Montana Department of
LABOR & INDUSTRY

2018 IECC Work Group

Agenda

Thursday 1/9/2020

Introduction:

- Tim Lloyd – Building Codes Bureau Chief
- Eric Copeland – Building Codes Program Manager
- Traci Collett – Building Codes Program Manager
- Introduction of all Attendees

Explanation of Code Adoption Procedures:

- Building Codes Council
- Energy and Telecommunication Committee
- Notice of Proposed Adoption

Discussion and Comments on Proposed Changes:

- Open Discussion

Summary of Comments:

Scheduling Additional Workgroup Meeting: (if needed)

Next Steps in Adoption:

Conclusion:

September 30, 2019

Sent via electronic mail to tlloyd@mt.gov

Tim Lloyd, Bureau Chief
Business Standards Division
Montana Department of Labor and Industry

RE: MONTANA ENERGY CODE UPDATE

Dear Mr. Lloyd:

Please accept these comments submitted on behalf of the Montana Environmental Information Center (MEIC) regarding the Montana Department of Labor and Industry (DLI) update of the Montana Energy Code.

DLI should adopt the Solar Ready Appendix to the 2018 International Energy Conservation Code (IECC) in order to allow local governments, if they choose, to adopt the Solar Ready Appendix.

Rooftop solar installations allow homeowners, businesses, local government entities, and more to save money on their energy bills by generating their own electricity on-site. Solar installations also reduce the need to extract and burn fossil fuels to generate electricity, reducing air and water pollution associated with those activities. Additionally, Montana's rooftop solar installation industry is comprised entirely of locally-based small businesses, meaning the jobs and revenue created by this industry remain right here in Montana.

Montana local governments are interested in increasing the use of clean, renewable energy in their community, with city officials in Missoula,[1] Helena,[2] Bozeman,[3] and Whitefish[4] all officially taking steps toward this goal. Undoubtably, these and other local governments would be interested in adopting solar ready building codes if given the opportunity.

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[1] See City of Missoula resolution adopted on 4/4/19 and https://missoulacurrent.com/outdoors/2019/04/missoula-clean-electricity-2/

[2] See City of Helena Resolution 20375 and http://helenair.com/news/politics/city-county/helena-city-commission-adopts-paris-climate-accord-goals/article_d6e3f1dd-e3b3-5d89-9a8f-137f6ba4650a.html

[3] https://www.bozemandailychronicle.com/news/environment/bozeman-mayor-commits-to-upholding-paris-climate-accord-goals/article_57693ecc-fc0d-56d5-acb6-36a0cb568bbf.html

[4] https://www.ypradio.org/post/city-whitefish-pledges-uphold-paris-climate-agreement#stream/0

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Please adopt the Solar Ready Appendix during the current update of Montana's energy codes in order to unlock the ability for Montana's local governments to choose whether to adopt them for their own communities.

Thank you,

Brian Fadie
Clean Energy Program Director, MEIC
bfadie@meic.org
(406) 443-2520

April 1, 2019

Tim Lloyd, Program Manager
Montana Department of Labor and Industry
P.O. Box 200517
Helena, Montana 59624-1728

Dear Mr. Lloyd:

The energy code plays a critical role in assuring that new residential construction in Montana is safe, durable, and affordable over the life of the building.

Below are recommendations regarding the adoption of the 2018 International Energy Conservation Code (IECC) as well as comments regarding several previously adopted amendments. These suggestions are derived, in part, from what I have learned in conducting over thirty training sessions for code officials, builders, and performance testing technicians since the adoption of the 2012 IECC. My comments have also been influenced by participation in the Montana Energy Code Collaborative. Also included are comments in support of several 2018 IECC provisions that differ from the 2012 IECC and should be adopted without amendment.

Sincerely,

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2018 IECC Provisions – Comments by Dale Horton, NCAT

Topic: Allowable Envelope Air Leakage

2018 IECC Section: R402.4.1.2

Recommendation: Modify the Section as described below.

R402.4.1.2 Testing. Replace the first sentence that reads ~~The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding five air changes per hour in Climate Zones 2 and 2, and three air changes per hour in Climate Zones 3 through 8~~ with the sentence The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding four air changes per hour in Climate Zone 6. Eliminate the Montana amendment that removed the word "third" from the sentence that reads "Where required by the code official, testing shall be conducted by an approved third party." No other changes should be made to this section.

Explanation: The 2012, 2015, and 2018 versions of the IECC call for a maximum leakage rate of 3 ACH50. Montana amended the 2012 IECC to allow 4 ACH50. The tight building envelopes of modern homes require effective mechanical ventilation. As the mechanical ventilation systems become more effective an argument can be made for tighter building envelopes. However there is currently some uncertainty regarding the design of effective mechanical ventilation systems. Moving from 4 ACH50 to 3 ACH50 would require only incremental improvements in construction practices but will likely meet resistance from builders. For example, over the last three years the average City of Missoula house tightness was 2.9 ACH50. While tighter homes should be possible in the future. Current uncertainties regarding mechanical ventilation systems suggests leaving the house tightness requirement at 4 ACH50 for the time being, is a reasonable approach.

The Montana amendment removing the word "third" has been problematic for code officials by limiting their ability to assure accurate test results. The amendment had merit when it was adopted in 2014 because the performance testing industry was immature. Since that time the number of testers has grown significantly and the amendment should be eliminated.

Topic: Duct Testing

2018 IECC Sections: R403.3.3 and R403.3.4

Recommendation: Adopt both sections as written. Eliminate the 11/7/14 amendment (1)(i) that refers to subsection R403.2.2 of the 2012 IECC and allows a duct leakage to the outside test.

R403.3.3 Duct testing (Mandatory) and R403.3.4 (Prescriptive). (Text not shown)

Explanation: The 2012, 2015, and 2018 versions of the IECC do not include a *leakage to the outside test*. The only test allowed in these codes is the *total duct leakage test*. Montana amended the 2012 IECC to allow a leakage to the outside test. The Montana amendment created a loophole for systems that include ducts located outside the thermal envelope. The amendment complicated code compliance by allowing two types of testing. If Montana chooses to allow a leakage to the outside test, which I do not recommend, then the allowable leakage rate should be reduced compared to the allowable leakage rate for the total duct leakage test. For example the 2009 IECC, the last edition to include both types of tests, the leakage to the outside test allowed only 8 cfm/SF compared to 12 cfm/SF for the total duct leakage test. If a leakage to the outside test is allowed the leakage value should be no greater than 2.5 cfm/SF.

Topic: Building Cavities and Return Ducts

2018 IECC Section: R403.3.5

Recommendation: Modify the Section with the addition of an exception as suggested below. Eliminate the 11/7/14 amendment (1)(j) that refers to subsection R403.2.3 of the 2012 IECC regarding using building cavities as return ducts.

R403.3.5 Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums. Exception: Building framing cavities may be used for return ducts if there is no atmospherically vented furnace, boiler, or water heater located in the house outside of a sealed and insulated room that is isolated from inside the thermal envelope and if the duct system has been tested as having a maximum total leakage not greater than 4 cfm/SF. The room walls, floor, and ceilings shall be insulated in accordance with the basement wall requirements of Table R402.1.1.

Explanation: The 2012, 2015, and 2018 versions of the IECC do not allow building cavities to be used as return ducts. The 11/7/14 Montana amendment (1)(j) allows this practice. The most important reason for not using building cavities for returns has to do with health and safety. Building cavities are notoriously difficult to seal. It is well documented that leaky return ducts can contribute to backdrafting of atmospherically vented water heaters, furnaces, and boilers in the combustion appliance zone when there is inadequate combustion air which can occur when an occupant plugs the combustion air inlet. The potentially harmful effect of leaky return ducts can be mitigated if sealed combustion closets or sealed combustion appliances are installed in the dwelling.

Topic: Mechanical ventilation

2018 IECC Section: R403.6

Recommended Amendment: Modify the Section as shown below.

R403.6 Mechanical ventilation (Mandatory). The building shall be provided with ventilation that complies with the requirements of the International Residential Code Section M1505 or International Mechanical Code, as applicable, 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.

Explanation: In the first paragraph referencing the IRC Section M1505 clarifies that this requirement may be met complying with either the IRC Section M1505 or with the IMC. This section was adopted by Montana during the previous code cycle. This recommendation merely extends that decision. It is important to allow compliance with IRC M1505 as an alternative to the MEC because its language is much easier to understand and results in comparable end results.

Topic: Energy Rating Index (ERI)

2018 IECC Section: R406

Recommended Amendments: Adopt Section R406 with the following amendments to provisions R406.3 and R406.5.

R406.3 Energy Rating Index. The Energy Rating Index (ERI) shall be determined in accordance with RESNET/ICC 301 as amended by RESNET/ICC 301-2014 Addendum E-2018 regarding House Size Index Adjustment Factors except for buildings covered by the International Residential Code, the ERI Reference Design Ventilation rate shall be in accordance with Equation 4-1. (The remainder of the section language is not included here and should be adopted without amendment.)

R406.5 Verification by approved agency. Verification of compliance with Section R406 shall be completed by a certified Residential Energy Services Network (RESNET) Home Energy Rater who is also certified by the International Codes Council as a Residential Energy Inspector/Plans Examiner or by an approved third party with comparable certifications.

Explanation: The suggested amendment to provision R406.3 recognizes a recent addendum to RESNET/ICC 301. The amendment, *RESNET/ICC 301-2014 Addendum E-2018 House Size Index Adjustment Factors*, should be adopted along with the basic standard. The addendum addresses how house size is treated by the standard. Under the current standard it is easier for a larger house to comply with the ERI score than a smaller home. The proposed addendum eliminates this problem.

The suggested amendment to provision R406.5 provides assurance that the individual conducting the compliance ERI work is certified as a HERS Rater and as an ICC Residential Energy Inspector/Plans Examiner. If an equivalent certification and rating system program becomes available the local code official may accept that program in lieu of the RESNET program certification.

The ERI was introduced in the 2015 IECC. The ERI compliance option provides design flexibility that can lead to significant cost savings over the prescriptive path, while also allowing home buyers to understand a home's energy efficiency. The voluntary ERI compliance path provides builders the option of complying with the code by meeting a target Energy Rating Index score. The minimum score for Montana according to 2018 IECC was 61. This is a numerical score where 100 equates to the levels prescribed in the 2006 IECC and zero is equivalent to a net-zero-energy home. Currently the only established rating system that meets the intent of the IECC is the Home Energy Rating System developed and administered by the Residential Energy Services Network (RESNET). This system is being used to rate about one-third of all new homes in the country. In addition to meeting the ERI target for a home's climate zone, under the ERI compliance path a builder must also meet the minimum envelope requirements of the 2009 IECC and all of the mandatory code provisions.

The ERI provision was supported by more than 20 of the country's biggest home builders—including Meritage Homes, Pulte Group, and KB Homes—and 90 small builders and other building industry stakeholders. This compliance path allows builders to select the most cost-effective energy efficiency measures to achieve the best performance for each home depending on its climate zone, rather than installing a series of prescriptive measures. The ERI compliance option may allow builders to keep construction costs lower because of the added flexibility in how compliance is achieved. Builders can consider equipment as well as the building envelope in calculating their ERI score. There is also an added benefit for builders that are already building to Energy Star or using HERS. The ERI option now gives those builders a way to more easily demonstrate compliance to the local building official.

A change in the 2018 IECC allows on-site power generation to effect the ERI. The use of on-site power generation determines the prescriptive envelope backstop (minimum allowed characteristics regardless of the ERI score). If renewables are used, the 2015 IECC prescriptive requirements must be met. If renewables are not used, then the 2009 IECC requirements remain the backstop.

Topic: Solar-Ready Appendix

2018 IECC Section: Appendix RA Solar-Ready Provisions – Detached One- and Two-family Dwellings and Townhouses

Recommended Action: Adopt Appendix RA of the 2018 IECC which will allow local jurisdictions to adopt the appendix if they so choose.

Explanation: This appendix was added to the 2015 IECC and is included in the 2018 IECC. This appendix provides for the future installation of solar electric or solar thermal energy systems. By adopting the appendix the state allows the local jurisdiction to adopt the appendix if they choose.

2018 IECC Provisions – Adopt Without Amendment

The following provisions of the 2018 IECC should be adopted without amendment. These provisions represent important improvements over the current state energy code. I mention these provisions since they could generate comment from industry stakeholders.

Topic: Log Home Envelope Compliance Option

2018 IECC Section: R402.1 Exception 2; Log Homes Designed to ICC 400

Explanation: ICC 400 has been available for adoption for many years. The 2018 IECC incorporates the standard as complying with the envelope requirements. Other code requirements still apply. Some log home manufacturers have taken exception to the energy code in the past. The ICC 400 standard was developed to deal with the unique features of log homes and is based on work done by the Log Homes Council Construction Codes & Standards Committee, Building Systems Council, and the National Association of Home Builders. *This provision should be adopted as written in 2018 IECC without amendment.*

Topic: Improved Window U-Factor

2018 IECC Section: R402.3 and Table R402.1.2; Window U-factor

Explanation: This change decreases the maximum allowable U-factor from 0.32 to 0.30 in the Montana climate zone. This provision should be adopted as written in 2018 IECC without amendment. A 2018 Energy Code Field Study found that 0.29 is the average window U-factor. Window heat loss remains a significant area of potential improvement in the building envelope. This is a modest improvement in the energy envelope requirements. *This provision should be adopted as written in 2018 IECC without amendment.*

Topic: Building Envelope Tightness Testing Standard

2018 IECC Section: R402.4.1.2 Testing

Explanation: Under the 2015 IECC, building envelope air leakage testing must be done in accordance with either ASTM E 779 or ASTM E 1827. The 2018 IECC adds the RESNET/ICC Standard 380-2016 to the acceptable standards. Referencing these standards clarifies requirements. While the test procedures are essentially unchanged there are more detailed reporting requirements. *This provision should be adopted as written in 2018 IECC without amendment.*

Topic: Ductwork Insulation

2018 IECC Section: 403.3.6.1

Explanation: Language in the 2015 and 2018 IECC made duct insulation requirements dependent on location and the diameter of the duct. The 2012 IECC requires supply ducts in the attic to be R-8 and all other ducts R-6. The 2015 and 2018 IECC revises the requirements so that supply and return ducts in the attic must be a minimum of R-8 (where ≥ 3-inch diameter) and R-6 (where <3-inch diameter). Also, supply and return ducts everywhere else outside the thermal envelop must be a minimum of R-6 (where ≥ 3-inch diameter) and R-4.2 (where < 3-inch diameter). There is an exception which allows for ducts (or portions of ducts) located completely inside conditioned space to not be insulated. This provision

clarifies how ducts buried in attic insulation should be insulated. *This provision should be adopted as written in 2018 IECC without amendment.*

Topic: Ducts Located in Conditioned Space

2018 IECC Section: R403.3.7

Explanation: Buried ducts can be considered in conditioned space, for purposes of the ERI, if the maximum duct leakage rate is less than or equal to 1.5 cfm/100 ft^2 and if the total ceiling insulation against and above the duct is equal to the prescriptive value for the attic plus the required duct insulation. This provision is directly related to the ERI compliance path and as such should not prove problematic for the industry. *This provision should be adopted as written in 2018 IECC without amendment.*

Topic: Mechanical Ventilation Fan Efficiency

2018 IECC Section: R403.6.1

Explanation: Values in the fan efficiency table, Table R403.6.1, are added for HRVs and ERVs.

This is a simple clarification and should not be an issue for the industry. *This provision should be adopted as written in 2018 IECC without amendment.*

Topic: Lighting Equipment

2018 IECC Section: R404.1

Explanation: The minimum high-efficacy lamps was increased from 75% in the 2012 IECC to 90% in the 2018 IECC. The rapid commercialization of CFL and LED lamps makes complying with this provision relatively easy and inexpensive. *This provision should be adopted as written in 2018 IECC without amendment.*

Topic: Existing Buildings Chapter

2018 IECC Section: Chapter R5

Explanation: This chapter was added to the 2015 IECC to clarify how the energy code addresses existing buildings. This chapter should be adopted. There have been many questions about how to apply the energy code to existing buildings. The intent of this new chapter is to provide clarity. *This chapter should be adopted as written in 2018 IECC without amendment.*

RECA
Responsible Energy Codes Alliance

VIA ELECTRONIC MAIL

August 27, 2019

Tim Lloyd
Montana Department of Labor and Industry
Building Codes Program
PO Box 200517
Helena, Montana 59624-1728

Re: RECA Comments Supporting Adoption of the 2018 *International Energy Conservation Code* for Residential and Commercial Construction in Montana

Dear Mr. Lloyd:

The Responsible Energy Codes Alliance (RECA)[1] submits the following comments in response to the Department of Labor and Industry's (Department) request for input on the proposed adoption of the 2018 International Codes. Specifically, we urge the Department to adopt the 2018 *International Energy Conservation Code* (*IECC*) for residential and commercial buildings with no weakening amendments.

A full adoption of the 2018 *IECC*—including provisions that were left out of the 2012 Montana code update—would bring long-lasting, cost-effective, energy efficiency improvements to Montana's residential and commercial buildings. Our comments below provide more information about the improvements contained in the 2018 *IECC*, as well as specific comments on weakening amendments that have been proposed in another letter already submitted by another stakeholder.

1. **The Department should adopt the 2018 *IECC* residential energy conservation provisions with no weakening amendments.**

The adoption of the 2018 *IECC* residential provisions would not only save energy and money for homeowners but would also advance the Legislature's Statement Of Policy On

[1] RECA is a broad coalition of product and equipment manufacturers, trade associations, building science experts, and energy efficiency advocates. A list of RECA members who support these comments can be found at the end of this letter. RECA's mission is to promote the adoption of the latest model energy codes without substantive weakening amendments and to help states and cities achieve the benefits their citizens have come to expect from modern building energy codes.

Residential Energy Efficiency.[2] Specifically, the Legislature found that "the people of Montana have an interest in energy efficiency in certain residential buildings for the purpose of protecting and improving their economic and environmental well-being and energy security, while recognizing the basic need for safe and affordable shelter."[3] A full adoption of the 2018 *IECC* for residential construction would improve occupant health, comfort, safety and welfare, provide the biggest boost of cost-effective energy and cost savings for Montana's homeowners, and would provide additional flexibility to meet the code's requirements:

- **Cost-effective investments in energy efficiency measures.** Montana's current residential energy code already leaves energy and cost savings on the table as compared to previous versions of the model code. For example, **according to the U.S. DOE, just adopting the 2015 *IECC* in Montana (and removing the current weakening amendments) would reduce energy costs by 8.5% (on average), saving homeowners $947.76 over the first 30 years of the useful life of the home.**[4] These improvements are well within the range of cost-effectiveness using the criteria outlined in M.C.A. § 50-60-801.[5] By incorporating the additional moderate improvements included in the 2018 *IECC* Montana homeowners will save an additional 2% in energy costs over the 2015 edition.[6]
- **Safe, reliable, and readily available energy efficiency measures.** The latest *IECC* includes moderate improvements in thermal envelope efficiency that have broad industry support, as well as improved fenestration and lighting standards and other energy-saving features that are already widely available statewide. These improvements not only save energy and cost, but also make residential homes more comfortable and sustainable in all seasons. Adopting the full 2018 *IECC* would also help simplify compliance and enforcement. The most recent version of U.S. Department Of Energy's (DOE) free REScheck compliance software is now available, and it is based on the 2018 *IECC*. The 2018 *IECC* also includes new compliance options that will allow builders to make good economic decisions, such as a new alternative

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[2] *See* M.C.A. § 50-60-801 (2017).

[3] *Id.*

[4] *See* U.S. Dep't of Energy, *Cost-Effectiveness Analysis of the Residential Provisions of the 2015 IECC for Montana*, at 2 (Feb. 2016).

[5] *See* M.C.A. § 50-60-801 ("It is the policy of the state of Montana to encourage energy efficiency in residential buildings through strategies that ensure that: ... (4) the cost of energy efficiency measures on the combination of down payments, monthly mortgage payments, and monthly utility bills does not adversely affect the affordability of housing to prospective home buyers and renters ...").

[6] *See* U.S. Dep't of Energy, *Preliminary Energy Savings Analysis: 2018 IECC Residential Requirements*, at viii (May 2019).

for burying ducts in attic insulation, potentially saving builders and homeowners energy and construction costs. And the 2018 *IECC* includes an updated version of the Energy Rating Index (ERI), which provides unprecedented flexibility for builders and key protections for homeowners.

These are only a few of the specific benefits of adopting the latest model energy code. We believe the benefits of the 2018 *IECC* extend not only to homeowners who live in these homes today, but also to future homeowners who will ultimately pay utility bills over the 70 to 100 year expected useful life of new homes.

2. The Department should adopt the 2018 *IECC* commercial energy conservation provisions with no weakening amendments.

We also strongly recommend the adoption of the 2018 *IECC* commercial provisions with no substantive weakening amendments. The owners, renters, and occupants of Montana's commercial buildings stand to benefit from the adoption of the 2018 *IECC* in many ways:

- **Better commercial buildings**. The 2018 *IECC* incorporates improvements to the building thermal envelope, including improvements in insulation and fenestration, that will be more sustainable and keep occupants more comfortable in both heating and cooling seasons. Higher standards for mechanical equipment and lighting will likewise result in better buildings. And the 2018 *IECC* contains the most up-to-date references, definitions, and streamlined language, providing a solid platform for effective code compliance and enforcement. Constructing commercial buildings to the most recent national model energy codes is a solid investment in Montana's energy future.
- **Energy and cost savings for building owners**. The 2018 *IECC* incorporates by reference the 2016 version of ASHRAE Standard 90.1, which was extensively reviewed and analyzed by the U.S. DOE and which was determined to improve source energy savings by 7.9% over ASHRAE Standard 90.1-2013.[7] These savings build upon the 8.5% source energy savings achieved in the 2013 edition.[8] And although the U.S. DOE has not yet analyzed the full savings impact of the 2018 *IECC* commercial chapters (which incorporate ASHRAE Standard 90.1-2016), we expect the result to be

[7] *See* U.S. Dep't of Energy, *Final Determination Regarding Energy Efficiency Improvements in ANSI/ASHRAE/IES Standard 90.1-2016: Energy Standard for Buildings, Except Low-Rise Residential Buildings*, 83 Fed. Reg. 8463, 8464 (Feb. 27, 2018).

[8] *See* U.S. Dep't of Energy, *Determination Regarding Energy Efficiency Improvements in ANSI/ASHRAE/IES Standard 90.1-2013: Energy Standard for Buildings, Except Low-Rise Residential Buildings*, 79 Fed. Reg. 57900, 57900 (Sept. 26, 2014).

of similar magnitude to the ASHRAE Standard 90.1-2016 update.[9] The energy savings resulting from improved energy codes will save owners and renters money—money that can be reinvested in Montana's economy.

3. **The Department should take this opportunity to eliminate previous state-specific amendments to the residential energy code that fall far short of *IECC* requirements.**

The current code update process is a good opportunity for Montana to capture some of the energy savings left on the table in the 2012 update. In each of these cases, the original requirement in the 2012 *IECC* was either maintained or improved upon in the 2015 or 2018 *IECC*, and we do not see any reason why Montana should continue to apply a weaker requirement.

- **Wall insulation** – Montana's current revisions to the 2012 *IECC*, contained in A.R.M. § 24.301.161(1), include an alternative for wall insulation in climate zone 6, permitting R-21 or 13+10, whereas the *IECC* would require R-20+5 or 13+10. (Subsection (1)(e) bases the U-factor equivalent on the weaker insulation value as well.) R-21 is clearly less efficient and not equivalent to the *IECC* values. Today's homes are being constructed to last 100 years or more, and some components (such as wall insulation) are likely to remain unchanged over the full lifetime of the building. As such, the efficiency requirements for these components should be carefully reviewed and optimized for long-term homeowner value. The wall insulation requirements in the 2018 *IECC* are cost-effective and will lead to more comfortable, more livable homes. *We recommend that Montana adopt the full wall insulation requirement of the 2018 IECC, which is R-20+5 or 13+10 (U-factor 0.048).*

- **Envelope air leakage** – Montana's current residential energy code requires new homes to demonstrate air leakage not exceeding 4 air changes per hour (ACH), whereas the *IECC* sets the limit at 3 ACH. The benefits of a tighter home, particularly in a cold climate, are very significant, including increased energy and cost savings, by keeping the conditioned air inside the thermal envelope; improved comfort through reduced drafts; and improved air quality, by helping to keep dust, car exhaust, insects, and other pollutants out of the home. *We recommend that Montana further improve the air leakage requirement to match the IECC's maximum of 3 ACH.*

[9] The *IECC* commercial provisions and ASHRAE Standard 90.1 have historically been very close in terms of energy conservation. Although the U.S. DOE has produced more analyses based on ASHRAE Standard 90.1 than the *IECC*, these analyses are commonly used as proxies for corresponding editions of the *IECC*.

- **Duct leakage to outdoors** – A.R.M. § 24.301.161(1)(i) and (l) currently allow ducts to be tested for leakage to the outdoors, as an alternative to the *IECC* requirement to test ducts for total system leakage. A test for leakage to outdoors only determines if air is being leaked outside the home and unlike total duct leakage does not reflect whether conditioned air is actually being delivered to the intended spaces of the home. By definition, total duct leakage may equal leakage to the outdoors in some circumstances, but in many cases it can far exceed leakage to the outdoors. As a result, testing for leakage to the outdoors is a far weaker standard and should not be allowed as an option. When a substantial amount of conditioned air spills out into the furnace room or otherwise does not reach intended locations in the home, the home's occupants will be uncomfortable and will respond by tweaking the thermostat to offset the failure to deliver this conditioned air to the desired locations in the home. In addition to the negative direct impacts on occupants from discomfort, the negative energy use/cost impact of uncomfortable occupants can also be significant. Changing the thermostat setting by just one degree can increase total energy use of the home from 4.5% for heating and 1.4% for cooling in Montana's climate zone. *Thus, we recommend that Montana eliminate the option to test duct leakage to the outdoors, consistent with the 2018 IECC.*

- **Building cavities as ducts** – Subsection (j) appears to allow building cavities to be used as return ducts. This is poor building practice for several reasons. Building cavities used as return air plenums are notoriously difficult to seal. Because cavity spaces are leaky, building pressure imbalances across the building envelope could increase, driving greater building infiltration. A cavity space used as a return air pathway may also pull pollutants into the building from unknown sources. And finally, the use of building cavities (which do not meet the same flame and smoke spread criteria of duct materials) could create fire spread issues in the event of a fire. *We recommend that Montana eliminate the use of building cavities as ducts, consistent with the IECC.*

4. The Department should reject any proposed amendments in this code review cycle that would further weaken the energy efficiency of Montana's buildings.

In a letter dated July 26, 2019, the Montana Building Industry Association (MBIA) suggested several amendments to Montana's energy code that would substantially roll back the efficiency of the current code. We urge the Department to reject all of these amendments, and any other similar amendments that would move Montana in the direction of less efficiency. We note that many of these proposals have been submitted multiple times at the national and state levels and have been rejected. We provide a few brief points on each

proposal below, but we are willing to provide additional information as the process moves forward. (We note that MBIA submitted duplicates of 5 of the 6 proposals. For convenience, we have included both numbers below.)

- **MBIA Proposal 3** – This proposal reduces current efficiency by raising the envelope air leakage limit from 4ACH50 to 5 ACH50 (instead of lowering it to 3ACH50 consistent with the 2012, 2015 and 2018 versions of the *IECC*) in the prescriptive and performance paths. As we indicated above, a tight thermal envelope is critical in Montana's climate, and this proposal would move the code in the wrong direction.

- **MBIA Proposal 4 (E1)** – This proposal is in conflict with Proposal 3, in that it sets the baseline requirement for air leakage at 3 ACH50 (which we agree with), but then creates a trade-off for air leakage up to 5 ACH50. While this option may worthy of some consideration, we think that following the current model code and simply adopting the 2018 *IECC* requirement of 3 ACH50 (or better) for all new homes would be preferable at this time.

- **MBIA Proposal 5 (E2)** – This proposal would be a major code rollback -- significantly rolling back the efficiency of Montana's current energy code by adopting the weaker envelope R-values and U-factors of the 2009 *IECC*. This would increase homeowner costs substantially and would lead to less comfortable homes. These rollbacks are unnecessary, since Montana has been enforcing more stringent envelope requirements for several years now.

- **MBIA Proposal 6 (E3)**– This proposal rolls back wall insulation R-values to 2009 *IECC* levels of efficiency. As we indicated above, Montana's homes should be built with the optimal level of insulation from the start, since walls are unlikely to be improved over the building's useful lifetime. The insulation requirements in the 2018 *IECC* (R-20+5 or 13+10) have been in the *IECC* since the 2012 edition, and they are feasible and cost-effective.

- **MBIA Proposal 7 (E4)** – This proposal is another major rollback – perhaps the worst – it would substantially roll back efficiency of the entire home to levels well below the current Montana energy code by adding efficiency trade-offs for heating, cooling, and water heating equipment into the performance path. Proposals similar to this were rejected in the past four code cycles for the 2009 – 2018 *IECC* editions, and the vast majority of states do not allow such trade-offs (including Montana). These trade-offs are not "energy neutral" as claimed in the reason statement, but instead would result in less efficient buildings over the long-term that cost consumers more, use more energy, and provide less comfort and sustainability. They would promote replacing long-lasting building efficiency measures, such as adequate insulation, efficient

fenestration and reduced air and duct leakage, with measures that have much shorter useful lives.

States are preempted by federal law from setting reasonable efficiency requirements for certain products, including heating, cooling and water heating equipment. As a result, if a state includes the efficiencies for these products in a performance-based building energy code, the state is obligated to use the federal minimums as the baseline. Because federal minimum efficiencies of these products typically lag well behind the products that are commonly installed in residential buildings, this creates an unnecessary and unwarranted trade-off "credit" in the simulated performance compliance path that could be used to trade away the overall efficiency of the building. The effect of this free-ridership is substantial: **An analysis of this issue has shown that these trade-offs could reduce the efficiency of homes by between 11-22%.**[10] *We strongly recommend that Montana reject this proposal, to avoid rolling back the current Montana energy code and to remain consistent with the 2018 IECC.*

- **MBIA Proposal 8 (E5)** – This proposal reduces efficiency by removing requirements for sealing and insulating rooms containing open-combustion heating and water heating equipment. These rooms typically have open vents for the purpose of combustion safety yet might only be separated from conditioned space (if at all) by an interior door. These requirements were added in the 2015 *IECC* with broad support from building code officials, and they remain intact in the 2018 *IECC* as well. This section of the *IECC* provides critical instructions for building code officials that will ultimately save energy; moreover, these requirements will help ensure healthy indoor air quality. *This proposal should be disapproved in order to maintain this clear set of requirements in the IECC and ensure that the efficiency and safety of these rooms is maintained.*

Conclusion

In sum, we believe the 2018 *IECC* will be a valuable update for the state's commercial and residential buildings, and we urge the Department to adopt both codes. Any proposed weakening amendments, such as those enumerated in these comments, should be rejected. We offer our assistance and experience in energy code adoption and implementation as you work to maximize building energy efficiency. We hope that you will not hesitate to draw on

[10] *See* ICF International, *Review and Analysis of Equipment Trade-offs in Residential Energy Codes* (Sep. 2013), *available at* https://energyefficientcodes.org/wp-content/uploads/2013-9-23-FIN-Review-Analysis-of-Equipment-Trade-offs-in-Residential-IECC.FIN_-1.pdf.

RECA
Responsible Energy Codes Alliance

RECA's support and willingness to help. Please contact me at (202) 339-6366 if you have any questions or would like to discuss how RECA can be of assistance.

Sincerely,

Eric Lacey
RECA Chairman

RECA is a broad coalition of energy efficiency professionals, regional organizations, product and equipment manufacturers, trade associations, and environmental organizations with expertise in the adoption, implementation and enforcement of building energy codes nationwide. RECA is dedicated to improving the energy efficiency of homes throughout the U.S. through greater use of energy efficient practices and building products. It is administered by the Alliance to Save Energy, a non-profit coalition of business, government, environmental and consumer leaders that supports energy efficiency as a cost-effective energy resource under existing market conditions and advocates energy-efficiency policies that minimize costs to society and individual consumers. Below is a list of RECA Members that endorse these comments.

Air Barrier Association of America

Alliance to Save Energy

American Chemistry Council

American Council for an Energy-Efficient Economy

EPS Industry Alliance

Extruded Polystyrene Foam Association

Institute for Market Transformation

Johns Manville Corporation

Knauf Insulation

National Fenestration Rating Council

Natural Resources Defense Council

North American Insulation Manufacturers Association

Owens Corning

Polyisocyanurate Insulation Manufacturers Association

Copeland, Eric

From: Lloyd, Timothy
Sent: Friday, September 6, 2019 8:08 AM
To: Copeland, Eric
Subject: FW: Air Tightness Requirement for Energy Code Adoption

FYI

From: Lloyd, Timothy
Sent: Friday, September 6, 2019 8:08 AM
To: Collett, Traci <TCollett@mt.gov>
Subject: FW: Air Tightness Requirement for Energy Code Adoption

Traci,

Comment from the listening session.

Tim

From: Andrea Michael <amichael@loveschack.com>
Sent: Thursday, September 5, 2019 3:05 PM
To: Lloyd, Timothy <tlloyd@mt.gov>
Subject: Air Tightness Requirement for Energy Code Adoption

Hello,
I spoke a the listening session last week in Helena about the air tightness requirement in the 2018 energy code and I am writing to follow up on my comments. These comments are in support of adoption the 2018 energy code with no amendment for air tightness (as is being requested by MBIA). As I stated at the session, if 3 ACH is deemed unachievable then I ask the amendment be made to no higher than 3.5 ACH. The reasons for this request are as follows:

1. Going to 5 ACH would revert the requirement to a 2009 level and be taking a step backwards from how people are already building.

a. The MT Residential Energy Code Field Study performed by Pacific Northwest Laboratory for the US DOE in Feb 2019 shows that builders are already achieving an average tightness of 3.5 (ranging from 1.4 to 4.6)

b. The supplemental results study from the Center for Appropriate Technology suggests that the average number would be even lower if the results had been stratified by city and county.

2. Air tightness, specifically 3 ACH with a standard exhaust system, is the most cost effective approach to energy savings
a. From The Economics of Zero Energy Homes by the Rocky Mountain Institute which features climate zones 6 and 7.

3. Air tightness is more important for thermal comfort and energy efficiency than additional insulation.

4. 3 ACH does not require additional ventilation to maintain healthy indoor air quality.

5. Northwestern Energy is going to be facing a supply shortage in the near future (anticipated in their upcoming report) and reducing energy consumption is simpler/ less expensive than adding new supply.

6. The most important purpose of the building code is to protect the health, safety and welfare of the public and this issue is directly related to that purpose.

Thank you for your attention on this matter. All the best,

Andrea Michael
AIA, NCARB
love | schack
architecture
an active design collaborative
www.loveschackarchitecture.com
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amichael@loveschack.com

BCxA™ Building Commissioning Association
NORTHWEST CHAPTER

September 9, 2019

Tim Lloyd
Montana Department of Labor and Industry
Building Codes Bureau
PO Box 200517
Helena, MT 59624-1728

Subject: 2018 IECC Adoption

Dear Mr. Lloyd,

We support the recent code change proposal submitted by Elkhorn Commissioning Group with respect to updating the 2018 International Energy Conservation Code (IECC) to reflect actual industry practice and processes. The letter submitted by Elkhorn dated August 14th, 2019 outlines enhancements to the 2018 energy code that were developed by air barrier testing experts and commissioning professionals in Washington state.

The changes proposed by Elkhorn were approved in Washington State by the Code Council on July 26th, 2019. Prior to approval, the proposed language went through public submission, technical advisory group review / approval, and public review / comment. The full the Energy Code rulemaking process is illustrated at the Energy Technical Advisory Group website: https://apps.des.wa.gov/sbcc/Page.aspx?nid=116

We urge Montana to update the 2018 IECC for commissioning to prevent confusion among building owners, to promote standard practice within Montana's construction industry, and to align with federal and national guidelines regarding building commissioning. Please refer to the Elkhorn proposal for more details. Further, we propose the following definition be added to Chapter 2 to clarify *Certified Commissioning Professional* – a term used throughout Elkhorn's proposal.

> **CERTIFIED COMMISSIONING PROFESSIONAL.** An individual who is certified by an ANSI/ISO/IEC 17024:2012 accredited organization to lead, plan, coordinate, and manage the commissioning team and implement the commissioning process.

Sincerely,

Building Commissioning Association, Northwest Chapter Board: https://www.bcxa.org/northwest/board/

Angela Templin: atemplin@glumac.com
Treasa Sweek: treasa@sweekengineers.com
Caleb Aring: caleb@elevatebcx.com
Scott Usselman: Scott.Usselman@eeiengineers.com
Scott Henderson: scotthe@mckinstry.com
Myra Ferriols: myra@keithlybarber.com
Janelle Kolisch: janelle.kolisch@cbre.com

Montana Department of
LABOR & INDUSTRY

Date: September 16, 2019

To: Interested Parties of the State of Montana

From: Tim Lloyd, Bureau Chief
Building Codes Program
Department of Labor and Industry

Re: Summary of the 2019 Code Adoption "Listening Sessions"

Introduction:

Since 2010, the Department of Labor and Industry has re-dedicated itself to the process of inviting and including stakeholders and other interested parties to participate in the department's processes of crafting policy and procedures on a wide variety of issues, code development, and adoption practices. This emphasis in transparency and citizen engagement began back with the 2009 code cycle when the department launched a series of stakeholder meetings to evaluate and seek input on the 2009 International Residential Code.

In 2018 the department continued the process by holding additional "Listening Sessions" on topics vital to both industry stakeholders and the department. In February and Mach of 2018, the department held six introductory listening sessions on the topic of the adoption of the 2018 versions of the I-Codes, and potentially the adoption of the International Plumbing Code (IPC).

The department's responsibilities with regard to this process is to balance the regulations found in the state building code and rules with the needs of the construction industry and the public interest in efficiency, cost-effectiveness, and safety in order to arrive at a level of regulation for building codes that meets this balance. The department is ultimately attempting to determine if additional code adoption or administrative rule amendments is necessary to protect public safety and welfare. The adoption process has a variety of steps and many opportunities for the public and stakeholders to weigh in with both written submittals and in-person testimony at one or all of the numerous public hearing opportunities. See Appendix "A" for a graphic representation of the code adoption process the department follows.

This document is primarily a summary of the completed "Listening Session" meetings to date. It contains the public comments received by the department during and following the "Listening Session" meetings. The summary should assist the department and the public in understanding the dynamic perspectives functioning in, and around, the built environment on this topic.

Purpose:

The purpose of the "Listening Session" meetings is to cultivate input from as many stakeholders as possible using a geographical cross-section of the State of Montana. The department wants to provide as much opportunity for stakeholders to attend a meeting and express their opinions regarding the topic and to promote a free exchange of ideas and concerns. Transparency was a key element of this process and the department continues to seek methods and opportunities to be inclusive and open with this engagement process.

It is important to provide a local, familiar environment for stakeholders to meet and discuss their concerns with the State of Montana, Department of Labor and Industry, Building Codes Program, so a regional format was decided on. Obviously, it is not possible or practical to hold meetings in every city, county, or town so the department reviewed those areas with generally the most building activity and chose locations close to those centers of building activity.

Scope:

The "Listening Session" meetings were held in the following locations on the dates listed:

- **Helena – Monday, August 26, 2019 – MACO Building – 2715 Skyway, Helena – 1:00 – 2:30 pm**
- **Billings – Wednesday, August 28, 2019 – Billings Library – 510 N 28th St, Billings 10:00 – 11:30 am**
- **Missoula – Thursday, August 29, 2019 – Holiday Inn Missoula, Downtown - 200 S. Pattee St, Missoula – 10:00 am – 12:00 pm**

All sessions were moderated by Tim Lloyd, Building Codes Program Bureau Chief and Eric Copeland, Program Manager. Each location was provided the same information regarding the topics to be discussed.

Each meeting location had a variety of handout information, sign in sheets, agendas, and contact information for submitting written information to the department.
See Appendix "B" for this information.

Notes were taken at each location to document all public comments received. Notes are not direct quotes of what the commenter stated but a summary of point(s) being made by the commenter. Some participants delivered written comments to the moderator. See Appendix "C" for written correspondence.

Summary (Location by Location)

Helena – 08/26/2019 – MACO Building – Start time 1:00 pm
Number of Counted Participants: 25
Number of Public Comments Received: 14

Energy Code Comments:

1. I would like to speak on the proposal from MBIA asking to go back to the 2016 code on energy tightness, feel this would be a step back; avg rating is 3.1. Airtightness has an impact on comfort greater than insulation. It does not require venting to ensure air quality, it is less expensive to lower consumption rather than add energy sources. This also affects safety, welfare. If request not taken feel 3.5 is adequate.
2. Generally, work with builders in several western states and agree that this is most cost effective; 3 ACH is adequate. We are meeting .6 in MT, ID, & WY which is a cost premium. .6 not necessary. This can be achieved without making massive changes. (will send email)
3. Not clear who will do commissioning, which systems are approved. (has already sent a letter). Commercial portion of energy code causes confusion as to how to meet code; some states require separate page showing energy portion; doing this would help. Submitting with plans, architects design, etc. along with energy portion.
4. 4 ACH vs 3 ACH; stay with 4 or you start to have problems with exhaust and ventilation.
5. If there is a new implementation of testing and requirements I'd like to know and have a list; to know how long, we'll have to implement those. Will that be available before implemented?
6. 2018 EIC has no new testing requirements.

Billings – 08/28/2019 – Billings Library – Start time 10:00 am
Number of Counted Participants: 13
Number of Public Comments Received: 26

Energy Code Comments:

1. Staying at 4 ACH instead of 3 required by code. I have seen 2.99 and contractors are even getting to 2. Contractors will bypass the department.
2. I also agree to 3 ACH instead of 4. When adopted it seemed unreasonably to meet. It is no longer unreasonable.
3. In Billings 90% are under 3 already. Don't see them pushing 4 anymore.

4 Would like a formal work group to work on the energy code. Include Dale Horton and some of the folks in his group.

Missoula – 08/29/2019 – Holiday Inn Downtown – Start time 1:00 pm
Number of Counted Participants: 26
Number of Public Comments Received: 23

Energy Code Comments:

1 Recommend going to 3 ACH from 4 ACH. I'm seeing 1 in the field
2 If you go to 3 ACH then you should add more mechanical ventilation to the code
3 Average presented ACH is 3.9 across the board. 3 is possible but we don't have enough inspection and regulation to do so. Those tighter than 3.9 do not have enough air ventilation. When looking at the IRC there is a need for additional ventilation. I strongly recommend that we stay at 4 and let other jurisdictions be the guinea pig.
4 Can local jurisdictions do energy on a residential garage attached or detached? Yes, if they have adopted the IRC.
5 The rules seem to indicate that a local jurisdiction would have to explicitly state that they include energy in what they regulate in their adoption of the energy code
6 Garages are unique. Garage doors don't have R-values, so it is almost impossible to do so.
7 I think the work group should discuss the real-life conditions of multifamily building and conflicts with building and fire codes. Only alternative given to test is the guarded testing and it is not a compliance testing reality. Consideration given to how multi-family is approached. Judgement calls if apartment leaking per energy code or leaking into the next apartment.
8 Look to future code increasing energy savings. Look at carbon also to lead to a more holistic view and not have to address energy after building is built.
9 In the statement of policy there is a lot of implied responsibility. Applying the energy code post occupancy or through the building process is something to think about.

24.301.160 INCORPORATION BY REFERENCE OF THE MODEL ENERGY CODE (REPEALED) (History: 50-60-201, 50-60-203, 50-60-803, MCA; IMP, 50-60-201, 50-60-203, 50-60-803, MCA; NEW, 1978 MAR p. 66, Eff. 1/26/78; TRANS, from Dept. of Admin., Ch. 352, L. 1985, Eff. 7/1/85; AMD, 1986 MAR p. 106, Eff. 1/31/86; AMD, 1989 MAR p. 1909, Eff. 11/22/89; AMD, 1992 MAR p. 1133, Eff. 5/29/92; AMD, 1994 MAR p. 670, Eff. 2/11/94; AMD, 1996 MAR p. 420, Eff. 2/9/96; AMD, 1997 MAR p. 2061, Eff. 11/18/97; AMD, 1998 MAR p. 2563, Eff. 9/25/98; TRANS, from Commerce, 2001 MAR p. 2301; REP, 2004 MAR p. 2103, Eff. 9/3/04.)

24.301.161 INCORPORATION BY REFERENCE OF INTERNATIONAL ENERGY CONSERVATION CODE (1) The Department of Labor and Industry adopts and incorporates by reference the International Code Council's International Energy Conservation Code, 2012 Edition, referred to as the International Energy Conservation Code, unless another edition is specifically stated, together with the following amendments:

(a) Subsections C103.1 and R103.1, General, are deleted and replaced with the following: "With each application for a building permit, and when required by the building official, plans and specifications shall be submitted. The building official may require plans and specifications be prepared by an engineer or architect licensed to practice by the state, except for owner-occupied, single-family dwelling houses."

(i) Exception:

"The code official is authorized to waive the requirements for construction documents or other supporting data if the code official determines they are not necessary to confirm compliance with this code."

(b) Subsections C104.2 and R104.2, Required Approvals, are deleted in their entirety when the code is used by the Building Codes Bureau of the Department of Labor and Industry. It remains undeleted and available for use for certified local governments using the code.

(c) Sections C202 and R202, General Definitions, the definition for "Air Barrier" is deleted and replaced with a new definition for "Air Barrier" as follows: "Air Barrier: Material(s) assembled and joined together to provide a barrier to air leakage through and into the building envelope. An air barrier may be a single material or a combination of materials."

(d) Table 402.1.1, INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT, is amending requirements for climate zone "6" as shown below in the table:

Climate Zone	Fenestration *U*-Factor(b)	Skylight(b) *U*-Factor	Glazed Penetration SHGC(b,d)	Ceiling *R*-Value	Wood Framed Wall *R*-Value
6	0.32	0.55	NR	49	21 or 13+10(h)

Mass Wall *R*-Value(i)	Floor *R*-Value	Basement(c) Wall *R*-Value	Slab(b) *R*-Value & Depth	Crawl Space Wall(c) *R*-Value
15/20	30(g)	15/19	10, 4 ft	15/19

(e) Table R402.1.3, EQUIVALENT *U*-FACTORS, is amending requirements as shown below in the table:

Climate Zone	Fenestration *U-Factor*	Skylight *U*-Factor	Ceiling *U*-Factor	Frame Wall *U*-Factor	Mass Wall *U*-Factor	Floor *U*-Factor	Basement Wall *U*-Factor	Crawl Space Wall *U*-Factor
6	0.32	0.55	0.026	0.054	0.060	0.033	0.050	0.055

(f) Subsection R402.2.2, Ceilings Without Attic Spaces, is deleted and replaced with the following: "Where Section 402.1.1 would require insulation levels above R-30 and the design of the roof/ceiling assembly does not allow sufficient space for the required insulation, the minimum required insulation for such roof/ceiling assemblies shall be R-30. This reduction of insulation from the requirements of Section 402.1.1, shall be limited to 250 square feet or ten percent of the total insulated ceiling area, whichever is less. This reduction shall not apply to the *U*-factor alternative approach in Section 402.1.3, and the total UA alternative in Section 402.1.4."

(g) Subsection R402.2.9, Crawl Space Walls, is deleted and replaced with the following: "As an alternative to insulating floors over crawl spaces, crawl space walls shall be permitted to be insulated when the crawl space is not vented to the outside. Temporary crawl space vent openings are allowed during construction for crawl spaces that have insulated crawl space walls. These temporary crawl space vent openings shall be closed, sealed, and insulated to the same R-value of the surrounding crawl space wall insulation once construction is complete and prior to the time that the final building inspection would occur. Crawl space wall insulation shall be permanently fastened to the wall and shall extend downward from the floor, the entire height of the crawl space wall. Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder. All joints of the vapor retarder shall overlap six inches and be sealed or taped. The edges of the vapor retarder shall extend at least six inches up the stem wall and shall be attached and sealed to the stem wall."

(h) Subsection R402.4.1.2, Testing, is deleted and replaced with the following: The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding four air changes per hour in Climate Zone 6. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the code official, testing shall be conducted by an approved 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. The requirements of testing found in subsection R402.4.1.2 will not be mandatory until one year following the final adoption of this rule. Buildings or dwelling units issued a building permit by a code official prior to this testing becoming required shall not be required to perform testing under subsection R402.4.1.2. During testing:

"(i) exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;

"(ii) dampers shall be closed, but not sealed, including exhaust, intake, makeup air, back draft and flue dampers;

"(iii) interior doors shall be open;

"(iv) exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;

"(v) heating and cooling system(s) shall be turned off;

"(vi) "B" or "L" vents, combustion air vents, and dryer vents shall be sealed; and

"(vii) HVAC ducts shall not be sealed.

(i) Subsection R403.2.2, Sealing (Mandatory). Delete the existing 2. found beneath, "duct tightness shall be verified by either of the following:" and replace the existing 1. with the following:

"Postconstruction test: Leakage to the outside of a condition space or total leakage shall be less than or equal to four cfm per 100 square feet of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. across the entire system, including the manufacturer's air handler enclosure. All register boot shall be taped or otherwise sealed during the test.

Exception: The duct tightness testing is not required for ducts and air handlers located entirely within the building thermal envelope.

(j) Subsection R403.2.3, Building Cavities, is deleted in its entirety and replaced with: "Building framing cavities shall not be used as supply ducts."

(k) Subsection R403.4.2, Hot Water Pipe Insulation (Prescriptive), is amended as follows:

Delete item number 3, delete item number 9, delete Table R403.4.2 and the text, "All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2."

(l) Table R405.5.2(1) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS, amend the table as shown below:

Building Component	Standard Reference Design	Proposed Design
Thermal distribution systems	Untested distribution systems: DSE = 0.88 Tested Ducts: Leakage rate to outside conditioned space as specified Section R403.2.2(1) Tested duct Location: Conditioned space Tested duct Insulation: in accordance with Section R403.2.1	Untested distribution systems: DSE from Table R405.5.2(2) Tested Ducts: Tested Leakage rate to outside conditioned space Duct Location: As proposed Duct Insulation: As proposed

(2) The purpose of the International Energy Conservation Code is to provide minimum requirements for the design of new buildings and structures and additions to existing buildings, regulating their exterior envelopes and selection of their heating, ventilating, air conditioning, service water heating, electrical distribution and illuminating systems, and equipment for effective use of energy.

(a) The department encourages owners, design professionals, and builders to voluntarily implement greater levels of energy efficiency in building design and construction than those required by the International Energy Conservation Code. Information regarding voluntary building standards for greater levels of energy efficiency can be obtained from the department by contacting the department at the address listed in (3), by telephone at 406-841-2053, or at the department's web site, http://bsd.dli.mt.gov/bc/bs_index.asp.

(3) The International Energy Conservation Code is a nationally recognized model code for energy efficient construction of buildings. A copy of the International Energy Conservation Code may be obtained from the Department of Labor and Industry, Building Codes Bureau, P.O. Box 200517, Helena, MT 59620-0517, at cost plus postage and handling. A copy may also be obtained by writing to the International Code Council, 4051 West Flossmoor Road, Country Club Hills, IL 60478-5795, or visiting the International Code Council web site at www.ICCsafe.org. (History: 50-60-203, 50-60-803, MCA; IMP, 50-60-201, 50-60-203, 50-60-803, MCA; NEW, 2004 MAR p. 2103, Eff. 9/3/04; AMD, 2006 MAR p. 567, Eff. 2/24/06; AMD, 2010 MAR p. 750, Eff. 3/26/10; AMD, 2014 MAR p. 2776, Eff. 11/7/14.)

24.301.162 ENERGY LABELING STICKERS (1) Where the energy labeling sticker is required by 50-60-803, MCA, the labeling sticker shall describe the energy efficiency components of the home. The builder or representative shall sign, date, and complete the label and permanently attach it to the interior electrical panel. The energy efficiency component labeling sticker must be a permanent self-adhesive label four by six inches in size that includes the following information:

(a) building address, name of builder or representative, date, and signature;

(b) nominal R-values for flat and vaulted ceilings, above grade walls, basement and crawlspace foundation insulation, floors over unheated space, slab insulation, and exterior doors;

(c) overall window unit U-factor. Window U-factor information is the factor stated on the window label from the National Fenestration Rating Council (NFRC);

(d) the energy efficiency rating of the heating system. This is the annual fuel utilization efficiency (AFUE) for gas heating systems and the heating season performance factor (HSPF) for heat pumps;

(e) energy efficiency information for water heaters. This is the energy factor (EF) rating, from the manufacturer and stated on the water heater; and

(f) other information that may be listed as an option to describe energy efficiency features of the home not stated above. (History: 50-60-203, 50-60-803, MCA; IMP, 50-60-201, 50-60-203, 50-60-803, MCA; NEW, 2004 MAR p. 2103, Eff. 9/3/04.)

Rules 24.301.163 through 24.301.169 reserved

July 26, 2019

Tim Lloyd
Montana Department of Labor and Industry
Building Codes Bureau
PO Box 200517
Helena, Montana 59624-1728

Dear Mr. Lloyd:

The Montana Department of Labor and Industry is considering future rulemaking to adopt updated energy codes. The 1550 member Montana Building Industry Association along with the National Association of Homebuilders supports the concept of a coordinated set of national model building codes developed for use by state and local code enforcement jurisdictions.

Montana homebuilders have been following the development of the International Residential Code (IRC) and the energy codes with a great deal of interest. We feel that the IRC is written in clear and easy to understand code language whereby builders can tell at a glance the intent of the code. A simple and understandable code translates into a code that is also more easily enforceable. Throughout the country homebuilders have played a major role in the development of the IRC and energy codes. The efficiency of builder operations would be improved by the consistency brought about by the IRC and energy codes.

We have already submitted comments, and participated on the process in developing the Montana building codes in 2018 and 2019, and very much appreciate the process and the openness that the Department has shown in working with us. What follows is an initial list that represents those sections of the energy codes which are a concern for MBIA builders, and how those concerns can be addressed. These comments were written primarily by our experts at NAHB. As we receive more feedback from our members, we would reserve the opportunity to comment further.

Thank you so much for the opportunity to work with you.

Sincerely,

Stephen Snezek
Executive Director
steve@montanabia.com
406-442-2279

1. Protection of Building Envelope

This amendment eliminates the requirement to provide an exterior-rated door at the top of a stairway that is enclosed by breakaway walls and provides access to a dwelling elevated on piers or piles in a coastal flood zone.

Revise as follows:

~~**R322.3.5.1 Protection of building envelope.** An exterior door that meets the requirements of Section R609 shall be installed at the top of stairs that provide access to the building and that are enclosed with walls designed to break away in accordance with Section R322.3.4.~~

Reason:

This amendment deletes the requirement added in the 2015 IRC that an exterior door be provided at the top of a stairway enclosed by breakaway walls and providing access to a dwelling located in a Coastal A Zone or Zone V special flood hazard area and elevated on piers or piles. While having a door at the top of such a stair may be good practice, the additional requirements associated with it being an exterior door are overly conservative, particularly if the door at the bottom of the enclosed stair is also an exterior door. By requiring compliance with all of the requirements of Section R609, the specified door would need to have a design pressure rating consistent with the design wind speed for the site, the door frame would need to be stiffened to resist the loads from such a door, proper anchorage of the door to the frame would need to be provided, and the door opening would need head, jamb, and sill flashing. The minimum added cost to provide a standard exterior door with flashing in lieu of a standard interior door is around $300; a hurricane wind-rated door would add an additional $200-$300 to the minimum costs.

It is noted that this requirement does not appear in the basic construction requirements of the National Flood Insurance Program in accordance with 44 CFR 60.3. It is also not specified as a practice that a community would earn credit for mandating and enforcing under FEMA's Community Rating Service, and would not lead to discounted flood insurance premiums.

2. Solar Photovoltaic Roof Systems

This amendment corrects language copied from the International Fire Code to address solar photovoltaic panels installed on the roof of a one- and two-family dwelling.

Revise as follows:

R324.7 Access and pathways. Roof access, pathways and spacing requirements shall be provided in accordance with Sections R324.7.1 through R324.7.2.5.

Exceptions:

1. Detached garages and accessory structures to one and two-family *dwellings* and *townhouses,* such as parking shade structures, carports, solar trellises and similar structures.
2. Roof access, pathways and spacing requirements need not be provided where an alternative ventilation method *approved* by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed.

R324.7.1 Roof access points. Roof access points shall be located in areas that do not require the placement of ground ladders over openings such as windows or doors, and located at strong points of building construction in locations where the access point does not conflict with overhead obstructions such as tree limbs, wires or signs.

R324.7.2 Solar photovoltaic systems. Solar photovoltaic systems shall comply with Sections R324.7.2.1 through R324.7.2.5.

R324.7.2.1 Size of solar photovoltaic array. Each photovoltaic array shall be limited to 150 feet by 150 feet (45 720 by 45 720 mm). Multiple arrays shall be separated by a clear access pathway not less than 3 feet (914 mm) in width.

R324.7.2.2 Hip roof layouts. Panels and modules installed on *dwellings* with hip roof layouts shall be located in a manner that provides a clear access pathway not less than 3 feet (914 mm) in width from the eave to the ridge on each roof slope where panels and modules are located. The access pathway shall be located ~~at a structurally strong location on the building capable of supporting the live load of fire fighters~~ along the structural members of the roof framing to support any person accessing the roof.

Exception: These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (16.6 percent) and less.

R324.7.2.3 Single ridge roofs. Panels and modules installed on *dwellings* with a single ridge shall be located in a manner that provides two, 3-foot-wide (914 mm) access pathways from the eave to the ridge on each roof slope where panels or modules are located.

Exception: This requirement shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (16.6 percent) and less.

R324.7.2.4 Roofs with hips and valleys. Panels and modules installed on *dwellings* with roof hips or valleys shall not be located less than 18 inches (457 mm) from a hip or valley where panels or modules are to be placed on both sides of a hip or valley. Where panels are to be located on one side only of a hip or valley that is of equal length, the 18-inch (457 mm) clearance does not apply.

Exception: These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (16.6 percent) and less.

~~**R324.7.2.5 Allowance for smoke ventilation operations.** Panels and modules installed on dwellings shall not be located less than 3 feet (914 mm) below the roof ridge to allow for fire department smoke ventilation operations.~~

~~**Exception:** Where an alternative ventilation method approved by the code official has been provided or where the code official has determined that vertical ventilation techniques will not be employed, clearance from the roof ridge is not required.~~

Reason:

This change is suggested based on two reasons. First, there is no reference in any of the ICC codes which specifically quantifies the weight of a fully geared up fire fighter. In addition, the provision for the access and the ability of the roof to support the live load of an individual should not be limited to the fire service. Solar PV panels will require cleaning and maintenance by the installer, electricians will need to periodically access

it to repair or replace components, and owners will need to clear debris and perform other housekeeping items. Secondly, while the IRC does take in to consideration the safety of occupants and fire service personnel, the IRC is not a fire service manual and should not include operational requirements for attacking fires from an offensive or defensive position. The IRC is a standalone building code for one- and two family dwellings and townhouses and it is not a fire operation manual.

3. Air Leakage Rate Correction (Climate Zones 1-8)

This amendment modifies the requirement from 3 air changes per hour (ACH) to 5 ACH in climate zones 1-8.

Revise as follows:

N1102.4.1.2 (R402.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding five air changes per hour in Climate Zones 1 ~~and 2, and three air changes per hour in Climate Zones 3~~ through 8. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E 779 or ASTM E 1827 and reported at a pressure of 0.2 inches 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*.

Table N1105.5.2 (1) [R405.5.2 (1)]
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

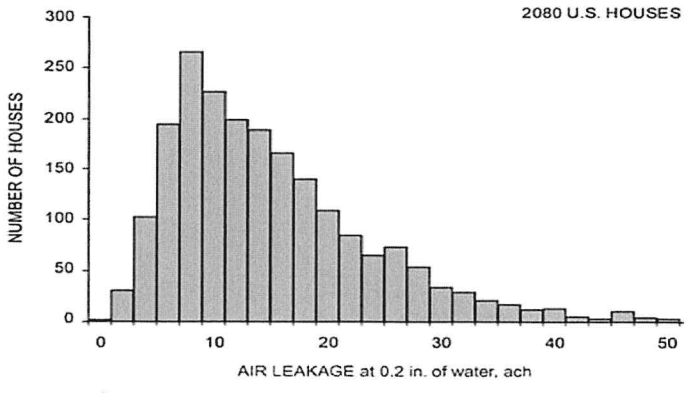
BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	Air leakage rate of 5 air changes per hour in Climate Zones 1 ~~and 2, and 3 air changes per hour in Climate Zones 3~~ through 8 at a pressure of 0.2 inches w.g (50 Pa). The mechanical ventilation rate shall be in addition to the air leakage rate and the same as in the proposed design, but no greater than 0.01 × *CFA* + 7.5 × (*Nbr* + 1) where: *CFA* = conditioned floor area *Nbr* = number of bedrooms Energy recovery shall not be assumed for mechanical ventilation.	For residences that are not tested, the same air leakage rate as the standard reference design. For tested residences, the measured air exchange rate[a]. The mechanical ventilation rated shall be in addition to the air leakage rate and shall be as proposed.

Footnotes remain unchanged

Reason:

Building tightness is an important part of an energy-efficient and comfortable house. However, 3 air changes (ACH) per hour at 50 Pascals is an extremely low target tightness, especially for smaller homes. The ASHRAE Handbook of Fundamentals shows that around 8% of U.S. homes achieve 3 ACH or less, 13% achieve 4 and less than 23% achieve 5. The proposed 5 ACH while still an aggressive tightness level will provide a tight, comfortable, energy-efficient home.

2013 ASHRAE Handbook—Fundamentals



Return to Residential

4. Air Leakage Trade-Off

This amendment allows builders to trade improvements in other building energy components for less stringent building envelope pressure test results, provides flexibility in meeting the air-tightness requirements and provides options for recovering from an unexpected air-tightness test failure.

Revise as follows:

N1102.4 (R402.4) Air leakage ~~(Mandatory)~~**.** The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections N1102.4.1 through N1102.4.4.

N1102.4.1 (R402.4.1) 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 (R402.4.1.1) Installation (Mandatory). 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 *code official*, an *approved* third party shall inspect all components and verify compliance.

N1102.4.1.2 (R402.4.1.2) Testing (Mandatory). The building or dwelling unit shall be tested ~~and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8~~ for air leakage. Testing shall be conducted with a blower door at a pressure of 0.2 inches 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*. During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weather stripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.

N1102.4.1.3 (R402.4.1.3) Leakage rate (Prescriptive). The building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section N1102.4.1.2.

Reason:

These modifications relocate the mandatory maximum air-tightness requirement and provide designers and builders the flexibility to trade off building tightness with other performance path measures when using the performance path. Currently the building tightness requirement is "mandatory" and the 3 and 5 ACH tightness levels, even under ideal circumstances, are very difficult to achieve. This amendment will provide energy neutral trade-offs, for expensive and sometimes unattainable requirements, by allowing other building improvements to be used to attain the same level of efficiency. This amendment does not change the stringency; it only increases its flexibility while achieving the required energy efficiency.

5. Prescriptive Table Requirements

This amendment replaces 2018 IRC Chapter 11 Tables N1102.1.2 and N1102.1.4 with tables from the 2009 IRC Chapter 11.

Delete Table N1102.1.2 and Table N1102.1.4 in their entirety and replace with the following:

TABLE N1102.1.2 (R402.1.2)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	1.20	0.75	0.30	30	13	3 / 4	13	0	0	0
2	0.65[j]	0.75	0.30	30	13	4 / 6	13	0	0	0
3	0.50[j]	0.60	0.30	30	13	5 / 8	19	5/13[f]	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5 / 10	19	10/13	10, 2ft	10/13
5 and Marine 4	0.35	0.60	NR	38	20 or 13+5[h]	13 / 17	30[g]	10/13	10, 2ft	10/13
6	0.35	0.60	NR	49	20 or 13+5[h]	15 / 19	30[g]	15/19	10, 4ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	38[g]	15/19	10, 4ft	10/13

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums. R-19 batts compressed into a nominal 2 x 6 framing cavity such that the R-value is reduced by R-I or more shall be marked with the compressed batt R-value in addition to the full thickness R-value.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

c. "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

d. R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.

e. There are no SHGC requirements in the Marine Zone.

f. Basement wall insulation is not required in warm-humid locations as defined by Figure 301.1 and Table 301.1.

g. Or insulation sufficient to fill the framing cavity, R-19 minimum.

h. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

i. The second R-value applies when more than half the insulation is on the interior of the mass wall.

j . For impact rated fenestration complying with Section R301.2.1.2 of the *International Residential Code* or Section 1608.1.2 of the *International Building Code,* the maximum U-factor shall be 0.75 in Zone 2 and 0.65 in Zone 3.

TABLE N1102.1.4 (R402.1.4) EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.057	0.060	0.033	0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.050	0.065

a. Non-fenestration U-factors shall be obtained from measurement, calculation or an approved source.
b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Zone 1, 0.14 in Zone 2, 0.12 in Zone 3, 0.10 in Zone 4 except Marine, and the same as the frame wall U-factor in Marine Zone 4 and Zones 5 through 8.
c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure 301.1 and Table 301.2.

Reason:

The increased table values in the 2012 IECC and the 2015 IECC did not show justification for the cost increases from the 2009 IECC. Studies indicate nationally almost a $6,000 increase to the cost of constructing a single-family detached dwelling with a 13-year simple payback. With statistics showing that for every $1,000 increase to the cost of construction nearly 206,000 potential home buyers will not qualify for a mortgage. This increase disqualifies approximately 1.3 million families from purchasing a home every year. That equates to approximately $24,000,000 in potential taxes revenues never being generated for municipalities.

6. Wall R-Value/U-Factors Corrections (Climate Zone 6-8)

This amendment reinstates the appropriate minimum wall assembly R-Values/U-Factors in climate zones 6, 7 & 8 published in the 2009 IRC Chapter 11.

Revise as follows:

TABLE N1102.1.2 (R402.1.2)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR[b]	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[i]	FLOOR R -VALUE	BASEMENT[c] WALL R -VALUE	SLAB[d] R-VALUE AND DEPTH	CRAWL SPACE[c] WALL R - VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h,i]	8/13	19	5/13f	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h,i]	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h,i]	13/17	30g	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20 or 13+5[h,i] ~~20+5 or 13+10[b,i]~~	15/20	30g	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20 or 13+5[h,i] ~~20+5 or 13+10[b,i]~~	19/21	38[g]	15/19	10, 4 ft	15/19

TABLE N1102.1.4 (R402.1.4) EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	0.50	0.75	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.060	0.098	0.047	0.091c	0.136
4 except Marine	0.35	0.55	0.026	0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.060	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	~~0.045~~ 0.060	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	~~0.045~~ 0.060	0.057	0.028	0.050	0.055

Footnotes remain unchanged

Reason:

The prescriptive wall requirement increased to R-20+R5 in climate zones 6, 7 and 8 of the 2012 IRC Chapter 11. The additional cost for this is estimated at $1,819 for 1,016 square feet of wall. This makes the simple payback between 26 and 55 years depending on the climate zone. This also will create a negative cash flow for the consumer in all cases.

Climate Zone	Representative City	Basement Wall R-Value Change	Energy Savings	Incremental Cost	Simple Payback
6	Minneapolis, MN	R-20->R-20+5	$33/yr	$1,819 ($1.79/ft2)	55 years
7	Bemidgi, MN	R-20->R-20+5	$41/yr	$1,819 ($1.79/ft2)	44 years
8	Fairbanks, AK	R-20->R-20+5	$71/yr	$1,819 ($1.79/ft2)	26 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4, Cost figures came from ASHRAERP-1481.

7. Mechanical Equipment Trade-Off

This amendment reinstates the performance option in IRC Chapter 11 to reduce prescriptive requirements by installing HVAC equipment with higher energy-efficiency performance ratings than required by the code.

Revise as follows:

TABLEN1105.5.2 (1) (R405.5.2 (1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems [d,e]	~~As proposed for other than electric heating without a heat pump, Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC Commercial Provisions.~~ Fuel type: same as proposed design Efficiencies: - Electric: air-source heat pump with prevailing federal minimum standards -Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards -Nonelectric boilers: natural gas boiler with prevailing federal minimum standards -Capacity: sized in accordance with Section R403.6	~~As proposed~~ As proposed As proposed As proposed As proposed
Cooling systems [d, f]	~~As proposed~~ -Fuel type: Electric -Efficiency: in accordance with prevailing federal minimum standards -Capacity: sized in accordance with Section N1103.6	~~As proposed~~ As proposed As proposed As proposed
Service Water Heating [d,e,f,g]	~~As proposed~~ -Fuel type: same as proposed design -Efficiency: in accordance with prevailing federal minimum standards -Use: gal/day = 30 + 10 × N_{br} -Tank temperature: 120°F ~~-Use: same as proposed design~~	~~As proposed~~ As proposed As proposed Same as standard reference Same as standard reference ~~gal/day = 30 + (10 × N_{br})~~

Footnotes remain unchanged

Reason:

This amendment serves to retain energy-neutral equipment trade-off provisions from 2006 IRC Chapter 11 for heating systems, cooling systems, and service water heating. By retaining these, builders can optimize a code-compliant house design by using energy-efficient equipment. Quite often, the use of this high-efficiency equipment provides a more cost-effective solution to achieve code compliance. Eliminating this ability discourages the concept of the "house as a system" approach which is a cornerstone of building science.

Rejecting this amendment will create a disincentive to install state-of- the-art, energy-efficient equipment. It will increase the cost of construction by driving builders to often use less efficient equipment while increasing the cost of construction.

Significant improvements in the efficiency of HVAC and water heating equipment have been made in the

last 20 years. With the increased emphasis on new and improved technologies, this trend is expected to continue and will result in even higher energy savings in future years. If builders are forced to comply with the energy code by installing requirements which are not cost effective, there will be a resistance to install higher efficiency equipment. This could end up hurting energy efficiency in the long term: For instance, consumers in homes with non-condensing furnaces will be less likely to install a higher efficiency condensing replacement furnace because of the additional cost to run an exhaust vent.

Industries such as log home manufacturers may no longer be able to construct to projected higher envelope requirements. The combination of increases in envelope thermal requirements, building tightness and duct tightness combined with the elimination of energy-neutral trade-offs pose a serious threat to the viability of the log home industry. There are practical limitations to the thickness of log home walls, increases in log diameter have an exponential increase to the cost of logs, making log walls with a U-factor of 0.082 or lower prohibitively expensive.

8. Rooms Containing Fuel Burning Appliances

This amendment removes the requirement to insulate, seal and separate from the thermal envelope the area surrounding fuel burning appliances.

Revise as follows:

Delete section **and do not replace.**

~~**N1102.4.4 (R402.4.4) Rooms containing fuel-burning appliances.** In Climate Zones 3 through 8, 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 R402.1.2, where the walls, floors and ceilings shall meet not less than 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 R403. 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 Section R402.4.2 and Section R1006 of the *International Residential Code*.~~

Reason:

This was a new section to the 2015 IECC and has proven to be confusing and is being misinterpreted.

- *No data was shown verifying a problem existed*
- *No energy savings potential was shown.*
- *No cost data was provided to justify the increase to the cost of construction.*
- *A study done by Home Innovation Research Labs finds the cost of meeting this requirement would be $878 for a home with space heating or water heating equipment in the basement.*

E1. Air Leakage Trade-Offs

This Amendment allows builders to trade improvements in other building energy components for less stringent building envelope pressure test results. This performance option provides flexibility in meeting the air tightness requirements and provides options for recovering from an unexpected air tightness test failure.

Revise as follows:

R402.4 Air leakage ~~(Mandatory)~~**.** The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.4.

R402.4.1 Building thermal envelope. The *building thermal envelope* shall comply with Sections R402.4.1.1 and R402.4.1.2. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

R402.4.1.1 Installation (Mandatory). The components of the *building thermal envelope* as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the *code official*, an *approved* third party shall inspect all components and verify compliance.

R402.4.1.2 Testing (Mandatory). The building or dwelling unit shall be tested ~~and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8~~ for air leakage. Testing shall be conducted with a blower door at a pressure of 0.2 inches 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*. During testing:

7. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
8. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
9. Interior doors, if installed at the time of the test, shall be open;
10. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
11. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
12. Supply and return registers, if installed at the time of the test, shall be fully open.

R402.4.1.3 Leakage rate (Prescriptive). The building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

Reason:

These modifications relocate the mandatory maximum air-tightness requirement and provide designers and builders the flexibility to trade off building tightness with other performance path measures when using the performance path. Currently the building tightness requirement is "mandatory" and the 3 and 5 ACH tightness levels, even under ideal circumstances, are very difficult to achieve. This amendment will provide energy neutral trade-offs, for expensive and sometimes unattainable requirements, by allowing other building improvements to be used to attain the same level of efficiency. This amendment does not change the stringency; it only increases its flexibility while achieving the required energy efficiency.

E2. Prescriptive Table Requirements

This amendment replaces 2015 IECC Tables R402.1.2 and R402.1.4 in the residential section of the 2015 with the following tables from the 2009 IECC.

Revise as follows:

Delete Table 402.1.1 and Table 402.1.3 in their entirety **and replace with the following:**

TABLE R402.1.2
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	1.20	0.75	0.30	30	13	3 / 4	13	0	0	0
2	0.65[j]	0.75	0.30	30	13	4 / 6	13	0	0	0
3	0.50[j]	0.60	0.30	30	13	5 / 8	19	5/13[f]	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5 / 10	19	10/13	10, 2ft	10/13
5 and Marine 4	0.35	0.60	NR	38	20 or 13+5[h]	13 / 17	30[g]	10/13	10, 2ft	10/13
6	0.35	0.60	NR	49	20 or 13+5[h]	15 / 19	30[g]	15/19	10, 4ft	10/13
7 and 8	0.35	0.60	NR	49	21	19 / 21	38[g]	15/19	10, 4ft	10/13

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums. R-19 batts compressed into a nominal 2 x 6 framing cavity such that the R-value is reduced by R-I or more shall be marked with the compressed batt R-value in addition to the full thickness R-value.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

c. "15/19" means R-15 continuous insulated sheathing on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulated sheathing on the interior or exterior of the home. "10/13" means R-10 continuous insulated sheathing on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

d. R-5 shall be added to the required slab edge R-values for heated slabs. Insulation depth shall be the depth of the footing or 2 feet, whichever is less in Zones 1 through 3 for heated slabs.

e. There are no SHGC requirements in the Marine Zone.

f. Basement wall insulation is not required in warm-humid locations as defined by Figure 301.1 and Table 301.1.

g. Or insulation sufficient to fill the framing cavity, R-19 minimum.

h. "13+5" means R-13 cavity insulation plus R-5 insulated sheathing. If structural sheathing covers 25 percent or less of the exterior, insulating sheathing is not required where structural sheathing is used. If structural sheathing covers more than 25 percent of exterior, structural sheathing shall be supplemented with insulated sheathing of at least R-2.

i. The second R-value applies when more than half the insulation is on the interior of the mass wall.

j . For impact rated fenestration complying with Section R301.2.1.2 of the *International Residential Code* or Section 1608.1.2 of the *International Building Code,* the maximum U-factor shall be 0.75 in Zone 2 and 0.65 in Zone 3.

TABLE 402.1.4
EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.75	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.65	0.65	0.035	0.082	0.141	0.047	0.360	0.136
4 except Marine	0.40	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.057	0.060	0.033	0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.033	0.050	0.065

a. Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.
b. When more than half the insulation is on the interior, the mass wall U-factors shall be a maximum of 0.17 in Zone 1, 0.14 in Zone 2, 0.12 in Zone 3, 0.10 in Zone 4 except Marine, and the same as the frame wall U-factor in Marine Zone 4 and Zones 5 through 8.
c. Basement wall U-factor of 0.360 in warm-humid locations as defined by Figure 301.1 and Table 301.2.
d. Foundation U-factor requirements shown in Table 402.1.3 include wall construction and interior air films but exclude soil conductivity and exterior air films. U-factors for determining code compliance in accordance with Section 402.1.4 (total *UA* alternative) of Section 405 (Simulated Performance Alternative) shall be modified to include soil conductivity and exterior air films.

Reason:

The increased table values in the 2012 IECC and the 2015 IECC did not show justification for the cost increases from the 2009 IECC. Studies indicate nationally almost a $6,000 increase to the cost of constructing a single-family detached dwelling with a 13-year simple payback. With statistics showing that for every $1,000 increase to the cost of construction nearly 206,000 potential home buyers will not qualify for a mortgage. This, increase disqualifies approximately 1.3 million families from purchasing a home every year. That equates to approximately $24,000,000 in potential taxes revenues never being generated for municipalities.

E3. Wall R-Value/U-Factors Corrections (Climate Zones 6-8)

This amendment reinstates the appropriate minimum wall assembly R-Values/U-Factors in climate zones 6, 7 & 8 published in the 2009 IRC Chapter 11.

Revise as follows:

TABLE R402.1.2
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR[b]	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[i]	FLOOR R -VALUE	BASEMENT[c] WALL R -VALUE	SLAB[d] R-VALUE AND DEPTH	CRAWL SPACE[c] WALL R - VALUE
1	NR	0.75	0.25	30	13	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13	4/6	13	0	0	0
3	0.35	0.55	0.25	38	20 or 13+5[h,i]	8/13	19	5/13f	0	5/13
4 except Marine	0.35	0.55	0.40	49	20 or 13+5[h,i]	8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.32	0.55	NR	49	20 or 13+5[h,i]	13/17	30[g]	15/19	10, 2 ft	15/19
6	0.32	0.55	NR	49	20 or 13+5h,i ~~20+5 or 13+10h,i~~	15/20	30[g]	15/19	10, 4 ft	15/19
7 and 8	0.32	0.55	NR	49	20 or 13+5h,i ~~20+5 or 13+10h,i~~	19/21	38[g]	15/19	10, 4 ft	15/19

Footnotes remain unchanged

TABLE R402.1.4 EQUIVALENT U-FACTORS[a]

Climate Zone	Fenestration U-Factor	Skylight U-Factor	Ceiling U-Factor	Frame Wall U-Factor	Mass Wall U-Factor[b]	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
1	0.50	0.75	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.060	0.098	0.047	0.091c	0.136
4 except Marine	0.35	0.55	0.026	0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.060	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	~~0.048~~ 0.057	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	~~0.048~~ 0.057	0.057	0.028	0.050	0.055

Footnotes remain unchanged

Reason:

The prescriptive wall requirement increased to R-20+R5 in climate zones 6, 7 and 8 in the 2012 IECC. The additional cost for this is estimated at $1,819 for 1,016 square feet of wall. This makes the simple payback between 26 and 55 years depending on the climate zone. This also will create a negative cash flow for the consumer in all cases.

Climate Zone	Representative City	Basement Wall R-Value Change	Energy Savings	Incremental Cost	Simple Payback
6	Minneapolis, MN	R-20->R-20+5	$33/yr	$1,819 ($1.79/ft2)	55 years
7	Bemidgi, MN	R-20->R-20+5	$41/yr	$1,819 ($1.79/ft2)	44 years
8	Fairbanks, AK	R-20->R-20+5	$71/yr	$1,819 ($1.79/ft2)	26 years

The energy modeling was done using the Energy Plus simulation engine and BEopt version 1.4, Cost figures came from ASHRAE RP-1481.

E4. Mechanical Equipment Trade-Off

This amendment reinstates the performance option to reduce prescriptive requirements by installing HVAC equipment with higher energy-efficiency performance ratings than required by the code.

Revise as follows:

TABLE R405.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems [d, e]	~~As proposed for other than electric heating without a heat pump. Where the proposed design utilizes electric heating without a heat pump the standard reference design shall be an air source heat pump meeting the requirements of Section R403 of the IECC Commercial Provisions.~~ Fuel type: same as proposed design Efficiencies: Electric: air-source heat pump with prevailing federal minimum standards Nonelectric furnaces: natural gas furnace with prevailing federal minimum standards Nonelectric boilers: natural gas boiler with prevailing federal minimum standards Capacity: sized in accordance with Section R403.6	~~As proposed~~ As proposed As proposed As proposed As proposed
Cooling systems [d, e]	~~As proposed~~ Fuel type: Electric Efficiency: in accordance with prevailing federal minimum standards Capacity: sized in accordance with Section R403,6	~~As proposed~~ As proposed As proposed
Service Water Heating [d, e, f, g]	~~As proposed~~ Fuel type: same as proposed design Efficiency: in accordance with prevailing federal minimum standards Use: gal/day = 30 + 10 × *Nbr* Tank temperature: 120°F ~~Use: same as proposed design~~	~~As proposed~~ As proposed Same as standard reference Same as standard reference ~~gal/day = 30 + (10 × *Nbr*)~~

Footnotes remain unchanged

Reason:

This amendment serves to retain energy-neutral equipment trade-off provisions from the 2006 IECC for heating and cooling systems and service water heating. By retaining these, builders have an opportunity to optimize a code-compliant house design by using energy-efficient equipment. Quite often, the use of this high-efficiency equipment provides a more cost-effective solution to achieve code compliance. Eliminating this ability discourages the concept of the "house as a system" approach, which is a cornerstone of building science.

Rejecting this amendment will reduce any incentive to install state-of- the-art, energy-efficient

equipment. It will increase the cost of construction by driving builders to often use less efficient equipment.

Significant improvements in the efficiency of HVAC and water heating equipment have been made in the last 20 years. With the increased emphasis on new and improved technologies, this trend is expected to continue and will result in even higher energy savings in future years. If builders are forced to comply with the energy code by installing requirements which are not cost-effective, there will be a resistance to install higher efficiency equipment. This could end up hurting energy efficiency in the long term, consumers which have non-condensing furnaces will be less likely to install a higher efficiency condensing replacement furnace because of the additional cost to run an exhaust vent.

Industries such as log home manufacturers may no longer be able to construct to projected higher envelope requirements. The combination of increases in envelope thermal requirements, building tightness and duct tightness combined with the elimination of energy neutral trade-offs pose a serious threat to the viability of the log home industry. There are practical limitations to the thickness of log home walls. Increasing requirements for the log diameter has a exponential increase in the cost of the logs, making log walls with a U- factor of 0.082 or lower prohibitively expensive

E5. Rooms Containing Fuel Burning Appliances

This amendment removes the requirement to insulate, seal and separate from the thermal envelope the area surrounding fuel burning appliances.

Revise as follows:

Delete section **and do not replace.**

~~**R402.4.4 (N1102.4.4) Rooms containing fuel-burning appliances.** In Climate Zones 3 through 8, 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 R402.1.2, where the walls, floors and ceilings shall meet not less than 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 R403. 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 Section R402.4.2 and Section R1006 of the *International Residential Code*.~~

Reason:

This was a new section to the 2015 IECC and has proven to be confusing and is being misinterpreted.

- *No data was shown verifying a problem existed*
- *No energy savings potential was shown.*
- *No cost data was provided to justify the increase to the cost of construction.*
- *A study done by Home Innovation Research Labs finds the cost of meeting this requirement would be $878 for a home with space heating or water heating equipment in the basement.*