



# 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](http://www.BoulderCounty.gov)

## BOARD OF REVIEW HEARING PACKET

**Thursday, December 19, 2024 at 3:00 P.M.**  
**Caribou Conference Room – 2<sup>nd</sup> Floor Courthouse Annex**  
**2045 13<sup>th</sup> 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-20241219/> for the link.

To join the meeting by phone, dial 720-400-7859 and the conference ID is: 900 711 584#

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

## HEARING PACKET

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Emails from the public, pages 05-28



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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](mailto: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 November 7, 2024, public meeting – Introductory of the proposed building code update and amendments to the 2021 International Code series.
4. **Public Hearing**  
BORC-24-0001: Building Code Update & Amendments  
Review and discuss proposed items to be considered for inclusion into the amendments to the 2021 International Code series.  
Input and feedback from the public will be taken during this hearing and will be limited to 3 minutes per person.  
Upcoming building code update hearings
  - Board of County Commissioners Hearing – January 23, 2025, at 9am hybrid in the BOCC Hearing Room
5. **Other committee items**
6. **Adjournment**



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## **Boulder County Board of Review**

### Minutes

November 7, 2024

3:00 PM

2045 13<sup>th</sup> Street, Boulder, CO 80302

Hybrid Hearing via Microsoft Teams

On November 7<sup>th</sup>, the Boulder County Board of Review met to go over the proposed building code adoption and amendments to the 2021 International Code series.

The meeting convened at 3:01pm and was recorded. This recording is available upon request.

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

Staff Present: Ron Flax (Chief Building Official/CP&P Deputy Director – in-person), Kathy Gissel (Permit & License Operations Manager – virtual), Heather Dodge (Plans Examiner – in person), Erica Rogers (Senior Assistant County Attorney – virtual), Liana Larremore (Assistant County Attorney - virtual), Michelle Huebner (Plans Examiner Supervisor – in person), Chad Hagen (Plans Examiner – in person), Alicia Lombardi (Permit Specialist Supervisor – 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**

All three members of the board were present.

### **3. Introductory Comments by the Secretary of the Board**

Ron Flax, Secretary of the Board, gave an overview of items on the agenda for the meeting and indicated that this meeting is the introductory meeting to the proposed building code update process. Ron provided an email address for anyone to send in questions and comments about the proposed building code updates and also provided the dates and times for all upcoming meetings and hearings in regard to the building code update.

**4. Appointing Board Members**

- a. **Chair:** Joseph Prinster was nominated by Michael Daley, seconded by Stephen Titus, and approved by unanimous vote.
- b. **Vice-Chair:** Michael Daley was nominated by Joseph Prinster, seconded by Stephen Titus, and approved by unanimous vote.

**5. Approval of the Previous Minutes**

Approval of the April 6, 2022, Board of Review Public Hearing minutes – Ignition Resistant Requirements for Construction in Wildfire Zone 2 (the Eastern half of Boulder County)

Motion: Stephen Titus moved to approve the minutes

Second: Michael Daley

Vote: Motion approved by unanimous vote

**6. Updates and approval to ByLaws approved by BOCC on October 29, 2024**

Kathy Gissel went over the updates that were made and approved to the 1998 ByLaws by the BOCC. The ByLaws had to be updated and approved prior to the Board of Review’s review and approval due to the five-member board/four-member quorum requirement since there are currently only three members on the board. The BOR had a couple of clarifying questions regarding the wording on the residency requirement and the board member terms.

Motion: Stephen Titus moved to approve the updated ByLaws

Second: Michael Daley

Vote: Motion approved by unanimous vote

**7. Public Meeting**

BOR-24-0001 – BOULDER COUNTY BUILDING CODE UPDATE & AMENDMENTS TO THE 2021 INTERNATIONAL CODE SERIES

Ron Flax presented the proposed building code update and amendments to the 2021 International Code series that staff has been working on. He indicated that this is the overview meeting and that any questions, comments, and/or concerns be emailed to our building code update email address of [buildingcodeupdate@bouldercounty.gov](mailto:buildingcodeupdate@bouldercounty.gov) so that they can be included in all meeting and hearing packets for the Board of Review and Board of County Commissioners to view. The proposed amendments can be viewed on the Board of Review website at <https://bouldercounty.gov/property-and-land/land-use/building/board-of-review/>.

Ron provided the upcoming code adoption meeting/hearing schedule and is as follows:

- Public Engagement Session – November 19, 2024, at 4:30pm in the BOCC Hearing Room
- Board of Review Meeting/Study Session – December 5, 2024, at 3pm hybrid in the Caribou Room
- Board of Review Hearing – December 19, 2024, at 3pm hybrid in the Caribou Room
- BOCC Code Adoption Hearing – January 16, 2025, at 9am hybrid in the BOCC Hearing Room

**8. Other Business Items**

None.

**9. Adjourned**

The meeting was adjourned at 4:26pm.

**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](#)

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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,



## Luke Griess

VP of Services

Scott Home Services, LLC

*"We Are Team Scott"*

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

[Schedule A Service!](#)



# 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<sup>1</sup> (e.g., single-family homes, duplexes) and Townhomes.<sup>2</sup> These homes may be site-built or modular construction.<sup>3</sup>

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<sup>4</sup>, 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<sup>5</sup>, and meet all applicable codes.<sup>6</sup> 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.<sup>7</sup>
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.<sup>8,9</sup> Rater must review all items in the ZERH Single Family V2 Rater Checklist.<sup>10</sup> 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
<b>1. ZERH V2 National Rater Field Checklist</b>	<input type="checkbox"/> Rater completes the DOE ZERH – Single Family Homes Version 2 National Rater Field Checklist
<b>2. ENERGY STAR Single Family</b>	<input type="checkbox"/> Certified under ENERGY STAR Single Family New Homes Version 3.2 <sup>11</sup>





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New Homes Baseline	
3. Envelope	<input type="checkbox"/> Ceiling, wall, floor, & slab insulation meet or exceed 2021 IECC UA <sup>12,13,14</sup> <input type="checkbox"/> Windows meet high performance requirements based on climate zone <sup>15</sup> <i>Advisory:</i> 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 <sup>16</sup>
4. Duct System	<input type="checkbox"/> All heating and cooling distribution ducts and heating and cooling air-handling equipment are located within the thermal and air barrier boundary <sup>17</sup>
5. Water Heating Efficiency	<input type="checkbox"/> Hot water delivery systems meet efficient design requirements <sup>18</sup> <b>or</b> <input type="checkbox"/> Water heater and fixtures meet efficiency criteria <sup>19</sup>
6. Lighting & Appliances	<input type="checkbox"/> All builder-supplied and -installed refrigerators, dishwashers, clothes washers, and clothes dryers are ENERGY STAR qualified <sup>20, 21</sup> <input type="checkbox"/> 100% of builder-installed lighting fixtures and lamps (bulbs) provided are LEDs <sup>22</sup> . <input type="checkbox"/> All installed bathroom ventilation and ceiling fans are ENERGY STAR qualified <sup>23</sup>
7. Indoor Air Quality	<input type="checkbox"/> Certified under EPA Indoor airPLUS <sup>24</sup> <input type="checkbox"/> Energy efficient balanced ventilation (HRV or ERV) is provided in Climate Zones 6-8 <sup>25</sup>
8. Renewable Ready	<input type="checkbox"/> Provisions of the DOE Zero Energy Ready Home PV-Ready Checklist Version 2 are Completed <sup>26</sup>
9. Electric Vehicle Ready	<input type="checkbox"/> 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." <sup>27</sup>
10. Heat Pump Water Heater Ready	<input type="checkbox"/> 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. <sup>28</sup>
11. Heat Pump Space Heating Ready	<input type="checkbox"/> 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." <sup>29</sup>

## Exhibit 2: DOE Zero Energy Ready Home Target Home <sup>30</sup>

HVAC Equipment <sup>31</sup>			
	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 no heat exchange	2.9 cfm/W no heat exchange	1.2 cfm/W; balanced with heat exchange, 65% ASRE
HVAC Grading			



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<ul style="list-style-type: none"> <li><b>Airflow Deviation:</b> Grade I, -7.5%</li> </ul>		<ul style="list-style-type: none"> <li><b>Watt Draw Efficiency:</b> Grade I, 0.45 cfm/W</li> </ul>		<ul style="list-style-type: none"> <li><b>Refrigerant Grade</b> (as applicable): Grade III</li> </ul>	
<b>Insulation and Infiltration</b>					
<ul style="list-style-type: none"> <li>Insulation levels modeled to 2021 IECC Prescriptive values and achieve Grade 1 installation, per ANSI / RESNET / ICC Standard 301</li> <li>Infiltration – SF Detached Dwelling units<sup>32</sup> (ACH50): CZs 1-2: 2.75   CZ 3,4A, 4B: 2.25   CZs 4C, 5-7: 2.0   CZ 8: 1.5</li> <li>Infiltration – SF Attached Dwelling units (duplexes, townhouses) (ACH50): 3.0 (all Climate Zones)</li> </ul>					
<b>Windows</b>					
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
<b>Doors</b>					
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	
<b>Water Heater</b>					
DHW equipment modeled at the following applicable efficiency levels based on Uniform Energy Factor (UEF):					
<ul style="list-style-type: none"> <li>Electric Systems: UEF = 2.57</li> <li>Gas / Propane Systems: UEF = 0.95</li> </ul>					
<b>Ducts and Thermostat<sup>33</sup></b>					
<ul style="list-style-type: none"> <li>All ducts and air handlers modeled within conditioned space, uninsulated, with no leakage to the outside</li> <li>Programmable thermostat</li> </ul>					
<b>Lighting &amp; Appliances</b>					
<ul style="list-style-type: none"> <li>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.</li> </ul>					

## Endnotes:

<sup>1</sup> 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.

<sup>2</sup> 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.



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<sup>3</sup> 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.

<sup>4</sup> 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.

<sup>5</sup> 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.

<sup>6</sup> 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:

- In cases where the overlapping requirements exceed the DOE ZERH Single Family guidelines, these overlapping requirements shall be met;
- 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.

<sup>7</sup> 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.

<sup>8</sup> 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](mailto: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.

<sup>9</sup> 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.

<sup>10</sup> 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).



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<sup>11</sup> 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.

<sup>12</sup> 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).

<sup>13</sup> 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.

<sup>14</sup> 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/slabeledge](http://www.energystar.gov/slabeledge). 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.

<sup>15</sup> 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] ≤ 0.30 [CZ 4] ≤ 0.30	[CZ 3] ≤ 0.25 [CZ 4] ≤ 0.40	≤ 0.27 = 0.28 = 0.29 = 0.30	Any ≥ 0.32 ≥ 0.37 ≥ 0.42	≤ 0.25	Any

The following exceptions apply:

- An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;
- An area-weighted average of fenestration products ≥ 50% glazed shall be permitted to satisfy the SHGC requirements;
- 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;



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

- 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  $> 20 \text{ btu} / \text{ft}^3 \times \text{F}$  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  $\geq 5,000$  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  $\geq 8,000$  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).

<sup>16</sup> 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](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.

<sup>17</sup> 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  $\leq 3 \text{ CFM}_{25}$  per 100  $\text{ft}^2$  of conditioned floor area, and:
  - o 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
  - o 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.



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

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

<sup>18</sup> 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  $\geq 10$  °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.

<sup>19</sup> Water heaters and fixtures meet the following efficiency criteria:

- a. Gas water heaters, if present, shall have a Uniform Energy Factor  $\geq 0.87$
- b. Electric water heaters, if present, shall have a Uniform Energy Factor  $\geq 2.2$
- 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



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

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.

<sup>20</sup> 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.

<sup>21</sup> 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.

<sup>22</sup> 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).

<sup>23</sup> This provision does not apply to H/ERVs that are used to provide exhaust ventilation for bathrooms.

<sup>24</sup> 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>

<sup>25</sup> 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:  $\geq 65\%$  SRE (@ 32 °F) and  $\geq 1.2$  CFM/Watt.

<sup>26</sup> 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  $\geq 15$  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.

<sup>27</sup> 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.



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

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

<sup>28</sup> 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.

<sup>29</sup> 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.

<sup>30</sup> 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.

<sup>31</sup> 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.

<sup>32</sup> Envelope leakage shall be determined by using Standard ANSI/RESNET/ICC 380-2019.

<sup>33</sup> 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

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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](mailto: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

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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](mailto: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](mailto:rflax@bouldercounty.gov)  
(He/Him/His)

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**From:** Guy Stevenson <[guy@guystevensondesigns.com](mailto:guy@guystevensondesigns.com)>  
**Sent:** Friday, November 8, 2024 12:38 PM  
**To:** Building Code Update <[buildingcodeupdate@bouldercounty.gov](mailto: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

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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  
Direct: 720-564-2643 | Main: 303-441-3930  
[rflax@bouldercounty.gov](mailto:rflax@bouldercounty.gov)  
(He/Him/His)

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**From:** Chris Krauss <[c.krauss@ascentgrp.com](mailto:c.krauss@ascentgrp.com)>  
**Sent:** Thursday, November 14, 2024 11:03 AM  
**To:** Building Code Update <[buildingcodeupdate@bouldercounty.gov](mailto: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 do assist in this process.

Regards,

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



1711 Pearl Street, #300  
303.865.4946 Direct  
303.499.3022 Office  
[www.ascentgrp.com](http://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

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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](mailto:cmdanceellen@gmail.com)>  
Sent: Thursday, November 7, 2024 11:14 AM  
To: Building Code Update <[buildingcodeupdate@bouldercounty.gov](mailto: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

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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](mailto: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

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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](mailto:rflax@bouldercounty.gov)  
(He/Him/His)

-----Original Message-----

From: [gdg@zplane.com](mailto:gdg@zplane.com) <[gdg@zplane.com](mailto:gdg@zplane.com)>  
Sent: Tuesday, December 3, 2024 1:11 PM  
To: Flax, Ron <[rflax@bouldercounty.gov](mailto:rflax@bouldercounty.gov)>  
Cc: Building Code Update <[buildingcodeupdate@bouldercounty.gov](mailto: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. "ft<sup>2</sup>" should be ft<sup>2</sup>.
- f. "m<sup>2</sup>" should be m<sup>2</sup>.
- 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 BTU/(h · ft<sup>2</sup> · °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 (BTU/h)/ft<sup>2</sup>/°F which, when read from left to right, agrees nicely with the common parlance expression for heat transmittance, i.e. heat flow [BTU/h] per unit area [ft<sup>2</sup>] per unit temperature differential [°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 W/m<sup>2</sup>/K is clearer and more intuitively accessible than W/(m<sup>2</sup> · K), even though they are both mathematically correct and equivalent.

I would also suggest using °C rather than 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 K for kelvins; almost all will understand °C.

Note that replacing K with °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 °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 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  $\text{ft}^2$ ,  $\text{m}^2$ , and BTU.
- b. The expression for IP units happens to be mathematically correct here ( $\text{h} \cdot \text{ft}^2 \cdot ^\circ\text{F}/\text{BTU}$ ), but unnecessarily obscure because it syntactically separates the time (h) and energy (BTU) components of the heat flow units (BTU/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.  
 $1/((\text{BTU}/\text{h})/\text{ft}^2/^\circ\text{F})$  [ $1/(\text{W}/\text{m}^2/^\circ\text{C})$ ].

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](mailto: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

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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 stellar. 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 increase 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 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