.

2. *Noncombustible* material. Material that complies with the requirements for *noncombustible* materials in this section, including but not limited to *approved* materials as follows:
2.1. Cementitious stucco
2.2. Cementitious cladding
2.3. Metal sheeting comprised of either aluminum at a minimum 0.019-inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149-inch (0.38 mm) thickness.
3. Fire-retardant-treated wood. *Fire-retardant-treated wood* labeled for exterior use. Where a section also specifies *fire-retardant-treated wood* with a dimensional thickness, the specified dimension at a minimum is required.

**LOG WALL CONSTRUCTION.** A type of construction in which exterior walls are constructed of solid wood members and where the smallest horizontal dimension of each solid wood member is at least 6-inches (152 mm).

**MULTILAYERED GLAZED PANELS**. Window or door assemblies that consist of two or more independently glazed panels installed parallel to each other, having a sealed air gap in between, within a frame designed to fill completely the window or door opening in which the assembly is intended to be installed.

**NONCOMBUSTIBLE.** As applied to building construction material means a material that, in the form in which it is used, is either one of the following:

1. Material of which no part will ignite and burn when subjected to fire. Any material conforming to ASTM E 136 shall be considered *noncombustible* within the meaning of this Section.
2. Material having a structural base of *noncombustible* material as defined in Item 1 above, with a surfacing material not over 1/8 inch (3.2 mm) thick, which has a flame spread index of 50 or less. Flame spread index as used herein refers to a flame spread index obtained according to tests conducted as specified in ASTM E 84 or UL723.

"*Noncombustible*" does not apply to surface finish materials. Material required to be *noncombustible* for reduced clearances to flues, heating appliances or other sources of high temperature shall refer to material conforming to Item 1. No material shall be classified as noncombustible that is subject to increase in combustibility or flame spread index, beyond the limits herein established, through the effects of age, moisture or other atmospheric condition.

**WILDFIRE MITIGATION PLAN.** A *wildfire mitigation plan* addresses the risk of wildfire both to the subject property and those posed to neighboring properties in the surrounding area by the proposed development through appropriate site location for structures, construction design and the use of ignition-resistant building material, defensible space and fuel reduction around structures, driveway access for emergency vehicles and an emergency water supply for firefighting in accordance with Article 4-804(C.)(12.) and Article 4-806(A.)(5.) of the Boulder County Land Use Code.

**WILDFIRE PARTNERS.** *Wildfire Partners* is a collaborative Boulder County wildfire hazard mitigation program for homeowners that helps to reduce the risk of damage to homes from wildland fire. In *Wildfire Partners*, homeowners take personal responsibility for preparing their home and property for wildland fire and actively participate in an onsite

assessment with a wildfire mitigation specialist. When participants complete their customized *wildfire mitigation plan* and pass their follow up inspection, they receive a *Wildfire Partners* Certificate and may be eligible for financial assistance (www.wildfirepartners.org).

**R390.4 Restrictions in Wildfire Zones.**
Individual buildings or structures constructed in Wildfire Zone 1-West County and Wildfire Zone 2-East County shall comply with this section.

**R390.4.1 Roof covering.**
Roofs shall have a roof assembly that complies with a Class A rating when tested in accordance with ASTM E108 or UL 790.

**Exceptions:**

1. Class A roof assemblies include those with coverings of brick, masonry or an exposed concrete roof deck.
2. Class A roof assemblies also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile or slate installed on noncombustible decks or ferrous, copper or metal sheets installed without a roof deck on noncombustible framing.
3. Class A roof assemblies include minimum 16 ounce per square foot (0.0416 kg/ $m^2$) copper sheets installed over combustible decks.
4. Class A roof assemblies include slate installed over ASTM D226, Type II underlayment over combustible decks.

For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be fire stopped to preclude entry of flames or embers, or have one layer of 72-pound (32.4 kg) mineral-surfaced, non-perforated cap sheet complying with ASTM D 3909 installed over the combustible decking.

**R390.4.1.1 Roof valleys.**
When provided, valley flashings shall be not less than 0.019-inch (No. 26 galvanized sheet gauge) corrosion-resistant metal installed over a minimum 36-inch (914 mm) wide underlayment consisting of one layer of 72-pound mineral-surfaced, non-perforated cap sheet complying with ASTM D 3909 running the full length of the valley.

**R390.4.1.2 Light transmitting plastics in roof installations.**
In all Wildfire Zones, light-transmitting plastics, including thermoplastic, thermosetting or reinforced thermosetting plastic material, shall conform to the Class CC1 combustibility classification referenced in the International Building Code® section 2606.4.

**R390.4.2 Gutters and downspouts.**
Gutters, downspouts, and gutter covering devices shall be constructed of noncombustible material. Gutters shall be provided with an *approved* means to prevent the accumulation of leaves, pine needles and debris in the gutter. Where downspouts, gutters and/or gutter guards are replaced or installed they shall be of noncombustible material.

**Exception:**

1. Buildings meeting one of the exceptions to *International Residential Code* Section R401.3.1 and *International Building Code* 1804.4 of this code may be constructed without gutters and downspouts.
2. Structures where gutter guards have not been previously installed and a reroof is performed, do not require gutter guards to be installed.

**R390.4.3 Spark arrestors.**
Chimneys serving fireplaces, barbecues, incinerators or decorative heating appliances in which solid or liquid fuel is used shall be protected with a spark arrester. Spark arresters shall be constructed of woven or welded wire screening of 12 USA standard gauge wire (0.1046 inch)(2.66 mm) having openings not exceeding 1/2-inch (12.7 mm). The net free area of the spark arrester shall not be less than four times the net free area of the outlet of the chimney.

**R390.4.4 Fences, retaining walls and similar appurtenances.**
Fences, retaining walls or other appurtenances that connect to buildings must be constructed of *noncombustible materials* or *ignition-resistant materials* for a distance of 5-feet beyond the exterior walls.

**R390.4.5 Overhanging projections.**

All exterior projections including, but not limited to, exterior balconies, carports, decks, patio covers, porch ceilings, unenclosed roofs and floors, overhanging buildings and similar architectural appendages and projections shall be protected as specified in this section.

**R390.4.5.1 Exterior open covers, patio covers, porch ceilings, roof eaves, soffits and cornices.**
The exposed underside of exterior patio ceilings, porch ceilings, rafter or truss eaves, soffits, and cornices shall be protected by one of the following:

1. Noncombustible material.
2. Ignition-resistant material.
3. Heavy timber construction.
4. 3/4-inch-thick nominal fire retardant-treated plywood labeled for exterior use.
5. Any approved inherently noncombustible material as defined by the NFPA, with approved defensible space within 12-feet (3658 mm) above grade.

**Exception:**
Rafter tails or roof beam ends may be exposed if they are heavy timber having minimum dimensions not less than 6-inch (152 mm) nominal in width and not less than 8-inches (203 mm) nominal in depth.

**R390.4.5.1.1 Protection of fascia.**
The leading edge of the roof at the fascia must be finished with a metal drip edge so that no wood sheathing is exposed.

**R390.4.5.1.2 Soffits and eaves extending over horizontal surfaces.**
"Combustible materials" (materials not considered noncombustible), including wood products, are not allowed to be installed within 6-inches (152 mm) of a horizontal surface, including but not limited to dormer roof eaves, roof eaves that extend over grade or decks, and areas where embers may accumulate within 6-inches (152 mm) of the eave. Noncombustible materials shall be used on soffits and eaves within 6-inches (152 mm) of an adjacent horizontal and sloped surfaces, including grade, deck, or roof construction.

**R390.4.5.2 Floor projections including unenclosed under floor protection 12 feet or less above finished grade.**
Buildings or structures shall have all underfloor areas enclosed to the ground with exterior walls in accordance with Section R390.4.6. For decks, see Section R390.4.8.

**Exception:**
Complete enclosure of floor projections and unenclosed floor areas exposed to the exterior may be omitted the exposed underside of cantilevered floor projections and exposed, unenclosed floor areas less than 12 feet (3658 mm) above grade or the surface, measured at any portion below, are protected by one of the following:

1. *Heavy timber construction.*
2. 3/4-inch (19.0 mm) thick nominal *fire retardant-treated* plywood labeled for exterior use.
3. One layer of 5/8-inch (15.9 mm) Type X exterior gypsum sheathing applied behind an exterior covering on the underside of the floor projection. Where finish materials are applied to the surface, those materials must be ignition resistant.
4. The exterior portion of a 1-hour fire-resistance-rated exterior assembly, as tested in accordance with ASTM E119 or UL 263, applied to the underside of the ceiling, roof ceiling or floor/ceiling, assembly, including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual. Where finish materials are applied to the surface, those materials must be ignition resistant.
5. Materials *approved* for not less than 1-hour fire resistance-rated construction on the exterior side, as tested in accordance with ASTM E119 or UL 263. Where finish materials are applied to the surface, those materials must be ignition resistant.

**R390.4.5.3 Floor projections including unenclosed under floor protection 200 square feet or less in area or greater than 12 feet above finished grade.**
Buildings or structures shall have all underfloor areas enclosed to the ground with exterior walls in accordance with Section R390.4.6. For decks, see Section R390.4.8.

**Exception:**
Complete enclosure of floor projections and unenclosed floor areas exposed to the exterior may be omitted where the exposed underside of cantilevered floor projections and exposed, unenclosed floor areas greater 12 feet (3658 mm) above grade or the surface, measured at any portion below, are protected by one of the following:

1. Any method listed in R390.4.5.2.

2. *Noncombustible material*.
3. *Ignition-resistant material*.
4. *Heavy timber construction.*
5. 3/4-inch-thick nominal *fire retardant-treated* plywood labeled for exterior use.
6. Any inherently *noncombustible material* as defined by the NFPA.

**R390.4.6 Exterior walls.**
Exterior walls of buildings or structures shall be constructed with one of the following methods:
1. *Approved noncombustible materials*.
2. *Heavy timber construction* or log wall construction.
3. *Fire-retardant-treated wood* labeled for exterior use on the exterior side.
4. *Ignition-resistant materials* on the exterior side.

Such material shall extend from the top of the foundation to the underside of the roof sheathing.

"Combustible materials" are materials not considered noncombustible, including wood products, are not allowed to be installed within 6-inches (152 mm) of a horizontal surface that extends 6-inches (152 mm) from the vertical plane of the wall. Noncombustible materials shall be used on walls within 6-inches (152 mm) of an adjacent horizontal surface, including grade, deck, or roof construction.

**Exception:**
Trim is not required to meet the materials requirements for exterior walls, where installed more than 6-inches (152 mm) above grade, floor, deck, or roof where wall abuts the horizontal surface.

**R390.4.6.1 The base of exterior walls.**
The base of exterior walls, posts or columns shall be protected on the bottom side with provisions such as metal flashing or wire mesh having openings no larger than 1/8-inch (3.2 mm) to protect them from ember intrusion and still allow for weeping and moisture control.

**R390.4.7 Reserved.**

**R390.4.8 Decks, appendages, and projections.**
Decks and other unenclosed accessory structures attached to buildings shall be constructed of the following materials:

**R390.4.8.1 Deck surface:**
*Noncombustible* material, *approved* wood thermoplastic composite lumber with an ASTM E84 *flame spread index* no greater than 200, *ignition-resistant building materials,* or any *approved* Class A roof assembly.

**R390.4.8.2 Deck framing:**
Deck framing shall be constructed of one of the following:
1. Metal
2. *Heavy timber* construction.
3. *Approved noncombustible materials*.
4. *Fire-retardant-treated wood* labeled for exterior use.
5. *Ignition-resistant building materials.*
6. Wood with a minimum nominal thickness of at least 2-inches for joists and 2-2x members for beams and columns or posts, fastened tightly together.

**R390.4.8.3 Deck Rails:**
Horizontal deck rails and guard rails shall be constructed of materials allowed under R390.4.8.1 and R390.4.8.2 where within 5-feet of the exterior walls.

**R390.4.8.4 Decks less than 4 feet above finished grade.**
Decks that are less than 4 feet to the deck walking surface shall be enclosed with noncombustible corrosion-resistant mesh with openings not to exceed 1/8 inches, or other *approved* materials. Enclosure shall not restrict clearance required for emergency escape and rescue openings required in IRC section R310 and IBC section 1031. The area beneath the deck shall be cleared of vegetation, debris, building materials, and combustible storage.

**R390.4.8.5 Pergolas and similar construction:**
Pergola framing shall be constructed of one of the following:

1. Metal
2. Heavy timber construction.
3. Approved noncombustible materials.
4. Fire-retardant-treated wood labeled for exterior use.
5. Ignition-resistant building materials.
6. Wood with a minimum nominal thickness of at least 2-inches for joists and 2-2x members for beams and columns or posts, fastened tightly together.

**R390.4.9 Exterior windows and glazing.**
Exterior windows, window walls, glazed doors, windows within exterior doors, and skylights shall be tempered glass, multilayered glazing, glass block, or have a fire protection rating of not less than 20 minutes. Unless they are part of a fire-rated assembly, window frames and sashes may be of any material permitted by this code.

**Exception:**

1. Windows with unreinforced vinyl frames or sashes are not permitted.
2. Individual buildings or structures on a property located in Wildfire Zone 2-East County are not required to comply with R390.4.9.

**R390.4.10 Exterior doors.**
Exterior doors and garage doors shall be *approved* noncombustible construction, metal clad, solid core wood not less than 1-3/4 inches in thickness, or have a fire protection rating of not less than 20 minutes. Windows within doors and glazed doors shall be in accordance with Section R390.4.9.

**Exception:**

1. Vehicle access doors.
2. Individual buildings or structures on a property located in Wildfire Zone 2-East County are not required to comply with R390.4.10.

**R390.4.11 Vents.**
Where provided, ventilation openings for enclosed attics, gable ends, ridge ends, under eaves and cornices, enclosed eave soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of ceilings are applied directly to the underside of roof rafters, underfloor ventilation, foundations and crawl spaces, or any other opening intended to permit ventilation, either in horizontal or vertical surface, including but not limited to rain screens, shall be in accordance with Section R390.4.11.1 or section R390.4.11.2 to resist building ignition from the intrusion of burning embers and flame through the ventilation openings.

**R390.4.11.1 Performance requirements.**
Ventilation openings shall be fully covered with listed vents tested in accordance with ASTM E2886, to demonstrate compliance with all of the following requirements.

1. There shall be no flaming ignition of cotton material during the Ember Intrusion Test.
2. There shall be no flaming or ignition during Integrity Test portion of the Flame Intrusion Test.
3. The maximum temperature of the unexposed side of the vent shall not exceed 662 deg F.

**R390.4.11.2 Prescriptive requirements.**
Where provided, attic ventilation openings, foundation or underfloor vents, or other ventilation openings vertical or horizontal surfaces and vents through roofs shall not exceed 144 square inches each. Such vents shall be covered with noncombustible corrosion resistant mesh with openings not to exceed 1/8-inch (3.2 mm) or shall be designed and *approved* to prevent flame or ember penetration into the structure.

*Note: Delete R327.4.12. When renumbered to R390, renumber subsections as appropriate for sequencing.*

**R390.4.12 Defensible space.**
Individual buildings or structures on a property must be provided with a fuel modification zone in accordance with the *defensible space standard*. When additions requiring a permit occur, both existing and new structures must be provided with *defensible space* in accordance with this section. The fuel modification zone must be maintained at all times.

**Exceptions:**

1. The implementation and completion of an *approved wildfire mitigation plan* prior to final inspection approval for the project.
2. Participation in the *Wildfire Partners* program and the issuance of a *Wildfire Partners* certificate prior to final inspection approval for the project.
3. Individual buildings or structures on a property located in Wildfire Zone 2-East County are not required to comply with *defensible space standard*, but must comply with R390.12.1.
4. In Wildfire Zone 1-West County, construction limited to new covered projections, porches, decks, or *repairs* to existing decks shall adhere solely to the requirements of Defensible Space Management Zone 1 per the *defensible space standard.* Furthermore, a weed barrier and gravel must be installed on all sides of the construction in accordance with Section R390.4.12.1.

**R390.4.12.1 Weed barrier and gravel or crushed rock specific.**
A weed barrier and gravel or crushed rock not less than 3/4-inch in diameter applied at least 2-inches thick must be installed beneath decks, unenclosed floors, and around the perimeter of the building to extend at least 5-feet beyond the exterior walls and at least 2-feet beyond the driplines of decks, bay windows and other eaves and overhangs.

**Exception:**
Noncombustible surfaces, such as poured concrete or asphalt, or other approved noncombustible materials, such as a weed barrier and brick, concrete or stone pavers, may be used to satisfy this requirement.

*Delete the Sections R390.5 (R327.5) entirely, requirements are incorporated throughout R390.5 (R327.4) as exceptions where specific requirements were omitted for wildfire zone 2-east when adopted (effective June 6, 2022.)*

# IRC CHAPTER 4: FOUNDATIONS

## SECTION R401: GENERAL

*Adopt Chapter 4 as published, except amend as follows. Add IRC section R401.3.1.*

**R401.3.1 Gutters and downspouts.**
Gutters, downspouts, and downspout extensions are required on all buildings.

**Exceptions:**

1. Post framed buildings.
2. Buildings where, in the opinion of the *building official*, the gutters will become damaged by sliding snow.
3. Roofs with eaves or overhangs of six feet or greater.
4. Roofs that are constructed with internal roof drains.
5. Buildings where an *approved* alternate means of drainage is designed by a soils engineer, or other qualified registered design professional.

*Adopt Chapter 5 through Chapter 8 as published, except to amend as follows. Amend section R806.1 as follows.*

# IRC CHAPTER 8: ROOF-CEILING CONSTRUCTION

## SECTION R806: ROOF VENTILATION

**R806.1 Roof ventilation.** See the provisions of Section R390.4.11 for attic ventilation in Wildfire Zones.

# IRC CHAPTER 9: ROOF ASSEMBLIES

## IRC SECTION R902: ROOF COVERING MATERIALS

*Adopt Chapter 9 as published except to amend as specifically noted as follows. Amend IRC Section R902.1, as follows:*

**R902.1 Roof covering materials.**
Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in *jurisdictions* designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a *lot line*. Class A, B and C roofing required by this section to be *listed* shall be tested in accordance with ASTM E108 or UL 790.
See Section R327.4.1 for roof covering materials requirements. Roof coverings in Wildfire Zones shall comply with IRC amendment R390.4.1.

**Exceptions:**

1. Class A roof assemblies include those with coverings of brick, masonry and exposed concrete roof deck.
2. Class A roof assemblies include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile, or slate installed on noncombustible decks.
3. Class A roof assemblies include minimum 16 ounces per square foot copper sheets installed over combustible decks.
4. Class A roof assemblies include slate installed over underlayment over combustible decks.

### IRC SECTION R903: ROOF DRAINAGE

*Amend IRC Section R903.4.3.1.1, as follows:*
**R903.4.1.1 Sizing of roof drains, scuppers, and downspouts.** The rainfall amount to be used to size roof drainage components shall be 2.4 inches per hour.

### IRC SECTION R905: REQUIREMENTS FOR ROOF COVERINGS

*Add section R905.2.4.2 to read as follows:*

**R905.2.4.2 Impact resistance of asphalt shingles.**
Asphalt shingles shall be Class 4 impact resistant, tested in accordance with UL 2218, and installed in accordance with the manufacturer's installation instructions.

**Exceptions:**

1. When an owner wishes to replace existing asphalt shingles that are less than class 4 impact resistant with tiles of a similar color or style, and there are no class 4 impact resistance shingles available of similar color or style, the *building official* may approve alternate materials that are less than class 4 impact resistant, so long as the replacement shingles are the highest class of impact resistant shingles available that match the color or style of the existing shingles. If no impact resistant materials are available, the *building official* may approve non-impact resistant materials that meet all other applicable requirements of this Code.
2. For repairs or additions to existing asphalt singles that are less than class 4 impact resistant, the owner may use the same or similar materials regardless of impact resistance of the new shingles.

## IRC CHAPTER 10: CHIMNEYS AND FIREPLACES

*Adopt Chapter 10 as published, except amend section 1004.4 to read as follows:*

**R1004.4 Unvented gas log heaters.**
An unvented gas log heater shall not be installed in a factory-built fireplace.

# Part IV—Energy Conservation: "BuildSmart"

## IRC CHAPTER 11: ENERGY EFFICIENCY

*Note: IRC Chapter 11 is amended to contain the requirements of the Boulder County BuildSmart program for residential energy efficiency and sustainability. Amended as such, the provisions are not interchangeable with the Residential Energy [RE] provisions of the International Energy Conservation Code.*

### SECTION N1101: GENERAL ADMINSTRATION

**N1101.1 Scope.**
This chapter regulates the energy efficiency for the design and construction of buildings regulated by this code.

**Exception:** Federally-certified manufactured dwellings and state-certified factory-built dwellings.

**N1101.2 Intent.**
This chapter shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each *building*. This chapter is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This chapter is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances. This chapter implements the provisions of the "Boulder County BuildSmart" program. BuildSmart serves the County's stated goals of promoting and encouraging high performing, sustainable residential development and redevelopment in the unincorporated areas of Boulder County by: promoting development that will create energy efficient structures that reduce both the production of green-house gases from residential buildings and the amount of material sent to landfills; conserving water and other natural resources in the homebuilding process; and insuring proper indoor air quality. BuildSmart also furthers the goals and measures outlined in the Colorado Climate Action Plan and the county's Sustainable Energy Plan. The production and efficient use of energy will continue to play a central role in the future of Colorado and the nation as a whole. The development, production, and efficient use of renewable energy will advance the security, economic well-being, and public and environmental health of Colorado, as well as contributing to the energy independence of our nation. The 2021 revision to BuildSmart continues to include both performance options and a prescriptive option for compliance, providing additional flexibility in selection of the most cost-effective design for each project.

**N1101.3 Compliance materials.**
The *building official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

**N1101.3.1 Compliance Documentation.**
The code official is authorized to require *compliance documentation*, certificates, or reports prior to issuance of the building permit, the certificate of occupancy, or prior to passing inspection. The production of these documents shall be in support of demonstrating compliance with the applicable requirements, construction installation method, or the energy compliance path being used.

**N1101.4 Above code programs.**
The *building official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy-efficiency program to exceed the energy efficiency required by this code. Buildings *approved* in writing by such an energy-efficiency program shall be considered in compliance with this code.

**N1101.5 Information on construction documents.**
Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *building 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 as herein governed. Details shall include, but are not limited to, as applicable:

1. Energy Compliance Path
2. Insulation materials and their *R-value*s.
3. Fenestration U-factors and SHGCs.
4. Area-weighted *U-factor* and SHGC calculations.
5. Mechanical system design criteria
6. Mechanical and service water heating system and equipment types, sizes and efficiencies.
7. Equipment and system controls.
8. Duct sealing, duct and pipe insulation and location.
9. Air sealing details.
10. Details of additional electric infrastructure, including branch circuits, conduit, or pre-wiring, and panel capacity in compliance with the provisions of this code.
11. Location of pathways for routing of raceways or cable from the *solar-ready* zone to the electrical service panel.
12. Location of designated EV-Ready spaces.

**N1101.5.1 Thermal envelope depiction.**
The building's thermal envelope shall be represented on the construction drawings.

**N1101.6 Defined terms.**
The following words and terms shall, for the purposes of this chapter, have the meanings shown herein.

**N1101.6.1 Interchangeability.**
Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

**N1101.6.2 Terms defined in other codes.**
Terms that are not defined in this code but are defined in the *International Building Code®*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code* or the *International Residential Code* shall have the meanings ascribed to them in those codes.

**N1101.6.3 Terms not defined.**
Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

**ABOVE-GRADE WALL.** A wall more than 50 percent above grade and enclosing *conditioned space*. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.

**ACCESS (TO).** That which enables a device, appliance or equipment to be reached by *ready access* or by a means that first requires the removal or movement of a panel or similar obstruction.

**ADDITION.** An extension or increase in the *conditioned space* floor area, number of stories, or height of a building or structure.

**AIR BARRIER.** Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material or a combination of materials.

**AIR-HANDLING UNIT.** A blower or fan used for the purpose of distributing supply air to a room, space or area.

**ALL-ELECTRIC BUILDING.** A *building* and building site that contains no *combustion equipment*, or plumbing for *combustion equipment*, and that uses heat pump technology as the primary supply for heating, cooling, and service water **heating loads.**

**ALTERATION.** Any construction, retrofit, remodel, or renovation to an existing structure other than *repair* or *addition*. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension to an addition or change to the existing arrangement or layout, type or purpose of the original installation. Alternations may convert unfinished conditioned space to finished space, or may impact the buildings thermal envelope.

**APPROVED.** Acceptable to the *code official.*

**APPROVED THIRD PARTY INSPECTION AGENCY.** An established and recognized agency that is regularly engaged in conducting tests furnishing inspection services, or furnishing product certification, where such agency has been *approved* by the *code official*.

**AUTOMATIC.** Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").

**BALANCED VENTILATION SYSTEM.** A ventilation system that simultaneously supplies outdoor air to and exhausts air from a space, where the mechanical supply airflow rate and the mechanical exhaust airflow rate are each within 10% of the average of the two airflow rates.

**BASEMENT WALL.** A wall 50 percent or more below grade and enclosing *conditioned space*.

**BUILDING.** Any structure used or intended for supporting or sheltering any use or occupancy, including any mechanical systems, service water heating systems and electric power and lighting systems located on the building site and supporting the building.

**BUILDING SITE.** A contiguous area of land that is under the ownership or control of one entity.

**BUILDING THERMAL ENVELOPE.** The basement walls, exterior walls, floor, roof and any other building elements that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

**CARBON DIOXIDE EQUIVALENT ($CO_2e$).** A measure used to compare the impact of various greenhouse gases based on their *global warming potential (GWP.)* $CO_2e$ approximates the time-integrated warming effect of a unit mass of a given greenhouse gas relative to that of carbon dioxide ($CO_2$).

**$CO_2$ Index:** An operational carbon index derived when using ANSI/RESNET/ICC 301 2022 Addendum B $CO_2e$ Rating Index

**CAVITY INSULATION.** Insulating material located between framing members.

**CIRCULATING HOT WATER SYSTEM.** A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.

**CLIMATE ZONE.** A geographical region based on climatic criteria as specified in this code.

**CODE OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative. (Term may be interchangeable with *building official*.)

**COMBUSTION EQUIPMENT.** Any equipment or appliances used for space heating, cooling, water heating (including pools and spas), cooking, clothes drying or lighting that uses natural gas, propane, other fuel gas, or fuel oil.

**COMPLIANCE DOCUMENTS.** Documents that are not required to be prepared by a registered design professional that demonstrate compliance with this code and are reviewed prior to the issuance of the building permit or before certificate of occupancy is released.

**CONDITIONED FLOOR AREA.** The horizontal projection of the floors associated with the *conditioned space*. For the purposes of this chapter, the *conditioned floor area* shall be measured as the floor area within the inside face of the interior *air barrier*.

**CONDITIONED SPACE.** An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling.

**CONTINUOUS AIR BARRIER.** A combination of materials and assemblies that restrict or prevent the passage of air through the building thermal envelope.

**CONTINUOUS INSULATION (ci).** Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior, or is integral to any opaque surface, of the building envelope.

**CRAWL SPACE WALL.** The opaque portion of a wall that encloses a crawl space and is partially or totally below grade.

**CURTAIN WALL.** *Fenestration* products used to create an external nonload-bearing wall that is designed to separate the exterior and interior environments.

**DECONSTRUCTION.** The dismantling of an existing building or portion thereof without the use of heavy machinery or the destruction of the materials. Deconstruction includes the salvage of materials from the existing structure for recycling, resale, or reuse as an alternative to sending them to a landfill. There are two types of deconstruction, structural and non-structural deconstruction.

**DECONSTRUCTION, NON-STRUCTURAL.** Non-Structural deconstruction (also referred to as soft-stripping) is the removal and reclaiming of the reusable non-structural components such as appliances, cabinets, doors, windows, flooring, fixtures, and finish materials.

**DECONSTRUCTION, STRUCTURAL.** Structural deconstruction is the removal and reclaiming of the reusable structural components of a building, such as walls, floors, and roofs.

**DECONSTRUCTION PROFESSIONAL.** A professional engaged in the deconstruction field.

**DEMAND RECIRCULATION WATER SYSTEM.** A water distribution system where one or more pumps prime the service hot water piping with heated water on demand for hot water.

**DAMPER.** A manually or automatically controlled device to regulate draft or the rate of flow of air or combustion gases.

**DIMMER.** A control device that is capable of continuously varying the light output and energy use of light sources.

**DEMOLITION.** The tearing down of an existing structure and the disposal of its components or materials without the implementation of deconstruction techniques.

**DEMAND RECIRCULATION WATER SYSTEM.** A water distribution system where pump(s) prime the service hot water piping with heated water upon demand for hot water.

**DUCT.** A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

**DUCT SYSTEM.** A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.

**DUCTWORK.** The assemblies of connected ducts, plenums, boots, fittings, dampers, supply registers, return grilles, and filter grilles through which air is supplied to or returned from the space to be heated, cooled, or ventilated. Supply ductwork delivers air to the spaces from the *space conditioning equipment*. Return ductwork conveys air from the spaces back to the *space conditioning equipment*. Ventilation ductwork conveys air to or from any space.

**DWELLING UNIT.** A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

**DWELLING UNIT ENCLOSURE AREA.** The sum of the area of ceiling, floors, and walls separating a dwelling unit's conditioned space from the exterior or from adjacent conditioned or unconditioned spaces. Wall height shall be measured from the finished floor of the *dwelling unit* to the underside of the floor above.

**ENERGY ANALYSIS.** A method for estimating the annual energy use of the *proposed design* and *standard reference design* based on estimates of energy use.

**ENERGY COST.** The total estimated annual cost for purchased energy for the building functions regulated by this code, including applicable demand charges.

**ENERGY SIMULATION TOOL.** An approved software program or calculation-based methodology that projects the annual energy use of a building.

**ENERGY RATING INDEX (ERI).** A numerical integer value that represents the relative energy performance of a rated design or constructed *dwelling unit* as compared with the energy performance of the ERI / HERS Reference Design, where an ERI / HERS value of 100 represents the energy performance of the ERI / HERS Reference Design and an ERI / HERS value of 0 represents a rated design or constructed *dwelling unit* with zero net energy performance.

**ENERGY STAR (for homes)**, A national program from the U.S. Environmental Protection Agency (EPA) that certifies new homes for features related to energy efficiency, durability, and indoor air quality (www.energystar.gov).

**EPD:** Environmental Product Declarations (EPDs)

**ERI REFERENCE DESIGN.** A version of the rated design that meets the minimum requirements of the 2006 *International Energy Conservation Code.*

**EXISTING BUILDING.** A building erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

**EXTERIOR WALL.** Walls including both above-grade walls and basement walls.

**FENESTRATION.** Products classified as either vertical *fenestration* or skylights.

**Skylights.** Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal, including unit skylights, tubular daylighting devices, and glazing materials in solariums, sunrooms, roofs and sloped walls.

**Vertical *fenestration*.** Windows that are fixed or operable, opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of not less than 60 degrees (1.05 rad) from horizontal.

**FENESTRATION PRODUCT, SITE-BUILT.** A *fenestration* designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built *fenestration* include storefront systems, curtain walls, and atrium roof systems.

**GLOBAL WARMING POTENTIAL (GWP).** A measurement that combines the impact of the various greenhouse gases relative to an equivalent unit of carbon dioxide over a given period of time.

**HEATED SLAB.** Slab-on-grade construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.

**HIGH EFFICACY LIGHT SOURCES**. Compact fluorescent lamps, light-emitting diode (LED) lamps, T-8 or smaller diameter linear fluorescent lamps, other lamps with an efficacy of not less than 65 lumens per watt, or luminaires with an efficacy of not less than 45 lumens per watt.

**HISTORIC BUILDING.** Buildings that are listed in or eligible for listing in the National Register of Historic Places or designated as historic under an appropriate state or local law.

**INDUSTRY-WIDE TYPE III ENVIRONMENTAL PRODUCT DECLARATION (IW-EPD).** Type III environmental product declaration (EPD) that estimates the average *global warming potential* of a specific product within an industry. Complies with the goal and scope for the production stage of at least cradle-to-gate in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The EPD results represent production weighted average data across multiple manufacturers.

**INFILTRATION.** The uncontrolled inward air leakage into a *building* caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

**INSULATED SIDING.** A type of continuous insulation with manufacturer-installed insulating material as an integral part of the cladding product having a minimum R-*value* of R-2 and is installed in a manner that places the insulation in direct contact with the surface that it is intended to insulate without gaps or voids.

**INSULATING SHEATHING.** An insulating board with a core material having a minimum R-*value* of R-2.

**LEED.** Leadership in Energy & Environmental Design is a green building certification program that encourages green building strategies and practices. To receive *LEED* certification, building projects satisfy prerequisites and earn points to achieve different levels of certification. *LEED* is a program of the US Green Building Council (USGBC) (http://www.usgbc.org/leed).

**LIVING BUILDING CHALLENGE.** A green building certification program administered by the International Living Future Institute. To be certified under this program, projects must meet a series of ambitious performance requirements (http://living-future.org).

**MANUAL.** Capable of being operated by personal intervention (see "Automatic").

**MIXED-FUEL BUILDING.** A *building* and *building site* that contains combustion equipment, or plumbing for combustion equipment, for space heating, cooling, water heating (including pools and spas), cooking, or clothes drying.

**OCCUPANT SENSOR CONTROL**. An automatic control device that detects the presence or absence of people within an area and causes lighting, equipment or appliances to be regulated accordingly.

**OCCUPIABLE SPACE.** An enclosed space intended for human activities, excluding those spaces intended primarily for other purposes, such as storage rooms and equipment rooms, that are only intended to be occupied occasionally and for short periods of time.

**ON-SITE RENEWABLE ENERGY.** Energy from *renewable energy resources* harvested at the building site.

**PASSIVE HOUSE.** The term *Passive house* (Passivhaus in German) refers to a rigorous standard for energy efficiency in buildings. It results in buildings that require little energy for space heating or cooling. The certification program is administered by PHIUS, or PHI, which are 501(c)3 organizations that provides research, technical standards, training, certification and design tools (www.phius.org) (https://passivehouse-international.org/ )

**PRODUCT.** Any material or product procured for permanent installation in the *building* that has the same specification requirements and is classified by the same product category rule.

**PRODUCT-SPECIFIC TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD).** Also known as manufacturer specific EPD. Type III environmental product declaration (EPD) complying with the goal and scope for the production stage of at least cradle-to-gate in accordance with ISO Standards 14025 and 21930 and be available in a publicly accessible database. The data can represent the impacts of a specific design and manufacturers across multiple facilities or be facility specific.

**PROPOSED DESIGN.** A description of the proposed *building* used to estimate annual energy use for determining compliance based on total building performance.

**RATED DESIGN.** A description of the proposed building used to determine the energy rating index.

**READY ACCESS (TO).** That which enables a device, appliance or equipment to be directly reached without requiring the removal or movement of any panel or similar obstruction.

**RENEWABLE ENERGY CERTIFICATE (REC).** An instrument that represents the environmental attributes of one megawatt hour of renewable energy; also known as an energy attribute certificate (EAC).

**RENEWABLE ENERGY RESOURCES.** Energy derived from solar radiation, wind, waves, tides, landfill gas, biogas, biomass or extracted from hot fluid or steam heated within the earth.

**RENEWABLE ENERGY SYSTEMS**. Any *renewable energy systems* which meet the intent of the required on-site renewable energy offset required by other sections of this code, including solar thermal systems, solar photovoltaic electric systems, geothermal heating systems, wood- and pellet-burning stoves, boilers, or furnaces, small scale wind generation systems, and other similar systems.

**REPAIR.** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage. For definitions applicable in Chapter 11, see Section N1101.9.

**REROOFING**. The process of recovering or replacing an existing roof covering. See "Roof recover" and "Roof replacement."

**RESIDENTIAL BUILDING**. For this chapter, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) as well as Group R-2, R-3 and R-4 *building*s three stories or less in height above grade plane.

**ROOF ASSEMBLY.** A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof covering, underlayment, and roof deck, and can also include a thermal barrier, ignition barrier, insulation or a vapor retarder.

**ROOF RECOVER**. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

**ROOF REPAIR.** Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

**ROOF REPLACEMENT.** The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

**R-value / R-factor (THERMAL RESISTANCE).** The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \times ft^2 \times °F/Btu$) [$(m^2 \times K)/W$].

**SERVICE WATER HEATING**. Supply of hot water for purposes other than comfort heating.

**SOLAR HEAT GAIN COEFFICIENT (SHGC).** The ratio of the solar heat gain entering the space through the *fenestration* assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation that is then reradiated, conducted, or convected into the space.

**SOLAR-READY ZONE.** A section or sections of the roof or *building* overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.

**SPACE CONDITIONING.** The treatment of air so as to control the temperature, humidity, filtration or distribution of the air to meet the requirements of a conditioned space.

**SPACE CONDITIONING EQUIPMENT.** The heat exchangers, air-handling units, filter boxes, and any apparatus installed in connection therewith used to provide space conditioning.

**STANDARD REFERENCE DESIGN.** A version of the *proposed design* that meets the minimum requirements of this

code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.

**SUNROOM.** A one-story structure attached to a dwelling with a glazing area in excess of 40 percent of the gross area of the structure's exterior walls and roof.

**THERMAL DISTRIBUTION EFFICIENCY (TDE).** The resistance to changes in air heat as air is conveyed through a distance of air duct. TDE is a heat-loss calculation evaluating the difference in the heat of the air between the air duct inlet and outlet caused by differences in temperatures between the air in the duct and the duct material. TDE is expressed as a percent difference between the inlet and outlet heat in the duct.

**THERMAL ISOLATION.** Physical and space conditioning separation from *conditioned space*(s). The *conditioned space*(s) shall be controlled as separate zones for heating and cooling or conditioned by separate equipment.

**THERMOSTAT.** An automatic control device used to maintain temperature at a fixed or adjustable set point.

**U-FACTOR / U-value (THERMAL TRANSMITTANCE).** The co-efficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h × $ft^2$ × °F) [W/ ($m^2$ × K)].

**VENTILATION AIR.** That portion of supply air that comes from outside (outdoors) plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.

**VISIBLE TRANSMITTANCE [VT].** The ratio of visible light entering the space through the *fenestration* product assembly to the incident visible light, Visible Transmittance, includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

**Whole building lifecycle analysis (WB LCA):** An analysis of a *building* and its *building* components lifetime environmental impact, including but not limited to embodied and operational carbon impact, on the environment locally and globally.

**WHOLE HOUSE MECHANICAL VENTILATION SYSTEM.** An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air with outdoor air when operating continuously or through a programmed intermittent schedule to satisfy the whole house ventilation rates.

**ZERO ENERGY READY HOMES (ZERH).** This national certification program from the U.S. Department of Energy (DOE) was previously known as the "Challenge Home" program. This program incorporates the basics of the Energy Star for Homes program, and adds additional requirements for water conservation, indoor air quality, and energy efficiency (http://energy.gov/eere/buildings/zero-energy-ready-home).

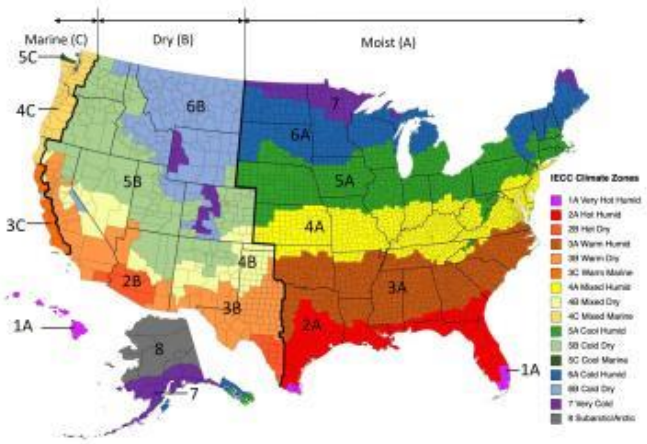
**ZONE.** A space or group of spaces within a *building* with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained throughout using a single controlling device.

**N1101.7 Climate zone.**
All of unincorporated Boulder County shall be considered Climate Zone 5. For the purpose of this code, Boulder County shall be in climate zone 5. Sites that are above 7500 feet in elevation above sea levels shall be evaluated with additional engineering based on the elevation and climate effects.

*Note: Tables N1101.7."CLIMATE ZONES, MOISTURE REGIMES AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY," and N1101.7.2, "INTERNATIONAL CLIMATE ZONE DEFINITIONS," are deleted. Sections N1101.7.1, "Warm humid counties," and Section N1101.7.2, "International climate zones," are also deleted. Insert Table N1101.7.*

**TABLE N1101.7: CLIMATE ZONES, MOISTURE REGIMES, AND WARM HUMID DESIGNATIONS BY**

**STATE, COUNTY AND TERRITORY** [a]




**Climate Zone 5B Boulder**

Footnote

a. Key: A – Moist, B – Dry, C – Marine. Absence of moisture designation indicates moisture regime is irrelevant. Asterisk (*) indicates a Warm Humid location.

**N1101.8 Tropical climate zone.**
This section is deleted.

**N1101.9 Interior design conditions.**
The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling, see Table R301.2(1).

**N1101.9.1 Exterior design Conditions:**
Based on climate data for location.

**N1101.10 Identification.**
Materials, systems, and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

**N1101.10.1 Building thermal envelope insulation.**
An R-*value* identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and R-*value* of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-*value*, installed density, coverage area and number of bags installed shall be listed on the certification. For reflective insulation, the number of reflective sheet(s), the number and thickness of the enclosed reflective air space(s) and the R-*value* for the installed assembly determined in accordance with Section N1101.10.6, shall be listed on the certification. For insulated siding, the R-*value* shall be labeled on the product's package and shall be listed on the certification. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

**Exception:**
For roof insulation installed above the deck, the R-*value* shall be labeled as required by the material standards specified in Table R906.2 of the 2021 IRC.

**N1101.10.1.1 Blown or sprayed roof/ceiling insulation.**
The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 square feet (28 $m^2$) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers not less than 1 inch

(25 mm) in height. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed R-*value* shall be listed on certification provided by the insulation installer.

**N1101.10.2 Insulation mark installation.**
Insulating materials shall be installed such that the manufacturer's R-*value* mark is readily observable upon inspection. For insulation materials that are installed without an observable manufacturer's R-*value* mark, such as blown or draped products, an insulation certificate complying with Section N1101.10.1 shall be left immediately after installation by the installer, in a conspicuous location within the building, to certify the installed R-*value* of the insulation material.

**N1101.10.3 *Fenestration* product rating.**
*U-factor*s of *fenestration* products (windows, doors and skylights) shall be determined in accordance with NFRC 100.

**Exception:**
Where required, garage door U-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

*U-factor*s shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled *U-factor* shall be assigned a default *U-factor* from Table N1101.10.3(1) or N1101.10.3(2). The solar heat gain coefficient (SHGC) and visible transmittance (VT) of glazed *fenestration* products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table N1101.10.3(3).

**TABLE N1101.10.3(1): DEFAULT GLAZED WINDOW, GLASS DOOR, AND SKYLIGHT U-FACTORS**

| FRAME TYPE | SINGLE PANE | DOUBLE PANE | SKYLIGHT | |
|---|---|---|---|---|
| | | | Single | Double |
| Metal | 1.20 | 0.80 | 2.00 | 1.30 |
| Metal with Thermal Break | 1.10 | 0.65 | 1.90 | 1.10 |
| Nonmetal or Metal Clad | 0.95 | 0.55 | 1.75 | 1.05 |
| Glazed Block | 0.60 | | | |

**TABLE N1101.10.3(2): DEFAULT DOOR U-FACTORS**

| DOOR TYPE | *U-FACTOR* |
|---|---|
| Uninsulated Metal | 1.20 |
| Insulated Metal | 0.60 |
| Wood | 0.50 |
| Insulated, nonmetal edge, max 45% glazing, any glazing double pane | 0.35 |

**TABLE N1101.10.3(3): DEFAULT GLAZED FENESTRATION SHGC AND VT**

| | SINGLE GLAZED | | DOUBLE GLAZED | | GLAZED BLOCK |
|---|---|---|---|---|---|
| | Clear | Tinted | Clear | Tinted | |
| SHGC | 0.8 | 0.7 | 0.7 | 0.6 | 0.6 |
| VT | 0.6 | 0.3 | 0.6 | 0.3 | 0.6 |

**N1101.10.4 Insulation product rating.**
The thermal resistance *R-value*, of insulation shall be determined in accordance with Part 460 of US-FTC CFR Title 16 in units of h × $ft^2$ × °F/Btu at a mean temperature of 75°F (24°C).

**N1101.10.4.1 Insulated siding.**
The thermal resistance *R-value*, of insulated siding shall be determined in accordance with ASTM C 1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.

**N1101.10.5 Air-impermeable insulation.**
Insulation having an air permeability not greater than 0.004 cubic feet per minute per square foot [0.002 L/ (s × $m^2$)] under pressure differential of 0.3-inch water gauge (75 Pa) when tested in accordance with ASTM E2178 shall be determined air-impermeable insulation.

**N1101.10.6 Air spaces:**
Where the R-*value* of an enclosed reflective air space or enclosed nonreflective air space is used for compliance with this standard, the air space shall be enclosed in a cavity bounded on all sides by building components and constructed to minimize airflow into and out of the enclosed air space. Airflow shall be deemed minimized where one of the following conditions occur:

1. The enclosed air space is unventilated.
2. The enclosed air space is bounded on one or more sides by an anchored masonry veneer, constructed in accordance with Chapter 7 of the *International Residential Code*, and vented by veneer weep holes located only at the bottom portion of the air space and spaced not less than 15 inches (381 mm) on center with the top of the cavity air space closed.

**Exception:**
For ventilated cavities, the effect of the ventilation of air spaces located on the exterior side of the continuous air barrier and adjacent to and behind the *exterior wall* covering material shall be determined in accordance with ASTM C1363 modified with an airflow entering the bottom and exiting the top of the air space at an air movement rate of not less than 70 mm/second.

**N1101.11 Installation.**
Materials, systems, and equipment shall be installed in accordance with the manufacturer's instructions and this code, the *International Building Code®*, or the *International Residential Code*, as applicable.

**N1101.11.1 Protection of exposed foundation insulation.**
Insulation applied to the exterior of basement walls, crawl space walls and the perimeter of slab-on-grade floors shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of the insulation's thermal performance. The protective covering shall cover the exposed exterior insulation and extend not less than 6 inches (153 mm) below grade.

**N1101.12 Maintenance information.**
Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a readily visible label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

**N1101.13 Compliance Application.**
Projects shall comply with either section N1101.13.1 or N1101.13.2.

**N1101.13.1 Prescriptive Compliance Option.**
The Prescriptive Compliance Option shall be limited in use to additions, alterations, remodels, and *repairs* as outlined in Section N1109 Existing Buildings.

The Prescriptive Compliance Option requires compliance with Sections N1101 through N1104.

**N1101.13.2 Performance Compliance Option.**
The Energy Rating Index (ERI/HERS) shall be the only allowed performance compliance option for new homes, or conditioned structures that are constructed in compliance with the *International Residential Code*. The ERI / HERS option shall be used to demonstrate compliance for new residential conditioned structures as outlined in Section N1106 and may be used to demonstrate compliance with *additions, alterations* and remodels as outlined in Section N1109.

**N1101.14 Certificate.**
A permanent certificate shall be completed by the builder or other *approved* party and posted on a wall in the space where the furnace is located, a utility room, or an *approved* location inside the building. Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall indicate the following:

1. The predominant R-*value*s of insulation installed in or on ceilings, roofs, walls, foundation components such as slabs, basement walls, crawl space walls and floors and ducts outside *conditioned space*s.
2. *U-factor*s of *fenestration* and the solar heat gain coefficient (SHGC) of *fenestration*. Where there is more than one value for any component of the building envelope, the certificate shall indicate both the value covering the largest area and the area weighted average value if available.
3. The results from any required duct system and building envelope air leakage testing performed on the building.
4. The types, sizes, fuel sources, and efficiencies of heating, cooling and service water-heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall indicate "gas-fired unvented room heater", "electric furnace", or "baseboard electric heater," as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces, and electric baseboard heaters.
5. Where on-site photovoltaic panel systems have been installed, the array capacity, inverter efficiency, panel tilt and orientation shall be noted on the certificate.
6. For buildings where an Energy Rating Index score is determined in accordance with Section R406, the Energy Rating Index score, both with and without any on-site generation, shall be listed on the certificate.
7. The code edition under which the structure was permitted, and the compliance path used.
8. The fuel sources for cooking and clothes drying equipment.
9. Where combustion equipment is installed, the certificate shall indicate information on the installation of additional electric infrastructure including which equipment and/or appliances include additional electric infrastructure, capacity reserved on the electrical service panel for replacement of each piece of combustion equipment and/or appliance.
10. Where a solar-ready zone is provided, the certificate shall indicate the location, dimensions, and capacity reserved on the electrical service panel.

**N1101.15 Homeowner's manual.**
The builder or owner's agent shall provide the owner with a binder of all equipment and appliance manufacturers' installation manuals, except for manuals that are required to be affixed to the equipment. These include the energy assessment report and ERI / HERS certificate. If the *code official approved* a community solar garden subscription attributed to the property as a means to meet the requirements of this chapter, the manual shall include any requirements for a continued subscription to a community solar garden necessary to meet the requirements of this chapter.

**N1101.16 Deconstruction**

**N1101.16.1 Deconstruction.**
All existing buildings and portions thereof requiring the removal of building materials before the construction of a new residential structure, *dwelling unit*, or *addition*, or remodel of an existing building, must be deconstructed the existing portions of the building as defined in this chapter. Demolition is not permitted.

**N1101.16.2 Penalty.**
Buildings that are demolished or partially demolished rather than deconstructed will, at the discretion of the *building official* be issued a stop work notice for a period not exceeding 30 days.

**N1101.16.3 Documentation of Intent to Deconstruct.**
Documentation of intent to deconstruct consisting of a deconstruction plan, a written description of deconstruction work, or the County Deconstruction Checklist must be provided at building permit application. The documentation of intent to deconstruct must include: the name of the Deconstruction Contractor, a list of the materials to be recovered, donated, or reused, and the destination of the materials. The documentation must include both Nonstructural Deconstruction and Structural Deconstruction. Items which must be donated, sold, or re-used include cabinets, dimensional lumber, flooring, and solid core doors.

**N1101.16.4 Verification of deconstruction of a structure.**
The completion of deconstruction as *approved* on the deconstruction plan must be verified by the Building Division. The owner or deconstruction contractor shall provide written verification of deconstruction by means of receipts or a written log, maintained by the homeowner or general contractor, which includes the volume or weight of materials and the destination where they were transported to the Building Division office. Verification must be received prior to scheduling the rough inspections.

**N1101.17 Construction jobsite waste reduction and recycling.**
All construction jobsite waste must be recycled including wood, scrap metal, cardboard, and concrete. Labeled containers must be provided at the construction-site for use in capturing recyclable material. A mixed load container may be used if that container is being sent to a waste/recycling center that will verify the weight of recycled material recovered from that mixed load.

**N1101.17.1 Documentation of intent to recycle.**
Documentation of intent to recycle which consists of a recycling plan, a written description of recycling activity, or the submittal of the County Recycling Checklist must be provided at building permit application. The documentation must clearly show how the requirements of Section 1101.15 will be met and must specify the locations of recycling containers and the destination where material will be recycled.

**N1101.17.2 Verification.**
Field inspection will be made by the Boulder County Building Division during the construction process to assure that recycling containers have been placed on-site. Prior to the final inspection, documentation must be provided to the Building Division office by the owner or waste/recycling contractor indicating the weight or volume of materials diverted from the waste stream. Materials that must be recycled include appliances, concrete, metals, cardboard, and wood (except pressure treated or painted wood), and thermostats and other devices containing mercury. Other materials which are accepted by the waste/recycling contractor must also be recycled.

**N1101.18 Indoor water conservation.**
New and replacement bathroom sink faucets, shower heads, toilets, and urinals must be labeled as meeting EPA Water Sense (www.epa.gov/WaterSense/) criteria.

**Exceptions:**

1. Showerheads with a maximum flow of 2.0 gallons per minute (gpm).
2. Urinals with a maximum flush rate of 0.5 gallons per flush (gpf).

**N1101.19 Renewable energy requirements.**
Whenever renewable energy systems are required by this chapter, those systems must be constructed on-site.

**Exception:**

A renewable energy contract may be used to demonstrate compliance where the following is applicable.

1. Where Areas of the roof are in full or partial shade for more than 70% of daylight hours annually the renewable energy shall be delivered or credited to the *building site* under an energy contract with a duration of not less than 15 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property.
2. If an applicant's property is situated in a part of the Boulder County where state law permits local utility companies to operate "solar gardens", "solar farms", or similar community renewable energy facilities, the applicant may choose to satisfy the *renewable energy requirements* of this chapter through the purchase of an adequate share in a community facility, at the discretion of the *building official.*

To qualify for a renewable energy contract, all of the following must be met.

1. An "adequate" share in a community facility must enable the production of an equivalent amount of power compared to what the applicant would otherwise be required to produce on-site; and
2. The share(s) must be purchased from a facility located within the same utility service area as the home; and
3. The renewable energy shall be delivered or credited to the *building site* under an energy contract with a duration of not less than 15 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property and cannot be sold or modified in any way without the consent of Boulder County is required.

**Exception:**

When there is a legal transfer to the applicant's successors-in-interest for use on the same property, written proof that all of these requirements are met must be filed with the Building Safety and Inspection Services Division prior to the final inspection approval or the issuance of a certificate of occupancy.

**N1101.20 *Approved* third party inspection agencies.**
The code official is authorized to accept reports of third-party inspection agencies not affiliated with the building design or construction, provided that such agencies are *approved* as to qualifications and reliability relevant to the building components and systems that they are inspecting or testing, and approval is granted prior to issuance of the building permit.

**N1101.20.1 Authorization of *approved* third-party inspection agency.**
An *approved* third-party inspection agency shall provide all requested information for the code official to determine that the agency meets the applicable requirements specified in Sections N1101.20.1.1 through N1101.20.1.3 and to authorize its work in the jurisdiction.

**N1101.20.1.1 Independence.**
An *approved* third-party inspection agency shall be an independent business identity. The agency shall perform its duties in accordance with the scope of delegated responsibilities established by the code official. The agency shall disclose to the code official any conflicts of interest including where fees for service are derived. The agency shall acknowledge in writing that it is only authorized to work within the scope of delegated responsibilities.

**N1101.20.1.2 Equipment.**
An *approved* third-party inspection agency shall have adequate. equipment to perform inspections and tests required by the code official and this code. All testing equipment shall be periodically calibrated as required by the manufacturer, testing standards used in this code, or certifications held by the *approved* third-party inspection agency.

**N1101.20.1.3 Personnel.**
Personnel assigned by an *approved* third-party inspection agency to perform inspections and testing shall be trained or credentialed and documentation of training or credentials shall be available to code official upon request.

**N1101.20.1.4 Delegated authority.**
Where *approved*, a third-party inspection agency shall have the authority to perform delegated inspections and determine compliance or noncompliance of work with *approved* construction documents.

**N1101.20.2 *Approved* third-party inspection agency reporting.**
An *approved* third-party inspection agency shall keep records of delegated inspections, tests, and *compliance documentation* required by this code. The agency shall submit reports of delegated inspections and tests to the code official and to the owner or owner's representative. Reports shall indicate the compliance determination for the inspected or tested work based on *approved* construction documents. A final report documenting required delegated inspections and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted, with other required *compliance documentation*, at a time required by the code official.

## SECTION N1102: BUILDING THERMAL ENVELOPE REQUIREMENTS

**N1102.1 General.**
When using the prescriptive compliance option, the *building thermal envelope* shall meet the requirements of Sections N1102.1.1 through N1102.1.2

**Exceptions:**

1. The following low energy buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this section shall be exempt from the *building thermal envelope* provisions of Section N1102.
   1.1. Those with a peak design rate of energy usage less than 3.4 Btu/h × $ft^2$ (10.7 W/ $m^2$) or 1.0 watt/ $ft^2$ of floor area for space conditioning purposes.
   1.2. Those that do not contain conditioned space.
2. Log homes designed in accordance with ICC 400.

**N1102.1.1 Vapor retarder.**
Wall assemblies in the *building thermal envelope* shall comply with the Class two or three vapor retarder requirements of Section R702.7 as outlined in Tables R702.7(2) or R702.7(2) of the 2021 IRC. A minimum vented air space shall be defined as one that is 3/8 of an inch or bigger.

**N1102.1.2 Insulation and *fenestration* criteria.**
The *building thermal envelope* shall meet the requirements of Table N1102.1.2 based on the climate zone specified in Section N1101.7. Assemblies shall have a *U-factor* equal to or less than that specified in Table N1102.1.2. *Fenestration* shall have a *U-factor* and glazed *fenestration* SHGC equal to or less than that specified in Table N1102.1.2.

**TABLE N1102.1.2: INSULATION MINIMUM *R-VALUE*S AND *FENESTRATION* REQUIREMENTS BY COMPONENT [h]**

| CONSTRUCTION COMPONENT | U-factor or R-value |
|---|---|
| VERTICAL FENESTRATION UFACTOR [g] | 0.27 ~~/ 0.25~~ |
| SKYLIGHT U-FACTOR | 0.35 |
| GLAZED VERTICAL FENESTRATION SHGC | 0.40 |
| SKYLIGHT SHGC | 0.40 |
| CEILING R-value | R-60 |
| INSULATION ENTIRELY ABOVE ROOF DECK | R-39 ci [b] |
| WOOD FRAME WALL R-value [c] | R-30 or R-20 & R-7.5ci [b], or<br>R-15 & R-12ci [b] , or R-0 & R- 25ci[b] |
| MASS WALL R-value [f] | 15/20 |
| FLOOR R-value [h] | R-38 or R-4 per inch |
| BASEMENT [b], f WALL R-value [b] | R-15ci [b] or R-20 or R-15& R-5ci [b] |
| UNHEATED SLAB d R-value & DEPTH [b] | R-15ci [b], 4 ft |
| HEATED SLAB [d], R-value & DEPTH [e] | R20ci, 4 ft and R-10 full slab |
| CRAWL SPACE WALL R-value [b] | R-15ci [b] or R-20 or R-15& R-5ci [b] |
| Doors separating conditioned and unconditioned space | R-5 |
| | |

For SI: 1 foot = 304.8 mm. / NR = Not Required. / ci = continuous insulation.

a. R-values are minimums. U-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed R-value of the insulation shall be not less than the R-value specified in the table.
b. ci stands for continuous insulation.
c. "20 & 7.5" means R20 cavity and R7.5 continuous insulation. 15 & 12ci means R15 cavity and R12 continuous insulation. 0 & 25ci means R0 cavity and R25 continuous insulation.
d. Unheated Slab insulation refers to slab edge insulation that shall be installed in accordance with Section N1102.2.9. Slab edge depth (2 feet) may be comprised of insulation from the top of slab down + horizontal insulation installed in a continuous manner under the slab.
e. A heated slab requires insulation at both the slab edge and under the full slab. Slab edge depth may be comprised of insulation from the top of slab down + horizontal insulation installed under the slab.
f. Mass walls shall be in accordance with Section N1102.2.5. The second R-value applies where more than half of the insulation is on the interior of the mass wall.
g. Reserved. ~~Where the proposed glazing area is greater than or equal to 15.0% of the conditioned floor area, as provided by Section N1101.5, the lower U-factor shall not be exceeded.~~
h. Overhead doors for garages and shops that contain conditioned floor area must have fully weather-stripped overhead doors with a minimum R-value of 13. Such doors must be weather stripped at the top, sides and bottom and between the panels.

**N1102.1.3 *R-value* computation.**
Cavity insulation alone shall be used to determine compliance with the cavity insulation *R-value* requirements in Table N1102.1.2. Where cavity insulation is installed in multiple layers, the *R-value*s of the cavity insulation layers shall be

summed to determine compliance with the cavity insulation *R-value* requirements. The manufacturer's settled R-*value* shall be used for blown-in insulation. Continuous insulation (ci) alone shall be used to determine compliance with the continuous insulation *R-value* requirements in Table N1102.1.2. Where continuous insulation is installed in multiple layers, the *R-value*s of the continuous insulation layers shall be summed to determine compliance with the continuous insulation *R-value* requirements. Cavity insulation *R-value*s shall not be used to determine compliance with the continuous insulation *R-value* requirements in Table N1102.1.2. Computed *R-value*s shall not include an *R-value* for other building materials or air films. Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table N1102.1.2, the manufacturer's labeled *R-value* for insulated siding shall be reduced by R-0.6. *Fenestration* shall have a *U-factor* and glazed *fenestration* SHGC equal to or less than that specified in Table N1102.1.2.

**N1102.2 Specific insulation requirements.**
In addition to the requirements of Section N1102.1, insulation shall meet the specific requirements of Sections N1102.2.1 through N1102.2.12, as applicable.

**N1102.2.1 Ceilings with attic spaces.**
Where Section N1102.1.2 required climate specific ceiling insulation is installed, it shall be installed over 100 percent of the ceiling or attic area. Wherever the full height of uncompressed R-*value* does not extend over the wall top plate at the eave, compliance shall be achieved using Section N1106 to reflect the reduced R-*value* at the eave. Regardless of the R-*value* of the insulation installed, it shall be installed over the wall top plate at the eave to achieve its full height and proposed R-*value*.

**N1102.2.2 Ceilings without attic spaces.**
Wherever the design of the roof/ceiling assembly does not allow sufficient space for the required insulation and the insulation *R-value*s is less than required by Table N1102.1.2 in the interstitial space above a ceiling and below the structural roof deck or just below the roof deck, compliance shall be achieved using Section N1106 to reflect the reduced *R-value*. The installed Insulation *R-value* shall extend over the top of the wall plate to the outer edge of such plate and shall not be compressed. Installations of unvented attic and unvented enclosed raftered assemblies shall be in accordance with Section R806.5 of the 2021 IRC.

**N1102.2.2.1 Attic knee wall**
Attic knee wall assemblies that separate conditioned space from unconditioned attic spaces shall meet the same insulation requirements as above-grade walls. Such knee walls shall have an air barrier between conditioned an unconditioned space.

**N1102.2.2.1.1 Truss framing separating conditioned and unconditioned space.**
Where vertical roof truss framing members are used to separate *conditioned space* and unconditioned space, they shall meet the same insulation requirements as the above-grade walls.

**N1102.2.3 Eave baffle.**
For air-permeable insulations in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain a net free area opening equal to or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material. The baffle shall be installed to the outer edge of the *exterior wall* top plate so as to provide maximum space for attic insulation coverage over the top plate. Where soffit venting is not continuous, baffles shall be installed continuously to prevent ventilation air in the eave soffit from bypassing the baffle.

**N1102.2.4 Access hatches and doors.**
Access hatches and doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces shall be made airtight weather-stripped and insulated to the same *R-value* required by Table N1102.1.2 or section N1106 for the wall or ceiling in which they are installed. Where loose-fill insulation is installed, a wood-framed or equivalent baffle or retainer shall be installed to prevent the loose-fill insulation from spilling into the living space when the attic access is opened. The baffle or retainer shall provide a permanent means of maintaining the required installed *R*- value of the loose-fill insulation. Access that prevents damaging or compression of the required insulation *R-value* shall be provided to all equipment installed in the space. Equipment platforms installed in the space shall be installed to prevent damaging or compression of the required installed insulation *R-value*.

**N1102.2.4.1 Access hatch and door insulation installation and retention.**
Vertical or horizontal access hatches and doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces shall be weather-stripped. Access that prevents damaging or compressing the insulation shall be provided to all equipment. Where loose-fill insulation is installed, a wood-framed or equivalent baffle, retainer, or dam shall be installed to prevent loose-fill insulation from spilling into living space from higher to lower sections of the attic, and from attics covering conditioned spaces to unconditioned spaces. The baffle or retainer shall provide a permanent means of maintaining the installed *R-value* of the loose-fill insulation.

**N1102.2.5 Mass walls.**
Mass walls where used as a component of the *building thermal envelope* shall be one of the following:
1. Above-ground walls of concrete block, concrete, insulated concrete form, masonry cavity, brick but not brick veneer, adobe, compressed earth block, rammed earth, solid timber, mass timber or solid logs.
2. Any wall having a heat capacity greater than or equal to 6 Btu/ft $^2$ × °F (123 kJ/m$^2$ × K).

*Note: Section N1102.2.6 is amended to read as follows. Table N1102.2.6 is deleted.*

**N1102.2.6 Steel-frame ceilings, walls, and floors.**
Steel-frame buildings shall comply with the ERI/HERS compliance pathway as outlined in N1106.2.

**Exception:**
Existing Construction projects shall comply with N1109.2.1.

**N1102.2.7 Floors.**
Floor cavity insulation shall be enclosed on all sides in an airtight assembly and comply with one of the following:
1. Insulation shall be installed to maintain permanent contact with the underside of the subfloor decking in accordance with manufacturer instructions to maintain required R-*value* or readily fill the available cavity space.
2. Floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing separating the cavity and the unconditioned space below. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the framing members shall be air sealed.
3. A combination of cavity and continuous insulation shall be installed so that the cavity insulation is in contact with the top side of the continuous insulation that is installed on the underside of the floor framing separating the cavity and the unconditioned space below. The combined R-*value* of the cavity and continuous insulation shall equal the required R-*value* for floors. Insulation shall extend from the bottom to the top of all perimeter floor framing members and the framing members shall be air sealed.

**N1102.2.8 Basement walls.**
*Basement wall*s shall be insulated in accordance with Table N1102.1.2 or the R-*value* determined in the *proposed design* by Section N1106.

**Exception:**
Basement walls associated with unconditioned basements where all of the following requirements are met:
1. The floor overhead, including the underside stairway stringer leading to the basement, is insulated in accordance with the *proposed design* and Table N1101.2 and installed in accordance with Section N1102.2.7.
2. There are no uninsulated duct, domestic hot water or hydronic heating surfaces exposed to the basement.
3. There are no HVAC supply or return diffusers serving the basement.
4. The walls surrounding the stairway and adjacent to *conditioned space* are insulated in accordance with Table N1101.2 or the *proposed design* from Section N1106.
5. The door(s) leading to the basement from *conditioned spaces* are insulated in accordance with Table N1101.1.2 or the *proposed design* from Section N1106. and are weather-stripped in accordance with Section N1102.2.4.
6. The *building thermal envelope* separating the basement from adjacent *conditioned spaces* complies with Table N1102.1.2.

**N1102.2.8.1 *Basement wall* insulation installation.**
Where *basement wall*s are insulated, the insulation shall be installed from the top of the *basement wall* down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less, or in accordance with the *proposed design* in Section N1106, as applicable.

**N1102.2.8.2 *Basement wall* insulation installations.**
Where installed, *basement wall* insulation shall be secured to the wall and extend downward from the sill plate to not less than the top of the foundation wall footing.

**Exception:**
Where the basement wall insulation is installed on the interior side of the wall it shall be secured to the wall and extend downward from the top of the concrete wall at the sill plate to not less than 3 inches from the basement slab.

**N1102.2.9 Slab-on-grade floors.**
Slab-on-grade floors with a floor surface less than 12 inches (305 mm) below grade shall be insulated in accordance with Table N1102.1.3.

**Exception:**
Slab-edge insulation is not required in jurisdictions designated by the code official as having a very heavy termite infestation.

**N1102.2.9.1 Slab-on-grade floor insulation installation.**
Where installed, the insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall and shall create a thermal break between attached slabs that are located outside of the building's thermal envelope. Insulation located below grade shall be extended 4 feet or the distance of the *proposed design*, as applicable, by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Where a *proposed design* includes insulation extending away from the building it shall be protected by pavement or by not less than 10 inches (254 mm) of soil. The top edge of the insulation installed between the *exterior wall* and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the *exterior wall*.

Full or heated slab insulation shall be continuous under the entire area of the slab-on-grade floor, except at structural column locations and service penetrations. Slab edge insulation required at the heated slab perimeter shall not be required to extend below the bottom of the heated slab and shall be continuous with the full slab insulation.

**N1102.2.9.1** Alternative slab-on-grade insulation configurations for buildings complying with Sections N1106, slab-on-grade insulation shall be installed in accordance with the *proposed design* or rated design.

**N1102.2.10 Crawl space walls.**
Crawl space walls shall be insulated in accordance with Table N1102.1.2.

**Exception:**
Crawl space walls associated with a crawl space that is vented to the outdoors and the floor overhead is insulated in accordance with Table N1102.1.2 and Section N1102.2.7.

**N1102.2.10.1 Crawl space wall insulation installation.**
Where installed, crawl space wall insulation shall be secured to the wall and extend downward from the sill plate to not less than the top of the foundation wall footing. Exposed earth in crawl space foundations shall be covered with a continuous Class I vapor retarder in accordance with the International Building Code® or *International Residential Code*, as applicable. Joints of the vapor retarder shall overlap by 6-inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend not less than 6-inches (153 mm) up stem walls and shall be attached and sealed to the stem walls.

**Exception:**
Where the crawl space wall insulation is installed on the interior side of the wall and the crawl space floor is more than 24 inches (610 mm) below the exterior grade, the crawl space wall insulation shall be permitted to extend downward from the top of the concrete wall at the sill plate at the top of the foundation to not less than the interior floor of the crawl space.

**N1102.2.10.2 Alternative crawl space wall insulation configurations.**
For buildings complying with Sections N1106 crawl space wall insulation shall be installed in accordance with the *proposed design* or rated design.

**N1102.2.11 Masonry veneer.**

Insulation shall not be required on the horizontal portion of the foundation that supports a masonry veneer.

**N1102.2.12 Sunroom and heated garage insulation.**
Sunrooms enclosing *conditioned space* and heated garages, used for vehicle storage, shall meet the insulation requirements of this code, but shall not be considered *habitable conditioned space*.

**Exception:**
For sunrooms and heated garages provided with thermal isolation, and enclosing conditioned space, the following exceptions to the insulation requirements of this code shall apply:
1. The minimum ceiling insulation R-values shall be R-49.
2. The minimum wall insulation R-value shall be R-20.
3. Walls separating a sunroom or heated garage with thermal isolation from conditioned space shall comply with the building thermal envelope requirements of this code.

**N1102.3 *Fenestration*.**
In addition to the requirements of Section N1102, *fenestration* shall comply with Sections N1102.3.1 and N1102.3.4.

**N1102.3.1 *U-factor*.**
An area-weighted average of *fenestration* products shall be permitted to satisfy the *U-factor* requirements.

**N1102.3.2 Glazed *fenestration* SHGC.**
An area-weighted average of *fenestration* products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

*Dynamic glazing* shall be permitted to satisfy the SHGC requirements of Table N1102.1.2 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 2.4, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other *fenestration*, and area-weighted averaging with other *fenestration* that is not dynamic glazing shall not be permitted.

**Exception:**
Dynamic glazing is not required to comply with this section when both the lower and higher labeled SHGC already comply with the requirements of Table N1102.1.2.

**N1102.3.3 Glazed *fenestration* exemption.**
Up to 15 square feet (1.4 $m^2$) of glazed *fenestration* per *dwelling unit* shall be permitted to be exempt from *U-factor* and SHGC, and the Door *R-value*, requirements in Section N1102.1.2.

**N1102.3.4 Opaque door exemption.**
One door opening with one side-hinged opaque door assembly up to 24 square feet (2.22 $m^2$) in area is exempted from the R-*value* requirement in Section N1102.1.2.

**N1102.4 Air leakage.**
The *building thermal envelope* shall be constructed to limit air leakage in accordance with the requirements of Sections N1102.4.1 through N1102.4.5.

**N1102.4.1 Building thermal envelope.**
The *building thermal envelope* shall comply with Sections N1102.4.1.1 and N1102.4.1.2. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

**N1102.4.1.1 Installation.**
The components of the *building thermal envelope* as listed in Table N1102.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table N1102.4.1.1, as applicable to the method of construction. Where required by the *building official* an *approved* third party shall inspect all components and verify compliance.

*(See TABLE N1102.4.1.1 AIR BARRIER AND INSULATION INSTALLATION on next page)*

**TABLE N1102.4.1.1 AIR BARRIER, AIR SEALING, AND INSULATION INSTALLATION**

| COMPONENT | AIR BARRIER CRITERIA | INSULATION INSTALLATION CRITERIA |
|---|---|---|
| General requirements | A continuous air barrier shall be installed in the building envelope.<br>Breaks, holes, or joints in the air barrier shall be sealed. | Air-permeable insulation shall not be used as a sealing material.<br>Air permeable insulation installed in building cavities assemblies shall be enclosed by an air barrier on all sides. |
| Ceiling/attic | An air barrier shall be installed in any dropped ceiling or soffit to separate it from unconditioned space.<br>Access openings, drop downstairs or knee wall doors to unconditioned attic spaces shall be air sealed with gasketing materials that allow for repeated entrance over time. | The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.<br>Access hatches and doors shall be installed and insulated in accordance with Section N1102.2.4.<br>Eave Baffles shall be installed in accordance with Section N1102.2.3. |
| Above Grade Walls | The junction of the foundation and sill plate shall be air sealed.<br>The junction of top plates and the drywall adjacent to unconditioned spaces shall be air sealed.<br>The junction of the bottom plate to the subfloor on exterior walls separating *conditioned space* from unconditioned space shall be air sealed. | Air permeable insulation installed in wall cavities shall be enclosed by an air barrier on all sides.<br>Building thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.<br>Corners in exterior frame walls shall be insulated with a material having a thermal resistance, *R-value*, of not less than R-3 per inch.<br>Headers on exterior walls framed with 2x6 lumber or greater in size shall be insulated to a minimum R-5. Engineering evidence shall be provided for header locations where insulation cannot be added due to structural requirements of the design. |
| Knee Wall | Knee walls shall have a sealed air barrier on the unconditioned side of the assembly to separate conditioned from unconditioned space. | Insulation installed in a knee wall assembly shall be installed in accordance with Section N1102.2.1. |
| Windows, skylights, and doors | The rough opening gap between framing and the frames of skylights, jambs of windows, and doors shall be sealed in accordance with *fenestration* manufacturer's instructions. | Framing cavities around windows, skylights and doors shall be insulated per window manufacturer's instructions |
| Rim joists | Rim joists shall include an exterior air barrier [b]<br>The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed. | Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board [b]<br>Air permeable insulation installed in rim joists shall be enclosed by an air barrier. |

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| Floors, separating conditioned from unconditioned space, including cantilevered floors and floors above garages | The air barrier shall be installed at any exposed edge of insulation.<br>Floor framing members that are part of the building thermal envelope shall be air sealed to maintain a continuous air barrier. | Air permeable insulation installed in floor cavities shall be enclosed on all sides<br>Floor framing cavity insulation shall be installed in accordance with the requirements of Section N1102.2.7. |
| Basement, crawl space, and slab foundations | Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder /air barrier in accordance with Section N1102.2.10.<br>Penetrations through concrete foundation walls and slabs shall be air sealed.<br>Class 1 vapor retarders shall not be used as an air barrier on below-grade walls and shall be installed in accordance with Section R702.7 of the *International Residential Code*. | Crawl space insulation, where provided instead of floor insulation, shall be installed in accordance with Section N110.2.10.<br>Conditioned basement foundation wall insulation shall be installed in accordance with Section N1102.2.8.<br>Slab-on-grade floor insulation shall be installed in accordance with Section N1102.2.9. |
| Shafts, penetrations | Duct and flue shafts and other similar penetrations to exterior or unconditioned space shall be sealed to allow for expansion, contraction and mechanical vibration.<br>Utility penetrations of the air barrier shall be caulked, gasketed or otherwise sealed and shall allow for expansion, contraction of materials and mechanical vibration. | Insulation shall be fitted tightly around utilities passing through shafts and penetrations in the building thermal envelope to maintain required R-*value*. |
| Narrow cavities | Narrow cavities of 1 inch or less that are not able to be insulated shall be air sealed. | Batts to be installed in narrow cavities shall be cut to fit or narrow cavities shall be filled with insulation that on installation readily conforms to the available cavity space. |
| Garage separation | Air sealing shall be provided between the garage and conditioned spaces. | Insulated portions of the garage separation assembly shall be installed in accordance with Sections N1101.10.1 and N1102.2.7. |
| Recessed lighting | Recessed light fixtures installed in the building thermal envelope shall be air sealed in accordance with Section N1102.4.5. | Recessed light fixtures installed in the building thermal envelope shall be air-tight and IC rated and shall be buried or surrounded with insulation. |
| Plumbing, wiring or other obstructions | All holes created by wiring, plumbing or other obstructions in the air barrier assembly shall be air sealed. | Insulation shall be installed to completely fill the available space and surround wiring, plumbing, or other obstructions, unless the required R-*value* can be met by installing insulation and air barrier systems completely to the exterior side of the obstructions. |

| | | |
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| Showers, tubs, and fireplaces adjacent to the building thermal envelope. | An air barrier shall separate insulation in the *building thermal envelope* from the shower, tub, or fireplace assembly adjacent to it.<br>Tub and shower drain trap penetrations through the subfloor shall be air sealed.<br>Fireplace doors shall comply with the requirements of N1102.4.2. | Exterior framed walls adjacent to showers, tubs, and fireplace shall be insulated to the same level as the proposed above grade or foundation wall they are adjacent to. |
| Electrical communication, and other equipment boxes, housings, and enclosures. | Boxes, housings, and enclosures that penetrate the *air barrier* shall be caulked, taped, gasketed, or otherwise sealed to the *air barrier* element being penetrated.<br>All concealed openings into the box, housing, or enclosure shall be sealed.<br>Alternatively, air-sealed boxes shall be installed in accordance with N1102.4.6. | Boxes, housing, and enclosure shall be completely buried in or surrounded by insulation. |
| HVAC register boots | HVAC supply and return register boots shall be sealed to the subfloor, wall covering, or ceiling penetrated by the boot. | HVAC supply and return register boots located within the *buildings thermal envelope* assembly shall be completely buried in or surrounded by insulation. |
| Concealed sprinklers | Where required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. | |
| Common walls or double walls separating attached single-family dwellings or townhouses | An interior air barrier shall be provided. Air sealing at the intersections with building thermal envelope shall be provided.<br>Where installed in a fire resistance rated wall assembly, air sealing materials shall comply with one of the following:<br>Be in accordance with an *approved* design for the fire resistance-rated assembly.<br>Be supported by *approved* data that shows the assembly as installed complies with the required fire-resistance rating. | Insulation materials recognized in the *approved* common wall or double wall design and installed in accordance with the *approved* design, shall be permitted to be used. |

a. Inspection of log walls shall be in accordance with the provisions of ICC 400.
b. Air barrier and insulation full enclosure is not required in unconditioned/ventilated attic spaces.

**N1102.4.1.2 Testing.**
The *building* or *dwelling unit* shall be tested for air leakage. The maximum air leakage rate for any building or *dwelling unit* under any compliance path shall not exceed 3.0 air changes per hour for single family buildings or 0.20 cubic feet per minute (CFM) per square foot [0.0079 $m^3$ / (s × $m^2$ )] of *dwelling unit* enclosure area for other than a single-family building.

Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2-inch w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third-party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* have been sealed.

**Exception:**
1. The Building Thermal Envelope and continuous air barrier shall separate and isolate heated and nonheated,

attached private garage spaces and heated and nonheated, detached private garage spaces from all other habitable, conditioned spaces in accordance with the items in Table N1102.4.1.1.

2. The volume of these garage spaces shall not be included in the calculated habitable conditioned volume for the purpose of calculating the air changes per hour compliance metric. Doors between habitable conditioned spaces and all attached garages shall be closed during air leakage testing unless the blower door testing assembly is installed in the doorway. Where required by the code official, an *approved* third-party independent from the installer shall inspect both air barrier and insulation installation criteria.

When testing individual *dwelling units*, an air leakage rate not exceeding 0.25 cubic feet per minute per square foot [0.008 $m^3$ / (s × $m^2$ )] of the *dwelling unit* enclosure area, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2-inch w.g. (50 Pa), shall be an accepted alternative permitted in all climate zones for:

1. Attached single-family and building dwelling units.
2. Buildings or dwellings units that are 1000 square feet (93$m^2$) or smaller.

**N1102.4.2 Fireplaces.**
Open hearth fireplaces shall not be permitted indoors. New wood-burning fireplaces shall have tight-fitting flue dampers or doors, and outdoor combustion air. Where using tight-fitting doors on factory-built fireplaces listed and labeled in accordance with UL 127, the doors shall be tested and listed for the fireplace. Where using tight-fitting doors on masonry fireplaces, the doors shall be listed and labeled in accordance with UL 907.

**N1102.4.3 *Fenestration* air leakage.**
Windows, skylights and sliding glass doors shall have an air *infiltration* rate of no more than 0.3 cfm per square foot (1.5 L/s/$m^2$), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/$m^2$), when tested according to NFRC 400 or AAMA/ WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer.

**Exception:** Site-built windows, skylights and doors.

**N1102.4.4 Rooms containing fuel-burning appliances.**
Where open combustion air ducts provide combustion air to open combustion fuel-burning appliances, the appliances and combustion air opening shall be located outside the *building thermal envelope* or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table N1102.1.2, where the walls, floors and ceilings shall meet a minimum of the basement wall R-*value* requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section N1103. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

**Exceptions:**

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Sections N1102.4.2 and R1006.

**N1102.4.5 Recessed lighting.**
Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and labeled as having an air leakage rate not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E 283 at a 1.57 psf (75 Pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

**N1102.4.6 Air-Sealed electrical and communication outlet boxes.**
Air-sealed electrical and communication outlet boxes that penetrate the air barrier of the *building thermal envelope* shall be caulked, taped, gasketed, or otherwise sealed to the air barrier element being penetrated. Air sealed boxes shall be buried in or surrounded by insulation. Air-sealed boxes shall be tested and marked in accordance with NEMA OS 4. Air-sealed boxes shall be installed in accordance with the manufacturer's instructions.

## SECTION N1103: SYSTEMS

**N1103.1 Controls.**
At least one thermostat shall be provided for each separate heating and cooling system.

**N1103.1.1 Programmable thermostat.**
The thermostat controlling the primary heating or cooling system of the *dwelling unit* shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day and different days of the week. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall be programmed initially by the manufacturer with a heating temperature setpoint not greater than 70°F (21°C) and a cooling temperature setpoint not less than 78°F (26°C).

**N1103.1.2 Heat pump supplementary heat.**
Heat pumps having supplementary electric-resistance heat shall have controls that, except during defrost, prevent supplemental heat operation when the heat pump compressor can meet the heating load.

**N1103.2 Hot water boiler outdoor temperature reset.**
The manufacturer shall equip each gas, oil and electric boiler (other than a boiler equipped with a tankless domestic water heating coil) with automatic means of adjusting the water temperature supplied by the boiler to ensure incremental change of the inferred heat load will cause an incremental change in the temperature of the water supplied by the boiler. This can be accomplished with outdoor reset, indoor reset or water temperature sensing.

**N1103.3 Ducts.**
Ducts and air handlers shall be in accordance with Sections N1103.3.1 through N1103.3.7. The air handler shall be installed within the *conditioned space* of the building or *dwelling unit*.

**N1103.3.1 Ducts located outside conditioned space.**
Supply and return ducts located outside *conditioned space* shall be insulated to an R-*value* of not less than R-8 and shall comply with Section N1103.3.3. Duct work shall not be buried beneath a building or underground.

**N1103.3.2 Ducts located in conditioned space.**
For *ductwork* to be considered inside conditioned space, it shall comply with one of the following:
1. The duct system shall be located completely within the continuous air barrier and within the building thermal envelope.
2. Ductwork in ventilated attic spaces shall be buried within ceiling insulation in accordance with Section N1103.3.3 and all of the following conditions shall exist:
   2.1. The air handler is located completely within the continuous air barrier and within the building thermal envelope.
   2.2. The duct leakage, as measured either by a rough-in test of the ducts or a post-construction total system leakage test to outside the building thermal envelope in accordance with Section N1103.3.6, is less than or equal to 1.5 cubic feet per minute (42.5 L/min) per 100 square feet (9.29 $m^2$) of conditioned floor area served by the duct system.
   2.3. The ceiling insulation R-value installed against and above the insulated duct is greater than or equal to the proposed ceiling insulation R-value, less the R-value of the insulation on the duct.
3. Ductwork in floor cavities located over unconditioned space shall comply with all of the following:
   3.1. A continuous air barrier installed between unconditioned space and the duct.
   3.2. Insulation installed in accordance with Section N1102.2.7.
   3.3. A minimum R-19 insulation installed in the cavity width separating the duct from unconditioned space.
4. Ductwork located within exterior walls of the building thermal envelope shall comply with the following:
   4.1. A continuous air barrier installed between unconditioned space and the duct.
   4.2. Minimum R-10 insulation installed in the cavity width separating the duct from the outside sheathing.
   4.3. The remainder of the cavity insulation shall be fully insulated to the drywall side.

**N1103.3.3 Ducts buried within ceiling insulation.**
Supply and return air ducts located in unconditioned attic or ceiling spaces shall comply with all of the following:
1. The supply and return ducts shall have an insulation *R-value* not less than R-8.
2. The duct shall be installed on the truss bottom cord or ceiling joist closest to the ceiling finish material separating *conditioned space* from unconditioned space and the sum of the ceiling insulation R-*value* above the top of the duct, and against the sides of the duct, shall enclose the duct in insulation and shall be greater than or equal to the proposed ceiling insulation R-*value* using Table N1102.1.2 or Section N1106.

3. At all points along each duct, the sum of the ceiling insulation *R-value* against and above the top of the duct, and against and below the bottom of the duct, shall be not less than R-19, excluding the *R-value* of the duct insulation.

**N1103.3.3.1 Effective *R-value* of deeply buried ducts.**
Where using the Energy Rating Index compliance option Section N1106 ducts that are installed in accordance with Section N1106.3.3 shall be considered as having an effective duct insulation *R-value* of R-25.

**N1103.3.4 Sealing.**
Duct systems including air handlers, and filter boxes shall be sealed. Joints and seams shall comply with Section M1601.4.1 of this code.

**N1103.3.4.1 Sealed air handler.**
Air handlers shall have a manufacturer's designation for an air leakage of not greater than 2 percent of the design air flow rate when tested in accordance with ASHRAE 193.

**N1103.3.5 Duct leakage and testing.**
Ducts shall be pressure tested in accordance with ANSI/RESNET/ICC 380 or ASTM E1554 to determine air leakage by one of the following methods:
1. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1-inch w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure if installed at the time of the test. All portions of the duct system, including but not limited to the air handler, filter box, supply and return boots shall be tested.
2. Post-construction test: Total leakage shall be measured with a pressure differential of 0.1-inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All portions of the duct system, including but not limited to the air handler, filter box, supply and return boots shall be tested.
3. Postconstruction test: When using the Energy Rating Index compliance option Section N1106, duct leakage to outside testing shall be measured in accordance with ANSI/RESNET/IECC 380.

   **Exception:**
   A duct air leakage test shall not be required for ducts serving ventilation systems that are not integrated with ducts serving heating or cooling systems.

**N1103.3.6 Duct leakage.**
The total leakage of the ducts, where measured in accordance with Section N1103.3.5, shall be as follows:
1. Rough-in test: The total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 $m^2$) of *conditioned floor area* where the air handler is installed at the time of the test.

   **Exceptions:**
   1.1. Where the air handler is not installed at the time of the test, the total leakage of both the independently tested supply and return duct work shall be less than or equal to 3.0 cubic feet per minute (85 L/min) per 100 square feet (9.29 $m^2$) of conditioned floor area.
   1.2. If the HVAC duct system is serving less than or equal to 1,200 square feet of conditioned floor area, the allowable duct leakage shall be 50 cubic feet per minute or less.
2. Postconstruction test: Total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 $m^2$) of conditioned floor area.

   **Exception:**
   If the HVAC duct system is serving less than or equal to 1,200 square feet of conditioned floor area, the allowable duct leakage shall be 50 cubic feet per minute or less.
3. Postconstruction duct leakage to outside: duct leakage to outside the building thermal envelope shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 $m^2$) of conditioned floor area when using the Energy Rating Index compliance option Section N1106.

**N1103.3.7 Building cavities.**
*Building framing* cavities shall not be used as pressurized ducts or plenums.

**N1103.4 Mechanical system and service hot water piping insulation.**
Mechanical system piping capable of carrying fluids greater than 105°F (41°C) or below 55°F (13°C) shall be insulated to an *R-value* of not less than R-3.

**N1103.4.1 Protection of piping insulation.**
Piping insulation exposed to weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance and wind. The protection shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall be prohibited.

*Note: Section N1103.5 Service hot water systems is amended as follows:*

**N1103.5 Service hot water systems.**
Energy conservation measures for service hot water systems shall be in accordance with Sections N1103.5.1 through N1103.5.5.

**N1103.5.1 Heated water circulation and temperature maintenance systems.**
Where installed heated water circulation systems shall be in accordance with Section R1103.5.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 1103.5.1.2. Automatic controls, temperature sensors and pumps shall be in a location with access. Manual controls shall be in a location with *ready access*.

**N1103.5.1.1 Circulation systems.**
Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold-water supply pipe. Gravity and thermosyphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water. The controls shall limit the temperature of the water entering the cold-water piping to not greater than 104º F (40º C).

**N1103.5.1.1.1 Demand recirculation water systems.**
Where installed, demand recirculation water systems shall have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.

**N1103.5.1.2 Heat trace systems.**
Where installed electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

**N1103.5.2 Hot water pipe insulation.**
Insulation for hot water piping with a thermal resistance, *R-value*, of not less than R-3 shall be applied to the following:
1. Piping 3/4 inch (19 mm) and larger in nominal diameter located inside the *conditioned space*.
2. Piping serving more than one *dwelling unit*.
3. Piping located outside the *conditioned space*.
4. Piping from the water heater to a distribution manifold.
5. Piping located under a floor slab.
6. Buried piping.
7. Supply and return piping in circulation and recirculation systems other than cold water pipe return demand recirculation systems.

**N1103.5.3 Drain water heat recovery units.**
Where installed, drain water heat recovery units shall comply with CSA B55.2. Drain water heat recovery units shall be tested in accordance with CSA B55.1. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi (20.7 kPa) for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi (13.8 kPa) for individual units connected to three or more showers.

*Note: Add Section 1103.5.4 Water heating equipment location is added as follows:*

**N1103.5.4 Water heating equipment location.**
Water heaters shall be located in a space with the following characteristics:
1. Minimum dimensions of 3 feet by 3 feet by 7 feet high.

2. Minimum volume of 760 cubic feet, or the equivalent of one 16-inch by 24-inch grill to a heated space and one 8-inch duct of no more than 10 feet in length for cool exhaust air.
3. Contains a condensate drain that is no more than 2 inches higher than the base of the installed water heater and allows natural draining without pump assistance, installed within 3 feet of the water heater.

**Exceptions:**

1. Water heaters with an input capacity of greater than 300,000 Btu/h that serves multiple *dwelling units* or *sleeping units.*
2. *Electric water heaters with a rated storage volume of less than 20 gallons.*
3. The space and ventilation requirements may be reduced to conform with the manufacturer's recommendations for a specific heat pump hot water heater that meets the requirements of Section N1103.5. The specific heat pump water heater shall be identified on the construction documents and the certificate required by Section N1101.14.

**N1103.5.5 Demand responsive water heating.**

Electric storage water heaters with rated water storage volume between 40 (150L) and 120 gallons (450L) and a nameplate input rating equal to or less than 12kW shall be provided with *demand responsive controls listed for participation in a demand response program that serves the building site* that comply with ANSI/CTA-2045-B Level 1 and are also capable of initiating water heating to meet the temperature set point in response to a *demand response signal* or another equivalent *approved* standard.

**Exceptions:**

1. Water heaters that provide a hot water delivery temperature of 180°F (82°C) or greater.
2. Water heaters that comply with Section IV, Part HLW or Section X of the ASME Boiler and Pressure Vessel Code.
3. Water heaters that use 3-phase electric power.

**N1103.6 Mechanical ventilation.**

*Buildings* and *dwelling units* shall be provided with mechanical *ventilation* that complies with the requirements of Section M1505 or with other *approved* means of *ventilation*. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

**N1103.6.1 Heat or energy recovery ventilation.**

*Dwelling units* shall be provided with a heat recovery or energy recovery ventilation system in Climate Zones 5. The system shall be balanced with a minimum sensible heat recovery efficiency of 65 percent at 32°F (0°C) at a flow greater than or equal to the design airflow as determined by ASHRAE 62.2-2013.

**N1103.6.2 Whole- dwelling mechanical ventilation system fan efficacy.**

Fans used to provide whole-dwelling mechanical ventilation shall meet the efficacy requirements of Table N1103.6.2 at one or more rating points. Fans shall be tested in accordance with HVI 916 and listed. The airflow shall be reported in the product listing or on the label. Fan efficacy shall be reported in the product listing or shall be derived from the input power and airflow values reported in the product listing or on the label. Fan efficacy for fully ducted HRV, ERC, balanced and in-line fans shall be determined at a static pressure of not less than 0.2-inch water column (49.82 Pa). Fan efficacy for ducted range hoods, bathroom, and utility room fans shall be determined at a static pressure of not less than 0.1-inch water column (24.91 Pa).

**TABLE N1103.6.2: MECHANICAL VENTILATION SYSTEM FAN EFFICACY WHOLE-DWELLING MECHANICAL VENTILATION SYSTEM FAN EFFICACY [a]**

| FAN LOCATION | AIR FLOW RATE MINIMUM (CFM) | MINIMUM EFFICACY (CFM / WATT) |
|---|---|---|
| HRV / ERV | Any | 1.2 cfm/watt or Energy Star Compliant |
| In-line fan supply or exhaust fan | Any | 3.8 cfm/watt or Energy Star Compliant |
| Other exhaust fan | < 90 | 2.8 cfm/watt or Energy Star Compliant |

| | | |
|---|---|---|
| Other exhaust fan | ≥ 90 | 3.5 cfm/watt or Energy Star Compliant |
| Air-handler that is integrated to tested and listed HVAC equipment | Any | 1.2 cfm/watt or Energy Star Compliant |

For SI: 1 cubic foot per minute = 28.3 L/min.

a. Design outdoor airflow rate/watts of fan used.

**N1103.6.3 Testing.**
Mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section N1103.6. Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood or box, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals or grilles, outlet terminals or grilles, or in the connected ventilation ducts. Where required by the code official, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

**Exception:**
Kitchen range hoods that are ducted to the outside with 6-inch (152 mm) or larger duct and not more than one 90-degree (1.57 rad) elbow or equivalent in the duct run.

**N1103.6.4 Intermittent exhaust control for bathrooms and toilet rooms.**
Where an exhaust system serving a bathroom or toilet room is designed for intermittent operation, the exhaust system controls shall include one or more of the following:

1. A timer control with one or more delay setpoints that automatically turns off exhaust fans when the selected setpoint is reached. Not fewer than one delay-off setpoint shall be 30 minutes or less.
2. An occupant sensor control with one or more delay setpoints that automatically turns off exhaust fans in accordance with the selected delay setpoint after all occupants have vacated the space. Not fewer than one delay-off setpoint shall be 30 minutes or less.
3. A humidity control with an adjustable setpoint ranging between 50 percent or more and 80 percent or less relative humidity that automatically turns off exhaust fans when the selected setpoint is reached.
4. A contaminant control that responds to a particle or gaseous concentration and automatically turns off exhaust fans when a design setpoint is reached.

Manual-off functionality shall not be used in lieu of the minimum setpoint functionality required by this section.

**Exception:**
Bathroom and toilet room exhaust systems serving as an integral component of an outdoor air ventilation system or a whole-house mechanical ventilation system.

**N1103.7 Equipment heating and cooling equipment sizing and efficiency rating.**
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. Where the installed heating and cooling delivery system uses duct work, ACCA Manual D or other *approved* design manual shall be used.

**N1103.8 Systems serving multiple *dwelling units*.**
Systems serving multiple *dwelling units* shall comply with Sections C403 and C404 of the *International Energy Conservation Code*—Commercial Provisions instead of Section N1103.

**N1103.9 Minimum Equipment Efficiency.**
Dwellings or accessory buildings with *conditioned space* using the prescriptive path must comply with the minimum equipment efficiency values of Table N1103.9.1.

**Exceptions:**
Permits for the replacement of existing equipment where a venting upgrade is not readily achievable.
Additions and remodels where existing systems are not being modified or replaced.

**TABLE N1103.9.1: MINIMUM EQUIPMENT EFFICIENCY VALUES**

| ITEM | REQUIREMENT |
|---|---|

| | |
|---|---|
| Appliances (new or replaced) | Energy Star Certified |
| Furnaces, Boilers | 92% AFUE with ECM Blower Motors |
| Water Heaters | 0.82 Energy Factor |
| Heat Pumps | Energy Star Certified |
| Unit Heaters | 92% Thermal Efficiency |

## SECTION N1104: ELECTRICAL POWER AND LIGHTING SYSTEMS (MANDATORY)

**N1104.1 Lighting equipment.**
All permanently installed lighting fixtures, excluding kitchen appliance lighting fixtures, shall contain only high-efficacy *light sources*.

*Section N1104.1.1 Fuel gas lighting is amended to read as follows:*

**N1104.1.1 Fuel gas lighting.**
Fuel gas lighting systems are prohibited.

*Section N1104.2 Additional electric infrastructure is added as follows:*

**N1104.2 Additional electric infrastructure.**
All combustion equipment shall be installed in accordance with Section N1104 and shall be provided with a junction box that is connected to an electrical panel by continuous raceways that meet the following requirements:

1. The junction box, raceway, and bus bar in the electric panel and conductors serving the electric panel shall be sized to accommodate electric equipment sized to serve the same load as the *combustion equipment*.
2. The panel shall have reserved physical space for a dual-pole circuit breaker.
3. The junction box and electrical panel directory entry for the dedicated circuit breaker space shall have labels stating, "For future electric equipment."
4. The junction box shall allow for the electric equipment to be installed within the same place of the *combustion equipment* that it replaces.

   **Exceptions:**
   1. Fossil fuel space heating equipment where a 208/240-volt electrical circuit with a minimum capacity of 40 amps exists for space cooling equipment.
   2. Water heating equipment with an input capacity greater than 300,000 Btu/h that serves multiple *dwelling units* or sleeping units.

**N1104.3 Electric vehicle charging for new construction.**
See requirements in the Colorado Model Electric Ready and Solar Ready Code, as adopted with these amendments.

**Exception:**
Detached garage accessory structures, as regulated by the *International Residential Code*, that do not have electrical installation do not need to install Electric Vehicle Charging Infrastructure provided the garage accessory structure is unfinished for future installation.

## SECTION N1105 (Delete): TOTAL BUILDING PERFORMANCE

*Section N1105 is deleted in its entirety.*

## SECTION N1106: ENERGY RATING INDEX (ERI / HERS) COMPLIANCE ALTERNATIVE

*Amend section N1106 to read as follows:*

**N1106.1 Scope.**
This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis or Home Energy Rating

System (HERS).

*Amend Table N1106.2.1 Requirements for Energy Rating Index add a new row under Mechanical and a new row under Electrical Power and Lighting Systems as follows:*

**N1106.2 ERI / HERS Compliance.**
Compliance based on the ERI / HERS, utilizing the RESNET HERS Index Score, requires that the rated design meets all the following:

1. The requirements as indicated within Section N1106.2.1 Mandatory Requirements for Energy Rating Index, including the thermal envelope requirement therein.
2. The Maximum Energy Rating Score ERI / HERS of Table N1106.5 and Section N1106.4.

**N1106.2.1 Mandatory requirements for Energy Rating Index.**

**TABLE N1106.2.1: MANDATORY REQUIREMENTS FOR ENERGY RATING INDEX (ERI / HERS) contained in the ERI rating index documents.**

| SECTION Reference to a code section includes all of the relative subsections except as indicated in the table. | Title |
|---|---|
| **N1101 General** | |
| N1101.5 | Information on construction documents |
| N1101.10.2 | Insulation Mark at Installation |
| N1101.11 | Installation |
| N1101.14 | Certificate |
| N1101.15 | Homeowners' manual |
| N1101.16 | Deconstruction |
| N1101.17 | Construction jobsite waste reduction and recycling |
| N1101.18 | Indoor water conservation |
| N1101.19 | Renewable energy requirements |
| **N1102 Building Thermal Envelope** | |
| N1102.1.1 | Vapor retarder |
| N1102.2 | Specific Insulation Requirements |
| N1102.4.1.1 | Air Leakage requirements |
| N1102.3.1 | Fenestration U-factor |
| N1102.4 | Air Leakage |
| **N1103 Systems** | |
| N1103.1 | Controls |
| N1103.3 | Ducts |
| N1103.4 | Mechanical system and service hot water piping insulation |
| N1103.5 | Service hot water systems |
| N1103.6 | Mechanical ventilation |
| N1103.7 | Equipment heating and cooling sizing and efficiency rating |
| N1103.8 | Systems serving multiple dwelling units |

| N1104 Electrical Power and Lighting Systems | |
|---|---|
| N1104.1 | Lighting equipment |
| N1104.2 | Additional electric infrastructure |
| N1104.3 | Electric vehicle charging for new construction |

**N1106.2.2 ERI/HERS Compliance.**
All new homes, or conditioned structures that are constructed in compliance with the *International Residential Code*, shall comply with N1102.2.2.

**N1106.2.2.1 New homes not greater than 1500 square feet of conditioned floor area shall meet all of the following.**
1. Compliance and certification with the most recent version of the national program requirements for ENERGY STAR Certified Homes is required.
2. Meet all the requirements for electrification and solar ready as required by the State of Colorado. See the Colorado Model Electric Ready and Solar Ready Code.
3. ERI / HERS scores shall be compliant to Table N1106.5.

**N1106.2.2.2 New homes greater than 1500 square feet not to exceed 3000 square feet of conditioned floor area shall meet all of the following.**
1. Compliance and certification with the most recent version of the national program requirements for ENERGY STAR Certified Homes is required.
2. Compliance and certification to the Department of Energy's *Zero Energy Ready Homes* program.
3. Meet all the requirements for electrification and solar ready as required by the State of Colorado. See the Colorado Model Electric Ready and Solar Ready Code.
4. ERI / HERS score shall be compliant to Table N1106.5.

**N1106.2.2.3 New homes greater than 3000 square feet of conditioned floor area shall meet all of the following.**
1. Compliance and certification to one of the following programs is required.
   1.1. The most recent version of the Department of Energy's *Zero Energy Ready Homes* program, or
   1.2. Either version of the *Passive house* programs, or
   1.3. The Platinum level of the *LEED* for homes program, or
   1.4. The *Living building challenge*,
2. Meet all the requirements for electrification and *solar-ready* as required by the State of Colorado. See the Colorado Model Electric Ready and Solar Ready Code.
3. ERI / HERS score shall be compliant to Table N1106.5.
4. Comply with embodied carbon requirements in N1108. (Note: This will apply 1 calendar year after the adoption of the Boulder County Building Code Amendment date *approved* by BOCC – TBD)

**N1106.3 Reserved.**

**N1106.4 Energy rating index without renewables and Energy Rating index with renewables.**
The building shall comply with the ERI / HERS scores as shown in Table N1106.5. The *proposed design* compliance report and confirmed design compliance report shall be provided for the building both illustrating compliance without renewables and with renewables respectively.

**N1106.4.1 Energy Rating Index (ERI / HERS).**
The Energy Rating Index (ERI / HERS) shall be determined in accordance with ANSI/RESNET/ICC 301.
Energy used to recharge or refuel a vehicle used for transportation on roads that are not on the building site shall not be included in the ERI / HERS reference design or the rated design.

**N1106.4.2 ERI / HERS-based compliance.**
Compliance based on an ERI / HERS analysis requires that the rated *proposed design* and confirmed built dwelling or structure be shown to have an ERI / HERS less than or equal to the appropriate value for the proposed all-electric building or *mixed-fuel building* as indicated in Table N1106.5 when compared to the ERI / HERS reference design. Compliance shall be based on a design proposed before implementing renewable energy components, a pre-renewables ERI / HERS

score, and a design proposed after implementing renewable energy components, a post-renewables ERI / HERS score. Both N1106.4.1 and N1106.4.2 are required for compliance on projects utilizing renewables.

**N1106.4.2.1 Pre-Renewables ERI / HERS Target score.**
The Pre-Renewable ERI / HERS Target score is the ERI/HERS design proposed before implementing renewable energy components. Prior to incorporating renewable into the project design, the project shall achieve an ERI / HERS target as determined per Table N1106.5.

**N1106.4.2.2 Post-Renewables ERI / HERS Target score.**
The Post-Renewables ERI / HERS Target score is the ERI/HERS design proposed after implementing renewable energy components. Once a Pre-Renewables ERI / HERS target has been determined for compliance, a Post renewables ERI / HERS target shall be determined per Table N1106.5.

**N1106.4.2.2.1 Renewable energy and the ERI / HERS score.**
*Renewable energy systems* may contribute to compliance using the ERI / HERS analysis of Section N1106.

**N1106.4.2.2.2 On-site renewable energy.**
*Renewable energy systems* used for compliance with Section N1106.2. May be permanently installed on the property of the building or purchased from an off-site provider.

**N1106.4.2.2.3 Offsite renewable energy.**
When offsite renewable energy is purchased and used to meet the requirements of Section N1106.7 the renewable energy shall be delivered or credited to the *building site* under an energy contract with a duration of not less than 15 years. The contract shall be structured to survive a partial or full transfer of ownership of the building property.

**N1106.5 Energy Rating Value Requirements**

**TABLE N1106.5: MAXIMUM ENERGY RATING (ERI / HERS) INDEX [a, b, c]**

| Conditioned Floor Area (Square Feet) | ERI / HERS Maximum Value (without renewable generation) | ERI / HERS Maximum Value (with renewable generation) |
|---|---|---|
| ≤ 1500 | 50 | 50 |
| 1600 | 50 | 45 |
| 1700 | 50 | 40 |
| 1800 | 50 | 35 |
| 1900 | 50 | 30 |
| 2000 | 50 | 25 |
| 2100 | 50 | 20 |
| 2200 | 50 | 15 |
| 2300 | 50 | 10 |
| 2400 | 50 | 5 |
| ≥ 2500 | 50 | 0 |

a. Conditioned Floor Area ("CFA") is to be rounded to the nearest 100 square feet.
b. ERI / HERS Score must be shown with and without the impacts of renewable energy systems.
c. Homes that are 100% electric (no gas lines installed): HERS/ERI target = 50 without renewables. Homes may install backup systems that only operate during times of electrical grid outages (or for periodic maintenance as recommended by backup system manufacturer) without triggering lower ERI/HERS scores. ~~Homes that are above 7000' in elevation may have a 100-gallon backup propane tank that serves backup systems that are only active during electrical power outages.~~

**N1106.6 Verification by *approved* third party agency.**
Verification of compliance with Section N1106 shall be completed by an *approved* third-party Energy Rater as outlined in Section N1101.20.

**N1106.7 Documentation.**
Documentation of the software used to determine the ERI / HERS and the parameters for the residential building shall be in accordance with Sections N1106.7.1 through N1106.7.4.

**N1106.7.1 Compliance software tools.**
Software tools used for determining ERI / HERS shall be *Approved* Software Rating Tools in accordance with RESNET/ICC 301.

**N1106.7.2 Compliance report.**
Compliance software tools shall generate a report that documents that the home and the ERI / HERS score of the rated design comply with Sections N1106.2, N1106.3 and N1106.4. *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 N1106.7.2.1 and N1106.7.2.2.

**N1106.7.2.1 Proposed compliance report for permit application.**
Compliance reports submitted with the application for a building permit shall include the following:
1. Building street address, or other building site identification.
2. Declaration of ERI / HERS on the title page and on the building plans.
3. The name of the individual performing the analysis and generating the compliance report.
4. The name and version of the compliance software tool.
5. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.
6. A certificate indicating that the *proposed design* has an ERI / HERS less than or equal to the appropriate score indicated in Table N1106.5 when compared to the ERI / HERS reference design. The certificate shall document the building component energy specifications that are included in the calculation, including: component level insulation R-*value*s or *U-factor*s; assumed duct system and building envelope air leakage testing results; and the type and rated efficiencies of proposed heating, cooling, mechanical ventilation and service water-heating equipment to be installed. If on-site renewable energy systems will be installed, the certificate shall report the type and production size of the proposed system.
7. When a site-specific report is not generated, the *proposed design* shall be based on the worst-case orientation and configuration of the rated home.

**N1106.7.2.2 Confirmed compliance report for a certificate of occupancy.**
A confirmed compliance report submitted for obtaining the certificate of occupancy shall be made site and address specific and include the following:
1. Building street address or other building site identification.
2. Declaration of ERI / HERS on the title page and on the building plans.
3. The name of the individual performing the analysis and generating the report.
4. The name and version of the compliance software tool.
5. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.
6. A final confirmed certificate indicating that the confirmed rated design of the built home complies with Sections N1106. The certificate shall report the energy features that were confirmed to be in the home, including: component-level insulation *R-values* or *U-factors*; results from any required duct system and building envelope air leakage testing; and the type and rated efficiencies of the heating, cooling, mechanical ventilation, and service water-heating equipment installed. Where on-site renewable energy systems have been installed on or in the home, the certificate shall report the type and production size of the installed system.

**N1106.7.3 Renewable energy certificate (REC) documentation.**
Where on-site renewable energy is included in the calculation of an ERI, one of the following forms of documentation

shall be provided to the *code official*:
1. Substantiation that the RECs associated with the on-site renewable energy are owned by, or retired on behalf of, the homeowner.
2. A contract that conveys to the homeowner the RECs associated with the on-site renewable energy, or conveys to the homeowner an equivalent quantity of RECs associated with other renewable energy.

**N1106.7.4 Additional documentation.**
The code official shall be permitted to require the following documents:
1. Documentation of the building component characteristics of the ERI / HERS 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.

**N1106.7.5 Specific approval.**
Performance analysis tools meeting the applicable subsections of Section N1106 shall be *approved*. Documentation demonstrating the approval of performance analysis tools in accordance with Section N1106.7.1 shall be provided.

**N1106.7.6 Input values.**
Where calculations require input values not specified by Sections N1102, N1103, and N1104, those input values shall be taken from ANSI/RESNET/ICC 301.

## SECTION N1107 (Delete): TROPICAL CLIMATE REGION COMPLIANCE PATH

*Delete section N1107 in its entirety.*

## SECTION N1108: EMBODIED CARBON

*Amend section N1108 to read as follows. Note: This section specifies requirements related to the environmental impacts of materials and building structures and limits on the environmental impacts of materials and building structures.*

**N1108.1 Embodied Carbon Compliance.**
When required by the provisions elsewhere in this code, the project shall demonstrate compliance to Section N1108 Embodied Carbon. (Note: This will apply 1 calendar year after the adoption of the Boulder County Building Code Amendment date *approved* by Boulder Board of County Commissioners – TBD)

**N1108.2 GWP limits for building materials pathway.**
New *residential buildings* shall comply with Sections **N1108.2.1** and **N1108.2.2**

**N1108.2.1 GWP limits.**
*Building* materials, including cement and concrete mixtures, and steel shall not exceed the *GWP* limits in Table N1108.2.1.

**Table N1108.2.1 Maximum GWP Thresholds**

| Material Category | Material Sub-Category | GWP Limit |
|---|---|---|
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: 2500 psi | 209 $kgCO_2e/m^3$ |
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: 3000 psi | 230 $kgCO_2e/m^3$ |
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: 4000 psi | 271 $kgCO_2e/m^3$ |
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: 5000 psi | 322 $kgCO_2e/m^3$ |
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: 6000 psi | 341 $kgCO_2e/m^3$ |

| | | |
|---|---|---|
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: 8000 psi | 396 $kgCO_2e/m^3$ |
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: LW[a] 3000 psi | 436 $kgCO_2e/m^3$ |
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: LW[a] 4000 psi | 479 $kgCO_2e/m^3$ |
| Cement and Concrete Mixtures | Cement and Concrete Mix at 28 days: LW[a] 5000 psi | 522 $kgCO_2e/m^3$ |
| Cement and Concrete Mixtures | Cement (1 metric ton) | 1,112 $kgCO_2e$ |

a. LW refers to Lightweight concrete products.

**N1108.2.2 Environmental product declarations.**
*GWP* limits listed in Table **N1108.2.1** shall be documented by a product specific Type III *Environmental Product Declaration (EPD)* for each product. Type III *EPD*s shall be developed in accordance with ISO Standards 14025 and 21930.

**Exception:**
Building projects that can demonstrate to the code official that no products in the Cement and Concrete Mix subcategories of Table N1108.2.1 with EPDs in compliance with the requirements of this section can be procured within 100 miles of the building site, Cement and Concrete Mix that does not meet the requirements of this section shall be permitted.

**N1108.3 Embodied $CO_2e$ in concrete products.**
Embodied $CO_2e$ in Concrete Products. The $CO_2e$ of concrete shall meet the requirements in this section, and products used for compliance shall have a product-specific Type III EPD. Documentation of the product's kg $CO_2e$/unit and EPDs shall be verified by a registered design professional on the project, and a summary shall be made available to the code official that includes a list of each product and associated kg $CO_2e$/unit, per the EPD.

**N1108.3.1 Embodied $CO_2e$ in concrete and concrete mix products.**
Credits for embodied $CO_2e$ in Cement and Concrete Mix and precast concrete products are achieved if 90% or more of all concrete mixes used in the building's primary structural foundations does not exceed the project limit ($CO_2e_{max}$) determined by 125% of *IW-EPD's* kg $CO_2e/y^3$. Precast and cast in place concrete products may be considered in this category. Products shall have a *product specific Type III EPD*.

**N1108.3.1.1 Concrete compliance.**
Total cement content shall be based on the total cement usage of all the concrete within the same project. Total cement content for a project shall not exceed the value calculated according to Equation: N1108.3.1.1.

**Equation N1108.3.1.1***

$CO_2e_{proj} < CO_2e_{max}$

where: $CO_2e_{proj} = \Sigma(CO_2e_n)\ (v_n)$ and $CO_2e_{max} = \Sigma(CO_2e_{lim})\ (v_n)$

and

n = the total number of concrete mixtures for the project

$CO_2e_n$ = the global warming potential for mixture n per mixture EPD, $kgCO_2e/y^3$

$CO_2e_{lim}$ = the global warming potential limit for mixture n per 125% of IW-EPD's

kg $CO_2e/y^3$

$v_n$ = the volume of mixture $_n$ concrete to be placed in the project, in $y^3$

*Equation attributed to publication 2024 New Buildings Institute, *Embodied Carbon Residential Code: A Pathway to Adopting Embodied Carbon Codes for Residential Buildings* document (Version 1, June 2024).

**N1108.3.2 Embodied $CO_2e$ in Precast Concrete Products.**
Embodied $CO_2e$ in Precast Concrete Products. Credits for embodied $CO_2e$ in concrete products are achieved if 75% of all

precast used as ordinary precast structural walls and foundations, based on cost or weight, shall not exceed 125% of IW-EPD's kg-$CO_2$e/metric ton.

**N1108.4 Documentation.**
Compliance documentation shall be submitted.

**N1108.4.1 At permit application.**
Submit a proposed plan prepared by an *approved* qualified consultant that demonstrates compliance for the proposed project.

**N1108.4.2 Prior to Final Inspections.**
Submit final compliance documentation prepared by an *approved* qualified consultant that demonstrates the project was completed incompliance of GWP limitations in N1108. Final compliance documentation is not considered compliant without review.

### Example kgCO2e/unit Summary Reporting Table

*Documentation requires that EPDs are "verified by a registered design professional on the project, and a summary shall be made available to the code official that includes a list of each product and associated kg$CO_2$e/unit, per the EPD." The following is an example summary:*

| Product | Required Percent of Compliance | Procured Product Amount | Total Product Amount | Percentage Confirmed | Target kg$CO_2$e/ unit 150% IW-EPD | Actual kg$CO_2$e/ unit per the EPD | Confirmed Compliance |
|---|---|---|---|---|---|---|---|
| Ready Mix Concrete 5000 psi | 25% | | | | 434 kg$CO_2$e/$v^3$ | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

## SECTION N1109: EXISTING BUILDINGS—GENERAL

**N1109.1 Scope.**
The provisions of Sections N1109 through N1113 shall control the *alteration*, *repair*, *addition*, and change of occupancy of existing *buildings* and structures.

**N1109.1.1 General.**
Except as specified in this chapter, this code shall not be used to require the removal, alteration or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code. Unaltered portions of the existing *building* or *building* supply system shall not be required to comply with this chapter, except as required by Section N1115.

**N1109.2 Compliance.**
*Additions*, *alterations*, *repairs* or *changes of occupancy* to, or relocation of, an existing building, building system, or portion thereof shall comply with Section N1110, N1111, N1112, or N1113, respectively, in this code and the *International Building Code®*, *International Fire Code*, *International Fuel Gas Code®*, *International Mechanical Code®*, *International Plumbing Code®*, and NFPA 70. Changes where unconditioned space is changed to *conditioned space* shall comply with Section N1110, N1111, and N1113 as applicable.

**N1109.2.1 Steel framed structures.**
Steel framed structures shall comply with ERI / HERS compliance pathway.

**N1109.3 Maintenance.**
*Buildings* and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and systems that are required by this code shall be maintained in conformance with the code edition under which installed. The *owner* or the owner's authorized agent shall be responsible for the maintenance of *buildings* and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

**N1109.4 New and replacement materials.**
Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for *repairs*, provided no hazards to life, health, or property is created. Hazardous materials shall not be used where the code for new construction would not allow their use in *buildings* of similar occupancy, purpose and location.

**N1109.5 Historic buildings.**
Provisions of this chapter relating to the construction, *repair*, alteration, restoration and movement of structures, and change of occupancy shall not be mandatory for *historic buildings* provided a report has been submitted to the *building official* and signed by the *owner*, a registered *design professional*, or a representative of the State Historic Preservation Office or the historic preservation authority having *jurisdiction*, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the *building*.

**N1109.6 Insulation and *fenestration* criteria.**
The *building thermal envelope* shall meet the requirements of Table N1102.1.2. Assemblies shall have a *U-factor* equal to or less than that specified in Table N1102.1.2. *Fenestration* shall have a *U-factor* and *glazed fenestration* SHGC equal to or less than that specified in Table N1102.1.2.

## SECTION N1110: ADDITIONS

**N1110.1 General.**
Additions to an existing building, building system or portion thereof shall conform to the provisions of this chapter as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this chapter, except as specified in Section N1115. Additions shall not create an unsafe or hazardous condition or overload existing building systems.

**N1110.2 Compliance.**
An *addition* shall be deemed to comply with this code where one of the following compliance options in sections N1110.2.1 or N1110.2.2 is used.

**N1110.2.1 Prescriptive compliance pathway (500 square feet maximum).**
For additions of 500 sq. ft. of conditioned floor area or less, the *addition* shall meet the requirements of this code, including Table N1102.1.2. These additions must also comply with Section N1115 to obtain 7 additional energy efficiency credits.

**Exception:**
Additions of over 200 square feet of floor area resulting in home greater than 2,500 square feet in conditioned floor area shall follow the Energy Rating Index compliance pathway. Similarly, conversions of nonconditioned space to conditioned space shall follow the Energy Rating Index compliance pathway.

**N1110.2.2 *Energy Rating Index* compliance pathway.**
For *additions* of any size, *Energy Rating Index* compliance verification shall demonstrate that the existing building plus the *addition* achieves a maximum ERI score as required based on the pathways in 1 through 3 below. This method requires the project to create *Energy Rating Index* verification at the stages outlined in Section N1110.2.2.1.

1. Additions less than or equal to 500 square feet are required to have an ERI / HERS score of 65 or lower.
2. Additions greater than 500 square feet but less than 1,000 square feet shall achieve a required ERI / HERS score of 60 or lower.

**Exception:**

Additions greater than 500 square feet but less than 1,000 square feet may demonstrate compliance by demonstrating

a 30% improvement in energy efficiency with an ERI / HERS score evaluation prior to starting work. The existing ERI / HERS score compared to the proposed ERI / HERS shall demonstrate a minimum of a 30% improvement in energy efficiency as an alternative to achieving the ERI / HERS 60 or lower.

3. Additions 1,000 square feet and greater shall achieve a required ERI / HERS score no greater than 70 before solar PV and meet requirement in Table N1110.2.2 with the addition of solar PV.

**N1110.2.2.1 Compliance Reports for the Energy Rating Index (ERI) compliance pathway.**
The following compliance reports shall be submitted for permitting and to obtain the certificate of occupancy.

1. Documentation required prior to permit issuance: Submit a projected Energy Rating Index (ERI) compliance report of the existing building plus the addition based on the proposed design for the building in its entirety demonstrating that the building plus the addition complies with the ERI score requirement in Figure N1110.2.2.
2. Documentation required prior to Final Inspection: Submit a final confirmed Energy Rating Index (ERI) compliance report prior to final inspection for the building in its entirety demonstrating that the building plus the addition complies with the ERI score requirement in Figure N1110.2.2.

**Table N1110.2.2: ERI score requirement for additions ≥ 1,000 sq ft.[a]**

| CFA, SQ FT* | MAXIMUM ERI | CFA, SQ FT* | MAXIMUM ERI | CFA, SQ FT* | MAXIMUM ERI |
|---|---|---|---|---|---|
| 0 | 68 | 3500 | 58 | 5600 | 33 |
| 1500 | 68 | 3600 | 58 | 5700 | 31 |
| 1600 | 68 | 3700 | 57 | 5800 | 29 |
| 1700 | 67 | 3800 | 57 | 5900 | 27 |
| 1800 | 67 | 3900 | 56 | 6000 | 25 |
| 1900 | 66 | 4000 | 55 | 6100 | 23 |
| 2000 | 66 | 4100 | 54 | 6200 | 21 |
| 2100 | 65 | 4200 | 53 | 6300 | 19 |
| 2200 | 65 | 4300 | 52 | 6400 | 17 |
| 2300 | 64 | 4400 | 51 | 6500 | 15 |
| 2400 | 64 | 4500 | 50 | 6600 | 13 |
| 2500 | 63 | 4600 | 49 | 6700 | 11 |
| 2600 | 63 | 4700 | 48 | 6800 | 9 |
| 2700 | 62 | 4800 | 47 | 6900 | 7 |
| 2800 | 62 | 4900 | 46 | 7000 | 5 |
| 2900 | 61 | 5000 | 45 | 7100 | 3 |
| 3000 | 61 | 5100 | 43 | 7200 | 1 |
| 3100 | 60 | 5200 | 41 | ≥7300 | 0 |
| 3200 | 60 | 5300 | 39 | | |
| 3300 | 59 | 5400 | 37 | | |
| 3400 | 59 | 5500 | 35 | | |

a. ***Alterations*** **shall comply as referenced in N1111.2.**

**N1110.3 Building envelope.**
New *building* envelope assemblies that are part of the *addition* shall have *R-values* and *U-factor* values equal to or better than those shown in table N1102.1.2

**N1110.4 Heating and cooling systems.**
HVAC *ductwork* newly installed as part of an *addition* shall comply with Section N1103, including N1103.7 and N1103.9.

**N1110.5 Service hot water systems.**
New service hot water systems that are part of the *addition* shall comply with Section N1103.5 and N1103.9.

**N1110.6 Lighting.**
New lighting systems that are part of the *addition* shall comply with Section N1104.1.

## SECTION N1111: ALTERATIONS

**N1111.1 General.**
Alterations to any building or structure shall comply with the requirements of the code for new construction, without requiring the unaltered portions of the existing building or building system to comply with this chapter, except as specified in Section N1115. *Alterations* shall be such that the existing *building* or structure is not less conforming with the provisions of this chapter than the existing *building* or structure was prior to the *alteration*. *Alterations* shall not create an unsafe or hazardous condition or overload existing *building* systems.

**N1111.2 Compliance.**
*Alterations* that alter the building thermal envelope or the heating, cooling, or water heating mechanical systems shall be such that the existing *building* or structure does not use more energy than the existing *building* or structure prior to the *alteration*. *Alterations* that are instigated as part of an addition shall demonstrate compliance with this code through the compliance options outlined in Section N1110.2.

For the purpose of determining project valuation for the requirements of this section, this valuation factor may include the total value of the proposed permit work plus the value of any permit *Alterations* that have occurred in the prior 24 months. Any increases in project valuation due to required energy efficiency upgrades in one compliance pathway are not required to be factored into the determination of the applicable compliance pathway under section N1111.2, as determined by the building official.

**N1111.2.1 *Alterations* valued at $50,000 or less.**
For *alterations* valued at $50,000 or less, compliance with this code can be shown by documenting adherence to Sections N1111.3 through N1111.7.

**N1111.2.2 *Alterations* greater than $50,000 to $250,000.**
*Alterations* greater than $50,000 to $250,000 in value shall comply with either N1111.2.2.1 or N1111.2.2.2.

**N1111.2.2.1 Prescriptive Pathway:**
*Alterations* shall adhere to Sections N1111.3 through N1111.8.

**N1111.2.2.2 ERI Pathway:**
Submit a projected Energy Rating Index (ERI) compliance report for the entire building based on the *proposed design*, showing that the building meets an ERI score of 65 or lower.

**N1111.2.3 *Alterations* greater than $250,000.**
*Alterations* greater than $250,000 in value shall comply with N1111.2.3.1.

**N1111.2.3.1 ERI Pathway:**
Submit a projected *Energy Rating Index* (ERI) compliance report for the entire building based on the *proposed design*, showing that the building meets an ERI score of 70 prior to PV and complies with Table N1110.2.2.

**N1111.3 Building thermal envelope.**
Building envelope assemblies that are part of the *alteration* shall have *R-values* and *U-factor* equal to or better than those shown in table N1102.1.2. The *R-value* of insulation shall not be reduced, nor the *U-factor* of a building thermal envelope assembly be increased as part of a building thermal envelope alteration.

**Exception:**
The following *alterations* shall not be required to comply with the requirements for new construction provided the energy use of the *building* is not increased:

1. Storm windows installed over existing *fenestration*.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Roof recover.
5. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during *reroofing* shall be insulated either above or below the sheathing.
6. Surface applied window film installed on existing single pane *fenestration* assemblies to reduce solar heat gain provided the code does not require the glazing or *fenestration* assembly to be replaced.

**N1111.4 Replacement *fenestration*.**
New and replacement *fenestration* units, including sash and glazing, shall meet the applicable requirements for *U-factor* and SHGC as provided in Table N1102.1.2. Where more than one replacement *fenestration* unit is to be installed, an area-weighted average of the *U-factor*, SHGC or both of all replacement *fenestration* units shall be an alternative that can be used to show compliance.

**N1111.5 Heating and cooling systems.**
HVAC *ductwork* newly installed as part of alteration shall comply with Section N1103, including N1103.7 and N1103.9.

**N1111.6 Service hot water systems.**
New service hot water systems that are part of the *alteration* shall comply with Section N1103.5 and N1103.9.

**N1111.7 Lighting.**
New lighting systems that are part of the *alteration* shall comply with Section N1104.1.

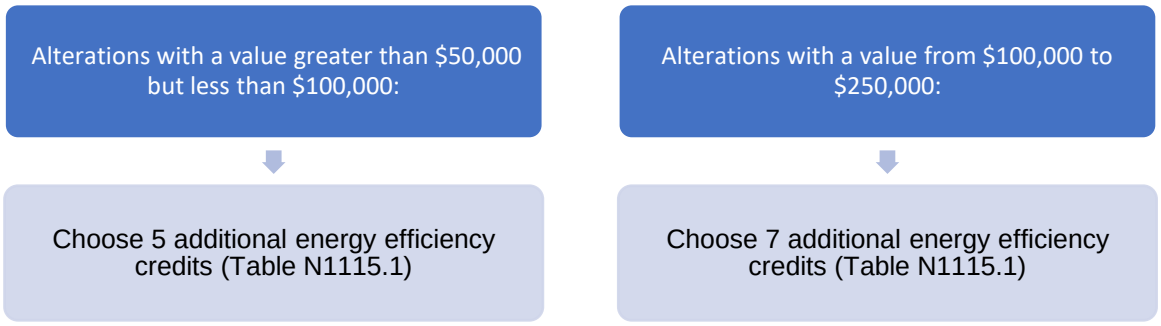
**Exception:**
Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

**N1111.8 Additional Efficiency requirements for alterations.**
Alterations with a value greater than $50,000 and less than $250,000 must obtain a minimum number of additional energy efficiency credits from Section N1115, as specified in N1111.8.1 or N1111.8.2. Alterations listed in Table N1115.1 that are not part of the current project or were installed previously may still be used to meet this requirement.

**N1111.8.1 Requirements for *alterations* with a value greater than $50,000 and less than $100,000.**
*Alterations* with a permit value greater than $50,000 but less than $100,000 options from Table N1115.1 to accumulate a minimum of 5 additional energy efficiency credits.

**N1111.8.2 Requirements for *alterations* with a value of $100,000 to $250,000.**
*Alterations* with a value from $100,000 to $250,000 must choose options from Table N1115.1 to accumulate a minimum of 7 additional efficiency credits.

**Figure N1111.8: ADDITIONAL ENERGY EFFICIENCY CREDITS FOR ALTERATIONS**



## SECTION N1112: REPAIRS

**N1112.1 General.**
Buildings, structures and parts thereof shall be repaired in compliance with Section N1109.3 and this section. Work on non-damaged components necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section N1109.3, ordinary *repairs* exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

**N1112.2 Application.**
For the purposes of this code, the following shall be considered *repairs*:
1. Glass-only replacements in an existing sash and frame.
2. Roof repairs.
3. Repairs where only the bulb, ballast, or both within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

## SECTION N1113: CHANGE OF OCCUPANCY OR USE

**N1113.1 General.**
Any space that is converted to *conditioned floor area* or portion thereof from another use or occupancy shall comply with this chapter.

**N1113.1.1 Unconditioned space.**
Any unconditioned or low-energy space that is altered to become a *conditioned space* shall comply with Section N1110 or N1111.

## SECTION N1114: MODIFICATIONS

**N1114.1 Modifications.**
The *building official* may make modifications to the requirements of this Chapter as allowed in Section 104.10 of the Boulder County Building Code if it is determined that strict application of the requirements of this Chapter:
1. Creates practical difficulties or excessive expense in the upgrade of an existing residential structure.
2. Requires alteration to either a structure greater than 50 years in age or any structure in a historic district or site which would materially alter the historic integrity of that structure or adversely affect the historic integrity of the district or site.
3. Creates practical difficulties in meeting on-site renewable energy requirements due to topographic constraints associated with the lot or location of the structure.

In assessing whether a request for a modification should be granted, the *building official* shall, in consultation with the staff and/or a qualified professional retained by the *building official* at the applicant's expense, determine whether the strict application of this chapter creates a situation described in items 1 through 3 listed above. If it is determined that the request warrants a modification on this basis, the *building official* shall determine what appropriate mitigation measures shall be required to ensure that the structure meets the intent and spirit of this chapter. Appropriate mitigation measures may include requiring additional energy-saving or resource-efficient construction methods or materials, sustainable framing techniques, use of environmentally friendly materials, adoption of water-saving landscaping and irrigation, or similar conservation measures.

## SECTION N1115: Existing Home Additional Energy Efficiency Pathway

**N1115.1 Scope.**
This section establishes additional efficiency options in accordance with Section N1110 and N1111.

### Table N1115.1: Additional Energy Efficiency

| **Additional Energy Efficiency Credit Sections** | Credit values |
|---|---|
| N1115.2 Energy Audit | 1 |
| N1115.3 Work that exposes thermal envelope cavities | 1 |
| N1115.4 Vented Kitchen Range Hood | 2 |
| N1115.5 Foundation wall insulation. | 2 |
| N1115.6 Blower door test / *Infiltration* measurement. | 5 |
| N1115.7 Energy Rating Index. | 7 |
| N1115.8 Radon Testing. | 2 |
| N1115.9 Radon system. | 2 |
| N1115.10 Space conditioning replacement HVAC design. | 5 |
| N1115.11 Gas space heating replacement. | 1 |
| N1115.12 Heat Pump space heating replacement. | 5 |
| N1115.13 Air conditioner space cooling replacement. | 2 |
| N1115.14 Heat Pump Space cooling replacement. | 2 |
| N1115.15 Gas Water heating. | 1 |
| N1115.16 Heat Pump Water heating. | 5 |
| N1115.17 Induction Cooktop and convection oven are installed | 2 |
| N1115.17 Blower door directed air sealing achieves less than 3 ACH50 | 5 |
| N1115.18 Whole house controlled mechanical ventilation. | 5 |
| N1115.19 Electric vehicle charging station | 3 |
| N1115.20 (Reserved) | ---- |
| N1115.21 Photovoltaic system. | 5 |
| N1115.22 Conditioned/non-vented crawl space. | 5 |
| N1115.23 Conditioned/non-vented attic space | 5 |
| N1115.24 Home is Fully electrified, | 7 |
| N1115.25 Less than full Window replacement | 2 |
| N1115.26 Full window replacement | 7 |
| | |

**N1115.1.1 Existing Items.**
Options listed in Table N1115.1, already integrated into the existing building and installed with a permit, may be used to meet this requirement, regardless of their installation date or inclusion in the current scope of work.

**N1115.2 Energy Audit.**
A RESNET or BPI energy audit, or equivalent, shall be conducted prior to permitting the house for an *addition* or *alteration*.

**N1115.3 Work that exposes thermal envelope cavities.**
Exposed *building thermal envelope* cavities must be air sealed and filled with insulation in accordance with Table N1102.1.2.

**N1115.4 Vented Kitchen Range Hood.**
The kitchen range hood shall be vented to the outdoors and shall comply with the *International Residential Code* section M1503 and M1505.4.4

**N1115.5 Foundation wall insulation.**
Foundation walls shall be insulated in accordance with Table N1102.1.2.

**N1115.6 *Infiltration* measurement.**
The house shall meet a whole house blower measurement of 3 ACH or less or Blower door directed air sealing achieves less than 3 ACH50. Using a blower door to guide air sealing in the home to achieve an air leakage rate of less than 3 ACH50.

**N1115.7 Energy Rating Index.**
The house shall achieve a HERS Energy Rating Index score of 50 or less.

**N111.5.8 Radon Testing.**
The house shall have a radon test prior to the commencement of work. Test results that are at 4 picocuries or greater shall install a radon mitigation system.

**N1115.9 Radon system.**
An active or passive radon system with fan location prewired shall be installed.

**N1115.10 Space conditioning replacement design.**
An ACCA manual J heat load calculation shall be created before selecting space heating or cooling equipment in accordance with ACCA Manual S.

**N1115.11 Gas Space heating replacement.**
Space heating replacements shall be condensing appliances with an AFUE of 0.93 or higher.

**N1115.12 Heat Pump Space heating replacement.**
Space heating replacements shall be a variable capacity Cold Climate heat pump with an HSPF2 of 8.1or higher and a capacity maintenance at 5 degrees of at least 70%.

**N1115.13 Air Conditioner Space cooling replacement.**
Space cooling replacements shall have a SEER value of 14 or higher.

**N1115.14 Heat Pump Space cooling replacement.**
Space cooling replacements shall have a SEER2 value of 15 or higher.

**N1115.15 Gas Water heating.**
Water heating appliances shall have an UEF of .90 or higher.

**N1115.16 Heat Pump Water heating.**
Water heating appliances shall have an COP of 2 or higher.

**N1115.17 Induction Cooktop and convection oven are installed.**
Provide documentation that an induction cooktop, electric convection oven, or a combination unit has been installed.

**N1115.18 Whole house controlled mechanical ventilation.**
Whole house controlled mechanical ventilation shall be properly sized and installed in the home in accordance with section N1103.6

**N1115.19 Electric vehicle charging station.**
A level 2 (240-volt) electric vehicle charging station shall be installed in the home.

**N1115.20 (Reserved)**

**N1115.21 Photovoltaic system.**
A PV system sized to 30% of the annual electrical consumption shall be installed.

**N1115.22 Conditioned/non-vented crawl space.**

Conversion from a vented crawl space to a conditioned crawl space in accordance with Section N1102.2.10 and Table 1102.1.2 and N1102.4.1.1.

**N1115.23 Conditioned/non-vented attic space.**
Conversion from a vented attic space to a conditioned attic space built in accordance with Section R806.5 of the Internation Residential Code.

**N1115.24 Home is Fully electrified.**
Provide documentation that a cold climate Heating cooling and water heating have been installed in accordance with Sections N1115.10, N1115.12, N1115.14, and N1115.16 and that an induction cooktop and convection oven has been installed in the building.

**N1115.25 Less than full window replacement:**
Any existing window that is replace as part of an alteration shall have a *U-factor* value of not less than 0.27 ~~0.25~~.

**N1115.26 Full window replacement.**
All the windows in an existing building have been replaced with windows that meet the requirements of Table N1102.1.2.

*Sections N1116 through N1189 are reserved.*

## SECTION N1190: Exterior Energy Uses and Onsite Energy Offsets

**N1190.1 General.**
Exterior energy uses, and specified interior uses, must be offset with on-site renewable energy production.

**Exception:**
Cooking appliances and Electrical Roofing Ice Melt Systems installed in homes built prior to 2016.

**N1190.1.1 Conversion of kilowatt hours per year to British Thermal Units (BTUs) per year.**
For the purpose of converting energy consumption in section N1190, the following factor shall be used.

1 kilowatt hour per year (kWh/year) = BTU per year / 3,412

Note: A separate building permit is required for on-site renewable energy generation equipment.

**N1190.2 Snow melt system controls.**
Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C), and precipitation is not falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (4.8°C).

**N1190.2.1 Snow melt and ice melt system design.**
Where installed, energy use by snow and ice melt systems must be offset by on-site renewable energy generation equivalent to the energy used by the snow and ice melting equipment. Plans must be submitted that detail the type, size and location of the on-site renewable energy generation equipment.

**N1190.2.2 Energy conservation design criteria for supporting on-site renewable energy equipment.**
On-site renewable energy generation equipment installed to offset the energy used by snow and ice melt systems shall be determined using the formula provided in Equation **N1190.2.2**.

**(Equation N1190.2.2):**

A = (B × 34,425 BTUs) / 3,412

Where:

On-Site Renewable Energy Requirements: 34,425 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in area of the ice or snow melt.

**N1190.3 Pool energy consumption.**
Swimming pools must be provided with energy conservation measures in accordance with Section N1190.3.1 through N1190.3.6 or be unheated. Heated pools must be heated by solar thermal or other equipment that does not rely directly or indirectly on the burning of fossil fuels or they must have their energy use offset by on-site renewable energy generation equipment equivalent to the energy use by the swimming pool.

**N1190.3.1 Heaters.**
The electric power to heaters shall be controlled by on-off switch, with *ready access*, that is an integral part of the heater mounted on the exterior of the heater, or external to and within 3 feet (914mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Where heat pumps are installed, only heat pumps rated for cold climates shall be allowed.

**Exceptions:**
1. Unheated swimming pools.
2. Heated swimming pools having less than 200 square feet (18.6 $m^2$) of water surface area are exempt from the requirements to provide renewable energy.
3. Legally installed swimming pools with legally installed water heating equipment are exempt from the onsite renewable requirement when replacing the previously *approved* water heating equipment.

**N1190.3.2 Time switches.**
Time switches or other control methods that can automatically turn off and on according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches and shall be in compliance with this section.

**Exceptions:**
1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

**N1190.3.3 Covers.**
Outdoor heated pools and outdoor spas shall be provided with a vapor retardant cover or other *approved* vapor-retardant means. Pools heated to more than 90°F (32°C) shall have side and bottom surfaces insulated on the exterior with a minimum insulation value of R-12 and shall have a pool cover with a minimum insulation value of *R*-12.

**N1190.3.4 Pumps.**
Swimming pool pumps must be multi-speed pumps.

**N1190.3.5 Swimming pools require onsite energy offsets.**
All heated swimming pools must be heated by solar thermal or other equipment that does not rely, directly or indirectly, on the burning of fossil fuels. Where heated pools are heated by the use of burning fossil fuels, directly or indirectly, they must have their energy use offset by on-site renewable energy generation equipment equivalent to the energy use by the swimming pool.

**Exception:**
Swimming pools having less than 200 sq. ft. of water surface area are exempt from the requirements to provide renewable energy.

**N1190.3.6 Energy conservation design standards for swimming pools.**
For the purpose of calculating the energy use of swimming pools, section N1190.3.6.1 Outdoor Swimming pools and N1190.3.6.2 Indoor Swimming Pools shall apply as applicable.

**N1190.3.6.1 Energy conservation design standards for outdoor swimming pools.**
The required on-site renewable energy offset for swimming pools located outdoors shall be determined using the formula provided in Equation N1190.3.6.1.

**(Equation N1190.3.6.1):**

$A = (B \times 29{,}000\ BTU) / 3{,}412$

Where:

Outdoor Swimming Pool Season: 3 months.

Swimming Pool Heating Temperature: 82°F (28°C) or less

On-Site Renewable Energy Requirements: 29,000 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the outdoor swimming pool.

**N1190.3.6.2 Energy conservation design standards for indoor swimming pools.**
The required on-site renewable energy offset for swimming pools located within unconditioned spaces shall be determined using the formula provided in Equation N1190.3.6.2.

**(Equation N1190.3.6.2):**

A = (B × 116,000 BTU) / 3,412

Where:

Indoor (unconditioned) Swimming Pool Season: 12 months.

Pool Heating Temperature: 82°F (28°C) or less

On-Site Renewable Energy Requirements: 116,000 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the indoor swimming pool.

Note: This Section is not intended to limit the season or temperature of swimming pools.

**N1190.4 Portable spas.**
The energy consumption of electric-powered portable spas shall be controlled by the requirements of APSP-14.

**N1190.5 Residential pools and permanent residential spas.**
Residential swimming pools and permanent residential spas that are accessory to detached one- and two-family dwellings and townhouses 3 stories or less in height above grade plane and that are available only to the household and its guests shall be in accordance with APSP-15.

**N1190.6 Spas.**
Any energy use by swim or exercise spas, indoor spas located in unconditioned spaces, or outdoor spas must be offset by on-site renewable energy generation equivalent to the energy use by the spa. Plans must show the annual energy use of the spa, the calculation method used to determine the expected energy use, and the on-site *renewable energy system*(s) which will be used to offset the energy used by the spa. All spas must be equipped with an insulated cover that is listed to provide a minimum R-*value* of at least 12.

**Exception:**
Spas and hot tubs which have been tested and listed for compliance with the requirements of the California Energy Commission (CEC) Title 20 (Standby power for portable electric spas shall not be greater than $3.75\ V^{2/3} + 40$ watts where V = the total volume of the spa in gallons), and are less than 64 square feet in surface area shall be exempted from the requirement to offset their energy usage by on-site *renewable energy generation.* Spas larger than 64 square feet in surface area that are certified to meet the requirements of the CEC shall offset their requirements at the rate of 140,000 BTUs per square foot per year.

**N1190.6.1 Energy conservation design standards for spas.**
The requirements of this section apply to spas that do not meet the exception in Section N1190.6.

**(Equation N1190.6.1):**

A = (B × 430,000 BTUs) / 3,412

Where:

Spa Season: 12 months.

On-Site Renewable Energy Requirements: 430,000 BTU per square foot in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the spa or hot tub.

**N1190.7 Saunas.**
Energy use by fossil-fuel-consuming outdoor saunas or saunas in unconditioned spaces must be offset by on-site *renewable energy generation* equivalent to the sauna's energy consumption. Construction documents must provide information on the spa's annual energy use, the calculations outlined in sections N1190.7.1 or N1190.7.2, and the production of the *renewable energy system* that will offset the sauna's energy consumption.

**N1190.7.1 Energy conservation design standards for electric saunas.**
The required on-site renewable energy offset for outdoor electric saunas or electric saunas located in unconditioned spaces can be determined using the formula provided in Equation N1190.7.1.

**(Equation N1190.7.1):**

A = B × 200 hours/year

Where:

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Power consumption of the heating appliance in kilowatts

**N1190.7.2 Energy conservation design standards for gas-fired saunas.**
The required on-site renewable energy offset for outdoor gas-fired saunas or gas-fired saunas located in unconditioned spaces shall be determined using the formula provided in Equation N1190.7.2.

**(Equation N1190.7.2):**

A = (B × 200 hours / year) / 3412

Where:

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = BTU rating of the gas-fired heater

**N1190.8. Energy conservation design standards for exterior fireplaces, firepits, and other energy uses.**
For purposes of calculating renewable energy offset requirements, the minimum usage of exterior, fossil-fuel-consuming, fireplaces and firepits shall be considered to be 50 hours per year. Exterior space heating devices shall be assumed to operate a minimum of 150 hours per year.

*Section N1191 through N1199 are reserved.*

# Part V—Mechanical

*Adopt IRC Chapters 12 through Chapters 13 as published, except to amend as follows.*

## IRC CHAPTER 13: GENERAL MECHANICAL SYSTEM REQUIREMENTS

### SECTION M1302: APPROVAL

*Add section to IRC section M1302 to refer to state and federal lists of approved wood-burning appliances.*

**M1302.2 Solid Fuel Burning Equipment.**
No permit shall be issued for the installation of a solid-fuel-burning fireplace stove, fireplace insert or wood stove appliance unless the appliance fully conforms with the requirements for emissions testing, certification and labeling found under Title 30, Article 28, Sections 402-405 of the Colorado Revised Statutes. All such appliances to be installed must be certified by the Air Pollution Control Division of the Colorado Department of Health to meet the emissions standards set forth in Section IV of Regulation No. 4 of Volume I of the Colorado Air Quality Control Commission as EPA Phase II or Colorado Phase III solid-fuel-burning devices.

*Adopt Chapters 14 through Chapter 24 as published, except to amend as follows.*

*Chapter 24 is adopted as published, except to amend as follows. Where there is a conflict the State of Colorado Fuel Gas Code, most specific shall govern.*

# Part VI—Fuel Gas

*Chapters 24 is adopted as published, except to amend as follows. Where there is a conflict the Colorado Fuel Gas Code, as adopted by the State of Colorado Plumbing Board, the most specific shall prevail.*

## IRC CHAPTER 24: FUEL GAS

### SECTION G2445: UNVENTED UNIT HEATERS

*Amend section G2445.4 as follows.*

**G2445.4 (621.4) Prohibited locations.**
The location of unvented room heaters shall comply with Section G2406.2.

**Exception:**
The use or installation of unvented room heaters, including but not limited to unvented gas log installations, are prohibited.

*Chapters 25 through 33 are adopted as published, except to amend as follows. Where there is a conflict the State of Colorado Plumbing Code, as adopted by the Colorado Plumbing Board, the most specific shall prevail.*

# Part VII—Plumbing

## IRC CHAPTER 26: PLUMBING

### SECTION P2601: GENERAL

*Add IRC section P2601.4 to read as follows:*

**P2601.4 Sanitation Facilities for Workers.**
Toilet facilities shall be provided for construction workers and such facilities shall be maintained in a sanitary condition. Construction workers toilet facilities of the non-sewer type shall conform to ANSI Z4.3-2005.

*Adopt IRC Section P2602 through P2603.5. as published. Amend P2603.5.1 as follows:*

**P2603.5.1 Sewer depth.**
Building sewers that connect to private sewage disposal systems shall be installed in compliance with the Boulder County Public Health and State of Colorado regulations.

*Adopt IRC Section P2604 through P2801.3, as published.*

## IRC CHAPTER 28: WATER HEATERS

### SECTION P2801: GENERAL

*Add IRC section P2801.3.1 to read as follows:*

**P2801.3.1 Heat Traps.**

Water heating equipment not supplied with integral heat traps that serve non-circulation systems shall be provided with heat traps on the supply and discharge piping consisting of an arrangement of piping and fittings that prevents thermo-siphoning of hot water during standby periods.

*Adopt IRC section P2801.4 through P2911 as published.*

# IRC CHAPTER 29: WATER SUPPLY AND DISTRIBUTION

## SECTION P2911: GRAY WATER: ON-SITE NONPOTABLE WATER REUSE SYSTEMS

*Add a sentence to Section P2911.1 to reference the requirements for compliance with Colorado statutes and regulations. Adopt the remainder of IRC section P2911 as published.*

**P2911.1 General.**
The provisions of this section shall govern the construction, installation, alteration and repair of on-site non-potable water reuse systems for the collection, storage, treatment and distribution of on-site sources of non-potable water as permitted by the jurisdiction. Any use of *gray water* shall be in strict compliance with applicable Colorado statutes and all applicable regulations of the Colorado Department of Natural Resources, Division of Water Resources and the Colorado Department of Public Health and Environment, Water Quality Control Commission, including "Regulation #86", 5 CCR 1002-86.

## SECTION P2912: RAINWATER: NONPOTABLE RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS

*Add a sentence to IRC Section P2912.1 to reference the requirements for compliance with Colorado statutes and regulations. Adopt the remainder of IRC Chapter 29 as published.*

**P2912.1 General.**
The provisions of this section shall govern the construction, installation, alteration, and repair of rainwater collection and conveyance systems for the collection, storage, treatment and distribution of rainwater for non-potable applications, as permitted by the jurisdiction. Any use of rainwater shall be in strict compliance with applicable Colorado statutes and all applicable regulations of the Colorado Department of Natural Resources, Division of Water Resources and the Colorado Department of Health and Environment, Water Quality Control Commission.

# IRC CHAPTER 30: SANITARY DRAINAGE

## SECTION P3009: GRAY WATER SOIL ABSORPTION SYSTEMS

*Adopt IRC Chapter 30 as published, except add a sentence to IRC Section P3009.1 to reference the requirements for compliance with Colorado statutes and regulations. Adopt the remainder of IRC Chapter 30 through the IRC Reference Standards as published.*

**P3009.1 Scope.**
The provisions of section R3009 shall govern the materials, design, construction and installation of sub-surface graywater soil absorption systems connected to non-potable water from on-site water reuse systems. Any use of *gray water* or rainwater shall be in strict compliance with applicable Colorado statutes and all applicable regulations of the Colorado Department of Natural Resources, Division of Water Resources and the Colorado Department of Public Health and Environment, Water Quality Control Commission.

*Chapters 34 through 43 are deleted in their entirety and replaced with the latest edition of the National Electrical Code (NFPA 70) as adopted by the State of Colorado Electrical Board.*

# APPENDIX

*Adopt International Residential Code Appendix Chapters AE, AF, AJ, AM, AO, AQ, AR, AS, AT, AU, and AX published by the International Code Council. Adopt Appendix RD.*

# IRC APPENDIX AE: MANUFACTURED HOUSING USED AS DWELLINGS

*Adoption of Appendix AE, Manufactured Housing Used as Dwellings, with amendments to correlate with the requirements of the Colorado Department of Local Affairs, Division of Housing.*

## SECTION AE101: SCOPE

*Amend IRC Appendix Section AE101.1 to include manufactured housing on rental lots.*

**AE101.1 General.**
These provisions shall be applicable only to a *manufactured home* used as a single *dwelling unit* and shall apply to the following: *(remainder of section to remain as published*)

*Add IRC Appendix Section AE101.2 to require that all installations meet the most recent requirements of the Colorado Department of Local Affairs, Division of Housing.*

**AE101.2 Colorado installation requirements.**
All *manufactured home* installations are to be in accordance with the requirements of the Colorado Department of Local Affairs, Division of Housing, including the most current edition of the installation regulations, including "*Manufactured Homes and Factory Built Housing Installation Handbook*," (DOH MHIP Handbook).

# IRC APPENDIX AF: RADON CONTROL METHODS

*Adopt IRC Appendix AF as published.*

# IRC APPENDIX AJ: EXISTING BUILDINGS AND STRUCTURES

*Adopt IRC Appendix AJ as published.*

*Moved or relocated structures shall comply with the International Existing Building Code.*

# IRC APPENDIX AM: HOME DAY CARE – R-3 OCCUPANCY

*Adopt IRC Appendix AM as published.*

# IRC APPENDIX AO: AUTOMATIC VEHICULAR GATES

*Adopt IRC Appendix AO as published.*

# IRC APPENDIX AQ: TINY HOUSES

*Adopt IRC Appendix AQ as published.*

# IRC APPENDIX AR: LIGHT STRAW-CLAY CONSTRUCTION

*Adopt IRC Appendix AR for light straw-clay construction.*

# IRC APPENDIX AS: STRAWBALE CONSTRUCTION

*Adoption of and amendments to IRC Appendix AS for strawbale construction, as follows. Add IRC Section AS108.3 to specify a strawbale wall assembly that is deemed to meet the prescriptive requirements of BuildSmart Table N1102.1.2.*

## SECTION AS108: THERMAL INSULATION

**AS108.3 Prescriptive Assembly.**
Wall assemblies that conform to the requirements of this section shall be deemed to meet the building thermal envelope requirements of Section N1102.1.2 (R402.1.2).

**AS108.3.1 Wall assembly.**
The strawbale wall assembly shall consist of stacked straw bales rendered on the interior and exterior sides with plaster. The bales shall be 2-string wheat, rye, barley, oat, or rice straw having thicknesses of 14" +/- 1" parallel to the strings, and 18" +/- 1" perpendicular to the strings. Bales shall have a minimum dry density of 6.5 pounds per cubic foot. Bales may be stacked in either thickness orientation (referred to as "on-edge" or "laid flat"). Cavities created by structural and/or non-structural framing members located within the strawbale wall thickness shall be filled with straw flakes, light straw-clay, or other equivalent, *approved*, vapor-open insulation materials.

**AS108.3.2 Plaster.**
The plaster shall be a clay, lime, or *approved* lime-cement material with a thickness as specified in this chapter on both the interior and exterior. Interior and exterior plaster must be continuous over the entire strawbale wall surface.

**Exceptions:**
1. Utility penetrations.
2. Truth windows.
3. Interior wall intersections.

**AS108.3.3 Interior plaster.**
Interior plaster on exterior strawbale walls is to have a vapor permeability equivalent to that of a Class III vapor retarder, as required in Chapter 11 of the IRC for Climate Zone 5. Class II and Class I vapor retarders are not to be included in exterior strawbale wall assemblies.

**Exception:**
Enclosure of a shower or steam room adjacent to an exterior strawbale wall.

# IRC APPENDIX AT: SOLAR-READY PROVISIONS-

# DETACHED ONE- AND TWO-FAMILY DWELLINGS AND TOWNHOUSES

*Adopt IRC Appendix AT as published, except AT103.1, first sentence, is amended as follows, with the rest of the section remaining as published:*

**AT103.1 General.**
New residential buildings with not less than 600 square feet (55.74 m 2) of roof area oriented between 110 degrees and 270 degrees of true north shall comply with Sections AT103.2 through AT103.8.

# IRC APPENDIX AU: COB CONSTRUCTION

*Adopt IRC Appendix AU as published.*

# IRC APPENDIX AX: ZERO ENERGY RESIDENTIAL BUILDING PROVISIONS

*Adopt IRC Appendix AZ as published.*

# RESIDENTIAL APPENDIX RD: EV READINESS

*Adopt Appendix RD: Electric Vehicle (EV) Readiness as follows:*

## SECTION RD101

**RD101 Purpose and intent.**
The purpose and intent of this Appendix RD is to accommodate the growing need for EV charging infrastructure, in particular meeting preferences for charging at home. Including these measures during initial construction substantially reduces the costs and difficulty of installing EV infrastructure at a later date.

## SECTION RD102: APPLICABILITY

**RD102 Applicability.**
This Appendix RD shall apply to all new residential construction to which the *International Residential Code* applies.

## SECTION RD103: DEFINITIONS

**RD103 Definitions.**

**AUTOMOBILE PARKING SPACE.** A space within a building or private or public parking lot, exclusive of driveways, ramps, columns, office, and work areas, for the parking of an automobile.

**DIRECT CURRENT FAST CHARGING (DCFC) EVSE:** EV power transfer infrastructure capable of fast charging on a 100A or higher 480VAC three-phase branch circuit. AC power is converted into a controlled DC voltage and current within the *EVSE* that will then directly charge the *electric vehicle*.

**EV LOAD MANAGEMENT SYSTEM:** A system designed to allocate charging capacity among multiple *EVSE* and that complies with the current National Electric Code.

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood *electric vehicle*s, and electric motorcycles, primarily powered by an electric motor that draws current from an electric source.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** Equipment for plug-in power transfer including the ungrounded, grounded, and equipment grounding conductors, and the *electric vehicle* connectors, attachment plugs, personal protection system and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT INSTALLED SPACE (EVSE space).** An automobile parking space that is provided with a dedicated *EVSE* connection.

**ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE).** A designated automobile parking space that is provided with electrical infrastructure, such as, but not limited to, raceways, cables, electrical capacity, and panelboard or other electrical distribution equipment space, necessary for the future installation of an *EVSE*.

**ELECTRIC VEHICLE READY SPACE (EV READY SPACE).** An automobile parking space that is provided with a branch circuit and either an outlet, junction box or receptacle, that will support an installed *EVSE*.

**UNIVERSAL VEHICLE CHARGING STATION.** A charging station installed in a parking space for a minimum vehicle width of 120 inches (3048 mm) with 36-inch access aisles (915 mm) on each side.

## SECTION RD104

**RD104 One- and two-family dwellings and townhouses.**
One *EV ready space* shall be provided for each *dwelling unit*. The branch circuit shall be identified as *EV ready* in the service panel or subpanel directory, and the termination location shall be marked as *EV ready*.

**Exception:**
*Dwelling units* where no parking spaces are either required or provided.

## SECTION RD105

**RD105.1 Quantity.**
The number of required *EVSE* spaces, *EV ready* spaces, and *EV capable* spaces shall be determined in accordance with this Section and Table RD105.1 based on the total number of *automobile parking spaces* and shall be rounded up to the nearest whole number. No less than one space is required for each dwelling.

**RD105.2 Electric Vehicle (EV) capable spaces.**
Each *EV capable* space used to meet the requirements of Section RD105.1 shall comply with all of the following:
1. A continuous raceway or cable assembly shall be installed between an enclosure or outlet located within 3 feet (914 mm) of the EV capable space and a suitable panelboard or other onsite electrical distribution equipment.
2. Installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with RD105.5
3. The electrical distribution equipment to which the raceway or cable assembly connects shall have sufficient dedicated space and spare electrical capacity for a 2-pole circuit breaker or set of fuses.
4. The electrical enclosure or outlet and the electrical distribution equipment directory shall be marked: "For future electric vehicle supply equipment (EVSE)."
5. Reserved capacity shall be no less than 4.1 kVA (20A 208/240V) for each EV capable space.

**RD105.3 Electric Vehicle (EV) ready spaces.**
Each branch circuit serving *EV ready spaces* used to meet the requirements of Section RD105.1 shall comply with all of the following:
1. Terminate at an outlet or enclosure, located within 3 feet (914 mm) of each EV ready space it serves.
2. Have a minimum circuit capacity in accordance with RD105.5.
3. The panelboard or other electrical distribution equipment directory shall designate the branch circuit as "For electric vehicle supply equipment (EVSE)" and the outlet or enclosure shall be marked "For electric vehicle supply equipment (EVSE)."

**RD105.4 Electric Vehicle Supply Equipment (EVSE) spaces.**
An installed *EVSE* with multiple output connections shall be permitted to serve multiple EVSE spaces. Each *EVSE* installed to meet the requirements of Section RD105.1, serving either a single *EVSE* space or multiple *EVSE* spaces, shall comply with all of the following:
1. Have a minimum circuit capacity in accordance with RD105.5.
2. Have a minimum charging rate in accordance with RD105.4.1.
3. Be located within 3 feet (914 mm) of each EVSE space it serves.
4. Be installed in accordance with Section RD105.6 and RD105.7

**RD105.4.1 Electric Vehicle Supply Equipment (EVSE) minimum charging rate.**
Each installed *EVSE* shall comply with one of the following:
1. Be capable of charging at a minimum rate of 6.2 kVA (or 30A at 208/240V).
2. When serving multiple *EVSE* spaces and controlled by an energy management system providing load management, be capable of simultaneously charging each *EVSE* space at a minimum rate of no less than 3.3 kVA.
3. When serving *EVSE* spaces allowed to have a minimum circuit capacity of 2.7 kVA in accordance with RD105.5.1 and controlled by an energy management system providing load management, be capable of simultaneously charging each *ESVE* space at a minimum rate of no less than 2.1 kVA.

**RD105.5 Circuit capacity.**
The capacity of electrical infrastructure serving each *EV capable* space, *EV ready* space, and *EVSE* space shall comply with one of the following:

1. A branch circuit shall have a rated capacity not less than 8.3 kVA (or 40A at 208/240V) for each EV ready space or *EVSE* space it serves.
2. The requirements of RD104.5.1.

**RD105.5.1 Circuit capacity management.**
The capacity of each branch circuit serving multiple *EVSE* spaces, EV ready spaces or EV capable spaces designed to be controlled by an energy management system providing load management in accordance with NFPA 70, shall comply with one of the following:
1. Have a minimum capacity of 4.1 kVA per space.
2. Have a minimum capacity of 2.7 kVA per space when serving *EV ready* spaces or *EVSE* spaces for a building site when all (100%) of the automobile parking spaces are designed to be *EV ready* or *EVSE* spaces.

**RD105.6 EVSE installation.**
EVSE shall be installed in accordance with NFPA 70 and shall be listed and labeled in accordance with UL 2202 or UL 2594.

**RD105.7 Electric Vehicle Supply Equipment (EVSE)-Energy Star.**
All EVSE shall be ENERGY STAR certified.

## Section RD105: Identification

### TABLE RD106.1: UNIVERSAL EV SPACE REQUIREMENTS

| TOTAL # OF EV CHARGING STATIONS | MINIMUM # OF UNIVERSAL VEHICLE CHARGING STATIONS |
|---|---|
| 1 or more | 25% |

**RD106.1 Identification.**
Construction documents shall designate all EV Capable spaces, EV Ready spaces and EV Installed spaces and indicate the locations of conduit and termination points serving them. The circuit breakers or circuit breaker spaces reserved for the EV Capable spaces, EV Ready spaces, and EV Installed spaces shall be clearly identified in the panel board directory. The conduit for EV Capable spaces shall be clearly identified at both the panel board and the termination point at the parking space.

# Amendments to the *International Existing Building Code*

*Adopt the **2021 International Existing Building Code**, including specifically Appendix B**;** published by the International Code Council, modeled from the 2021 International Existing Building Code ("IEBC"), with amendments to the following:*

## Part 1—Scope and Application

## IEBC CHAPTER 1

*IEBC Chapter 1 is deleted, except for Sections 101.1 through 101.5 with amendments. The remainder of the administrative provisions are found under the preceding Chapter 1 of the Boulder County Building Code. Section 101.1 through 101.5 are amended as follows:*

### SECTION 101: SCOPE AND GENERAL REQUIREMENTS

**101.1 Title.**
These regulations shall be known as the *Existing Building Code* of Boulder County, herein-after referred to as "this code."

**101.2 Scope.**
The provisions of this code shall apply to the *repair*, *alteration*, *change of occupancy*, *addition* to and relocation of *existing buildings*.

**Exception:**
Detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress, and their accessory structures not more than three stories above grade plane in height, shall comply with this code or the *International Residential Code.*

**101.2.1 Application of fire code.**
Where work regulated by this code is also regulated by the construction requirements for *existing buildings* in Chapter 11 of the *International Fire Code*, such work shall comply with applicable requirements in both codes.

**101.3 Purpose.**
The intent of this code is to provide flexibility to permit the use of alternative approaches to achieve compliance with minimum requirements to safeguard the provide a reasonable level of safety, health, property protection and general welfare insofar as they are affected by the *repair*, *alteration*, *change of occupancy*, *addition,* and relocation of *existing buildings*.

**101.4 Applicability.**
This code shall apply to the repair, alteration, change of occupancy, addition and relocation of existing buildings, regardless of occupancy, subject to the criteria of Sections 101.4.1 and 101.4.2. Sections 102.6.1 and 102.6.2 of the Boulder County Building Code Amendments.

*Note: Delete IEBC subsections 101.4.1 and 101.4.2, as these are referenced in Chapter 1 of Boulder County Building Code amendments. Adopt IEBC section 101.5.*

**101.5 Safeguards during construction.**
Construction work covered in this code, including any related demolition, shall comply with the requirements of Chapter 15.

*Delete the remainder of Chapter 1 of the IEBC. Adopt the IEBC from Chapter 2 through the Reference Standards as published.*

## Part 2—Administration and Enforcement

# Amendments to the International Mechanical Code

*Adopt the **2021 International Mechanical Code** ("IMC"), without any of the appendixes specifically, and published by the International Code Council, modeled from the 2021 International Mechanical Code ("IMC"), with amendments to the following:*

## IMC CHAPTER 1: ADMINISTRATION

## PART 1–SCOPE AND APPLICATION

### IMC SECTION 101: SCOPE AND GENERAL REQUIREMENTS

*IMC Chapter 1 is deleted, except for IMC Sections 101 and 102 adopted as follows:*

**[A] 101.1 Title.**
These regulations shall be known as the *Mechanical Code of Boulder County*, hereinafter referred to as "this code."

**[A] 101.2 Scope.**
This code shall regulate the design, installation, maintenance, alteration and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings. This code shall also regulate those mechanical systems, system components, equipment and appliances specifically addressed herein. The installation of fuel gas distribution piping and equipment, fuel gas-fired appliances and fuel gas-fired appliance venting systems shall be regulated by the International Fuel Gas Code.

**Exception:**
Detached one- and two-family dwellings and townhouses not more than three stories high above grade plane in height with a separate means of egress and their accessory structures not more than three stories above grade plane in height shall comply with this code or the *International Residential Code*.

**[A] 101.2.1 Appendices.**
Provisions in the appendices shall not apply unless specifically adopted. None of the appendices are specifically adopted.

**[A] 101.3 Purpose.**
The purpose of this code is to establish minimum requirements to provide a reasonable level of safety, health, property protection and general welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of mechanical equipment or systems.

**[A] 101.4 Severability.**
If a section, subsection, sentence, clause or phrase of this code is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this code.

### IMC SECTION 102: APPLICABILITY

**[A] 102.1 General.**
Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern. Where, in a specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

**[A] 102.2 Existing installations.**
Except as otherwise provided for in this chapter, a provision in this code shall not require the removal, alteration or abandonment of, nor prevent the continued utilization and maintenance of, a mechanical system lawfully in existence at the time of the adoption of this code.

**[A] 102.2.1 Existing buildings.**

Additions, alterations, renovations or repairs related to building or structural issues shall be regulated by the *International Existing Building Code*.

**[A] 102.3 Maintenance.**
Mechanical systems, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition. Devices or safeguards that are required by this code shall be maintained in compliance with the edition of the code under which they were installed. The owner or the owner's authorized agent shall be responsible for maintenance of mechanical systems. To determine compliance with this provision, the code official shall have the authority to require a mechanical system to be reinspected. The inspection for maintenance of HVAC systems shall be performed in accordance with ASHRAE/ACCA/ANSI Standard 180.

**[A] 102.4 Additions, alterations or repairs.**
Additions, alterations, renovations or repairs to a mechanical system shall conform to that required for a new mechanical system without requiring the existing mechanical system to comply with all of the requirements of this code. Additions, alterations or repairs shall not cause an existing mechanical system to become unsafe, hazardous or overloaded.

Minor additions, alterations, renovations and repairs to existing mechanical systems shall meet the provisions for new construction, unless such work is done in the same manner and arrangement as was in the existing system, is not hazardous and is *approved*.

**[A] 102.5 Change in occupancy.**
It shall be unlawful to make a change in the occupancy of any structure that will subject the structure to any special provision of this code applicable to the new occupancy without approval. The code official shall certify that such structure meets the intent of the provisions of law governing building construction for the proposed new occupancy and that such change of occupancy does not result in any hazard to the public health, safety or welfare.

**[A] 102.6 Historic buildings.**
The provisions of this code relating to the construction, alteration, repair, enlargement, restoration, relocation or moving of buildings or structures shall not be mandatory for existing buildings or structures identified and classified by the state or local jurisdiction as historic buildings where such buildings or structures are judged by the code official to be safe and in the public interest of health, safety and welfare regarding any proposed construction, alteration, repair, enlargement, restoration, relocation or moving of buildings.

**[A] 102.7 Moved buildings.**
Except as determined by Section 102.2, mechanical systems that are a part of buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code for new installations.

**[A] 102.8 Referenced codes and standards.**
The codes and standards referenced herein shall be those that are listed in Chapter 15 and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections 102.8.1 and 102.8.2.

**Exception:**
Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and the manufacturer's installation instructions shall apply.

**[A] 102.8.1 Conflicts.**
Where conflicts occur between provisions of this code and the referenced standards, the provisions of this code shall apply.

**[A] 102.8.2 Provisions in referenced codes and standards.**
Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

**[A] 102.9 Requirements not covered by this code.**

Requirements necessary for the strength, stability or proper operation of an existing or proposed mechanical system, or for the public safety, health and general welfare, not specifically covered by this code, shall be determined by the code official.

**[A] 102.10 Other laws.**
The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

**[A] 102.11 Application of references.**
Reference to chapter section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

*Delete the remainder of Chapter 1 and replace with Chapter 1: Part 2-Adminstration and Enforcement of the Boulder County Building Code amendments.*

# IMC CHAPTER 9: SPECIFIC APPLIANCES, FIREPLACES, AND SOLID FUEL-BURNING EQUIPMENT

## IMC SECTION 901: GENERAL

*Adopt IMC Chapters 2 through Chapter 15. Amend by adding section 901.5 to comply with Colorado statutes and provide a link to state and federal lists of approved wood-burning appliances.*

**901.5 Solid Fuel Burning Equipment.**
No permit shall be issued for the installation of a solid-fuel-burning fireplace stove, fireplace insert, or wood stove appliance unless the appliance fully conforms with the requirements for emissions testing, certification and labeling found under Title 30, Article 28, Sections 402-405 of the Colorado Revised Statutes. All such appliances to be installed must be certified by the Air Pollution Control Division of the Colorado Department of Public Health to meet the emissions standards set forth in Section IV of Regulation No. 4 of Volume I of the Colorado Air Quality Control Commission as EPA Phase II or Colorado Phase III solid-fuel-burning devices. Solid-fuel burning devices shall meet the most current emissions standards for wood stoves established by the Colorado Air Quality Control Commission, or any other clean-burning device that is *approved* by the commission.

# Amendments to the International Plumbing Code

## Modeled from the 2021 International Plumbing Code ("IPC")

*Adopt the **2021 International Plumbing Code** ("IMC"), without any of the appendixes specifically, and published by the International Code Council, modeled from the 2021 International Plumbing Code ("IPC"), with amendments to the following. Where there is a conflict with the most recent adopted Colorado Plumbing Code, as adopted by the State of Colorado Plumbing Board, the most specific shall prevail.*

## IPC CHAPTER 1: ADMINISTRATION

*This chapter is deleted in its entirety and replaced by Chapter 1, the Administrative Provisions of the Boulder County Building Code, except IPC section 101 and 102 are adopted, specifically, as follows:*

## PART 1–SCOPE AND APPLICATION

### SECTION 101: SCOPE AND GENERAL REQUIREMENTS

**[A] 101.1 Title.**
These regulations shall be known as the *Plumbing Code of Boulder County* hereinafter referred to as "this code."

**[A] 101.2 Scope.**
The provisions of this code shall apply to the erection, installation, alteration, repairs, relocation, replacement, addition to, use, or maintenance of plumbing systems within this jurisdiction. This code shall regulate nonflammable medical gas, inhalation anesthetic, vacuum piping, nonmedical oxygen systems and sanitary and condensate vacuum collection systems. The installation of fuel gas distribution piping and equipment, fuel-gas-fired water heaters and water heater venting systems shall be regulated by the International Fuel Gas Code. Provisions in the appendices shall not apply unless specifically adopted.

**Exception:**
Detached one- and two-family dwellings and townhouses not more than three stories high above grade plane in height with a separate means of egress, and their accessory structures not more than three stories above grade plane in height, shall comply with this code or the International Residential Code.

**[A] 101.3 Purpose.**
The purpose of this code is to establish minimum requirements to provide a reasonable level of safety, health, property protection and general welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of plumbing equipment and systems.

**[A] 101.4 Severability.**
If any section, subsection, sentence, clause or phrase of this code is for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this code.

### SECTION 102: APPLICABILITY

**[A] 102.1 General.**
Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

**[A] 102.2 Existing installations.**
Plumbing systems lawfully in existence at the time of the adoption of this code shall be permitted to have their use and maintenance continued if the use, maintenance or repair is in accordance with the original design and hazard to life, health or property is not created by such plumbing system.

**[A] 102.2.1 Existing buildings.**
Additions, alterations, renovations or repairs related to building or structural issues shall be regulated by the *International Existing Building Code*.

**[A] 102.3 Maintenance.**
Plumbing systems, materials and appurtenances, both existing and new, and parts thereof, shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. Devices or safeguards required by this code shall be maintained in compliance with the edition of the code under which they were installed.
The owner or the owner's authorized agent shall be responsible for maintenance of plumbing systems. To determine compliance with this provision, the *code official* shall have the authority to require any plumbing system to be reinspected.

**[A] 102.4 Additions, alterations or repairs.**
Additions, alterations, renovations or repairs to any plumbing system shall conform to that required for a new plumbing system without requiring the existing plumbing system to comply with all of the requirements of this code. Additions, alterations or repairs shall not cause an existing system to become unsafe, unsanitary or overloaded. Minor additions, alterations, renovations and repairs to existing plumbing systems shall meet the provisions for new construction, unless such work is done in the same manner and arrangement as was in the existing system is not hazardous and is *approved*.

**[A] 102.5 Change in occupancy.**
It shall be unlawful to make any change in the occupancy of any structure that will subject the structure to any special provision of this code applicable to the new occupancy without approval of the *code official*. The *code official* shall certify that such structure meets the intent of the provisions of law governing building construction for the proposed new occupancy and that such change of occupancy does not result in any hazard to the public health, safety or welfare.

**[A] 102.6 Historic buildings.**
The provisions of this code relating to the construction, alteration, repair, enlargement, restoration, relocation or moving of buildings or structures shall not be mandatory for existing buildings or structures identified and classified by the state or local jurisdiction as historic buildings where such buildings or structures are judged by the *code official* to be safe and in the public interest of health, safety and welfare regarding any proposed construction, alteration, repair, enlargement, restoration, relocation or moving of buildings.

**[A] 102.7 Moved buildings.**
Except as determined by Section 102.2, plumbing systems that are a part of buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code for new installations.

**[A] 102.8 Referenced codes and standards.**
The codes and standards referenced in this code shall be those that are listed in Chapter 15 and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections 102.8.1 and 102.8.2.

**[A] 102.8.1 Conflicts.**
Where conflicts occur between provisions of this code and the referenced standards, the provisions of this code shall apply.

**[A] 102.8.2 Provisions in referenced codes and standards.**
Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

**[A] 102.9 Requirements not covered by code.**
Any requirements necessary for the strength, stability or proper operation of an existing or proposed plumbing system, or for the public safety, health and general welfare, not specifically covered by this code shall be determined by the *code official*.

**[A] 102.10 Other laws.**
The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

**[A] 102.11 Application of references.**
Reference to chapter section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

*Adopt IPC Chapters 2 through Chapter 15, except to amend as follows.*

# IPC CHAPTER 5: WATER HEATERS

## SECTION 502: INSTALLATION

*Amend subsection 502.1.2, regarding heat traps, to IPC section 502.1.*

**502.1.2 Heat Traps.**
Water heating equipment not supplied with integral heat traps that serve noncirculation systems shall be provided with heat traps on the supply and discharge piping consisting of an arrangement of piping and fittings that prevents thermo-siphoning of hot water during standby periods.

*Amend IPC section 1106.1, to provide a rainfall rate for the design of building storm drains.*

# IPC CHAPTER 11: STORM DRAINAGE

## SECTION 1106: SIZE OF CONDUCTORS, LEADERS, AND STORM DRAINS

*Add language to provide a rainfall rate for the design of building storm drains.*

**1106.1 General.**
The size of the vertical conductors and leaders, building storm drains, building storm sewers, and any horizontal branches of such drains or sewers shall be based on the 100-year hourly rainfall rate of 2.4 inches per hour.

*Adopt IPC Chapter 13 as published except, amend the IPC sections as noted as follows:*

# IPC CHAPTER 13: NONPOTABLE WATER SYSTEMS

## SECTION 1301: GENERAL

*Amend IPC Section 1301.1 to reference the requirements for compliance with Colorado statutes and regulations.*

**1301.1 General.**
The provisions of Chapter 13 shall govern the materials, design, construction and installation of systems for the collection, storage, treatment and distribution of nonpotable water. For nonpotable rainwater systems, the provisions of CSA B805/ICC 805 shall be an alternative for regulating the materials, design, construction and installation of systems for rainwater collection, storage, treatment and distribution of nonpotable water. The use and application of nonpotable water shall comply with laws, rules and ordinances applicable in the jurisdiction. Any use of nonpotable water shall be in strict compliance with applicable Colorado statutes and all applicable regulations of the Colorado Department of Natural Resources, Division of Water Resources and the Colorado Department of Public Health and Environment, Water Quality Control Commission, including “Regulation #86,” 5 CCR 1002-86.

## SECTION 1302: ON-SITE NONPOTABLE WATER REUSE SYSTEMS

*Amend IPC Section 1302.1 to reference the requirements for compliance with Colorado statutes and regulations.*

**1302.1 General.**
The provisions of ASTM E2635 and Section 1302 shall govern the construction, installation, alteration and repair of on-site nonpotable water reuse systems for the collection, storage, treatment and distribution of on-site sources of nonpotable water as permitted by the jurisdiction. Any use of *gray water* or *nonpotable water* shall be in strict compliance with applicable Colorado statutes and all applicable regulations of the Colorado Department of Natural Resources, Division of Water Resources and the Colorado Department of Public Health and Environment, Water Quality Control Commission, including "Regulation #86," 5 CCR 1002-86.

### SECTION 1303: NONPOTABLE RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS

*Amend IPC Section 1303.1 to reference the requirements for compliance with Colorado statutes and regulations.*

**1303.1 General.**
The provisions of Section 1303 shall govern the construction, installation, alteration and repair of rainwater collection and conveyance systems for the collection, storage, treatment and distribution of rainwater for nonpotable applications, as permitted by the jurisdiction. Any use of *rainwater* shall be in strict compliance with applicable Colorado statutes and all applicable regulations of the Colorado Department of Natural Resources, Division of Water Resources and the Colorado Department of Public Health and Environment, Water Quality Control Commission, including "Regulation #86," 5 CCR 1002-86.

### SECTION 1304: RECLAIMED WATER SYSTEMS

*Amend IPC Section 1304.1 to reference the requirements for compliance with Colorado statutes and regulations.*

**1304.1 General.**
The provisions of this section shall govern the construction, installation, alteration and repair of systems supplying *nonpotable reclaimed water*. Any use of *nonpotable reclaimed water* shall be in strict compliance with applicable Colorado statutes and all applicable regulations of the Colorado Department of Natural Resources, Division of Water Resources and the Colorado Department of Public Health and Environment, Water Quality Control Commission, including "Regulation #86," 5 CCR 1002-86.

## IPC CHAPTER 14: SUBSURFACE LANDSCAPE IRRIGATION SYSTEMS

### IPC SECTION 1401: GENERAL

*Add a sentence to Section 1401.1 to reference the requirements for compliance with Colorado statutes and regulations.*

**1401.1 Scope.**
The provisions of Chapter 14 shall govern the materials, design, construction and installation of subsurface graywater soil absorption systems connected to *nonpotable water* from on-site water reuse systems. Any use of *nonpotable water* for subsurface landscape irrigation shall be in strict compliance with applicable Colorado statutes and all applicable regulations of the Colorado Department of Natural Resources, Division of Water Resources and the Colorado Department of Public Health and Environment, Water Quality Control Commission, including "Regulation #86," 5 CCR 1002-86.

# Amendments to the International Fuel Gas Code

*Adopt the **2021 International Fuel Gas Code** ("IFGC"), without any of the appendixes specifically, and published by the International Code Council, modeled from the 2021 International Plumbing Code ("IFGC"), with amendments to the following. Where there is a conflict with the most current adopted Colorado Fuel Gas Code, as adopted by the State of Colorado Plumbing Board, the most specific shall prevail.*

## PART 1–SCOPE AND APPLICATION

## IFGC CHAPTER 1: ADMINISTRATION

### SECTION 101 (IFGC): SCOPE AND GENERAL REQUIREMENTS

**101.1 Title.**
These regulations shall be known as the *Fuel Gas Code of Boulder County*, hereinafter referred to as "this code."

**101.2 Scope.**
This code shall apply to the installation of fuel-gas *piping* systems, fuel gas *appliances*, gaseous hydrogen systems and related accessories in accordance with **Sections 101.2.1** through **101.2.5**.

**Exception:**
Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane in height high with separate means of egress and their accessory structures not more than three stories above grade plane in height, shall comply with this code or the *International Residential Code*.

**101.2.1 Gaseous hydrogen systems.**
Gaseous hydrogen systems shall be regulated by Chapter 7.

**101.2.2 Piping systems.**
These regulations cover piping systems for natural gas with an operating pressure of 125 pounds per square inch gauge (psig) (862 kPa gauge) or less, and for LP-gas with an operating pressure of 20 psig (140 kPa gauge) or less, except as provided in Section 402.7. Coverage shall extend from the *point of delivery* to the outlet of the *appliance* shutoff valves. *Piping* system requirements shall include design, materials, components, fabrication, assembly, installation, testing, inspection, operation and maintenance.

**101.2.3 Gas appliances.**
Requirements for gas appliances and related accessories shall include installation, combustion and ventilation air and venting and connections to *piping* systems.

**101.2.4 Systems, appliances and equipment outside the scope.**
This code shall not apply to the following:

1. Portable LP-gas appliances and equipment of all types that is not connected to a fixed fuel piping system.
2. Installation of farm appliances and equipment such as brooders, dehydrators, dryers and irrigation equipment.
3. Raw material (feedstock) applications except for piping to special atmosphere generators.
4. Oxygen-fuel gas cutting and welding systems.
5. Industrial gas applications using gases such as acetylene and acetylenic compounds, hydrogen, ammonia, carbon monoxide, oxygen and nitrogen.
6. Petroleum refineries, pipeline compressor or pumping stations, loading terminals, compounding plants, refinery tank farms and natural gas processing plants.
7. Integrated chemical plants or portions of such plants where flammable or combustible liquids or gases are produced by, or used in, chemical reactions.
8. LP-gas installations at utility gas plants.
9. Liquefied natural gas (LNG) installations.
10. Fuel gas piping in power and atomic energy plants.
11. Proprietary items of equipment, apparatus or instruments such as gas-generating sets, compressors and calorimeters.

12. LP-gas equipment for vaporization, gas mixing and gas manufacturing.
13. Temporary LP-gas piping for buildings under construction or renovation that is not to become part of the permanent piping system.
14. Installation of LP-gas systems for railroad switch heating.
15. Installation of hydrogen gas, LP-gas and compressed natural gas (CNG) systems on vehicles.
16. Except as provided in Section 401.1.1, gas piping, meters, gas pressure regulators and other appurtenances used by the serving gas supplier in the distribution of gas, other than undiluted LP-gas.
17. Building design and construction, except as specified herein.
18. Piping systems for mixtures of gas and air within the flammable range with an operating pressure greater than 10 psig (69 kPa gauge).
19. Portable fuel cell appliances that are neither connected to a fixed piping system nor interconnected to a power grid.

**101.2.5 Other fuels.**
The requirements for the design, installation, maintenance, alteration and inspection of mechanical systems operating with fuels other than fuel gas shall be regulated by the International Mechanical Code.

**101.3 Appendices.**
Provisions in the appendices shall not apply unless specifically adopted.

**101.4 Purpose.**
The purpose of this code is to establish minimum requirements to provide a reasonable level of safety, health, property protection and general public welfare by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of fuel gas equipment or systems.

**101.5 Severability.**
If a section, subsection, sentence, clause or phrase of this code is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this code.

## SECTION 102 (IFGC): APPLICABILITY

**102.1 General.**
Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern. Where, in a specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

**102.2 Existing installations.**
Except as otherwise provided for in this chapter, a provision in this code shall not require the removal, alteration or abandonment of, nor prevent the continued utilization and maintenance of, existing installations lawfully in existence at the time of the adoption of this code.

**102.2.1 Existing buildings.**
*Additions*, *alterations*, renovations or repairs related to building or structural issues shall be regulated by the *International Existing Building Code*.

**102.3 Maintenance.**
Installations, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe condition. Devices or safeguards that are required by this code shall be maintained in compliance with the edition of the code under which they were installed. The owner or the owner's authorized agent shall be responsible for maintenance of installations. To determine compliance with this provision, the *code official* shall have the authority to require an installation to be reinspected.

**102.4 Additions, alterations or repairs.**
*Additions*, *alterations*, renovations or repairs to installations shall conform to that required for new installations without requiring the existing installation to comply with all of the requirements of this code. *Additions*, *alterations*, or repairs shall not cause an existing installation to become unsafe, hazardous or overloaded. Minor *additions*, *alterations*,

renovations, and repairs to existing installations shall meet the provisions for new construction, unless such work is done in the same manner and arrangement as was in the existing system, is not hazardous and is *approved.*

**102.5 Change in occupancy.**
It shall be unlawful to make a change in the *occupancy* of a structure that will subject the structure to the special provisions of this code applicable to the new *occupancy* without approval. The *code official* shall certify that such structure meets the intent of the provisions of law governing building construction for the proposed new *occupancy* and that such change of *occupancy* does not result in any hazard to the public health, safety or welfare.

**102.6 Historic buildings.**
The provisions of this code relating to the construction, *alteration*, repair, enlargement, restoration, relocation or moving of buildings or structures shall not be mandatory for existing buildings or structures identified and classified by the state or local jurisdiction as historic buildings where such buildings or structures are judged by the *code official* to be safe and in the public interest of health, safety and welfare regarding any proposed construction, *alteration*, repair, enlargement, restoration, relocation or moving of buildings.

**102.7 Moved buildings.**
Except as determined by Section 102.2, installations that are a part of buildings or structures moved into or within the jurisdiction shall comply with the provisions of this code for new installations.

**102.8 Referenced codes and standards.**
The codes and standards referenced in this code shall be those that are *listed* in Chapter 8 and such codes and standards shall be considered to be part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections 102.8.1 and 102.8.2.

**Exception:**
Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and the manufacturer's installation instructions shall apply.

**102.8.1 Conflicts.**
Where conflicts occur between the provisions of this code and the referenced standards, the provisions of this code shall apply.

**102.8.2 Provisions in referenced codes and standards.**
Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

**102.9 Requirements not covered by code.**
Requirements necessary for the strength, stability or proper operation of an existing or proposed installation, or for the public safety, health and general welfare, not specifically covered by this code, shall be determined by the *code official*.

**102.10 Other laws.**
The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

**102.11 Application of references.**
Reference to chapter section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

# IFGC CHAPTER 6: SPECIFIC APPLIANCES.

*Amend section 621.1 to read as follows:*

## SECTION 621: UNVENTED ROOM HEATERS

**621.1 Prohibited locations**.

Unvented unit heaters are prohibited.

# The National Electrical Code ("NEC")

## State Adoption of the National Electrical Code (NFPA 70)

***National Electrical Code*** (NFPA 70), as adopted by the Colorado State Electrical Board, published by the National Fire Protection Association (NFPA).

# Amendments to the International Energy Conservation Code ("IECC")

*Adopt the 2021 International Energy Conservation Code ("IMC"), including appendixes CB, CD, RB, and RD specifically as noted, and published by the International Code Council, modeled from the 2021 International Energy Conservation Code ("IECC"), with amendments to the following.*

## IECC – COMMERCIAL PROVISIONS

## IECC CHAPTER 1 [CE]: SCOPE AND ADMINISTRATION

*This chapter of the IECC is deleted in its entirety and replaced by Chapter 1, the administrative provisions of the Boulder County Building Code, except Sections C101.1 through C101.5, are amended to read as follows:*

### SECTION C101: GENERAL

**C101.1 Title.**
This code shall be known as the Energy Conservation Code of Boulder County, and shall be cited as such. It is referred to herein as "this code."

**C101.2 Scope.**
This code applies to commercial buildings and the buildings' sites and associated systems and equipment.

**C101.3 Intent.**
This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

**C101.4 Applicability.**
Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

**C101.4.1 Mixed residential and commercial buildings.**
Where a building includes both residential building and commercial building portions, each portion shall be separately considered and meet the applicable provisions of the IECC—Commercial Provisions or IECC—Residential Provisions.

**C105.1 Compliance.**
Residential buildings shall meet the provisions of IECC [RE] residential provisions, except that one- and two-family dwellings and townhouses and their accessory buildings shall meet the Boulder County BuildSmart requirements of the amended Chapter 11 of the *International Residential Code*.
Commercial buildings shall meet the provisions of IECC [CE] commercial provisions. New commercial buildings or complexes of buildings located on the same parcel with over 25,000 square feet in total building floor area and additions and alterations to existing buildings that were constructed under the *International Green Construction Code* shall meet the amended provisions of the *International Green Construction Code* as adopted by Boulder County.

**C101.5.1 Compliance materials.**
The code official shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

*Adopt Chapter 2 [CE] as published, except Section C202 GENERAL DEFINITIONS is amended to add or revise the following definitions in alphabetical order.*

# IECC CHAPTER 2 [CE]: DEFINITIONS

## IECC SECTION C202: GENERAL DEFINITIONS

**ALL-ELECTRIC BUILDING.** A *building* and building site that contains no *combustion equipment*, or plumbing for *combustion equipment*, and that uses heat pump technology as the primary supply for heating, cooling, and service water heating loads.

**COMBUSTION EQUIPMENT:** Any equipment or appliances used for space heating, cooling, water heating (including pools and spas), cooking, clothes drying or lighting that uses natural gas, propane, other fuel gas, or fuel oil.

**DECONSTRUCTION.** The dismantling of an existing building or portion thereof without the use of heavy machinery or the destruction of the materials. Deconstruction includes the salvage of materials from the existing structure for recycling, resale, or reuse as an alternative to sending them to a landfill. There are two types of deconstructions, structural and non-structural deconstruction.

**DECONSTRUCTION, NON-STRUCTURAL.** Non-Structural deconstruction (also referred to as soft stripping) is the removal and reclaiming of the reusable non-structural components such as appliances, cabinets, doors, windows, flooring, fixtures, and finish materials.

**DECONSTRUCTION, STRUCTURAL.** Structural deconstruction is the removal and reclaiming of the reusable structural components of a building, such as walls, floors, and roofs.

**DECONSTRUCTION PROFESSIONAL.** A professional engaged in the deconstruction field.

**DEMOLITION.** The tearing down of an existing structure and the disposal of its components or materials without the implementation of deconstruction techniques.

**HORTICULTURAL LIGHTING.** Electric lighting used for horticultural production, cultivation, or maintenance.

**MIXED-FUEL BUILDING.** A *building* and building site that contains *combustion equipment*, or plumbing for *combustion equipment*, for space heating, cooling, water heating (including pools and spas), cooking, or clothes drying.

**PHOTOSYNTHETIC PHOTON EFFICACY (PPE).** Photosynthetic photon flux emitted by a light source divided by its electrical input power in units of micromoles per second per watt, or micromoles per joule (μmol/J) between 400-700nm as defined by ANSI/ASABE S640.

# IECC CHAPTER 3 [CE]: GENERAL REQUIREMENTS

*Adopt the C301 through C303 of the IECC [CE] – Commercial provisions as published, except to amend as follows.*

*Sections C304 – C390 are reserved. Add to General Requirements, Chapter 3, Section C391 "Deconstruction" as follows:*

## IECC SECTION C391: DECONSTRUCTION

**C391.1 General.**

All existing buildings and portions thereof requiring removal of building materials shall be deconstructed as defined in Sections C202 and R202. *Demolition* is not permitted.

**C391.2 Penalty.**
Buildings demolished or partially demolished rather than deconstructed will, at the discretion of the *building official*, be issued a stop work notice for a period not exceeding 30 days.

**C391.3 Documentation of intent to deconstruct.**
Documentation of intent to deconstruct, consisting of a *deconstruction* plan, a written description of *deconstruction* work, or the County *Deconstruction* Checklist shall be provided at building permit application. The documentation of intent to deconstruct must include: the name of the *deconstruction* contractor, a list of the materials to be recovered, donated, or reused, and the destination of the materials. The documentation must include both *nonstructural deconstruction* and *structural deconstruction*. Items which shall be donated, sold, or re-used include cabinets, dimensional lumber, flooring, and solid core doors.

**C391.4 Verification of *deconstruction* of a structure.**
The completion of *deconstruction* as *approved* on the *deconstruction* plan must be verified by the Building Division. The owner or *deconstruction professional* shall provide written verification of deconstruction by means of receipts or a written log, maintained by the homeowner or general contractor, which includes the volume or weight of materials and the destination where they were transported to the Building Safety & Inspection Services Division. Verification must be received prior to scheduling the rough inspections.

*Add to General Requirements, Chapter 3, Section C392 "Construction jobsite waste reduction and recycling." These are general requirements to Boulder County Building Code Energy Conservation compliance.*

## IECC SECTION C392: CONSTRUCTION JOBSITE WASTE REDUCTION AND RECYCLING

**C392.1 Construction jobsite waste reduction and recycling.**
All construction jobsite waste must be recycled, including wood, scrap metal, cardboard, and concrete. Labeled containers must be provided at the construction-site for use in capturing recyclable material. A mixed load container may be used if that container is being sent to a waste/ recycling center that will verify the weight of recycled material recovered from that mixed load.

**C392.2 Documentation of intent to recycle.**
Documentation of intent to recycle which consists of a recycling plan, a written description of recycling activity, or the submittal of the County Recycling Checklist must be provided at building permit application. The documentation must specify the locations of recycling containers and the destination where material will be recycled.

**C392.3 Verification.**
Field inspection will be made by the Boulder County Building Division during the construction process to assure that recycling containers have been placed on-site. Prior to the final inspection, documentation must be provided to the Building Division office by the owner or waste/recycling contractor indicating the weight or volume of materials diverted from the waste stream. Materials that must be recycled include appliances, concrete, metals, cardboard, and wood (except pressure treated or painted wood), and thermostats and other devices containing mercury. Other materials which are accepted by the waste/recycling contractor must also be recycled.

*Add to General Requirements, Chapter 3, Section C393, "Trash Storage and Recycling Areas." These are general requirements to Boulder County Building Code Energy Conservation compliance.*

## IECC SECTION C393: TRASH STORAGE AND RECYCLING AREAS

**C393.1 On-site recycling.**
The following requirements shall apply to the construction of trash storage and recycling areas for attached dwellings and all business and industrial buildings or uses:

**C393.1.1 Covered area.**
Trash storage and recycling area shall be accommodated within the structure, or adequate common area shall be included on-site and indicated on a site plan.

**C393.1.2 Hard surface required, screening and landscaping.**
All outdoor trash recycling storage and containers shall be placed on a hard surface, including, without limitation, concrete, and shall be screened.

**C393.1.3 Maintenance and service.**
Trash storage and recycling area shall include adequate space for the maintenance and servicing of containers for recyclable materials that are provided by local disposal and recycling companies.

# IECC CHAPTERS 4 [CE]: COMMERCIAL ENERGY EFFICIENCY

*Adopt Chapter 4 as published, except Section C401.2.1, items 2, and 401.2.2 are amended to add for mixed fuel buildings, as follows:*

**C401.2 Application.**
Commercial buildings shall comply with Section C401.2.1 or C401.2.2.

**C401.2.1 International Energy Conservation Code.**
Commercial buildings shall comply with one of the following:

1. Prescriptive Compliance. The Prescriptive Compliance option requires compliance with Sections C402 through C406 and Section C408. Dwelling units and sleeping units in Group R-2 buildings without systems serving multiple units shall be deemed to be in compliance with this chapter, provided that they comply with Section R406.
2. Total Building Performance. The Total Building Performance option requires compliance with Section C407 and, for *mixed fuel buildings*, Section C405.13 and 10 credits from Tables C406.1(1) through C406.1(5).

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

**C401.2.2 ASHRAE 90.1.**
Commercial buildings shall comply with the requirements of ANSI/ASHRAE/IESNA 90.1 and, for *mixed fuel buildings*, Section C405.13 and 10 credits from Tables C406.1(1) through C406.1(5).

*Section C402.3 Roof solar reflectance and thermal emittance, first sentence, is amended as follows, the remaining portions of the section adopted as published:*

**C402.3 Roof solar reflectance and thermal emittance.**
Low-sloped roofs directly above conditioned spaces shall comply with one or more of the options in Table C402.3.

## IECC Section C403

*Amend C403.13.2 with the following:*

**C403.13.2 Snow- and ice-melt system controls.**
Snow and ice-melting systems shall include automatic controls configured to shut off the system when the pavement temperature is above 50°F (10°C) and precipitation is not falling, and an automatic or manual control that is configured to shut off when the outdoor temperature is above 40°F (4°C).

**C403.13.2.1 Design.**
Energy use by snow and ice melt systems must be offset by on-site renewable energy generation equivalent to the energy used by the snow and ice melting equipment. Plans must be submitted that detail the type, size and location of the on-site renewable energy generation equipment. Note: A separate building permit is required for on-site renewable energy generation

equipment.

**C403.13.2.2 Design criteria for supporting on-site renewable energy equipment.**
On-site renewable energy generation equipment installed to offset the energy used by snow and ice melt systems must be designed to provide 34,425 BTUs per square foot per year.

## IECC C404:

*Amend C404.2.1 High input service water-heating systems, item 1 under exceptions. Adopt C404.2.1 as follows:*

**C404.2.1 High input service water-heating systems.**
Gas-fired water-heating equipment installed in new buildings shall be in compliance with this section. Where a singular piece of water-heating equipment serves the entire building and the input rating of the equipment is 1,000,000 Btu/h (293 kW) or greater, such equipment shall have a thermal efficiency, Et, of not less than 92 percent. Where multiple pieces of water-heating equipment serve the building and the combined input rating of the water-heating equipment is 1,000,000 Btu/h (293 kW) or greater, the combined input-capacity-weighted-average thermal efficiency, Et, shall be not less than 90 percent.

**Exceptions:**
1. Where not less than 50 percent of the annual *service water heating* requirement is provided by *on-site renewable energy* or site-recovered energy not including any capacity used for compliance with Section C406 of this code, the minimum thermal efficiency requirements of this section shall not apply.
2. The input rating of water heaters installed in individual dwelling units shall not be required to be included in the total input rating of service water-heating equipment for a building.
3. The input rating of water heaters with an input rating of not greater than 100,000 Btu/h (29.3 kW) shall not be required to be included in the total input rating of service water-heating equipment for a building.

*Amend section C404.8 through C404.9 are deleted. Refer to section C490.*

*Amend section C404.10 is added as follows:*

**C404.10 Water heating equipment location.**
Water heaters with *combustion equipment* shall be located in a space with the following characteristics:
1. Minimum dimensions of 3 feet by 3 feet by 7 feet high.
2. Minimum volume of 760 cubic feet, or the equivalent of one 16-inch by 24-inch grill to a heated space and one 8-inch duct of no more than 10 feet in length for cool exhaust air.
3. Contains a condensate drain that is no more than 2 inches higher than the base of the installed water heater and allows natural draining without pump assistance, installed within 3 feet of the water heater.

**Exceptions:**
1. Instantaneous water heaters located within 10 feet of the point of use.
2. Water heats with an input capacity of more than 300,000 Btu/h.

## IECC Section C405:

*Amend Section C405.4 Lighting for plant growth and maintenance is re-titled "Horticultural Lighting" and amended to read as follows:*

**C405.4 Horticultural Lighting.**
Permanently installed luminaires shall have a *photosynthetic photon efficacy* of not less than 1.7 μmol/J for *horticultural lighting* in *greenhouses* and not less than 1.9 μmol/J for all other horticultural lighting. Luminaires for horticultural lighting in greenhouses shall be controlled by a device that automatically turns off the luminaire when sufficient daylight is available. Luminaires for horticultural lighting shall be controlled by a device that automatically turns off the luminaire at specific programmed times.

*Amend Section C405.5.3 Gas lighting is amended to read as follows:*

**C405.5.3. Gas lighting.**
Gas fired lighting appliances are not permitted.

*Amend Table C405.12.2 to add a new line at the end of the table.*

| | |
|---|---|
| Electric vehicle charging | *Electric vehicle* charging loads. |

*A new Section C405.13 is added to read as follows:*

**C405.13 Additional electric infrastructure.**
All *combustion equipment* shall be provided with a junction box that is connected to an electrical panel by continuous raceways that meet the following requirements:

1. The junction box, raceway, and bus bar in the electric panel and conductors serving the electric panel shall be sized to accommodate electric equipment sized to serve the same load as the *combustion equipment*.
2. The panel shall have reserved physical space for a three-pole circuit breaker.
3. The junction box and electrical panel directory entry for the dedicated circuit breaker space shall have labels stating, "For future electric equipment."
4. The junction box shall allow for the electric equipment to be installed within the same place of the *combustion equipment* that it replaces.

**Exceptions:**

1. Warm air furnaces serving spaces that also have space cooling.
2. Water heating equipment with an input capacity more than 300,000 Btu/h
3. Industrial, manufacturing, laboratory, and high hazard occupancy combustion equipment.

## IECC Section C406:

*Amend Section C406.1 Additional energy efficiency credit requirements, first sentence, is amended to read as follows with the other parts of the paragraph and section to remain:*

**C406.1 Additional energy efficiency credit requirements.**
New all-electric buildings shall achieve a total of 10 credits and new mixed-fuel buildings shall achieve a total of 20 credits from Tables C406.1(1) through C406.1(5) where the table is selected based on the use group of the building and from credit calculations as specified in relevant subsections of Section C406. Where a building contains multiple-use groups, credits from each use group shall be weighted by floor area of each group to determine the weighted average building credit. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Where not required by Section C405.12, include an energy monitoring system in accordance with Section C406.10.
10. Where not required by Section C403.2.3, include a fault detection and diagnostics (FDD) system in accordance with Section C406.11.
11. Efficient kitchen equipment in accordance with Section C406.12.

*Section C406.1(2) ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP R AND I OCCUPANCIES is retained in its entirety, except rows identifying Sections C406.7.3 and C406.7.4 in Climate Zone 5B are amended to read as follows:*

**TABLE C406.1(2): ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP R AND I OCCUPANCIES**

| SECTION | CLIMATE ZONE 5B |
|---|---|
| C406.7.3: Efficient fossil fuel water heater [b] | 3 |
| C406.7.4: Heat pump water heater [b] | 9 |

*TABLE C406.1(3) ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP E OCCUPANCIES is retained in its entirety, except Sections C406.7.3 and C406.7.4 in Climate Zone 5B are amended to read as follows:*

**TABLE C406.1(3): ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP E OCCUPANCIES**

| SECTION | CLIMATE ZONE 5B |
|---|---|
| C406.7.3: Efficient fossil fuel water heater [a] | NA |
| C406.7.4: Heat pump water heater [a] | 3 |

*TABLE C406.1(5) ADDITIONAL ENERGY EFFICIENCY CREDITS FOR OTHER OCCUPANCIES is retained in its entirety, except Sections C406.7.3 and C406.7.4 in Climate Zone 5B are amended to read as follows:*

**TABLE C406.1(5): ADDITIONAL ENERGY EFFICIENCY CREDITS FOR OTHER [a] OCCUPANCIES**

| SECTION | CLIMATE ZONE 5B |
|---|---|
| C406.7.3: Efficient fossil fuel water heater [b] | 3 |
| C406.7.4: Heat pump water heater [b] | 9 |

*TABLE C407.2 REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE is retained in its entirety and amended to add the following items:*

**TABLE C407.2: REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE**

| SECTION [a] | TITLE |
|---|---|
| **Envelope** | |
| C401.3 | Thermal envelope certificate |
| C402.2.4 | Slabs-on-grade |
| C402.2.6 | Insulation of radiant heating system |
| C402.3 | Roof solar reflectance and thermal emittance |

*Sections C408 through C489 are reserved. Adopt C490 as follows.*

## SECTION C490: Exterior Energy Uses and Onsite Energy Offsets

**C490.1 General.**
Exterior energy uses, and specified interior uses, must be offset with on-site renewable energy production.

**Exception:**
Cooking appliances and Electrical Roofing Ice Melt Systems installed in homes built prior to 2016.

**C490.1.1 Conversion of kilowatt hours per year to British Thermal Units (BTUs) per year.**
For the purpose of converting energy consumption in section C490, the following factor shall be used.

1 kilowatt hour per year (kWh/year) = BTU per year / 3,412

Note: A separate building permit is required for on-site renewable energy generation equipment.

**C490.2 Snow melt system controls.**
Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C), and precipitation is not falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (4.8°C).

**C490.2.1 Snow melt and ice melt system design.**
Where installed, energy use by snow and ice melt systems must be offset by on-site renewable energy generation equivalent to the energy used by the snow and ice melting equipment. Plans must be submitted that detail the type, size and location of the on-site renewable energy generation equipment.

**C490.2.2 Energy conservation design criteria for supporting on-site renewable energy equipment.**
On-site renewable energy generation equipment installed to offset the energy used by snow and ice melt systems shall be determined using the formula provided in Equation **C490.2.2**.

**(Equation C490.2.2):**

A = (B × 34,425 BTUs) / 3,412

Where:

On-Site Renewable Energy Requirements: 34,425 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in area of the ice or snow melt.

**C490.3 Pool energy consumption.**
Swimming pools must be provided with energy conservation measures in accordance with Section C490.3.1 through C490.3.6 or be unheated. Heated pools must be heated by solar thermal or other equipment that does not rely directly or indirectly on the burning of fossil fuels or they must have their energy use offset by on-site renewable energy generation equipment equivalent to the energy use by the swimming pool.

**C490.3.1 Heaters.**
The electric power to heaters shall be controlled by on-off switch, with *ready access*, that is an integral part of the heater mounted on the exterior of the heater, or external to and within 3 feet (914mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Where heat pumps are installed, only heat pumps rated for cold climates shall be allowed.

**Exceptions:**
1. Unheated swimming pools.
2. Heated swimming pools having less than 200 square feet (18.6 $m^2$) of water surface area are exempt from the requirements to provide renewable energy.
3. Legally installed swimming pools with legally installed water heating equipment are exempt from the onsite renewable requirement when replacing the previously *approved* water heating equipment.

**C490.3.2 Time switches.**
Time switches or other control methods that can automatically turn off and on according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches and shall be in compliance with this section.

**Exceptions:**

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

**C490.3.3 Covers.**

Outdoor heated pools and outdoor spas shall be provided with a vapor retardant cover or other *approved* vapor-retardant means. Pools heated to more than 90°F (32°C) shall have side and bottom surfaces insulated on the exterior with a minimum insulation value of R-12 and shall have a pool cover with a minimum insulation value of *R*-12.

**C490.3.4 Pumps.**

Swimming pool pumps must be multi-speed pumps.

**C490.3.5 Swimming pools require onsite energy offsets.**

All heated swimming pools must be heated by solar thermal or other equipment that does not rely, directly or indirectly, on the burning of fossil fuels. Where heated pools are heated by the use of burning fossil fuels, directly or indirectly, they must have their energy use offset by on-site renewable energy generation equipment equivalent to the energy use by the swimming pool.

**Exception:**

Swimming pools having less than 200 sq. ft. of water surface area are exempt from the requirements to provide renewable energy.

**C490.3.6 Energy conservation design standards for swimming pools.**

For the purpose of calculating the energy use of swimming pools, section C490.3.6.1 Outdoor Swimming pools and C490.3.6.2 Indoor Swimming Pools shall apply as applicable.

**C490.3.6.1 Energy conservation design standards for outdoor swimming pools.**

The required on-site renewable energy offset for swimming pools located outdoors shall be determined using the formula provided in Equation C490.3.6.1.

**(Equation C490.3.6.1):**

A = (B × 29,000 BTU) / 3,412

Where:

Outdoor Swimming Pool Season: 3 months.

Swimming Pool Heating Temperature: 82°F (28°C) or less

On-Site Renewable Energy Requirements: 29,000 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the outdoor swimming pool.

**C490.3.6.2 Energy conservation design standards for indoor swimming pools.**

The required on-site renewable energy offset for swimming pools located within unconditioned spaces shall be determined using the formula provided in Equation C490.3.6.2.

**(Equation C490.3.6.2):**

A = (B × 116,000 BTU) / 3,412

Where:

Indoor (unconditioned) Swimming Pool Season: 12 months.

Pool Heating Temperature: 82°F (28°C) or less

On-Site Renewable Energy Requirements: 116,000 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the indoor swimming pool.

Note: This Section is not intended to limit the season or temperature of swimming pools.

**C490.4 Portable spas.**
The energy consumption of electric-powered portable spas shall be controlled by the requirements of APSP-14.

**C490.5 Residential pools and permanent residential spas.**
Residential swimming pools and permanent residential spas that are accessory to detached one- and two-family dwellings and townhouses 3 stories or less in height above grade plane and that are available only to the household and its guests shall be in accordance with APSP-15.

**C490.6 Spas.**
Any energy use by swim or exercise spas, indoor spas located in unconditioned spaces, or outdoor spas must be offset by on-site renewable energy generation equivalent to the energy use by the spa. Plans must show the annual energy use of the spa, the calculation method used to determine the expected energy use, and the on-site *renewable energy system*(s) which will be used to offset the energy used by the spa. All spas must be equipped with an insulated cover that is listed to provide a minimum R-*value* of at least 12.

**Exception:**
Spas and hot tubs which have been tested and listed for compliance with the requirements of the California Energy Commission (CEC) Title 20 (Standby power for portable electric spas shall not be greater than $3.75\ V^{2/3} + 40$ watts where V = the total volume of the spa in gallons), and are less than 64 square feet in surface area shall be exempted from the requirement to offset their energy usage by on-site *renewable energy generation.* Spas larger than 64 square feet in surface area that are certified to meet the requirements of the CEC shall offset their requirements at the rate of 140,000 BTUs per square foot per year.

**C490.6.1 Energy conservation design standards for spas.**
The requirements of this section apply to spas that do not meet the exception in Section C490.6.1.

**(Equation C490.6.1):**

A = (B × 430,000 BTUs) / 3,412

Where:

Spa Season: 12 months.

On-Site Renewable Energy Requirements: 430,000 BTU per square foot in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the spa or hot tub.

**C490.7 Saunas.**
Energy use by fossil-fuel-consuming outdoor saunas or saunas in unconditioned spaces must be offset by on-site *renewable energy generation* equivalent to the sauna's energy consumption. Construction documents must provide information on the spa's annual energy use, the calculations outlined in sections C490.7.1 or C490.7.2, and the production of the *renewable energy system* that will offset the sauna's energy consumption.

**C490.7.1 Energy conservation design standards for electric saunas.**
The required on-site renewable energy offset for outdoor electric saunas or electric saunas located in unconditioned spaces can be determined using the formula provided in Equation C490.7.1.

**(Equation C490.7.1):**

A = B × 200 hours/year

Where:

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Power consumption of the heating appliance in kilowatts

**C490.7.2 Energy conservation design standards for gas-fired saunas.**
The required on-site renewable energy offset for outdoor gas-fired saunas or gas-fired saunas located in unconditioned spaces shall be determined using the formula provided in Equation C490.7.2.

**(Equation C490.7.2):**

A = (B × 200 hours / year) / 3412

Where:

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = BTU rating of the gas-fired heater

**C490.8. Energy conservation design standards for exterior fireplaces, firepits, and other energy uses.**
For purposes of calculating renewable energy offset requirements, the minimum usage of exterior, fossil-fuel-consuming, fireplaces and firepits shall be considered to be 50 hours per year. Exterior space heating devices shall be assumed to operate a minimum of 150 hours per year.

*Section C491 through C499 are reserved. Adopt Chapter 5 [CE] and Chapter 6 [CE] as published.*

*Adopt Appendixes CB and CD as follows:*

# COMMERCIAL APPENDIX CB: SOLAR-READY ZONE

*Adopt Appendix CB: Solar-Ready Zone as published, except to amend section CB103.1, as follows, with the rest of the section remaining.*

**CB103.1 General.**
A solar-ready zone shall be located on the roof of buildings that are subject to the commercial provisions of the IECC and are oriented between 110 degrees and 270 degrees of true north or have low-slope roofs. Solar-ready zones shall comply with Sections CB103.2 through CB103.9.

**Exceptions:**

1. A building with a permanently installed, on-site renewable energy system.
2. A building with a solar-ready zone that is shaded for more than 70 percent of daylight hours annually.
3. A building where the licensed design professional certifies that the incident solar radiation available to the building is not suitable for a solar-ready zone.
4. A building where the licensed design professional certifies that the solar zone area required by Section CB103.3 cannot be met because of extensive rooftop equipment, skylights, vegetative roof areas or other obstructions.

*Adopt Appendix CD: EV Readiness is adopted as follows.*

# COMMERCIAL APPENDIX CD: EV READINESS

## Section CD101: Purpose and Intent

**CD101. Purpose and intent.**
The purpose and intent of this Appendix CD is to accommodate the growing need for EV charging infrastructure. Including these measures during initial commercial construction substantially reduces the costs and difficulty of installing EV infrastructure at a later date.

**CD102. Applicability.**
This Appendix CD shall apply to all new commercial construction to which the current *International Building Code* applies.

## Section CD103: Definitions

**AUTOMOBILE PARKING SPACE.** A space within a building or private or public parking lot, exclusive of driveways, ramps, columns, office, and work areas, for the parking of an automobile.

**DIRECT CURRENT FAST CHARGING (DCFC) EVSE.** EV power transfer infrastructure capable of fast charging on a 100A or higher 480VAC three-phase branch circuit. AC power is converted into a controlled DC voltage and current within the EVSE that will then directly charge the electric vehicle.

**EV LOAD MANAGEMENT SYSTEM.** A system designed to allocate charging capacity among multiple EVSE and that complies with the current National Electric Code.

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from an electric source.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** Equipment for plug-in power transfer including the ungrounded, grounded, and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, personal protection system and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT INSTALLED SPACE (EVSE space).** An automobile parking space that is provided with a dedicated EVSE connection.

**ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE).** A designated automobile parking space that is provided with electrical infrastructure, such as, but not limited to, raceways, cables, electrical capacity, and panelboard or other electrical distribution equipment space, necessary for the future installation of an EVSE.

**ELECTRIC VEHICLE READY SPACE (EV READY SPACE).** An automobile parking space that is provided with a branch circuit and a ground fault circuit interrupter (GFCI/GFI) outlet, junction box, or receptacle, that will support an installed EVSE.

## Section CD104: Electric Vehicle Power Transfer Infrastructure

**CD104 Electric vehicle power transfer infrastructure.**
New parking facilities shall be provided with *electric vehicle* power transfer infrastructure in compliance with Sections CD104.1 through CD104.6, and CD105.

**CD104.1 Quantity.**
The number of required *EVSE spaces*, *EV ready spaces*, and *EV capable spaces* shall be determined in accordance with this Section and Table CD104.1 based on the total number of *automobile parking spaces* and shall be rounded up to the nearest whole number. For R-2 buildings, the Table requirements shall be based on the total number of dwelling units or the total number of *automobile parking spaces*, whichever is less.

1. Where more than one parking facility is provided on a building site, the number of required automobile parking spaces required to have EV power transfer infrastructure shall be calculated separately for each parking facility.
2. Where one shared parking facility serves multiple building occupancies, the required number of spaces shall be determined proportionally based on the floor area of each building occupancy.
3. Installed EVSE spaces that exceed the minimum requirements of this section may be used to meet minimum requirements for EV ready spaces and EV capable spaces.
4. Installed EV ready spaces that exceed the minimum requirements of this section may be used to meet minimum requirements for EV capable spaces.
5. Where the number of EV ready spaces allocated for R-2 occupancies is equal to the number of dwelling units or to the number of automobile parking spaces, whichever is less, requirements for EVSE spaces for R-2 occupancies shall not apply.
6. In commercial multi-family (R-2, R-3, and R-4) complexes, four stories or greater, that contain multiple buildings, required EV spaces shall be dispersed throughout parking areas so that each building has access to a similar number

of spaces per dwelling unit.

7. Requirements for a Group S-2 parking garage shall be determined by the occupancies served by that parking garage. Where new automobile parking spaces do not serve specific occupancies, the values for Group S-2 parking garage in Table CD104.1 shall be used.
8. Direct Current Fast Charging. The number of EVSE spaces for Groups A, B, E, I, M and S-2 Occupancies may be reduced by up to ten per DCFC EVSE provided that the building includes not less than one parking space equipped with a DCFC EVSE and not less than one EV ready space. A maximum of fifty spaces may be reduced from the total number of EVSE spaces.

**Exception:**
Parking facilities, serving occupancies other than R-2 with fewer than 10 automobile parking spaces.

**TABLE CD104.1: REQUIRED EV POWER TRANSFER INFRASTRUCTURE**

| BUILDING TYPE | MINIMUM EV INSTALLED SPACES | MINIMUM EV READY SPACES | MINIMUM EV CAPABLE SPACES |
|---|---|---|---|
| Group A, B, E, M | 10% | 5% | 10% |
| Group F, I, R-3, R-4 | 2% | 0% | 5% |
| Group R-1 and R-2 a | 15% | 5% | 40% |
| Group S-2 Parking Garages | 10% | 5% | 0% |

a. Where all (100%) parking serving R-2 occupancies are EV ready spaces, requirements for *EVSE* spaces for R-2 occupancies shall not apply.

**CD104.2 EV capable spaces.**
Each EV capable space used to meet the requirements of Section CD104.1 shall comply with all of the following:

1. A continuous raceway or cable assembly shall be installed between an enclosure or outlet located within 3 feet (914 mm) of the EV capable space and a suitable panelboard or other onsite electrical distribution equipment.
2. Installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with CD104.5
3. The electrical distribution equipment to which the raceway or cable assembly connects shall have sufficient dedicated space and spare electrical capacity for a 2-pole circuit breaker or set of fuses.
4. The electrical enclosure or outlet and the electrical distribution equipment directory shall be marked: "For future electric vehicle supply equipment (EVSE)."
5. Reserved capacity shall be no less than 4.1 kVA (20A 208/240V) for each EV capable space.

**CD104.3 EV ready spaces.**
Each branch circuit serving EV ready spaces used to meet the requirements of Section CD104.1 shall comply with all of the following:

1. Terminate at an outlet or enclosure, located within 3 feet (914 mm) of each *EV ready space* it serves.
2. Have a minimum circuit capacity in accordance with CD104.5.
3. Branch circuit on the panelboard or other electrical distribution equipment directory designated as "For electric vehicle supply equipment (EVSE)" and the outlet or enclosure marked "For electric vehicle supply equipment (EVSE)."

**CD104.4 EVSE spaces.**
An installed *EVSE* with multiple output connections shall be permitted to serve multiple *EVSE spaces*. Each *EVSE* installed to meet the requirements of Section CD104.1, serving either a single *EVSE space* or multiple *EVSE spaces*, shall comply with all of the following:

1. Have a minimum circuit capacity in accordance with CD104.5.
2. Have a minimum charging rate in accordance with CD104.4.1.

3. Be located within 3 feet (914 mm) of each *EVSE* space it serves.
4. Be installed in accordance with Section CD104.6 and CD104.7.

**CD104.4.1 EVSE minimum charging rate.**
Each installed *EVSE* shall comply with one of the following:
1. Be capable of charging at a minimum rate of 6.2 kVA (or 30A at 208/240V).
2. When serving multiple *EVSE spaces* and controlled by an energy management system providing load management, be capable of simultaneously charging each *EVSE space* at a minimum rate of no less than 3.3 kVA.
3. When serving *EVSE spaces* allowed to have a minimum circuit capacity of 2.7 kVA in accordance with CD104.5.1 and controlled by an energy management system providing load management, be capable of simultaneously charging each *ESVE space* at a minimum rate of no less than 2.1 kVA.

**CD104.5 Circuit capacity.**
The capacity of electrical infrastructure serving each *EV capable space*, *EV ready space*, and *EVSE space* shall comply with one of the following:
1. A branch circuit with a rated capacity not less than 8.3 kVA (or 40A at 208/240V) for each *EV ready space* or *EVSE space* it serves.
2. The requirements of CD104.5.1.

**CD104.5.1 Circuit capacity management.**
The capacity of each branch circuit serving multiple *EVSE spaces*, *EV ready spaces* or *EV capable spaces* designed to be controlled by an energy management system providing load management in accordance with NFPA 70, shall comply with one of the following:
1. Have a minimum capacity of 4.1 kVA per space.
2. Have a minimum capacity of 2.7 kVA per space when serving *EV ready spaces* or *EVSE spaces* for a building site where all (100%) of the automobile parking spaces are designed to be *EV ready* or *EVSE spaces*.

**CD104.6 EVSE installation.**
*EVSE* shall be installed in accordance with NFPA 70 and shall be listed and labeled in accordance with UL 2202 or UL 2594.

**CD104.7. EVSE ENERGY STAR.**
All *EVSE* shall be ENERGY STAR certified.

### Section CD105: Identification

**CD105.1 Identification.**
Construction documents shall designate all *EV capable spaces*, *EV ready spaces*, and *EVSE spaces* and indicate the locations of conduit and termination points serving them. The circuit breakers or circuit breaker spaces reserved for the *EV capable spaces*, *EV ready spaces*, and *EVSE spaces* shall be clearly identified in the panel board directory. The conduit for *EV capable spaces* shall be clearly identified at both the panel board and the termination point at the parking space.

# IECC – RESIDENTIAL PROVISIONS

## IECC CHAPTER 1 [RE]: SCOPE AND ADMINISTRATION

*This chapter of the IECC is deleted in its entirety and replaced by Chapter 1, the administrative provisions of the Boulder County Building Code, except for Sections R101.1 through R101.5 are amended to read as follows.*

### IECC SECTION R101: GENERAL

**R101.1 Title.**
This code shall be known as the *Energy Conservation Code of Boulder County* and shall be cited as such. It is referred to herein as “this code.”

**R101.2 Scope.**
This code applies to residential buildings, building sites, and associated systems and equipment.

**R101.3 Intent.**
This code shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

**R101.4 Applicability.**
Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

**R101.4.1 Mixed residential and commercial buildings.**
Where a building includes both residential building and commercial building portions, each portion shall be separately considered and meet the applicable provisions of the IECC—Commercial Provisions or IECC—Residential Provisions.

**R101.5 Compliance.**
Residential buildings shall meet the provisions of IECC [RE] residential provisions, except that one- and two-family dwellings and townhouses and their accessory buildings shall meet the Boulder County BuildSmart requirements of the amended Chapter 11 of the *International Residential Code*.
Commercial buildings shall meet the provisions of IECC [CE] commercial provisions. New commercial buildings or complexes of buildings located on the same parcel with over 25,000 square feet in total building floor area and additions and alterations to existing buildings that were constructed under the *International Green Construction Code* shall meet the amended provisions of the *International Green Construction Code* as adopted by Boulder County.

**R101.5.1 Compliance materials.**
The code official shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

*Adopt Chapter 2 [RE] as published, except Section C202 Definitions is amended to add or revise the following definitions in alphabetical order.*

## IECC CHAPTER 2 [RE]: DEFINITIONS

*Section R202 GENERAL DEFINITIONS is amended to add or revise the following definitions in alphabetical order:*

**ALL-ELECTRIC BUILDING.** A *building* and building site that contains no *combustion equipment*, or plumbing for *combustion equipment*, and that uses heat pump technology as the primary supply for heating, cooling, and service water heating loads.

**COMBUSTION EQUIPMENT:** Any equipment or appliances used for space heating, cooling, water heating (including pools and spas), cooking, clothes drying or lighting that uses natural gas, propane, other fuel gas, or fuel oil.

**DECONSTRUCTION.** The dismantling of an existing building or portion thereof without the use of heavy machinery or the destruction of the materials. Deconstruction includes the salvage of materials from the existing structure for recycling, resale, or reuse as an alternative to sending them to a landfill. There are two types of deconstructions, structural and non-structural deconstruction.

**DECONSTRUCTION, NON-STRUCTURAL.** Non-Structural deconstruction (also referred to as soft stripping) is the removal and reclaiming of the reusable non-structural components such as appliances, cabinets, doors, windows, flooring,

fixtures, and finish materials.

**DECONSTRUCTION, STRUCTURAL.** Structural deconstruction is the removal and reclaiming of the reusable structural components of a building, such as walls, floors, and roofs.

**DECONSTRUCTION PROFESSIONAL.** A professional engaged in the deconstruction field.

**DEMOLITION.** The tearing down of an existing structure and the disposal of its components or materials without the implementation of deconstruction techniques.

**MIXED-FUEL BUILDING.** A *building* and building site that contains *combustion equipment*, or plumbing for *combustion equipment*, for space heating, cooling, water heating (including pools and spas), cooking, or clothes drying.

*Adopt Chapter 3 of the IECC [RE] – Residential provisions as published, except amend as follows. Sections R304 – R390 are reserved. Add to General Requirements, Chapter 3, Section R391 "Deconstruction" as follows:*

# IECC CHAPTER 3 [RE]: GENERAL REQUIREMENTS

## IECC SECTIONS R391: DECONSTRUCTION

**R391.1 General.**
All existing buildings and portions thereof requiring removal of building materials must be deconstructed as defined in Sections C202 and R202. *Demolition* is not permitted.

**R391.2 Penalty.**
Buildings demolished or partially demolished rather than deconstructed will, at the discretion of the *building official*, be issued a stop work notice for a period not exceeding 30 days.

**R391.3 Documentation of intent to deconstruct.**
Documentation of intent to deconstruct, consisting of a *deconstruction* plan, a written description of *deconstruction* work, or the County *Deconstruction* Checklist must be provided at building permit application. The documentation of intent to deconstruct must include: the name of the *deconstruction* contractor, a list of the materials to be recovered, donated, or reused, and the destination of the materials. The documentation must include both *nonstructural deconstruction* and *structural deconstruction*. Items which must be donated, sold, or re-used include cabinets, dimensional lumber, flooring, and solid core doors.

**R391.4 Verification of *deconstruction* of a structure.**
The completion of *deconstruction* as *approved* on the *deconstruction* plan must be verified by the Building Division. The owner or *deconstruction professional* shall provide written verification of deconstruction by means of receipts or a written log, maintained by the homeowner or general contractor, which includes the volume or weight of materials and the destination where they were transported to the Building Safety & Inspection Services Division. Verification must be received prior to scheduling the rough inspections.

*Add to General Requirements, Chapter 3, Section R392 "Construction jobsite waste reduction and recycling" as follows:*

## IECC SECTIONS R392: CONSTRUCTION JOBSITE WASTE REDUCTION AND RECYCLING

**R392.1 Construction jobsite waste reduction and recycling.**
All construction jobsite waste must be recycled, including wood, scrap metal, cardboard, and concrete. Labeled containers must be provided at the construction-site for use in capturing recyclable material. A mixed load container may be used if that container is being sent to a waste/ recycling center that will verify the weight of recycled material recovered from that mixed load.

**R392.2 Documentation of intent to recycle.**
Documentation of intent to recycle which consists of a recycling plan, a written description of recycling activity, or the submittal of the County Recycling Checklist must be provided at building permit application. The documentation must specify the locations of recycling containers and the destination where material will be recycled.

**R392.3 Verification.**
Field inspection will be made by the Boulder County Building Division during the construction process to assure that recycling containers have been placed on-site. Prior to the final inspection, documentation must be provided to the Building Division office by the owner or waste/recycling contractor indicating the weight or volume of materials diverted from the waste stream. Materials that must be recycled include appliances, concrete, metals, cardboard, and wood (except pressure treated or painted wood), and thermostats and other devices containing mercury. Other materials which are accepted by the waste/recycling contractor must also be recycled.

*Add to General Requirements, Chapter 3, Section R393, "Trash Storage and Recycling Areas." These are general requirements to Boulder County.*

## IECC SECTIONS R393: TRASH STORAGE AND RECYCLING AREAS

**R393.1 On-site recycling.**
The following requirements shall apply to the construction of trash storage and recycling areas for attached dwellings and all business and industrial buildings or uses:

**R393.1.1 Covered area.**
Trash storage and recycling area shall be accommodated within the structure, or adequate common area shall be included on-site and indicated on a site plan.

**R393.1.2 Hard surface required, screening and landscaping.**
All outdoor trash recycling storage and containers shall be placed on a hard surface, including, without limitation, concrete, and shall be screened.

**R393.1.3 Maintenance and service.**
Trash storage and recycling area shall include adequate space for the maintenance and servicing of containers for recyclable materials that are provided by local disposal and recycling companies.

*Adopt Chapter 4 of the IECC [RE] – Residential provisions as published, except amend as follows.*

# IECC CHAPTER 4 [RE]: Additional Efficiency

*Section R401.2.5 Additional energy efficiency is amended as follows:*

**R401.2.5 Additional energy efficiency.**
This section establishes additional requirements applicable to all compliance approaches to achieve additional energy efficiency.

1. For buildings complying with Section R401.2.1, the building shall meet one of the following:
   1.1. For *all-electric buildings*, one of the additional efficiency package options shall be installed according to Section R408.2.
   1.2. For *mixed-fuel buildings*, three of the additional efficiency packages shall be installed, at least one of which addresses the envelope.
2. For buildings complying with Section R401.2.2, the building shall meet one of the following:
   2.1. For *all-electric buildings*, one of the additional efficiency package options in Section R408.2 shall be installed without including such measures in the proposed design under Section R405.
   2.2. For *mixed-fuel buildings*, three of the additional efficiency packages shall be installed, at least one of which addresses the envelope, without including such measures in the proposed design under Section R405.

2.3. For *all-electric buildings*, the proposed design of the building under Section R405.3 shall have an annual energy cost that is less than or equal to 95 percent of the annual energy cost of the standard reference design.
2.4. For *mixed-fuel buildings*, the proposed design of the building under Section R405.3 shall have an annual energy cost that is less than or equal to 80 percent of the annual energy cost of the standard reference design.

For buildings complying with the Energy Rating Index alternative Section R401.2.3, the Energy Rating Index value shall be at least 5 percent less than the Energy Rating Index target specified in Table R406.5.
The options selected for compliance shall be identified in the certificate required by Section R401.3.

*Amend Section R401.3 Certificate. Enumerated item 4, is amended and new items 8, 9, and 10 are added as follows:*

**R401.3 Certificate.**
A permanent certificate shall be completed by the builder or other *approved* party and posted on a wall in the space where the furnace is located, a utility room, or an *approved* location inside the building. Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall indicate the following:

1. The predominant R-values of insulation installed in or on ceilings, roofs, walls, foundation components such as slabs, basement walls, crawl space walls and floors and ducts outside conditioned spaces.
2. U-factors of fenestration and the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value for any component of the building envelope, the certificate shall indicate both the value covering the largest area and the area weighted average value if available.
3. The results from any required duct system and building envelope air leakage testing performed on the building.
4. The types, sizes, fuel sources, and efficiencies of heating, cooling and service water-heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall indicate "gas-fired unvented room heater", "electric furnace", or "baseboard electric heater," as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces, and electric baseboard heaters.
5. Where on-site photovoltaic panel systems have been installed, the array capacity, inverter efficiency, panel tilt and orientation shall be noted on the certificate.
6. For buildings where an Energy Rating Index score is determined in accordance with Section R406, the Energy Rating Index score, both with and without any on-site generation, shall be listed on the certificate.
7. The code edition under which the structure was permitted, and the compliance path used.
8. The fuel sources for cooking and clothes drying equipment.
9. Where combustion equipment is installed, the certificate shall indicate information on the installation of additional electric infrastructure including which equipment and/or appliances include additional electric infrastructure, capacity reserved on the electrical service panel for replacement of each piece of combustion equipment and/or appliance.
10. Where a solar-ready zone is provided, the certificate shall indicate the location, dimensions, and capacity reserved on the electrical service panel.

*Section R403.5 Service hot water systems is amended as follows:*

**R403.5 Service hot water systems.**
Energy conservation measures for service hot water systems shall be in accordance with Sections R403.5.1 through R403.5.4.

*Section R403.5.4 Water heating equipment location is added as follows:*

**R403.5.4 Water heating equipment location.**
Water heaters with *combustion equipment* shall be located in a space with the following characteristics:

1. Minimum dimensions of 3 feet by 3 feet by 7 feet high.
2. Minimum volume of 760 cubic feet, or the equivalent of one 16-inch by 24-inch grill to a heated space and one 8-inch duct of no more than 10 feet in length for cool exhaust air.
3. Contains a condensate drain that is no more than 2 inches higher than the base of the installed water heater and allows natural draining without pump assistance, installed within 3 feet of the water heater.

**Exceptions:**
Water heaters with an input capacity of greater than 300,000 Btu/h that serves multiple *dwelling units* or *sleeping units.*

*Section R404.1.1 Fuel gas lighting is amended to read as follows:*

**R404.1.1 Fuel gas lighting.**
Fuel gas lighting systems are prohibited.

*Section R404.4 Additional electric infrastructure is added as follows:*

**R404.4 Additional electric infrastructure.**
All combustion equipment shall be installed in accordance with Section R403.5.4 and shall be provided with a junction box that is connected to an electrical panel by continuous raceways that meet the following requirements:

1. The junction box, raceway, and bus bar in the electric panel and conductors serving the electric panel shall be sized to accommodate electric equipment sized to serve the same load as the combustion equipment.
2. The panel shall have reserved physical space for a dual-pole circuit breaker.
3. The junction box and electrical panel directory entry for the dedicated circuit breaker space shall have labels stating, "For future electric equipment."
4. The junction box shall allow for the electric equipment to be installed within the same place of the combustion equipment that it replaces.

**Exceptions:**

1. Fossil fuel space heating equipment where a 208/240-volt electrical circuit with a minimum capacity of 40 amps exists for space cooling equipment.
2. Water heating equipment with an input capacity greater than 300,000 Btu/h that serves multiple dwelling units or sleeping units.

*Table R405.2 Requirements for Total Building Performance adds a new row under Mechanical and a new row under Electrical Power and Lighting Systems as follows:*

**TABLE R405.2 REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE**

| SECTION | TITLE |
|---|---|
| **Mechanical** | |
| R403.5.4 | Water heating equipment location |
| **Electrical Power and Lighting Systems** | |
| R404.4 | Additional electric infrastructure |

*Section R406.2 ERI compliance, first paragraph, is amended to read as follows with the other parts of the section to remain:*

**R406.2 ERI / HERS Compliance.**
Compliance based on the ERI, utilizing the HERS Index Score, requires that the rated design meets all of the following:

1. The requirements of the sections indicated within Table R406.2.
2. The maximum ERI of Table R406.5.

*Amend Table R406.2 Requirements for Energy Rating Index add a new row under Mechanical and a new row under Electrical Power and Lighting Systems as follows:*

**TABLE R406.2 REQUIREMENTS FOR ENERGY RATING INDEX**

| SECTION | TITLE |
|---|---|

| Mechanical | |
|---|---|
| R403.5.4 | Water heating equipment |
| Electrical Power and Lighting Systems | |
| R404.4 | Additional electric infrastructure |

*Section R406.5 ERI-based compliance is amended as follows:*

**R406.5 ERI- / HERS-based compliance.**
Compliance based on an ERI analysis requires that the rated proposed design and confirmed built dwelling be shown to have an ERI less than or equal to the appropriate value for the proposed *all-electric building* or *mixed-fuel building* as indicated in Table R406.4 when compared to the ERI reference design.

**TABLE R406.5 MAXIMUM ENERGY RATING INDEX**

| CLIMATE ZONE | ALL-ELECTRIC BUILDING | MIXED FUEL BUILDING |
|---|---|---|
| 5 | 55 | 50 |

*Sections R409 through R489 are reserved. Adopt R490 as follows.*

## IECC SECTION R490: Exterior Energy Uses and Onsite Energy Offsets

**R490.1 General.**
Exterior energy uses, and specified interior uses, must be offset with on-site renewable energy production.

**Exception:**
Cooking appliances and Electrical Roofing Ice Melt Systems installed in homes built prior to 2016.

**R490.1.1 Conversion of kilowatt hours per year to British Thermal Units (BTUs) per year.**
For the purpose of converting energy consumption in section R490, the following factor shall be used.

1 kilowatt hour per year (kWh/year) = BTU per year / 3,412

Note: A separate building permit is required for on-site renewable energy generation equipment.

**R490.2 Snow melt system controls.**
Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C), and precipitation is not falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (4.8°C).

**R490.2.1 Snow melt and ice melt system design.**
Where installed, energy use by snow and ice melt systems must be offset by on-site renewable energy generation equivalent to the energy used by the snow and ice melting equipment. Plans must be submitted that detail the type, size and location of the on-site renewable energy generation equipment.

**R490.2.2 Energy conservation design criteria for supporting on-site renewable energy equipment.**
On-site renewable energy generation equipment installed to offset the energy used by snow and ice melt systems shall be determined using the formula provided in Equation **R490.2.2**.

**(Equation R490.2.2):**

$A = (B \times 34{,}425 \text{ BTUs}) / 3{,}412$

Where:

On-Site Renewable Energy Requirements: 34,425 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in area of the ice or snow melt.

**R490.3 Pool energy consumption.**
Swimming pools must be provided with energy conservation measures in accordance with Section R490.3.1 through R490.3.6 or be unheated. Heated pools must be heated by solar thermal or other equipment that does not rely directly or indirectly on the burning of fossil fuels or they must have their energy use offset by on-site renewable energy generation equipment equivalent to the energy use by the swimming pool.

**R490.3.1 Heaters.**
The electric power to heaters shall be controlled by on-off switch, with *ready access*, that is an integral part of the heater mounted on the exterior of the heater, or external to and within 3 feet (914mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Where heat pumps are installed, only heat pumps rated for cold climates shall be allowed.

**Exceptions:**
1. Unheated swimming pools.
2. Heated swimming pools having less than 200 square feet (18.6 $m^2$) of water surface area are exempt from the requirements to provide renewable energy.
3. Legally installed swimming pools with legally installed water heating equipment are exempt from the onsite renewable requirement when replacing the previously *approved* water heating equipment.

**R490.3.2 Time switches.**
Time switches or other control methods that can automatically turn off and on according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches and shall be in compliance with this section.

**Exceptions:**
1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

**R490.3.3 Covers.**
Outdoor heated pools and outdoor spas shall be provided with a vapor retardant cover or other *approved* vapor-retardant means. Pools heated to more than 90°F (32°C) shall have side and bottom surfaces insulated on the exterior with a minimum insulation value of R-12 and shall have a pool cover with a minimum insulation value of *R*-12.

**R490.3.4 Pumps.**
Swimming pool pumps must be multi-speed pumps.

**R490.3.5 Swimming pools require onsite energy offsets.**
All heated swimming pools must be heated by solar thermal or other equipment that does not rely, directly or indirectly, on the burning of fossil fuels. Where heated pools are heated by the use of burning fossil fuels, directly or indirectly, they must have their energy use offset by on-site renewable energy generation equipment equivalent to the energy use by the swimming pool.

**Exception:**
Swimming pools having less than 200 sq. ft. of water surface area are exempt from the requirements to provide renewable energy.

**R490.3.6 Energy conservation design standards for swimming pools.**
For the purpose of calculating the energy use of swimming pools, section R490.3.6.1 Outdoor Swimming pools and R490.3.6.2 Indoor Swimming Pools shall apply as applicable.

**R490.3.6.1 Energy conservation design standards for outdoor swimming pools.**

The required on-site renewable energy offset for swimming pools located outdoors shall be determined using the formula provided in Equation R490.3.6.1.

**(Equation R490.3.6.1):**

A = (B × 29,000 BTU) / 3,412

Where:

Outdoor Swimming Pool Season: 3 months.

Swimming Pool Heating Temperature: 82°F (28°C) or less

On-Site Renewable Energy Requirements: 29,000 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the outdoor swimming pool.

**R490.3.6.2 Energy conservation design standards for indoor swimming pools.**

The required on-site renewable energy offset for swimming pools located within unconditioned spaces shall be determined using the formula provided in Equation R490.3.6.2.

**(Equation R490.3.6.2):**

A = (B × 116,000 BTU) / 3,412

Where:

Indoor (unconditioned) Swimming Pool Season: 12 months.

Pool Heating Temperature: 82°F (28°C) or less

On-Site Renewable Energy Requirements: 116,000 BTU per square feet in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the indoor swimming pool.

Note: This Section is not intended to limit the season or temperature of swimming pools.

**R490.4 Portable spas.**

The energy consumption of electric-powered portable spas shall be controlled by the requirements of APSP-14.

**R490.5 Residential pools and permanent residential spas.**

Residential swimming pools and permanent residential spas that are accessory to detached one- and two-family dwellings and townhouses 3 stories or less in height above grade plane and that are available only to the household and its guests shall be in accordance with APSP-15.

**R490.6 Spas.**

Any energy use by swim or exercise spas, indoor spas located in unconditioned spaces, or outdoor spas must be offset by on-site renewable energy generation equivalent to the energy use by the spa. Plans must show the annual energy use of the spa, the calculation method used to determine the expected energy use, and the on-site *renewable energy system*(s) which will be used to offset the energy used by the spa. All spas must be equipped with an insulated cover that is listed to provide a minimum R-*value* of at least 12.

**Exception:**

Spas and hot tubs which have been tested and listed for compliance with the requirements of the California Energy Commission (CEC) Title 20 (Standby power for portable electric spas shall not be greater than $3.75\ V^{2/3} + 40$ watts where V = the total volume of the spa in gallons), and are less than 64 square feet in surface area shall be exempted from the requirement to offset their energy usage by on-site *renewable energy generation.* Spas larger than 64 square feet in surface area that are certified to meet the requirements of the CEC shall offset their requirements at the rate of 140,000 BTUs per square foot per year.

**R490.6.1 Energy conservation design standards for spas.**

The requirements of this section apply to spas that do not meet the exception in Section R490.6.1.

**(Equation R490.6.1):**

A = (B × 430,000 BTUs) / 3,412

Where:

Spa Season: 12 months.

On-Site Renewable Energy Requirements: 430,000 BTU per square foot in surface area per year.

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Square feet in surface area of the spa or hot tub.

**R490.7 Saunas.**

Energy use by fossil-fuel-consuming outdoor saunas or saunas in unconditioned spaces must be offset by on-site *renewable energy generation* equivalent to the sauna's energy consumption. Construction documents must provide information on the spa's annual energy use, the calculations outlined in sections R490.7.1 or R490.7.2, and the production of the *renewable energy system* that will offset the sauna's energy consumption.

**R490.7.1 Energy conservation design standards for electric saunas.**

The required on-site renewable energy offset for outdoor electric saunas or electric saunas located in unconditioned spaces can be determined using the formula provided in Equation R490.7.1.

**(Equation R490.7.1):**

A = B × 200 hours/year

Where:

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = Power consumption of the heating appliance in kilowatts

**R490.7.2 Energy conservation design standards for gas-fired saunas.**

The required on-site renewable energy offset for outdoor gas-fired saunas or gas-fired saunas located in unconditioned spaces shall be determined using the formula provided in Equation R490.7.2.

**(Equation R490.7.2):**

A = (B × 200 hours / year) / 3412

Where:

A = Required on-site renewable energy offset kilowatt hours per year (kWh/yr.)

B = BTU rating of the gas-fired heater

**R490.8. Energy conservation design standards for exterior fireplaces, firepits, and other energy uses.**

For purposes of calculating renewable energy offset requirements, the minimum usage of exterior, fossil-fuel-consuming, fireplaces and firepits shall be considered to be 50 hours per year. Exterior space heating devices shall be assumed to operate a minimum of 150 hours per year.

*Section R491 through R499 are reserved. Adopt Chapter 5 [RE] and Chapter 6 [RE] as published.*

*Adopt Appendixes RB and RD as follows:*

# RESIDENTIAL APPENDIX RB: Solar Ready Provisions.

*Adopt Appendix RB: Solar-Ready Zone as published, except to amend section RB103.1, as follows, with the rest of the section remaining.*

**RB103.1 General.**
New residential buildings with not less than 600 square feet (55.74 m 2) of roof area oriented between 110 degrees and 270 degrees of true north shall comply with Sections RB103.2 through RB103.8.

*Note: This is the EV-ready appendix for residential, including multi-family three stories or less.*

*Adopt Appendix RD: EV Readiness is adopted as follows.*

# RESIDENTIAL APPENDIX RD: EV READINESS

## SECTION RD101

**RD101 Purpose and intent.**
The purpose and intent of this Appendix RD is to accommodate the growing need for EV charging infrastructure, in particular meeting preferences for charging at home. Including these measures during initial construction substantially reduces the costs and difficulty of installing EV infrastructure at a later date.

**RD102 Applicability.**
This Appendix RD shall apply to all new residential construction to which the *International Residential Code* applies.

## SECTION RD103

**RD103 Definitions.**

**AUTOMOBILE PARKING SPACE.** A space within a building or private or public parking lot, exclusive of driveways, ramps, columns, office, and work areas, for the parking of an automobile.

**DIRECT CURRENT FAST CHARGING (DCFC) EVSE:** EV power transfer infrastructure capable of fast charging on a 100A or higher 480VAC three-phase branch circuit. AC power is converted into a controlled DC voltage and current within the *EVSE* that will then directly charge the *electric vehicle*.

**EV LOAD MANAGEMENT SYSTEM:** A system designed to allocate charging capacity among multiple *EVSE* and that complies with the current National Electric Code.

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood *electric vehicle*s, and electric motorcycles, primarily powered by an electric motor that draws current from an electric source.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** Equipment for plug-in power transfer including the ungrounded, grounded, and equipment grounding conductors, and the *electric vehicle* connectors, attachment plugs, personal protection system and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle*.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT INSTALLED SPACE (EVSE space).** An automobile parking space that is provided with a dedicated *EVSE* connection.

**ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE).** A designated automobile parking space that is provided with electrical infrastructure, such as, but not limited to, raceways, cables, electrical capacity, and panelboard or other electrical distribution equipment space, necessary for the future installation of an *EVSE*.

**ELECTRIC VEHICLE READY SPACE (EV READY SPACE).** An automobile parking space that is provided with a branch circuit and either an outlet, junction box or receptacle, that will support an installed *EVSE*.

**UNIVERSAL VEHICLE CHARGING STATION.** A charging station installed in a parking space for a minimum vehicle width of 120 inches (3048 mm) with 36-inch access aisles (915 mm) on each side.

## SECTION RD104

**RD104 One- and two-family dwellings and townhouses.**
One *EV ready* space shall be provided for each *dwelling unit*. The branch circuit shall be identified as *EV ready* in the service panel or subpanel directory, and the termination location shall be marked as *EV ready*.

**Exception:**
Dwelling units where no parking spaces are either required or provided.

## SECTION RD105

**RD105 Residential multi-family dwellings, 3-stories or less.**
New dwelling units for residential multi-family buildings, other than duplexes and townhomes, shall be provided with *electric vehicle* power transfer infrastructure in compliance with Sections RD105.1 through RD105.6 and Sections RD106 through RD107.

**RD105.1 Quantity.**
The number of required *EVSE* spaces, *EV ready* spaces, and *EV capable* spaces shall be determined in accordance with this Section and Table RD105.1 based on the total number of *automobile parking spaces* and shall be rounded up to the nearest whole number. For R-2 buildings, the Table requirements shall be based on the total number of dwelling units or the total number of *automobile parking spaces*, whichever is less.

1. Where more than one parking facility is provided on a building site, the number of required automobile parking spaces required to have EV power transfer infrastructure shall be calculated separately for each parking facility.
2. Installed EVSE spaces that exceed the minimum requirements of this section may be used to meet minimum requirements for EV ready spaces and EV capable spaces.
3. Installed EV ready spaces that exceed the minimum requirements of this section may be used to meet minimum requirements for EV capable spaces.
4. Where the number of EV ready spaces allocated for R-2 occupancies is equal to the number of dwelling units or to the number of automobile parking spaces allocated to R-2 occupancies, whichever is less, requirements for EVSE spaces for R-2 occupancies shall not apply.
5. In residential multi-family complexes that contain multiple buildings, required EV spaces shall be dispersed throughout parking areas so that each building has access to a similar number of spaces per dwelling unit.

**TABLE RD105.1: REQUIRED EV POWER TRANSFER INFRASTRUCTURE FOR MULTI-FAMILY**

| BUILDING TYPE | MINIMUM EV INSTALLED SPACES | MINIMUM EV READY SPACES | MINIMUM EV CAPABLE SPACES |
|---|---|---|---|
| Group R-1 and R-2[a] | 15% | 5% | 40% |
| Group R-3 and R-4 | 2% | 0% | 5% |

a. Where all (100%) parking serving R-2 occupancies are EV ready spaces, requirements for EVSE spaces for R-2 occupancies shall not apply.

**RD105.2 EV capable spaces.**
Each *EV capable* space used to meet the requirements of Section RD105.1 shall comply with all of the following:

1. A continuous raceway or cable assembly shall be installed between an enclosure or outlet located within 3 feet (914 mm) of the EV capable space and a suitable panelboard or other onsite electrical distribution equipment.
2. Installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with RD105.5
3. The electrical distribution equipment to which the raceway or cable assembly connects shall have sufficient dedicated space and spare electrical capacity for a 2-pole circuit breaker or set of fuses.

4. The electrical enclosure or outlet and the electrical distribution equipment directory shall be marked: "For future electric vehicle supply equipment (EVSE)."
5. Reserved capacity shall be no less than 4.1 kVA (20A 208/240V) for each EV capable space.

**RD105.3 EV ready spaces.**
Each branch circuit serving *EV ready* spaces used to meet the requirements of Section RD105.1 shall comply with all of the following:

1. Terminate at an outlet or enclosure, located within 3 feet (914 mm) of each EV ready space it serves.
2. Have a minimum circuit capacity in accordance with RD105.5.
3. The panelboard or other electrical distribution equipment directory shall designate the branch circuit as "For electric vehicle supply equipment (EVSE)" and the outlet or enclosure shall be marked "For electric vehicle supply equipment (EVSE)."

**RD105.4 EVSE spaces.**
An installed *EVSE* with multiple output connections shall be permitted to serve multiple EVSE spaces. Each *EVSE* installed to meet the requirements of Section RD105.1, serving either a single *EVSE* space or multiple *EVSE* spaces, shall comply with all of the following:

1. Have a minimum circuit capacity in accordance with RD105.5.
2. Have a minimum charging rate in accordance with RD105.4.1.
3. Be located within 3 feet (914 mm) of each EVSE space it serves.
4. Be installed in accordance with Section RD105.6 and RD105.7

**RD105.4.1 EVSE minimum charging rate.**
Each installed *EVSE* shall comply with one of the following:

1. Be capable of charging at a minimum rate of 6.2 kVA (or 30A at 208/240V).
2. When serving multiple *EVSE* spaces and controlled by an energy management system providing load management, be capable of simultaneously charging each *EVSE* space at a minimum rate of no less than 3.3 kVA.
3. When serving *EVSE* spaces allowed to have a minimum circuit capacity of 2.7 kVA in accordance with RD105.5.1 and controlled by an energy management system providing load management, be capable of simultaneously charging each *ESVE* space at a minimum rate of no less than 2.1 kVA.

**RD105.5 Circuit capacity.**
The capacity of electrical infrastructure serving each *EV capable* space, *EV ready* space, and *EVSE* space shall comply with one of the following:

1. A branch circuit shall have a rated capacity not less than 8.3 kVA (or 40A at 208/240V) for each EV ready space or *EVSE* space it serves.
2. The requirements of RD104.5.1.

**RD105.5.1 Circuit capacity management.**
The capacity of each branch circuit serving multiple *EVSE* spaces, EV ready spaces or EV capable spaces designed to be controlled by an energy management system providing load management in accordance with NFPA 70, shall comply with one of the following:

1. Have a minimum capacity of 4.1 kVA per space.
2. Have a minimum capacity of 2.7 kVA per space when serving *EV ready* spaces or *EVSE* spaces for a building site when all (100%) of the automobile parking spaces are designed to be *EV ready* or *EVSE* spaces.

**RD105.6 EVSE installation.**
EVSE shall be installed in accordance with NFPA 70 and shall be listed and labeled in accordance with UL 2202 or UL 2594.

**RD105.7 EVSE ENERGY STAR.**
All EVSE shall be ENERGY STAR certified.

## Section RD105: Identification

## TABLE RD106.1: UNIVERSAL EV SPACE REQUIREMENTS

| TOTAL # OF EV CHARGING STATIONS | MINIMUM # OF UNIVERSAL VEHICLE CHARGING STATIONS |
|---|---|
| 1 or more | 25% |

**RD106.1 Identification.**
Construction documents shall designate all EV Capable spaces, EV Ready spaces and EV Installed spaces and indicate the locations of conduit and termination points serving them. The circuit breakers or circuit breaker spaces reserved for the EV Capable spaces, EV Ready spaces, and EV Installed spaces shall be clearly identified in the panel board directory. The conduit for EV Capable spaces shall be clearly identified at both the panel board and the termination point at the parking space.

# Amendments to the International Green Construction Code ("IgCC")

*Adopt the **2021 International Green Construction Code**, including all Normative Appendixes and Informative Appendixes published by the International Code Council, modeled from the 2021 International Green Construction Code ("IgCC"), with amendments to the following.*

*IGCC Chapter 1 is deleted, except as noted as follows. The remainder of the administrative provisions are found under the preceding Chapter of the Boulder County Building code. Section 101 is amended as follows:*

## IGCC CHAPTER 1: SCOPE AND ADMINISTRATION

## PART 1—SCOPE AND APPLICATION

### IGCC SECTION 101: SCOPE AND GENERAL REQUIREMENTS

**101.1 Title.**
These regulations shall be known as the Green Construction Code of Boulder County, hereinafter referred to as "this code."

**101.2 (2.3) General.**
This code is intended to provide minimum requirements to be used in conjunction with the other codes and standards adopted by the jurisdiction. The requirements in this code shall not be used to circumvent any applicable safety, health or environmental requirements.

**101.3 Scope.**
The provisions of this code shall apply to the design, construction, addition, alteration, change of occupancy, relocation, replacement, repair, equipment, building site, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures and to the site on which the building is located for new buildings or complexes of buildings on the same property 25,000 square feet in total building floor area or greater and *additions* and *alterations* to existing buildings that were constructed under the *International Green Construction Code*. Occupancy classifications shall be determined in accordance with the *International Building Code*® (IBC®).

**101.3.1 (2.2) Applicability.**
The provisions of this code do not apply to the following:

1. Single-family dwellings.
2. Multiple-family dwellings of three stories or fewer above grade.
3. Manufactured houses (mobile homes).
4. Manufactured houses (modular).

**Exception:**
Where complexes of buildings or multiple buildings are located on a parcel, the square footage calculation of developed structures contribute to the total building area calculation regardless of occupancy or use.

**101.4 (1.1) Intent.**
The intent of this code is to provide mini-mum requirements for the siting, design, construction and plans for operation of high-performance green buildings to: reduce emissions from buildings and building systems; enhance building occupant health and comfort; conserve water resources; protect local biodiversity and ecosystem services; promote sustainable and regenerative materials cycles; enhance building quality; enhance resilience to natural, technological, and human-caused hazards; and support the goal of development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**101.5 (4.1 & 4.2) Compliance.**
Building projects shall comply with this code. Within each of Chapters 5 through 9, building projects shall comply with all

mandatory provisions (x.3) and, where offered, either the:
1. Prescriptive Option (x.4) or
2. Performance Option (x.5).

Building projects shall also comply with all provisions of Chapter 10.

**Exceptions:**

1. Compliance shall not be required with sections that are listed in Table 101.5.1 where the jurisdiction has opted out by checking "No" in the corresponding cell in the jurisdictional requirement column.
2. Where the jurisdiction has indicated a diversion percentage for Section 501.3.8.1 in Table 101.5.1, that percentage shall replace the diversion percentage indicated in Section 501.3.8.1.
3. All new building projects where the new building floor area is 25,000 square feet or greater shall comply with the Performance Option.

**101.5.1 Jurisdictional options.**

The jurisdictional options listed in Table 101.5.1 provide jurisdictions the flexibility to adopt the code in a manner that is best suited to meet their unique environmental and regional goals and needs. The informative symbol [JO] after the section number indicates jurisdictional option provisions. Table 101.5.1 may be used for the code adoption ordinance:

1. Where "No" boxes are provided, the jurisdiction checks the box to indicate where that section is not to be enforced as a requirement in the jurisdiction. Where the "No" box is not checked, that section is adopted.
2. Where a numerical value is listed to specify the level of performance, the jurisdiction shall indicate the required value to be adopted. Where a numerical value is not indicated, the value in the text is adopted without change.

In addition to the jurisdictional options listed in Table 101.5.1, the code also provides for optional jurisdictional adoption of Informative Appendix H, Option for Energy Efficiency Using the IECC Prescriptive Compliance Path and Informative Appendix M, Option for Residential Compliance Using the National Green Building Standard. Where the jurisdiction adopts Appendix H, compliance with Sections 7.3 and 7.4 of this code shall be as specified in Appendix H.

*All sections within Table 101.5.1 are adopted. The "No" box is not selected for any of the listed sections.*

**TABLE 101.5.1: REQUIREMENTS DETERMINED BY THE JURISDICTION**

| SECTION | Chapter 5—Site Sustainability | JURISDICTIONAL REQUIREMENT |
|---|---|---|
| 501.3.5.2 (5.3.5.2) | Mitigation of Heat Island Effect—Walls | __ No |
| 501.3.6 (5.3.6) | Reduction of Light Pollution | __ No |
| 501.3.7.2.2 (5.3.7.2.2) | Bicycle Parking Location | __ No |
| 501.3.7.2.3 (5.3.7.2.3) | Bicycle Parking, Horizontal Parking Racks | __ No |
| 501.3.7.2.5 (5.3.7.2.5) | Bicycle Parking, Security and Visibility | __ No |
| 501.3.8.1 (5.3.8.1) | Building Site Waste Management—Diversion Percentage | 65 % |
| **SECTION** | **Chapter 6—Water Use Efficiency** | **JURISDICTIONAL REQUIREMENT** |
| 601.3.1.2.1(a,3) [6.3.1.2.1(a,3)] | Irrigation System Design, Master Valve | __ No |
| 601.3.1.2.1(a,4) [6.3.1.2.1(a,4)] | Irrigation System Design, Flow Sensors | __ No |
| 601.3.4 (6.3.4) | Special Water Features | __ No |
| 601.3.5.2 (6.3.5.2) | Consumption Data Collection | __ No |
| 601.3.5.3 (6.3.5.3) | Data Storage and Retrieval | __ No |
| 601.3.9 (6.3.9) | Dual Water Supply Plumbing | __ No |

| | | |
|---|---|---|
| **SECTION** | **Chapter 7—Energy Efficiency** | **JURISDICTIONAL REQUIREMENT** |
| 701.4.2.1 (7.4.2.1) | Building Envelope Requirements | __ No |
| 701.4.2.3 (7.4.2.3) | Single Rafter Roof Insulation | __ No |
| 701.4.2.4 (7.4.2.4) | High-speed Doors | __ No |
| 701.4.2.7 (7.4.2.7) | Permanent Projections | __ No |
| 701.4.2.10 (7.4.2.10) | Orientation | __ No |
| 701.4.3.2 (7.4.3.2) | Ventilation Controls for Densely Occupied Spaces | __ No |
| 701.4.3.4 (7.4.3.4) | Economizers | __ No |
| 701.4.3.5 (7.4.3.5) | Zone Controls | __ No |
| 701.4.3.7 (7.4.3.7) | Exhaust Air Energy Recovery | __ No |
| 701.4.3.8 (7.4.3.8) | Kitchen Exhaust Systems | __ No |
| 701.4.4.3 (7.4.4.3) | Insulation for Spa Pools | __ No |
| 701.4.6.3.1 (7.4.6.3.1) | Occupancy Sensor Controls in Commercial and Industrial Storage Stacks | __ No |
| 701.4.6.3.2 (7.4.6.3.2) | Automatic Controls for Egress and Security Lighting | __ No |
| 701.4.7.2 (7.4.7.2) | Supermarket Heat Recovery | __ No |
| 701.4.7.4 (7.4.7.4) | Programmable Thermostats | __ No |
| 701.4.7.5 (7.4.7.5) | Refrigerated Display Cases | __ No |
| 701.5.4 (7.5.4) | Energy Simulation Aided Design | __ No |
| **SECTION** | **Chapter 8—Indoor Environmental Quality** | **JURISDICTIONAL REQUIREMENT** |
| 801.3.1.3(b) [8.3.1.3(b)] | Outdoor Air Ozone Removal | __ No |
| 801.3.1.4.2 (8.3.1.4.2) | Exfiltration | __ No |
| 801.3.3.4 (8.3.3.4) | Interior Sound Reverberation | __ No |
| 801.3.9 [8.3.9] | Exterior Views | __ No |
| 801.4.1.3 (8.4.1.3) | Shading for Offices | __ No |
| **SECTION** | **Chapter 9—Materials and Resources** | **JURISDICTIONAL REQUIREMENT** |
| 901.3.1.2 (9.3.1.2) | Total Waste | __ No |
| **SECTION** | **Chapter 10—Construction and Plans for Operation** | **JURISDICTIONAL REQUIREMENT** |
| 1001.4.4 (10.4.4) | Construction Activity Pollution Prevention: Protection of Occupied Areas | __ No |
| 1001.7 (10.7) | Postconstruction Building Flush-out and Air Monitoring | __ No |
| 1001.10 (10.10) | Service Life Plan | __ No |
| 1001.11.2 (10.11.2) | Transportation Management Plan, Owner- occupied Building Projects or Portions of Building Projects | __ No |
| 1001.11.3 (10.11.3) | Transportation Management Plan, Building Tenant | __ No |

**101.5.2 (4.3.2) Normative appendices.**
The normative appendices to this code are considered to be integral parts of the mandatory requirements of this code, which for reasons of convenience are placed apart from all other normative elements.

**101.5.3 (4.3.3) Informative appendices.**
The informative appendices to this code, and informative notes located within this code, contain additional information and are not mandatory or part of this code except where specifically adopted by the authority having jurisdiction (AHJ).

*Informative note: Informative Appendices H and M are written in mandatory language suitable for inclusion in local codes where specifically adopted by the jurisdiction.*

**101.5.4 (4.3.4) Referenced standard reproduction annexes.**
The referenced standard reproduction annexes contain material that is cited in this code but that is contained in another standard. The referenced standard reproduction annexes are not part of this code but are included in its publication to facilitate its use.

*The remainder of Sections 102 through section are deleted, refer to Chapter 1 of the Administrative Provisions of the Boulder County Building Code Amendments. Chapter 2 through 6 are adopted as published.*

## IGCC Chapter 7 :

*Adopt Chapter 7 as published, except to amend as follows.*

**701.3 (7.3) Mandatory provisions.**
701.3.1 (7.3.1) General. Building projects shall be designed to comply with Sections 5.2.1, 6.2.1, 7.2.1, 8.2.1, 9.2.1, and 10.2.1 of ANSI/ASHRAE/IES Standard 90.1.

**701.3.1.1 (7.3.1.1) Climate zones.**
For climate zones, see ANSI/ASHRAE/IES Standard 90.1, Section 5.1.4, and ANSI/ASHRAE Standard 169.

For the purpose of this code, Boulder County shall be in climate zone 5. Sites that are above 7500 feet in elevation above sea levels shall be evaluated with additional engineering based on the elevation and climate effects.

*Adopt Chapter 8 through Chapter 11 as published, without amendment.*

*All appendixes are adopted, as published, including Normative Appendixes A, B, C, and D; and Informative Appendixes E, F, G, H, I, J, K, L, M, and N. Appendixes are adopted as published without amendment.*

# Amendments to the International Performance Code for Buildings and Facilities

*Modeled from the 2021 International Code Council Performance Code for Buildings and Facilities (ICCPC) published by the International Code Council (ICC).*

## Part I—Administrative

### ICCPC CHAPTER 1: GENERAL ADMINISTRATIVE PROVISIONS

#### SECTION 101: INTENT AND PURPOSE

*Note: International Code Council Performance Code for Buildings and Facilities (ICCPC) is adopted as published. Chapter 1 is adopted as published, except amend Section 101.2 to state that the adoption is for limited use.*

**101.2 Purpose.**
To provide appropriate health, safety, welfare, and social and economic value, while promoting innovative, flexible and responsive solutions that optimize the expenditure and consumption of resources. This code is adopted only for use as a guide and a tool to evaluate proposals for modifications and for alternate materials, design and methods of construction and equipment in accordance with Sections 104.10 and 104.11, respectively, of the Boulder County Building Code.

# Amendments to the International Swimming Pool and Spa Code ("ISPSC")

*Adopt the **2021 International Swimming Pool and Spa Code** ("ISPSC"), without any of the appendixes specifically**;** published by the International Code Council, modeled from the 2021 International Existing Building Code ("ISPSC"), with amendments to the following:*

## ISPSC CHAPTER 1: SCOPE AND ADMINISTRATION

## PART 1—SCOPE AND APPLICATION

*Note: This chapter is deleted, except sections 101.1 through 101.3 are adopted as follows:*

### ISPSC SECTION 101: SCOPE AND GENERAL REQUIREMENTS

**101.1 Title.**
These regulations shall be known as the Swimming Pool and Spa Code of Boulder County, herein-after referred to as "this code."

**101.2 Scope.**
The provisions of this code shall apply to the construction, alteration, movement, renovation, replacement, repair and maintenance of aquatic recreation facilities, pools and spas. The pools and spas covered by this code are either permanent or temporary, and shall be only those that are designed and manufactured to be connected to a circulation system and that are intended for swimming, bathing or wading.

**101.2.1 Flotation tanks.**
Flotation tank systems intended for sensory deprivation therapy shall not be considered to be included in the scope of this code.

**101.3 Purpose.**
The purpose of this code is to establish minimum requirements to provide a reasonable level of safety, health, property protection, and general welfare by regulating and controlling the design, construction, installation, quality of materials, location and maintenance or use of pools and spas.

### ISPSC SECTION 102: APPLICABILITY

**102.1 General.**
Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

**102.2 Existing installations.**
Any pool or spa and related mechanical, electrical and plumbing systems lawfully in existence at the time of the adoption of this code shall be permitted to have their use and maintenance continued if the use, maintenance or repair is in accordance with the original design and no hazard to life, health or property is created.

**102.3 Maintenance.**
Pools and spas and related mechanical, electrical and plumbing systems, both existing and new, and parts thereof, shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. Devices or safeguards that are required by this code shall be maintained in compliance with the edition of the code under which they were installed. The owner or the owner's authorized agent shall be responsible for maintenance of systems. To determine compliance with this provision, the code official shall have the authority to require any system to be

reinspected.

**102.4 Additions, alterations or repairs.**
Additions, alterations, renovations or repairs to any pool, spa or related system shall conform to that required for a new system without requiring the existing systems to comply with the requirements of this code. Additions, alterations or repairs shall not cause existing systems to become unsafe, insanitary or overloaded. Minor additions, alterations, renovations and repairs to existing systems shall be permitted in the same manner and arrangement as in the existing system, provided that such repairs or replacement are not hazardous and are approved.

**102.5 Historic buildings.**
The provisions of this code relating to the construction, alteration, repair, enlargement, restoration, relocation or moving of pools, spas or systems shall not be mandatory for existing pools, spas or systems identified and classified by the state or local jurisdiction as part of a historic structure where such pools, spas or systems are judged by the code official to be safe and in the public interest of health, safety and welfare regarding any proposed construction, alteration, repair, enlargement, restoration, relocation or moving of such pool or spa.

**102.6 Moved pools and spas.**
Except as determined by Section 102.2, systems that are a part of a pool, spa or system moved into or within the jurisdiction shall comply with the provisions of this code for new installations.

**102.7 Referenced codes and standards.**
The codes and standards referenced in this code shall be those that are listed in Chapter 11 and such codes and standards shall be considered to be part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and the referenced standards, the provisions of this code shall be the minimum requirements.

**102.7.1 Application of the International Codes.**
Where the International Residential Code is referenced in this code, the provisions of the International Residential Code shall apply to related systems in detached one- and two-family dwellings and townhouses not more than three stories in height. Other related systems shall comply with the applicable International Code or referenced standard.

**102.8 Requirements not covered by code.**
Any requirements necessary for the strength, stability or proper operation of an existing or proposed system, or for the public safety, health and general welfare, not specifically covered by this code shall be determined by the code official.

# Colorado Model Electric Ready and Solar Ready Code

*Adopt Colorado Model Electric Ready and Solar Ready Code as published with the following amendments. Chapter 1 is deleted entirely, except sections 101 and 102 are adopted as follows.*

## Chapter 1 Scope and Administration

### SECTION 101 SCOPE AND GENERAL REQUIREMENTS.

**101.1 Title.**
This code shall be known as the Electric Ready and Solar Ready Code of Boulder County, and shall be cited as such. It is referred to herein as "this code".

**101.2 Scope.**
This code applies to all buildings and dwelling units, and the buildings' sites and associated systems and equipment.

**101.3 Intent.**
This code shall regulate the design and construction of buildings to prepare new buildings for solar photovoltaic or solar thermal, electric vehicle charging infrastructure, and electrification of building systems. This code is intended to provide flexibility and balance upfront construction costs with the future cost to retrofit buildings to accommodate these systems. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

**101.4 Applicability.**
Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

**101.4.1 Residential Buildings.**
Residential buildings must comply with the Residential Chapters of this code.

**101.4.2 Commercial Buildings.**
Commercial buildings must comply with the Commercial Chapters of this code.

*Adopt section 102 as follows:*

### SECTION 102 WAIVER AND VARIANCE.

**102.1 Scope.**
The following waivers shall be permitted to be requested if buildings meet the following requirements.

**102.1.1 Commercial Buildings 10,000 sq. ft. or Greater.**
Commercial buildings that have a gross floor area greater than 10,000 sq. ft. shall be eligible to request a partial waiver to the requirements of this code if they meet the requirements of Section 102.2.

**102.1.2 Buildings Impacted by a Natural Disaster.**
Boulder County is permitted to authorize, upon appeal in specific cases, a waiver from the requirements of this code where, owing to a declared natural disaster that has destroyed buildings or resulted in other exceptional and extraordinary circumstances as determined by Boulder County and Boulder County determines enforcement of the provisions of this code will result in unnecessary hardship.

**102.2 Substantial Cost Differential Waiver.**
Boulder County shall be permitted to authorize, upon appeal, a waiver from the requirements of this code for an applicant that asserts that compliance with this code will result in a substantial cost differential. Boulder County, when authorizing such a waiver, shall be permitted to waive certain requirements of this code only until the cost differential for compliance with the remaining requirements reaches one percent or less. The burden of proof is upon the applicant to provide substantiation of a cost differential, such as quotes, or other licensed design professional analyses as *approved* by Boulder County.

**102.2.1 Substantial Cost Differential.**
For the purposes of Section 102.2, "substantial cost differential" means costs incurred as a result of compliance with the requirements of this code would exceed one percent of total mechanical, electrical, and plumbing construction costs inclusive of materials and labor.

*Delete sections 103 through 106 of Colorado Model Electric Ready and Solar Ready Code entirely. Refer to Chapter 1 Administrative Provisions of the Boulder County Building Code Amendments. Adopt section 107: Reference Standards of Colorado Model Electric Ready and Solar Ready Code.*

## SECTION 107 REFERENCED STANDARDS.

**107.1 General.**
The codes and standards referenced in this code shall be listed in Section **107.2**, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference.

**107.2 Referenced Codes and Standards.**
The codes and standards referenced in this code are as follows:
1. *International Building Code*
2. Chapter 3
3. Chapter 11
4. International Energy Conservation Code
5. International Fire Code
6. *International Residential Code*
7. National Electrical Code Article 625
8. UL2202 and 2594

**107.2.1 Conflicts.**
Where conflicts occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

**107.2.2 Provisions in Referenced Codes and Standards.**
Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

**107.3 Applications of References.**
References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section, or provision of this code.

**107.4 Other Laws.**
The provisions of this code shall not be deemed to nullify any provisions of local, state, or federal law.

*Delete sections 108 and 109 of the Colorado Model Electric Ready and Solar Ready Code entirely. Refer to Chapter 1 of the Boulder County Building Code Amendments.*

# Chapter 2 Definitions

## SECTION 201 GENERAL.

**201.1 Scope.**
Unless stated otherwise, the following words and terms in this code shall have the meanings indicated in this chapter.

**201.2 Interchangeability.**
Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

**201.3 Terms Defined in Other Codes.**
Terms that are not defined in this code but are defined in the *International Building Code*®, *International Fire Code*®, *International Fuel Gas Code*®, *International Mechanical Code*®, *International Plumbing Code*®, *International Energy Conservation Code*®, or *International Residential Code*® shall have the meanings ascribed to them in those codes.

**201.4 Terms not Defined.**
Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

## SECTION 202 GENERAL DEFINITIONS.

**APPROVED.** Acceptable to the code official.

**APPROVED AGENCY.** An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, or furnishing product certification, where such agency has been approved by the code official.

**CODE OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

**COMBUSTION EQUIPMENT.** For this code, any equipment or appliance used for space-heating, service water heating, cooking, clothes drying or lighting that uses fuel gas or fuel oil.

**COMMERCIAL BUILDING.** Commercial buildings are defined, for this code, as all commercial buildings and R-Occupancies that are covered by the *International Building Code*®.

**CORE AND SHELL.** The first phase of a commercial project that has the outer building envelope constructed and may contain interior lighting and heating and has not received a permanent Certificate of Occupancy.

**DIRECT CURRENT FAST CHARGER (DCFC) EVSE.** Equipment capable of fast charging on a 100A or higher 480VAC three-phase branch circuit. AC power is converted into a controlled DC voltage and current within the EVSE that will then directly charge the electric vehicle.

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, including but not limited to, passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, EVSE, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current. Off-road, self-propelled electric mobile equipment, including but not limited to, industrial trucks, hoists, lifts, transports, golf carts, airline ground support equipment, tractors, and boats are not considered electric vehicles.

**ELECTRIC VEHICLE CAPABLE LIGHT SPACE (EV CAPABLE LIGHT SPACE).** A designated vehicle parking space that has conduit and/or raceway installed to support future implementation of electric vehicle charging installation, and has sufficient physical space adjacent to the existing electrical equipment for future electric upgrades.

**ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE).** A designated vehicle parking space that has the electric panel capacity and conduit and/or raceway installed to support future implementation of electric vehicle charging.

**ELECTRIC VEHICLE READY SPACE (EV READY SPACE).** A designated vehicle parking space that has the electric panel capacity, raceway wiring, receptacle, and circuit overprotection devices installed to support future implementation of electrical vehicle charging.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** An electric vehicle charging system or device that is used to provide electricity to a plug-in electric vehicle or plug-in hybrid electric vehicle, is designed to ensure that a safe connection has been made between the electrical grid and the vehicle, and is able to communicate with the vehicle's control system so that electricity flows at an appropriate voltage and current level.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT INSTALLED SPACE (EVSE INSTALLED SPACE).** A vehicle parking space that is provided with a dedicated EVSE connection.

**FIRST TENANT FINISH.** The first tenant finish(es) in a new structure or core and shell building that is credited towards meeting the requirements of this Chapter.

**FUEL GAS.** A natural gas, manufactured gas, liquefied petroleum gas, or mixtures of these gasses.

**FUEL OIL.** Kerosene or any hydrocarbon oil having a flash point of not less than 100°F (38°C).

**FUTURE ELECTRIC EQUIPMENT.** Equipment or appliances necessary to support future all-electric space and water heating, cooking, or clothes drying.

**PLUG-IN HYBRID ELECTRIC VEHICLE.** An electric vehicle having a second source of motive power.

**RESIDENTIAL BUILDING.** Residential buildings are defined, for this code, as one- and two-family dwellings and townhouses as defined in the *International Residential Code*.

**SOLAR-READY ZONE.** A section or sections of the roof or building overhang designated and reserved for future installation of a solar photovoltaic system or solar thermal system.

# Chapter 3 Electric Ready

# PART 1 RESIDENTIAL ELECTRIC READY

## SECTION RE301: SCOPE

**RE301.1 General.**
These provisions shall be applicable for all new construction.

## SECTION RE302: ADDITIONAL ELECTRIC INFRASTRUCTURE

**RE302.1 Additional Electric Infrastructure.**
Combustion equipment in residential buildings must meet the requirements of Sections RE302.2 through RE302.6.

**Exceptions:**

1. Interior fireplaces that do not serve as a primary source of heating.
2. Exterior fireplaces and firepits.

**RE302.2 Combustion Equipment.**
*Combustion equipment* shall be provided with all of the following:

1. A dedicated, appropriately phased branch circuit sized to accommodate future electric equipment or appliances to serve a comparable capacity to meet the heating load.
2. An electric receptacle or junction box that meets the requirements of Section RE302.5, and is connected to the electrical panel through the branch circuit. Each electrical receptacle or junction box shall have reasonable access to the combustion equipment or dedicated physical space for future electric equipment with no obstructions other than the current combustion equipment.
3. Where combustion equipment is used for space or water heating, dedicated physical space shall be provided for future electric equipment, including an electric resistance backup coil for ducted systems, if applicable.

**Exception:**
Dwelling units with installed air conditioning systems are not required to provide additional dedicated physical space for an outdoor heat pump.

**RE302.3 Electrical Panel Space.**
The electrical panel shall have a reserved space for a minimum two-pole circuit breaker for each branch circuit provided for future electric equipment or appliances.

**RE302.4 Labeling.**
The junction box or receptacle and the dedicated circuit breaker space serving future electric equipment or appliances in the electrical panel shall be labeled for their intended use.

**RE302.5 Adjacency.**
The electrical receptacle or junction box must be provided within 3 feet of the combustion equipment or appliances, or within 3 feet of the dedicated physical space for future electric equipment or appliances.

**Exception:**
For *combustion equipment* dedicated to space or water heating, the electrical receptacle or junction box shall be located not more than 6 feet from the *combustion equipment* or the dedicated physical space for *future electric equipment*.

**RE302.6 Condensate Drain.**
Where combustion equipment for space heating and water heating is installed, a location shall be provided for condensate drainage.

# PART 2 COMMERCIAL ELECTRIC READY

## SECTION CE301 - SCOPE

**CE301.1 General.**
These provisions shall be applicable for all new buildings, additions, and *first tenant finish* permits.

**CE301.1.1 First Tenant Finishes.**
In the case that a *first tenant finish* to a commercial *core and shell* building or unfinished space is credited towards meeting the requirements of this Chapter, the *code official* shall not issue a Certificate of Occupancy to the tenant until the requirements of Section **CE302** are met.

## SECTION CE302 - ADDITIONAL ELECTRIC INFRASTRUCTURE

**CE302.1 Additional Electric Infrastructure.**
*Combustion equipment* in *commercial buildings* shall meet the electric infrastructure requirements of Sections CE302.2 or CE302.3.

**Exceptions:**
1. Interior fireplaces that do not serve as a primary source of heating.
2. Exterior fireplaces and fire pits.
3. Additions to buildings that do not provide new space-heating equipment will not be required to provide additional electrical infrastructure to the existing space-heating equipment.

**CE302.2 Commercial Buildings Less than 10,000 sq. ft. and all R-Occupancies.**
*Commercial buildings* that have a gross floor area of less than 10,000 sq. ft., and all R-occupancies of any size, shall comply with Sections CE302.2.1 through CE302.2.5.

**CE302.2.1 Combustion Equipment.**
*Combustion equipment* shall be provided with all of the following:

1. A dedicated, appropriately phased branch circuit sized to accommodate future electric equipment or appliances to serve a comparable capacity to meet the heating load.
2. An electric receptacle or junction box that meets the requirements of Section CE302.2.5, and is connected to the electrical panel through the branch circuit. Each electrical receptacle or junction box shall have reasonable access to the combustion equipment or dedicated physical space for future electric equipment with no obstructions other than the current combustion equipment.
3. Where combustion equipment is used for space or water heating, dedicated space shall be provided for all future electric equipment, including an electric resistance backup coil for ducted systems if applicable.

**Exception:**
Buildings with installed air conditioning systems are not required to provide additional dedicated physical space for an outdoor heat pump.

**CE302.2.2 Electrical Panel Space.**
The electrical panel shall have reserved physical space for a minimum two-pole or three-pole circuit breaker for each branch circuit provided for *future electric equipment* or appliances. The physical space in the electrical panel for each circuit breaker shall be sized with sufficient breaker capacity to meet the electrical demand of the *future electric equipment* or appliance that is sized to serve a comparable capacity to meet the heating load.

**CE302.2.3 Labeling.**
The junction box or receptacle and the dedicated circuit breaker space serving *future electric equipment* or appliances in the electrical panel shall be labeled for their intended use.

**CE302.2.4 Adjacency.**
The electrical receptacle or junction box must be provided within 3 feet of the *combustion equipment* or appliances or within 3 feet of the dedicated physical space for *future electric equipment* or appliances.

**Exception:**
For *combustion equipment* dedicated to space or water heating, the electrical receptacle or junction box shall be located not more than 6 feet from the *combustion equipment* or the dedicated physical space for *future electric equipment*.

**CE302.2.5 Condensate Drain.**
Where *combustion equipment* for space heating and water heating is installed, a location shall be provided for condensate drainage.

**CE302.3 Commercial Buildings 10,000 sq. ft. or Greater.**
All *commercial buildings* that have a gross floor area of 10,000 sq. ft. or greater shall comply with the following requirements.

**Exception:** R-occupancies.

**CE302.3.1 Combustion Equipment or Appliances.**
All combustion equipment shall be provided with the following:

1. A junction box that is located in the same physical space as the combustion equipment and is reasonably accessible, and that is connected to the electrical panel by continuous conduit and/or raceways.
2. Dedicated electrical panel space for an appropriately phased branch circuit sized to accommodate future electric equipment or appliances to serve a comparable capacity to meet the heating load.
3. Where combustion equipment is used for space and water heating, dedicated physical space shall be provided for all future electric equipment.

**CE302.3.2 Electrical Panel Space.**

The electrical panel shall have reserved physical space for a minimum two-pole or three-pole circuit breaker for each branch circuit provided for *future electric equipment* or appliances. The physical space in the electrical panel for each circuit breaker shall be sized with sufficient breaker capacity to meet the electrical demand of the *future electric equipment* or appliance that is sized to serve a comparable capacity to meet the heating load.

**CE302.3.3 Labeling.**
The dedicated circuit breaker space serving *future electric equipment* or appliances in the electrical panel shall be labeled," For future electric equipment".

**CE302.3.4 Physical Space.**
Dedicated physical space shall be provided for additional electric equipment, including but not limited to transformers and cabinets, necessary for electrical service to *future electric equipment* or appliances.

# Chapter 4 Solar Ready

# PART 1 RESIDENTIAL SOLAR READY.

## SECTION RS401 - SCOPE.

**RS401.1 General.**
These provisions shall be applicable for new construction.

## SECTION RS402 - SOLAR READY ZONE.

**RS402.1 General.**
New *residential buildings* with not less than 600 square feet of roof area oriented between 110 degrees and 270 degrees of true north or that is a low-sloped roof, shall comply with Sections **RS402.2** through **RS402.8**.

**Exceptions:**

1. New residential dwelling units with a permanently installed on-site renewable energy system that provides electricity to the dwelling unit's electrical system.
2. A building where all areas of the roof that would otherwise meet the requirements of Section RS402 are in full or partial shade for more than 70 percent of daylight hours annually.

**RS402.2 Construction Document Requirements for Solar-Ready Zone.**
Construction documents shall indicate the *solar-ready zone*.

**RS402.3 Solar-Ready Zone Areas.**
The total *solar-ready zone* area for each dwelling unit shall be not less than 300 square feet exclusive of mandatory access or setback areas as required by the International Fire Code. The *solar-ready zone* shall be composed of areas not less than 5 feet in width and not less than 80 square feet exclusive of access or setback areas as required by the International Fire Code.

**Exception:**
New townhouses three stories or less in height above grade plane and with a total floor area less than or equal to 2,000 square feet of conditioned space per townhouse unit shall have a *solar-ready zone* area of not less than 150 square feet.

**RS402.4 Obstructions.**
*Solar-ready zones* shall be free from obstructions, including but not limited to, vents, chimneys, and roof-mounted equipment.

**RS402.5 Shading.**
The *solar-ready zone* shall be set back from any existing or new permanently affixed object on the building or site that is located south, east, or west of the *solar-ready zone* a distance not less than two times the object's height above the nearest point on the roof surface. Such objects include, but are not limited to, taller portions of the building itself, parapets,

chimneys, antennas, signage, rooftop equipment, trees, and roof plantings either existing at the time of permit application or planned for on the construction documents.

**RS402.6 Roof Load Documentation.**
The structural design loads of roof dead load and roof live load shall be clearly indicated on the construction documents.

**RS402.7 Interconnection Pathway.**
Construction documents shall indicate pathways for routing of conduit and/or raceway from the solar-ready zone to the electrical service panel.

**RS402.8 Electrical Service Reserved Space.**
The main electrical service panel shall have sufficient reserved space to allow the installation of a dual pole circuit breaker for future solar electric installation and shall be labeled "For Future Solar Electric." The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

# PART 2 COMMERCIAL SOLAR READY

## SECTION CS401 - SCOPE

**CS401.1 General.**
These provisions shall be applicable for new construction.

## SECTION CS402 - SOLAR-READY ZONE

**CS402.1 General.**
A solar-ready zone shall be located on the roof of all new commercial buildings and are oriented between 110 and 270 degrees of true north or have low-slope roofs. Solar-ready zones shall comply with Sections CS402.2 through CS402.7.

**Exceptions:**

1. A building with a permanently installed, on-site renewable energy system that meets the following criteria.
   1.1. The system produces the energy output equivalent to covering 40 percent of the net roof area with solar photovoltaic calculated as the horizontally projected gross roof area less the area covered by skylights, occupied roof decks, vegetative roof areas, and mandatory access or set back areas as required by the International Fire Code.
   1.2. The system is located on the roof or overhang of the building or on the roof or overhang of another structure located within 250 feet of the building, on the building premise, on covered parking, or another *approved* location installed with the building project and under the same property ownership.
2. A building with a solar-ready zone that is shaded for more than 70 percent of daylight hours annually.
3. A building where the licensed design professional certifies that the incident solar radiation available to the building is not suitable for a solar-ready zone.
4. A building where the licensed design professional certifies that the solar-ready zone area required by Section CS402.3 cannot be met because of extensive rooftop equipment, skylights, vegetative roof areas, or other obstructions.

**CS402.2 Construction Document Requirements for a Solar-Ready Zone.**
Construction documents shall indicate the solar-ready zone.

**CS402.3 Solar-Ready Zone Area.**
The total solar-ready zone area shall not be less than 40 percent of the roof area calculated as the horizontally projected gross roof area less the area covered by skylights, occupied roof decks, vegetative roof areas, and mandatory access or set back areas as required by the International Fire Code. The solar-ready zone shall be a single area or smaller, separated sub-zone areas. Each sub-zone area shall be not less than 5 feet in width in the narrowest dimension.
This zone shall be located on the roof or overhang of the building or on the roof or overhang of another structure located within 250 feet of the building, on the building premise, on covered parking, or another *approved* location installed with

the building project and under the same property ownership.

**CS402.4 Obstructions.**
Solar-ready zones shall be free from obstructions, including pipes, vents, ducts, HVAC equipment, skylights, and roof-mounted equipment.

**CS402.5 Roof Loads and Documentation.**
A collateral dead load of not less than 5 pounds per square foot shall be included in the gravity and lateral design calculations of the solar-ready zone. The structural design loads for roof dead load and roof live load shall be indicated on the construction documents.

**CS402.6 Interconnection Pathway.**
Construction documents shall indicate pathways for routing of conduit and/or raceway from the solar-ready zone to the electrical service panel.

**CS402.7 Electrical Service Reserved Space.**
The main electrical service panel shall have a minimum bus bar rating of not less than 200 amps. The main electrical service panel shall have a reserved space to allow installation of a dual-pole circuit breaker for future solar electric. These spaces shall be labeled "For Future Solar Electric." The reserved spaces shall be positioned at the end of the panel that is opposite from the panel supply conductor connection.

# PART 3 RESIDENTIAL SOLAR PANEL CAPACITY

## SECTION RS410 – SCOPE

**RS410.1 General.**
These provisions shall be applicable for all new construction.

**RS410.2 Electric Service Reserved Space.**
The main electrical service panel shall have sufficient reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled "For Future Solar Electric." The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

**Exception**:
A dwelling unit that already must comply with the solar-ready provisions in Chapter 4 or that has a permanently installed on-site renewable energy system that provides electricity to the dwelling unit's electrical system.

# PART 4 COMMERCIAL SOLAR PANEL CAPACITY

## SECTION CS410 - SCOPE

**CS410.1 General.**
These provisions shall be applicable for new construction.

**CS410.2 Electric Service Reserved Space.**
The main electrical service panel shall have a minimum bus bar rating of not less than 200 amps. The main electrical service panel shall have sufficient reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled, "For Future Solar Electric." The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

**Exception:**
A building that already must comply with the solar-ready provisions in Chapter 4 or that has a permanently installed on-site renewable energy system that provides electricity to the building's electrical system.

# PART 5 JURISDICTIONAL OPTIONS

**CS403.X Electrical Energy Storage System-Ready Area.**
The floor area of the electrical energy storage system-ready area shall be not less than 2 feet in one dimension and 4 feet in another dimension, and located in accordance with Section 1207 of the International Fire Code. The location and layout diagram of the electrical energy storage system-ready area, including the conduit and/or raceway or plumbing running to the energy storage system-ready area, shall be indicated on the construction documents. The main electrical service panel shall have a reserved space to allow installation of a dual-pole circuit breaker for future electrical energy storage system installation.

**RS403.X / CS403.X Construction Documentation Certificate.**
A permanent certificate, indicating the solar-ready zone and other requirements of Chapter 4 Part 1/Chapter 4 Part 2, shall be posted near the electrical distribution panel, water heater, or other conspicuous location by the builder or registered design professional.

# Chapter 5 Electric Vehicle Ready

## PART 1 RESIDENTIAL ELECTRIC VEHICLE READY

### SECTION RV501 – SCOPE

**RV501.1 General.**
These provisions shall be applicable for all new construction.

### SECTION RV502: ELECTRIC VEHICLE POWER TRANSFER INFRASTRUCTURE

**RV502 Electric Vehicle (EV) Power Transfer Infrastructure.**
New vehicle parking spaces for residential buildings shall be provided in accordance with Sections RV502.1 and RV502.3.

**RV502.1 One- and Two-family Dwellings and Townhouses.**
Each dwelling unit with a dedicated attached or detached garage or other onsite designated parking provided for the dwelling unit shall be provided with one *EV ready space* per dwelling unit.

**RV502.2 EV Ready Spaces.**
Each *EV ready space* shall have a branch circuit that complies with all of the following:

1. Terminate at a receptacle, located within 3 feet of each *EV ready space* it serves. *EV ready* includes two adjacent parking spaces if the receptacle for the electrical facilities of this section is installed adjacent to and between both parking spaces.
   1.1. Have a minimum circuit capacity of 8.3 kVA (40A 208/240V).
   1.2. The electrical panel, electrical distribution equipment directory, and all outlets or enclosures shall be marked "For future electric vehicle supply equipment".

**Exception:**
A receptacle need not be provided if a hard-wired *EVSE* is installed.

**RV502.3 Identification.**
Construction documents shall designate the EV ready spaces and indicate the locations of raceway and/or conduit and the termination points serving them. The circuits or spaces reserved for EV ready spaces shall be clearly identified in the panel or subpanel directory.

## PART 2 COMMERCIAL ELECTRIC VEHICLE READY

### SECTION CV501 – SCOPE

**CV501.1 General.** These provisions shall be applicable for all new construction.

## SECTION CV502 ELECTRIC VEHICLE POWER TRANSFER INFRASTRUCTURE

**CV502 Electric Vehicle (EV) Power Transfer Infrastructure.**
Where new parking is provided for *commercial buildings*, it shall be provided with *electric vehicle* power transfer infrastructure in compliance with Sections CV502.1 through CV502.9.

**CV502.1 Quantity.**
The number of required *EVSE installed spaces, EV ready spaces, EV capable spaces*, and *EV capable light spaces* shall be determined in accordance with this Section and Table CV502.1 based on the total number of provided vehicle parking spaces and shall be rounded up to the nearest whole number. This includes all covered parking under carports or detached garages.

**CV502.1.1 Where more than one parking lot is provided on a building site.**
Where more than one parking lot is provided on a building site, the number of provided vehicle parking spaces required to have *EV* power transfer infrastructure shall be calculated separately for each parking lot.

**CV502.1.1.1 R-2 Occupancies.**
R-2 Occupancies, as defined in Chapter 3 of the *International Building Code*®, shall use the total parking requirement for the entire development to determine the EV power transfer infrastructure requirements using Table CV502.1.

**CV502.1.2 *Commercial buildings that install Direct Current Fast Charging* (DCFC) *Electric Vehicle Supply Equipment* (EVSE).**
For *commercial buildings* that install a *DCFC EVSE*, each *DCFC EVSE* installed shall be permitted to be substituted for other space types as follows:
1. *Commercial buildings* other than R-2 Occupancies shall be permitted to substitute up to 10 spaces when the building provides a minimum of 20 percent as a combination of parking spaces as *EV Capable*, *EV ready*, or *EVSE installed spaces*.
2. R-2 Occupancies shall be permitted to substitute up to 5 spaces when the building provides a minimum of 60 percent of parking spaces as a combination of *EV Capable light, EV Capable, EV ready*, or *EVSE installed spaces*.

**CV502.1.3 *Electric Vehicle Supply Equipment* (EVSE) *installed spaces* that exceed the minimum requirements.**
*EVSE installed spaces* that exceed the minimum requirements of this section are permitted to be used to meet minimum requirements for *EV ready spaces*, *EV capable spaces*, and *EV capable light spaces*.

**CV502.1.4 *Electric Vehicle Supply Equipment* (EVSE) *ready spaces* that exceed the minimum requirements.**
E*V ready spaces* that exceed the minimum requirements of this section are permitted to be used to meet minimum requirements for *EV capable spaces* and *EV capable light spaces*.

**CV502.1.5 *Electric Vehicle Supply Equipment* (EVSE) *capable spaces* that exceed the minimum requirements.**
*EV capable spaces* that exceed the minimum requirements of this section are permitted to be used to meet the minimum requirements for *EV capable light spaces*.

**CV502.1.6 All attached garages**
All attached garages with direct connection to an apartment will be required to have one EV ready space.

### Table CV502.1: EV Power Transfer Infrastructure Requirements

| Building Type/Space Type | EVSE Installed Space | EV Ready Space | EV Capable Space | EV Capable Light Space |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **All commercial buildings with 10 or less parking spaces.** | 1 space | 1 space | 0 | 0 |
| **Commercial buildings, except for R-2 occupancies, with greater than 10 parking spaces.** | 2% of spaces | 8% of spaces | 10% of spaces | 10% of spaces |
| **R-2 occupancies with fewer than 10 parking space** | 0 | 15% of spaces | 10% of spaces | 10% of spaces |
| **R-2 occupancies with greater than 10 parking spaces.** | 5% of spaces | 15% of spaces | 10% of spaces | 30% of spaces |

**CV502.2 EV Capable Light Spaces.**
Each *EV capable light space* shall comply with all of the following:
1. A continuous raceway and/or conduit shall be installed between a suitable electrical panel or other electrical distribution equipment and terminate within 3 feet of the *EV capable light space* and shall be capped. E*V capable light* includes two adjacent parking spaces if the raceway and/or conduit for the electrical facilities terminates adjacent to and between both parking spaces.
2. Installed raceway and/or conduit shall be sized and rated to supply a minimum of 208 volts and a minimum of 40-ampere rated circuits.
3. Dedicated physical space to accommodate all equipment necessary for electrical service to future *EV* supply equipment.
4. The routing of the raceway and/or conduit must be noted on the construction documents and the raceway shall be permanently and visibly marked “EV CAPABLE” at the load center and termination point locations.

**CV502.3 EV Capable Spaces.**
Each *EV capable space* shall comply with all of the following:
1. A continuous raceway and/or conduit shall be installed between a suitable electrical panel or other electrical distribution equipment and terminate within 3 feet of the EV capable space and shall be capped. EV capable includes two adjacent parking spaces if the raceway and/or conduit for the electrical facilities terminates adjacent to and between both parking spaces.
2. Installed raceway and/or conduit shall be sized and rated to supply a minimum of 208 volts and a minimum of 40-ampere rated circuits.
3. The electrical panel or other electrical distribution equipment to which the raceway and/or conduit connects shall have sufficient dedicated space and spare electrical capacity to supply a minimum of 208 volts and a minimum of 40-ampere rated circuits.
4. The termination point of the conduit and/or raceway and the electrical distribution equipment directory shall be marked: “For future electric vehicle supply equipment (EVSE).”
5. Reserved capacity shall be no less than 8.3 kVA (40A 208/240V) for each EV capable space.

**CV502.4 EV Ready Spaces.**
Each *EV ready space* shall have a branch circuit that complies with all of the following:
1. Terminate at a receptacle or junction box located within 3 feet of each EV ready space it serves. EV ready includes two adjacent parking spaces if the receptacle for the electrical facilities of this section is installed adjacent to and between both parking spaces.
2. Have a minimum circuit capacity of 8.3 kVA (40A 208/240V).
3. The electrical panel, electrical distribution equipment directory, and all outlets or enclosures shall be marked “For future electric vehicle supply equipment (EVSE).”

**CV502.5 Electric Vehicle Supply Equipment (EVSE).**
All EVSE shall meet all of the following requirements:
1. The installed EVSE shall meet one of the following requirements:
   1.1. A power capacity of at least 6.2 kVa (or 30A at 208/240V) and has the ability to connect to the internet.
   1.2. An inductive charging system for battery-powered electric vehicles that:
      1.2.1.Is ENERGY STAR certified; and
      1.2.2.Has the ability to connect to the internet.
2. An electric vehicle charging system shall be wall-mounted or pedestal style and may provide multiple cords to connect with electric vehicles.
3. An electric vehicle charging system shall be listed and labeled for EV charging and must comply with the current version of Article 625 of the National Electrical Code.

**CV502.6 EVSE Installed Spaces.**
An installed EVSE with multiple output connections shall be permitted to serve multiple EVSE installed spaces. Each EVSE installed serving either a single EVSE installed space or multiple EVSE installed spaces, shall comply with all of the following:
1. Have a minimum charging rate in accordance with Section CV502.7.
2. Be located within 3 feet of each EVSE installed space it serves.
3. Be installed in accordance with Section CV502.8.
4. Have a minimum circuit capacity of 8.3 kVA (40A 208/240V).
5. Must meet the requirements of Section CV502.5.

**CV502.7 EVSE Minimum Charging Rate.**
Each installed EVSE shall comply with one of the following:
1. Be capable of charging at a minimum rate of 6.2 kVA (or 30A at 208/240V).
2. When serving multiple *EVSE spaces* and controlled by an energy management system providing load management, be capable of simultaneously sharing each EVSE *space* at a minimum charging rate of no less than 3.3 kVA.

**CV502.8 EVSE Installation.**
EVSE shall be installed in accordance with NFPA 70 and shall be listed and labeled in accordance with UL 2202 or UL 2594. When serving an accessible parking space, *EVSE* shall be accessible in accordance with the *International Building Code* Chapter 11.

**CV502.9 Identification.**
Construction documents shall designate all EVSE installed spaces, EV ready spaces, EV capable spaces, and EV capable light spaces and indicate the locations of raceway and/or conduit and termination points serving them. The circuits or spaces reserved for *EVSE installed spaces, EV ready spaces,* and *EV capable spaces* shall be clearly identified in the panel or subpanel directory. The raceway and/or conduit for *EV ready spaces, EV capable spaces* and *EV capable light spaces* shall be clearly identified at both the panel or subpanel and the termination point at the parking space.

## JURISDICTIONAL OPTIONS

**RV / CV Disbursement.**
Required EVSE installed spaces, EV ready spaces, EV capable spaces, and EV capable light spaces shall be dispersed throughout parking areas in R-2 occupancies that contain multiple buildings so that each building has access to roughly the same number of spaces.

**RV / CV Service Fees.**
The property owner is not restricted from collecting a service fee for the use of an EV charger utilized at a required EVSE made available to residents, employees, and visitors to the property.
The property owner may limit the use of EV charging spaces to ensure that it remains available for employees and customers.

Boulder County

# Community Planning & Permitting

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***Building Safety & Inspection Services Team***

**BOULDER COUNTY BOARD OF REVIEW**
**DOCKET BORC-24-0001**
**PUBLIC HEARING**
**Building Code Update & Amendments (2021 I-Codes)**
**January 8th 2025 at 2:00pm**

**Caribou Conference Room & Virtual**
**2nd Floor Courthouse Annex, 2045 13th Street, Boulder, Co 80302**

**Staff:**
Ron Flax, Deputy Director of Community Planning and Permitting / Chief Building Official
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Chad Hagen, Plans Examiner
Kyle McCatty, Wildlife Mitigation Specialist Supervisor

**Overview:**
During the Board of Review hearing on December 19th 2024, the Board discussed a variety of topics and recommended some changes to the proposed Boulder County Building Code Amendments. A full recording of the meeting can be found at: https://bouldercounty.gov/property-and-land/land-use/building/board-of-review/

In response to the discussion at this hearing several edits to the proposed amendments were made by staff as listed below. In addition, there were a few minor editorial adjustments and corrections that were noticed by staff or pointed out in public comments.

**Key edits:**

1) The definition of Crawl Space has been amended to allow for 200 square feet of a crawlspace to have a 6'-8" head height to allow for mechanical and plumbing equipment.

2) Section N1110.2.2 has been amended in accordance with the recommendations of the Board of Review Discussion. Staff has added an alternative pathway for additions greater than 500 square feet but less than 1,000 square feet. These projects may demonstrate compliance by demonstrating a 30% improvement in energy efficiency using a HERS score evaluation prior to starting any work.

3) Table N1106.5: Per the recommendation of the Board of Review this table has been modified to allow the use of backup systems county-wide without penalty. These systems remain limited to equipment that only operate during electric grid outages.

4) Editorial: Staff clarified equations as published by the International Code Council (ICC). References in equations to square feet or square meters have corrected factors to show super script sf2 = sf2 or M2 = M2. References to where a subscript reference was listed as CO2 have been changes to show subscript as CO2. Clarified and coordinated references to mathematical operators in equations. Multiplication is referenced with ×. Editorial Note: The ICC as published is not perfectly consistent with the use of formula notations. Boulder County has kept the text of the proposed amendments in alignment with the nationally published model code as published. While there are some minor inconsistencies, staff does not believe that these variations interfere with the clear understanding or use of the code.

**Other Discussion Items of Note:**
During the Hearing, the Board of Review discussed several topics related to "seasonal cabins" in Boulder County. There were several examples discussed where these existing structures struggle to meet the stringent health and safety requirements of the Building Code. Some board members expressed a desire to explore creating a more flexible code pathway for these buildings. While this falls beyond the scope of the current docket – since this topic has significant long-range planning impacts, staff will be looking for guidance from the BOCC regarding this suggestion.

**Summary:**
Docket BORC-24-0001 contains the staff recommendations for the Boulder County Building Code adoption of the suite of 2021 I-Codes as published by the ICC along with Local Amendments to this code. Documents containing more information about these amendments can be found at the Board of Review website: https://bouldercounty.gov/property-and-land/land-use/building/board-of-review/.

**STAFF RECOMMENDATION:**
Staff recommends that the Board of Review recommend to the Board of County Commissioners approval of Docket BORC-24-0001.