



## CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: **Jared Johnson, Phius Alliance Minnesota**  
**Marcy Conrad Nutt, Passive House Minnesota**

Date: **August 29, 2023**  
**Revised November 7, 2023**

Email address: **jared.t.johnson11@gmail.com**  
**marcy@phmn.org**

Model Code: **2021 IECC**

Telephone number: **507-923-5415**  
**612-202-2791**

Code or Rule Section: **R402.4.1.3**

Firm/Association affiliation, if any: **Phius Alliance Minnesota, Passive House Minnesota**

Code or rule section to be changed: **R402.4.1.3 Leakage Rate**

Intended for Technical Advisory Group (“TAG”):

■

### General Information

**Yes**    **No**

- |  |                                     |                                     |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota?                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| B. Is the proposed change required due to climatic conditions of Minnesota?            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| C. Will the proposed change encourage more uniform enforcement?                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| D. Will the proposed change remedy a problem?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment?               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

### Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).

#### **R402.4.1.3 Leakage Rate**

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

**No**

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~strike through~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

**R402.4.1.3 Leakage Rate**

**“When complying with Section R401.2.1, the building or dwelling unit shall have an air leakage rate not exceeding 5.0 air changes per hour in Climate Zones 0, 1 and 2, and ~~3.0~~ 2.0 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.”**

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.

**Yes – the performance path (R405.4.2) should be updated accordingly to match the proposed change to the prescriptive:**

**TABLE R405.4.2(1)  
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	The air leakage rate at a pressure of 0.2 inch w.g. (50 Pa) shall be Climate Zones 0 through 2: 5.0 air changes per hour. Climate Zones 3 through 8: <b>2.0 3.0</b> air changes per hour.	The mechanical ventilation rate <del>s</del> shall be in addition to the air leakage rate and shall be as proposed.
	The mechanical ventilation rate shall be in addition to the air leakage rate and shall be the same as in the proposed design, but not greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where: CFA = conditioned floor area, ft <sup>2</sup> . N <sub>br</sub> = number of bedrooms. The mechanical ventilation system type shall be the same as in the proposed design. Energy recovery shall not be assumed for mechanical ventilation.	

## **Need and Reason**

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

### **Tighter air sealing:**

**Air leakage in cold climates creates unnecessary costs for property owners, as well as health and durability challenges in our Minnesota climate:**

- **In winter, leaks carry warm, moist air through building walls, causing condensation within the wall cavity. This, in turn, creates rot and mold, which lead to unnecessary health risks and maintenance costs. In addition, heating dollars and humidity are lost through the leaks.**
- **In summer, air leakage results in lost cooling dollars. Leaks also let in allergens, increasingly common pollutants such as wildfire smoke, and humidity. Keeping humidity levels at a safe and healthy level is easier and cheaper in buildings that are well air-sealed.**

**Lowering the requirement from 3.0 ACH50 to 2.0 would provide better protection against the issues listed above and improve overall energy performance, while still remaining achievable with current construction materials and practices.**

2. Why is the proposed code change a reasonable solution?

**Air-sealing uses materials and methods already common and affordable within the building industry. We believe the proposed change can be achieved with little more than education and attention to detail. According to RESNET: Of the 6,143 completed HERS-rated projects in Minnesota over the last 12 months, 75% of those projects have achieved an ACH level of 2.0 or lower.**

3. What other factors should the TAG consider?

**Tighter air sealing has definite benefits, but requires balanced ventilation to maintain a healthy interior environment – the two must be considered together.**

## **Cost/Benefit Analysis**

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.

**As stated above, we anticipate any cost increase would be minimal. Air sealing is already standard practice, and the majority of new builds in Minnesota are already hitting these ACH levels.**

2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.

**The energy savings alone would quickly make up for the minimal extra cost. Extra insurance against moisture intrusion into walls is also a potential offset.**

3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.

**Builders, who will pass it along to individual homeowners.**

4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.

**No, there should not be extra compliance costs.**

5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

**Not that we are aware of.**

**Regulatory Analysis**

1. What parties or segments of industry are affected by this proposed code change?

**Trade workers (siders, framers, specialized subcontractors)**

2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.

**People might argue against the idea of making air-tight walls, instead choosing to “let the walls breathe”. There is an argument to be had in letting walls breathe, as it prevents moisture from sticking around for too long in any cavity. The problem with this approach in our Minnesota climate is that it prevents insulation from ever being used effectively. If we are going to try to cut down energy usage in cold climates, insulation will have to be part of that solution, and protecting these insulated walls with tight air-sealing is a must.**

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?

**Over the long term, the amount of energy savings that will not be realized will be tremendous. Small incremental gains can create huge progress when multiplied over thousands and thousands of new homes. More homes will have wall moisture issues as well, which are expensive remediations in comparison to a little extra front-end air sealing work.**

4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.

**We are unaware of any federal or state regulation or requirement related to this proposed change.**

\*\*\*Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can considered by the TAG.

## Final Testing and Completion Report

RSR File Number: 09-XE-137-04

Site Walk Date: January 26, 2010



**Home:** 1605 Case Avenue St Paul MN 55106

**Model:** Case Ave

**Builder:** Twin Cities Habitat for Humanity  
3001 Fourth Street SE, Minneapolis, MN 55414



### Energy Star Rating

This Home meets the Energy Star Requirements: Yes

HERS Index 51

Thermal Bypass Checklist (TBC) Pass

Duct Leakage Meets

AC Sizing On file



### Tax Credit Status

This home is 73.5%

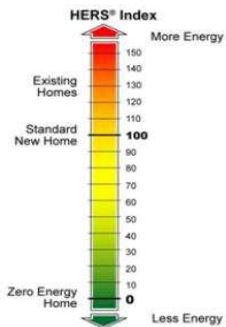
Tax Credit Target 44.3

Tax Credit Designed 23.5

more efficient than the 2004 IECC

Homes over 50% may be eligible for 2005 EPACT Federal Tax Credit

This documentation does not meet the requirements of the IRS guideline for the Federal Tax Credit. You will need to obtain the proper documentation by contacting Residential Science Resources, and working with your accountant and/or tax preparation personnel.



### HERS Index

RESNET Ratings provides a relative energy use index called the HERS Index— a HERS Index of 100 represents the energy use of the “American Standard Building” and an Index of 0 (zero) indicates that the Proposed Building uses no net purchased energy (a Zero Energy Building). The HERS Index is a linear metric where every percentage point that a building’s energy use is reduced represents a decreased point reduction on the index.

Your home scored a 51



### Home Performance Testing Results

#### Blower Door Results

Tested CFM50 317  
CFM50/Sqft of Surface Area 0.08  
ACH50 1.23  
CFM50/Sqft of Floor Area 0.18

#### Duct Leakage Results

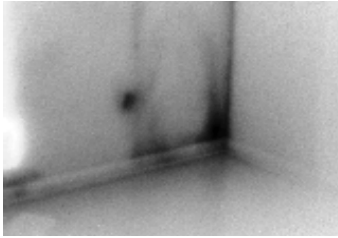
CFM25 Leakage to outside 32

#### Ventilation Flow Results

Target 48  
Actual Flow n/a  
Rated Flow n/a

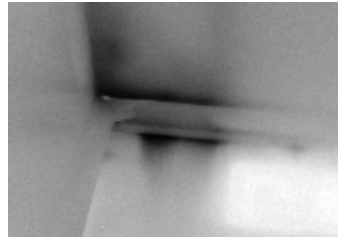
### Mechanical Equipment

Type of Equipment	Efficiency	Brand/Make	Model
Primary Heating Source	95	Day and Night	C9MVX060F12A1
Primary Cooling Source	13	Day and Night	N4A31BAKB200
Mechanical Ventilation		Enerflo	NRFLOH
Thermostat		Honeywell	Focus Pro
Domestic Hot Water	0.82	Rinnai tankless	C53Di-0



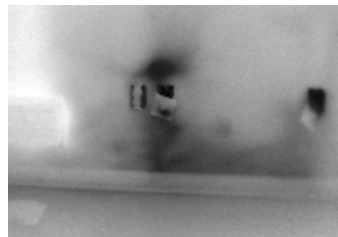
**Bottom plate leakage**

**Air leakage between bottom plates and floors can lead to building durability issues, uneven interior surface temperatures, high utility costs, and occupant discomfort. Seal plates to sub-floor as walls are set or apply a bead of sealant at the floor before drywall is installed.**



**Electrical box leakage**

**Unsealed electrical boxes can lead to durability issues, uneven interior surface temperatures, drafts, and occupant discomfort. Foam wiring penetrations and seal the vapor/air barrier to boxes.**



Residential Science Resources, LLC respects the privacy of Twin Cities Habitat for Humanity and will keep all of this information confidential and not disclose this or any other information without expressed written consent. Thank you for the opportunity to assist you in the construction of your homes.

Sincerely,  
Josh Heller  
Residential Science Resources, LLC  
Building Science Consultant

RSR is an independent building performance testing and certification company following RESNET guidelines. RESNET sets the standards of quality for the building energy performance certification industry (Home Energy Rating System - HERS Rating). The EPA requires homes to meet its strict standards for the ENERGY STAR certification following RESNET guidelines.

# RESNET HOME ENERGY RATING

## Standard Disclosure

For home location at: 1605 Case Avenue St Paul MN 55106

Check the applicable disclosure(s) in accordance with the Instructions on the reverse of this page:


1.  The Rater or the Rater's employer is receiving a fee for providing the rating on this home.
  
2.  The addition to the rater or Rater's employer has provided the following consulting services for this home
  - A.  Mechanical system design
  - B.  Moisture control or indoor air quality consulting
  - C.  Performance testing and/or commissioning other than required for the rating itself
  - D.  Training for sales or construction personnel
  - E.  Other (specify): \_\_\_\_\_
  
3.  The Rater or Rater's employer is:
  - A.  The seller of this home or their agent
  - B.  The mortgagor for some portion of the financed payments on this home
  - C.  An employee, contractor or consultant of the electric and /or natural gas utility serving this home
  
4.  The Rater or Rater's employer is a supplier or installer of products, which may include:

Installed in this home by: OR Is in the business of:

HVAC systems.....	[ ] Rater	[ ] Employer	OR	[ ] Rater	[ ] Employer
Thermal insulation Systems.....	[ ] Rater	[ ] Employer	OR	[ ] Rater	[ ] Employer
Air sealing of the envelope or duct systems.....	[ ] Rater	[ ] Employer	OR	[ ] Rater	[ ] Employer
Windows or window shading.....	[ ] Rater	[ ] Employer	OR	[ ] Rater	[ ] Employer
Energy efficient appliances.....	[ ] Rater	[ ] Employer	OR	[ ] Rater	[ ] Employer
Construction (builder, developer, construction contractor, etc.).....	[ ] Rater	[ ] Employer	OR	[ ] Rater	[ ] Employer
Other (specify):.....	[ ] Rater	[ ] Employer	OR	[ ] Rater	[ ] Employer

Rick Wheeler  
Rater's Printed Name

09-XE-137-04  
Certification #

  
Rater's Signature

1/26/2010  
Date

I attest that the above information is true and correct to the best of my Knowledge. As a Rater or Rating Provider I abide by the rating quality control provisions of the Mortgage Industry National Home Energy Rating Standard as set forth by the Residential Energy Services Network (RESNET). The national rating quality control provisions of the rating standard are contained in Chapter One 4 C. 8. of the standard and are posted at <http://www.natresnet.org/accred/standards.pdf>



# Home Energy Rating Certificate

## Final Report

Rating Date: 2020-07-09  
 Registry ID: 897935241  
 Ekotrope ID: Od4Mmpyv



### HERS® Index Score:

# 47

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

### Annual Savings

# \$1,526

\*Relative to an average U.S. home

**Home:**  
 421 Maryland Ave. W.  
 St. Paul, MN 55117

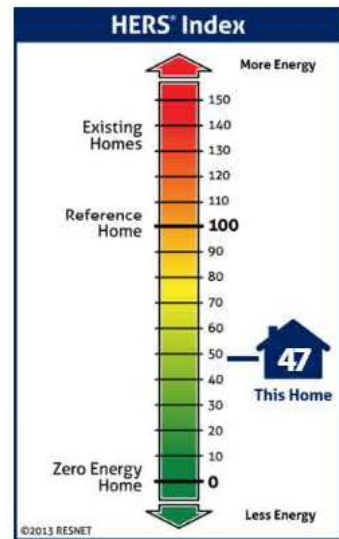
**Builder:**  
 T.C. Habitat for Humanity

### Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	38.3	\$326
Cooling	0.0	\$0
Hot Water	17.2	\$139
Lights/Appliances	19.6	\$469
Service Charges		\$210
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>75.2</b>	<b>\$1,145</b>

### This home meets or exceeds the criteria of the following:

- ENERGY STAR v3
- ENERGY STAR v3.1
- 2015 International Energy Conservation Code
- 2012 International Energy Conservation Code
- 2009 International Energy Conservation Code
- 2006 International Energy Conservation Code



### Home Feature Summary:

- Home Type: Single family detached
- Model: 5S-TS4-2
- Community: N/A
- Conditioned Floor Area: 1,824 ft<sup>2</sup>
- Number of Bedrooms: 4
- Primary Heating System: Furnace • Natural Gas • 96.1 AFUE
- Primary Cooling System: N\_A
- Primary Water Heating: Water Heater • Natural Gas • 0.68 UEF
- House Tightness: 336 CFM50 (1.26 ACH50)
- Ventilation: 58 CFM • 51 Watts
- Duct Leakage to Outside: 15 CFM @ 25Pa (0.82 / 100 s.f.)
- Above Grade Walls: R-24
- Ceiling: Attic, R-50
- Window Type: U-Value: 0.3, SHGC: 0.32
- Foundation Walls: N/A

### Rating Completed by:

**Energy Rater:** Tony Beres  
 RESNET ID: 5490671

**Rating Company:** Center for Energy and Environment  
 1754 University Ave W, St Paul, MN 55104

**Rating Provider:** Building Knowledge  
 PO Box 1376, Burnsville MN 55337

Tony Beres, Certified Energy Rater  
 Digitally signed: 8/21/20 at 2:09 PM







# ENERGY STAR® CERTIFIED NEW HOME

ENERGY STAR

**Builder Name:** T.C. Habitat for Humanity  
**Permit Date/Number:**  
**Home Address:** 421 Maryland Ave. W., St. Paul, MN 55117

**Rating Company:** Center for Energy and Environment  
**Rater ID (RTIN):** 5490671  
**Rating Date:** 2020-07-09  
**Version:** 3.1

## Standard Features of an ENERGY STAR Certified New Home

Your ENERGY STAR certified new home has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation and high-performing windows to deliver improved comfort and lower utility bills.



Air Infiltration Test: **336 CFM50 (1.26 ACH50)**

Primary Insulation Levels:

**Ceiling: R-50**      **Floor: N/A**  
**Wall: R-24**        **Slab: R-10**

Primary Window Efficiency:

**U-Value: 0.3**        **SHGC: 0.32**

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering into the home.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling system, and ventilation system that is designed and installed for optimal performance.



Total Duct Leakage: **212 CFM @ 25Pa (Post-Construction)**      Duct Leakage to Outdoors: **15 CFM @ 25Pa (0.82 / 100 s.f.)**

Primary Heating (System Type • Fuel Type • Efficiency):  
**Furnace • Natural Gas • 96.1 AFUE**

Primary Cooling (System Type • Fuel Type • Efficiency):  
**N\_A**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



ENERGY STAR Qualified Lighting: **100%**

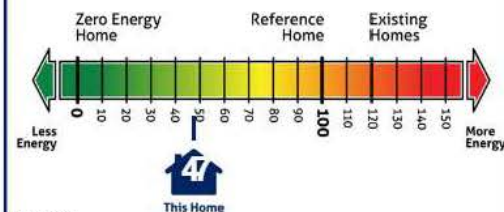
ENERGY STAR Qualified Appliances and Fans:

**Refrigerators: 1**    **Dishwashers: 0**  
**Ceiling Fans: 0**    **Exhaust Fans: 2**

Primary Water Heater (System Type • Fuel Type • Efficiency):

**Water Heater • Natural Gas • 0.68 UEF**

### HERS® Index



This certificate provides a summary of the major energy efficiency and other construction features that contribute to this home earning the ENERGY STAR, including its Home Energy Rating System (HERS) score, as determined through independent inspection and verification performed by a trained professional. The Home Energy Rating System is a nationally-recognized uniform measurement of the energy efficiency of homes.

Note that when a home contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes may be certified to earn the ENERGY STAR using a sampling protocol, whereby one home is randomly selected from a set of homes for representative inspections and testing. In such cases, the features found in each home within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home may differ, but offer equivalent or better performance. This certificate was printed using Ekotrope™ (Version 3.2.3.2509).

Learn more at [www.energystar.gov/homefeatures](http://www.energystar.gov/homefeatures)

# RESNET HOME ENERGY RATING Standard Disclosure



For home(s) located at: 421 Maryland Ave. W., St. Paul, MN

Check the applicable disclosure(s):

- 1. The Rater or the Rater's employer is receiving a fee for providing the rating on this home.
- 2. In addition to the rating, the Rater or the Rater's employer has also provided the following consulting services for this home:

- A. Mechanical system design
- B. Moisture control or indoor air quality consulting
- C. Performance testing and/or commissioning other than required for the rating itself
- D. Training for sales or construction personnel
- E. Other(specify)

- 3. The Rater or the Rater's employer is:
  - A. The seller of this home or their agent
  - B. The mortgagor for some portion of the financed payments on this home
  - C. An employee, contractor, or consultant of the electric and/or natural gas utility serving this home
- 4. The Rater or Rater's employer is a supplier or installer of products, which may include:

Products	Installed in this home by	OR is in the business of
HVAC systems	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Thermal insulation systems	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Air sealing of envelope or duct systems	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Energy efficient appliances	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Construction (builder, developer, construction contractor, etc)	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer
Other (specify): <input type="text"/>	<input type="checkbox"/> Rater <input type="checkbox"/> Employer	<input type="checkbox"/> Rater <input type="checkbox"/> Employer

- 5. This home has been verified under the provisions of Chapter 6, Section 603 "Technical Requirements for Sampling" of the Mortgage Industry National Home Energy Rating Standard as set forth by the Residential Energy Services Network (RESNET). Rater Certification #: 5490671

Name: Tony Beres

Signature: 

Organization: Center for Energy and Environment

Digitally signed: 8/21/20 at 2:09 PM

I attest that the above information is true and correct to the best of my knowledge. As a Rater or Rating Provider I abide by the rating quality control provisions of the Mortgage Industry National Home Energy Rating Standard as set forth by the Residential Energy Services Network(RESNET). The national rating quality control provisions of the rating standard are contained in Chapter One 102.1.4.6 of the standard and are posted at

<https://standards.resnet.us>

The Home Energy Rating Standard Disclosure for this home is available from the rating provider.



# ENERGY STAR V3.1 Home Report



## Property

421 Maryland Ave. W.  
St. Paul, MN 55117  
Model: 5S-TS4-2

421 Maryland Ave W St. Paul, MN  
55117

## Organization

Center for Energy and Env  
Tony Beres

## Builder

T.C. Habitat for Humanity

## Inspection Status

2020-07-09  
Rater ID (RTIN): 5490671  
RESNET Registered  
(Confirmed)

## Mandatory Requirements

- ✓ Duct leakage at post construction better than or equal to ENERGY STAR v3/3.1 requirements.
- ✓ Envelope insulation levels meet or exceed ENERGY STAR v3/3.1 requirements.
- ✓ Slab on Grade Insulation must be > R-5, and at IECC 2009 Depth for Climate Zones 4 and above.
- ✓ Envelope insulation achieves RESNET Grade I installation, or Grade II with insulated sheathing.
- ✓ Windows meet the 2009 IECC Requirements - Table 402.1.1.
- ✓ Duct insulation meets the EPA minimum requirements of R-6.
- ✓ Mechanical ventilation system is installed in the home.
- ✓ ENERGY STAR Checklists fully verified and complete.

## HERS Index Target

Reference Home HERS	57
SAF (Size Adjustment Factor)	1.00
SAF Adjusted HERS Target	<u>57</u>
As Designed Home HERS	47
As Designed Home HERS w/o PV	47

## Normalized, Modified End-Use Loads (MBtu / year)

	ENERGY STAR	As Designed
Heating	27.1	22.2
Cooling	5.2	4.3
Water Heating	13.8	8.8
Lights and Appliances	20.6	19.6
<b>Total</b>	<b>66.7</b>	<b>55.0</b>



This home **MEETS** or **EXCEEDS** the energy efficiency requirements for designation as an **EPA ENERGY STAR Qualified Home** under Version 3.1

## Pollution Prevented

Type of Emissions	Reduction
Carbon Dioxide (CO <sub>2</sub> ) - tons/yr	1.1

## Energy Cost Savings

	\$/yr
Heating	80
Cooling	0
Water Heating	42
Lights & Appliances	27
Generation Savings	0
<b>Total</b>	<b>149</b>

The energy savings and pollution prevented are calculated by comparing the Rated Home to the ENERGY STAR Version 3.1 Reference Home as defined in the ENERGY STAR Qualified Homes HERS Index Target Procedure for National Program Requirements, Version 3.1 promulgated by the Environmental Protection Agency (EPA). In accordance with the ANSI/RESNET/ICC 301-2014 Standard, building inputs affecting setpoints infiltration rates, window shading and the existence of mechanical systems may have been changed prior to calculating loads



November 8, 2023

VIA ELECTRONIC DELIVERY

Members of the Residential Energy Code TAG,

Given the conversations of the past several meetings of the Residential Energy Code Technical Advisory Group (TAG), Housing First Minnesota wanted to provide an overview of the state of Minnesota's housing market and its demonstrated record on energy efficiency construction.

By way of background, Housing First Minnesota represents more than 1,200-member firms across Minnesota engaged in the construction and renovation of the new homes built to the State Building Code. Our comments are rooted in our mission of homeownership opportunities for all and must be viewed against the backdrop of Minnesota's housing affordability and access crises and its record as a leader in energy efficient new construction. Housing First Minnesota also operates Minnesota's Green Path, the state's largest energy efficient construction program.

## MINNESOTA BUILDING CODE

50 years ago, the Minnesota State Legislature initiated the creation of the Minnesota State Building Code. In the enabling legislation, the Legislature identified the need for affordability to be considered as a central aspect of the State Building Code, noting that, "[a] multitude of laws, ordinances, rules, regulations, and codes regulating the construction of buildings and the use of materials therein is a factor contributing to the high cost of construction. Many such requirements are obsolete, complex, and unnecessary. They serve to increase costs without providing correlative benefits of safety to owners, builders, tenants, and users of buildings." This intent lives on today in Minnesota Statutes 326B.101:

**"The commissioner shall administer and amend a state code of building construction which will provide basic and uniform performance standards, establish reasonable safeguards for health, safety, welfare, comfort, and security of the residents of this state and provide for the use of modern methods, devices, materials, and techniques which will in part tend to lower construction costs. The construction of buildings should be permitted at the least possible cost consistent with recognized standards of health and safety."** (Emphasis Added).

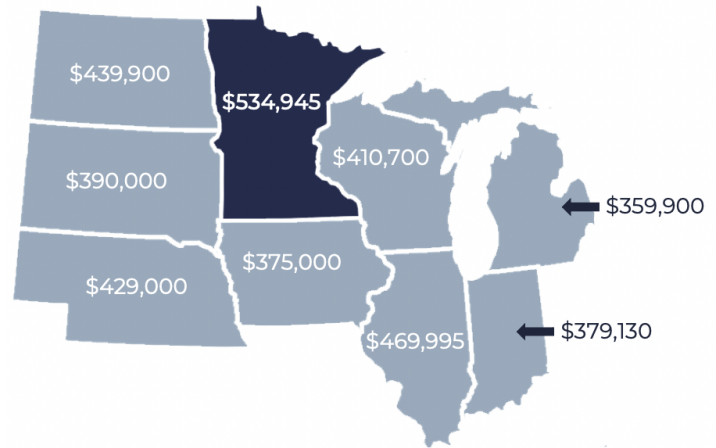
Additionally, in *BATC v. DLI*, the Minnesota Court of Appeals established that any Minnesota amendment must have an established record documenting the rational basis for the amendment. Should this TAG recommend any Minnesota-specific amendments that are arbitrary in nature, or lack adequate rationale, these amendments would be at risk of being invalidated by our courts.

## MARKET DATA

Central to the adoption of a new residential energy code is a clear understanding of the state of Minnesota’s beleaguered housing market. Minnesota and the Twin Cities, in particular, are facing one of the worst housing crises in the nation. This crisis is rooted in a housing regulatory framework that often dismisses affordability in favor of the concerns of special interest groups.

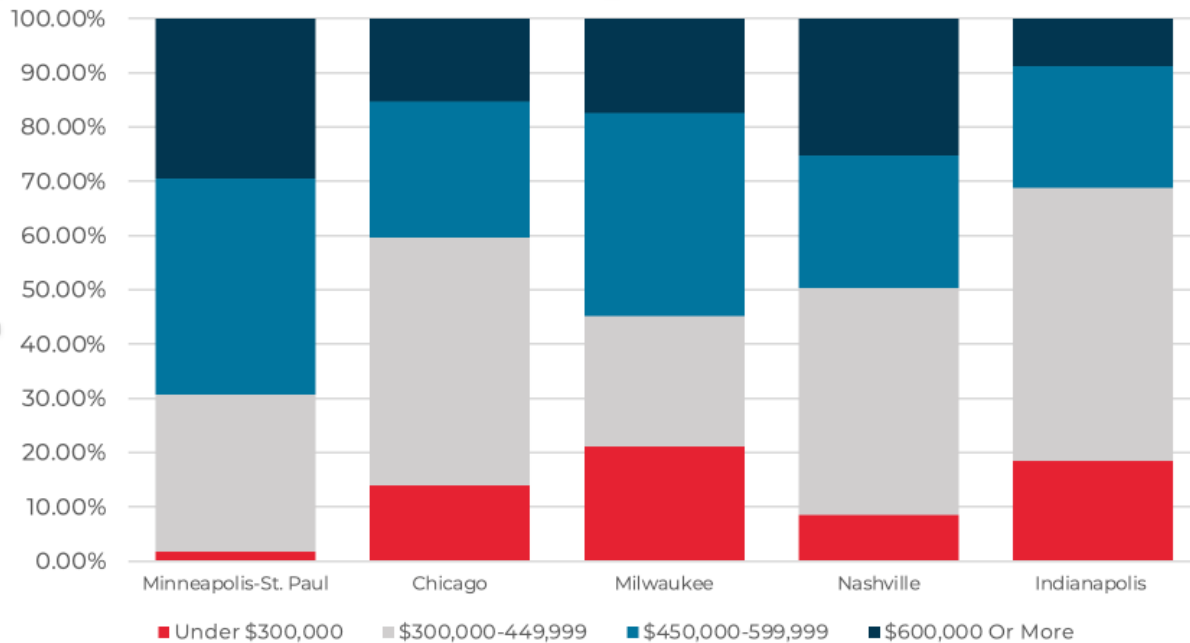
- [Minnesota is the most costly new home housing market in the region](#), according to Zonda (right, figure 1). The median new home price in Minnesota is **30 percent higher** than Wisconsin. The Twin Cities median new home price is \$550,000.
- The Twin Cities is home to the [widest homeownership equity gap](#) in the nation.
- Minnesota is 106,000 housing unit short, according to Up For Growth, [more than double](#) what it was in 2018. The housing shortage is concentrated in the Twin Cities, with represents 72 percent of the deficit.
- Driving the lack of affordability is the [inability to build new starter homes](#) in Minnesota at affordable price points (figures 2 and 3 below).

Figure 1 – Midwest Median New Single-Family Detached Home Price – Oct. 2023



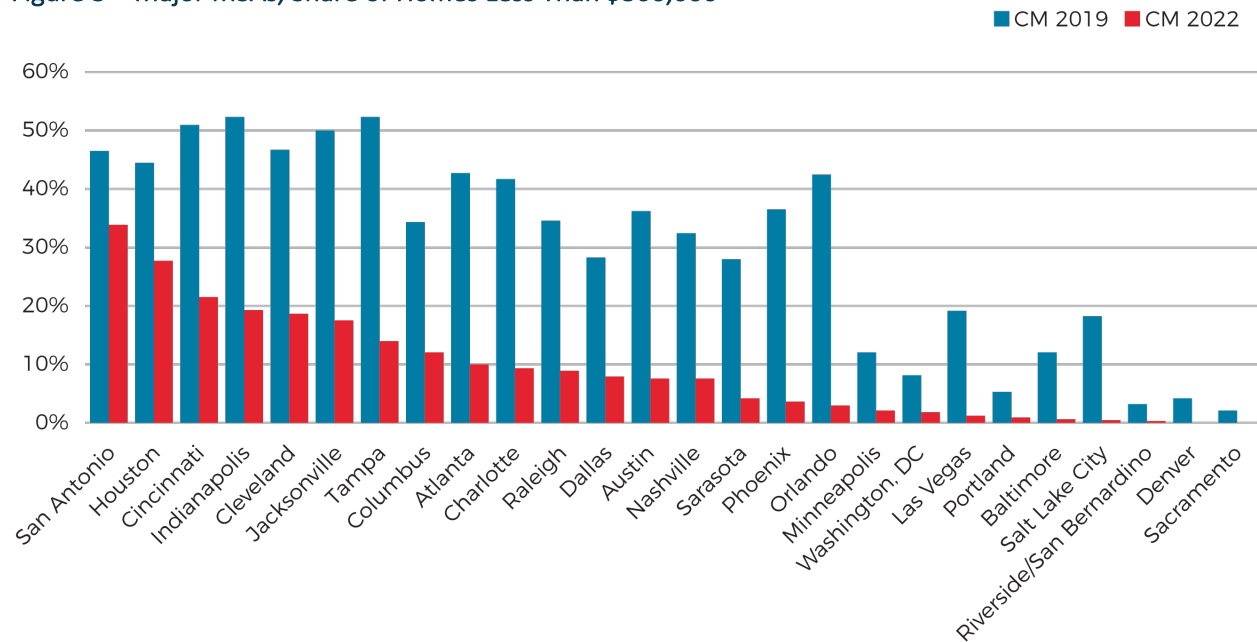
Source: Zonda, Oct. 2023

Figure 2 – Midwest New Home Price Point Distribution, Jan. 2022-Feb. 2023



Source: Zonda

Figure 3 – Major MSAs, Share of Homes Less Than \$300,000



Source: Zonda Review of 2019 and 2022 New Homes Under \$300,000.

### ENERGY EFFICIENT CONSTRUCTION IN MINNESOTA

Despite claims that Minnesota has somehow fallen behind, the state continues to be [the leader](#) in energy efficient new home construction. According to RESNET, Minnesota continues to have the lowest HERS rating for any state with a high amount of rating and testing of homes.

As noted, in the last meeting of the TAG, many homes have an air change per hour performance of less than 2.0. This is true predominately of larger homes with a basement. This is a significant challenge for slab on grade homes, townhomes, twin homes and small homes. Notably, given the affordability challenges in this state, these are home types where construction must be increased. Any attempt to place a wholesale upper limit of 2 ACH on all homes would serve as an effective ban the construction of the homes most needed in our market.

### PAYBACK PERIOD AND INTREST RATES

According to the Pacific Northwest National Laboratory report for the United States Department of Energy (DOE Report) estimating the simple payback period of the 2021 IECC in Minnesota, the payback is estimated to be 12.8-year payback in zone 6 and a 11.8-year payback at in zone 7, based upon energy savings realized in the first year.

These payback periods are inaccurate and underestimate costs and payback due to an underlying issue: near-historic lows of the interest rates when they were calculated. Published in June-2021, at a time when mortgage rates were less than 3 percent according to Freddie Mac, these no longer reflect the market conditions today. That same data set has the mortgage rate in the United States at 7.76 present.

Figure 4 - Buyer Costs, 3% vs. 7.76 % Mortgage – Median Twin Cities Home



	3% Interest (June/July 2021)	7.76% Interest (Nov. 2023)	Change
	\$550,000	\$550,000	-
	12%	12%	-
	\$484,000	\$484,000	-
	\$5,000	\$5,000	-
	\$2,658.90	\$4,089.11	+ \$1,430.71 (+ \$53.80%)
	\$31,906.80	\$49,069.32	+ \$17,162.52 (+ \$53.80%)

Absent any cost increase due to the energy code changes being considered, buyers of the median-priced home in the Twin Cities, paying 12% down, have seen a \$17,162 (53.80%) increase in annual housing costs since these payback estimates were prepared.

Using the estimated cost increases used in the DOE report (\$3,703 for Zone 6a and \$5,294 for Zone 7), and today's rates and DOE'2 12% down payment, the payback is as follows:

**Figure 5-2021 IECC Payback At 7.76% Mortgage Rate**

	Current Twin Cities Median Home Price Zone 6	2021 IECC Cost Increase Home Price Zone 6	Current Median Home Price Statewide Zone 7	2021 IECC Cost Increase Home Price Zone 7
Home Price	\$550,000	\$553,703	\$534,945	\$540,239
Down Payment	12%	12%	12%	12%
Mortgage Amount	\$484,000.00	\$48,7257.76	\$47,0751.60	\$47,5410.32
Taxes and Interest Annual	\$5,000	\$5,000	\$5,000	\$5,000
Monthly Payment	\$4,089.11	\$4,113.84	\$3,988.59	\$4,023.94
Annual Housing Costs	\$49,069.32	\$49,366.08	\$47,863.08	\$48,287.28
Annual Housing Costs Increase	-	+\$296.76	-	+\$424.20
First Year Energy Savings	-	\$231.00	-	\$376.00
Net Housing Costs	-	<b>+\$65.76</b>	-	<b>+\$48.20</b>

Given the current state of the housing market and today's interest rates at near historic averages, the payback does not amount to a set savings using the DOE's estimates of 12% down. In Zone 6, Twin Cities homebuyers will pay \$65.76 more annually (not less) than they would without the 2021 IECC increase in construction costs. In zone 7, new home buyers would pay \$48.20) more annually in housing costs, not less.

## CONCLUSION

Minnesota has long been recognized as a leader in energy efficiency home construction. Yet, we are a laggard in several critical housing affordability and accessibility metrics. Given the affordability issues and industry-leading efficiency ratings, this TAG must balance its approach and broaden its focus to include

the affordability metric. [Housing First Minnesota respectfully requests that this TAG establish a maximum cost increase for new housing units subject to the code.](#)

Adopting this standard would appropriately reflect Minnesota's current dynamic where we are working through a housing affordability and access problem, while currently leading the nation in energy efficiency performance.

Thank you for consideration of our comments.

Regards,



Nick Erickson  
Senior Director of Housing Policy  
Housing First Minnesota



# CENTRAL MINNESOTA BUILDERS ASSOCIATION

November 8, 2023

VIA ELECTRONIC DELIVERY

Members of the Residential Energy Code TAG:

**CMBA, on behalf of our more than 300 member builders and contractors, is sharing our concerns for balancing energy efficiency with practicality and affordability.** Minnesota faces a deepening housing availability and affordability crisis, and our members are dedicated to creating housing opportunities for everyone. **Efficiency measures the TAG is considering would exacerbate this housing crisis.**

First of all, it is important to emphasize our builders and contractors are already getting the job done on energy efficiency. **Minnesotans build the most energy efficient new housing** in the upper Midwest. **We do not face a crisis in energy efficient home building, but a massive supply and affordability crisis.** Every new energy regulation and requirement puts housing affordability out-of-reach for more Minnesotans.

A half century ago, when the Minnesota State Legislature initiated the State Building Code, it identified the critical need to consider affordability, noting that, “[a] multitude of laws, ordinances, rules, regulations, and codes regulating the construction of buildings and the use of materials therein **is a factor contributing to the high cost of construction.** Many such requirements are obsolete, complex, and unnecessary. They serve to increase costs without providing correlative benefits of safety to owners, builders, tenants, and users of buildings.” That original legislative intent remains relevant in Minnesota Statutes 326B.101: “The commissioner shall administer and amend a state code of building construction which will provide basic and uniform performance standards, establish reasonable safeguards for health, safety, welfare, comfort, and security of the residents of this state and provide for the use of modern methods, devices, materials, and techniques **which will in part tend to lower construction costs.** The construction of buildings **should be permitted at the least possible cost** consistent with recognized standards of health and safety.” (Emphasis Added).

**The median new home price in Minnesota is 30 percent higher than that same home in Wisconsin,** even as our builders continue building the most energy efficient new homes in the region. According to RESNET, **Minnesota continues to have the lowest HERS rating for any state with a high amount of rating and testing of homes.**

As noted during the last TAG meeting, many Minnesota homes have an air change per hour (AHC) performance of less than 2.0, primarily in larger homes with basements. Such a low exchange rate is a huge challenge for slab-on-grade (“patio”) homes, townhomes, twin homes and small homes – the very type of housing we need to address Minnesota’s housing supply and affordability crisis. **Implementing a 2 AHC limit would effectively ban the construction of such homes at the very time Minnesota needs them.** We also know the payback calculations are inaccurate because they were based on some of the lowest interest rates in housing history.

Given the housing supply and affordability crisis facing Minnesota, and our already industry-leading efficiency ratings, **this TAG must balance its approach and prioritize the affordability metric. CMBA respectfully requests that this TAG establish a maximum increased cost impact for what it proposes.**

Thank you for consideration of our comments and concerns, and please feel free to contact me with questions.

Sincerely yours,

Wanda Schroeder  
Executive Director

Cc: CMBA Board of Directors  
CMBA Government Affairs, Steve Gottwalt  
Housing First MN, Nick Erickson



## CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

Author/requestor: John G. Smith, P.E.

Date: October 23, 2023

Email address:

Model Code: Residential

Telephone number:

Code or Rule Section: R402.2.3 Eave Baffle

Firm/Association affiliation, if any:

Code or rule section to be changed: 1322

Intended for Technical Advisory Group ("TAG"):

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### General Information

**Yes**    **No**

- |  |                                     |                                     |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota?                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| B. Is the proposed change required due to climatic conditions of Minnesota?            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| C. Will the proposed change encourage more uniform enforcement?                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| D. Will the proposed change remedy a problem?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment?               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

### Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).  
R402.2.3 Eave Baffle

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.

3. Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

R402.2.3 ~~Eave baffle.~~ Wind wash prevention. For air-permeable insulation in vented attics, a baffle shall be installed adjacent to soffit and eave vents. Baffles shall maintain a net free area opening equal to or greater than the size of the vent. The baffle shall extend over the top of the attic insulation. The baffle shall be permitted to be any solid material. The baffle shall be installed to the outer edge of the exterior wall top plate so as to provide maximum space for attic insulation coverage over the topplate. Where soffit venting is not continuous, baffles shall be installed continuously to prevent ventilation air in the eave soffit from bypassing the baffle. A wind wash baffle shall be provided to separate air permeable insulation from the ventilation intake space, extending vertically from the outside edge of the exterior wall top plate to the top of the insulation and sealed on the bottom and sides.

4. Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.  
No

### **Need and Reason**

1. Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)  
Preventing wind wash of the attic insulation along the perimeter wall edges is important to maintain the thermal performance of the insulation. Adding the wind wash baffle accomplishes this.
2. Why is the proposed code change a reasonable solution?  
It is a common solution to the issue.
3. What other factors should the TAG consider?

### **Cost/Benefit Analysis**

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.  
The proposed change clarifies a proper installation method which should be included in the project.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.  
No
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is

any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.

### **Regulatory Analysis**

1. What parties or segments of industry are affected by this proposed code change?  
General contractor, insulation contractor, building officials.
  
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.  
No
  
3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?  
Consequences of not adopting are reduction in thermal performance of attic insulation at perimeter.
  
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.  
No

\*\*\*Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.





## CODE CHANGE PROPOSAL FORM

(Must be submitted electronically)

*Author/requestor:* John G. Smith, P.E.

*Date:* October 23, 2023

*Email address:*

*Model Code:* Residential Energy Code

*Telephone number:*

*Code or Rule Section:* 1322

*Firm/Association affiliation, if any:*

*Code or rule section to be changed:* R402.1.5 Total UA alternative

*Intended for Technical Advisory Group ("TAG"):*

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### General Information

**Yes**    **No**

- |  |                                     |                                     |
|--|-------------------------------------|-------------------------------------|
| A. Is the proposed change unique to the State of Minnesota?                            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| B. Is the proposed change required due to climatic conditions of Minnesota?            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| C. Will the proposed change encourage more uniform enforcement?                        | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| D. Will the proposed change remedy a problem?  | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| E. Does the proposal delete a current Minnesota Rule, chapter amendment?               | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| F. Would this proposed change be appropriate through the ICC code development process? | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |

### Proposed Language

1. The proposed code change is meant to:

change language contained the model code book? If so, list section(s).  
R402.1.5 Total UA alternative

change language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

delete language contained in the model code book? If so, list section(s).

delete language contained in an existing amendment in Minnesota Rule? If so, list Rule part(s).

add new language that is not found in the model code book or in Minnesota Rule.

2. Is this proposed code change required by Minnesota Statute? If so, please provide the citation.  
No

- Provide *specific* language you would like to see changed. Indicate proposed new words with underlining and ~~striketrough~~ words proposed for deletion. Include the entire code (sub) section or rule subpart that contains your proposed changes.

**R402.1.5 Total UA alternative:** Where the total building thermal envelope UA, the sum of U-factor times assembly area, is less than or equal to the total UA resulting from multiplying the U-factors in Table R402.1.2 by the same assembly area as in the proposed building, the building shall be considered to be in compliance with Table R402.1.2. The UA calculation shall be performed using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. In addition to UA compliance, ~~the SHGC requirements of Table R402.1.2 and~~ the maximum fenestration U-factors of Section R402.5 shall be met.

**R402.1.5.1 Performance criteria.** The combined thermal transmittance (U<sub>o</sub>) factors for walls, roof/ceilings, and floors over unheated spaces used for alternative calculation equivalency purposes must be less than or equal to:

- 0.110 Btu/h ft<sup>2</sup> °F for walls;
- 0.024 Btu/h ft<sup>2</sup> °F for roof/ceilings; and
- 0.033 Btu/h ft<sup>2</sup> °F for floors.

- Will this proposed code change impact other sections of a model code book or an amendment in Minnesota Rule? If so, please list the affected sections or rule parts.  
No

**Need and Reason**

- Why is the proposed code change needed? Please provide a general explanation as well as a specific explanation for any changes to numerical values (heights, area, etc.)

Using only UA equivalency with no limits on the baseline U values for the walls, roof/ceiling and floors over unheated spaces can have unintended consequences. For example, considering the walls only and performing U<sub>o</sub> equivalent calculations, the effect of increasing glass area is shown below:

<b>Prescriptive wall values:</b>					
<b>U<sub>g</sub>:</b>		<b>0.30</b>			
<b>U<sub>w</sub>:</b>		<b>0.045</b>			
<b>Framing to Cavity Ratio: 25%/75%</b>					
For changing glass areas, what is resulting overall					
U <sub>o</sub> which would satisfy UA alternative calculations?					
	<b>% Glass</b>	<b>% Framing</b>	<b>% Cavity</b>	<b>U<sub>o</sub></b>	<b>U<sub>o</sub>/0.110 wall limit</b>
	15.00%	22.92%	68.76%	0.083	0.76
	20.00%	22.60%	67.80%	0.096	0.87
	25.00%	22.28%	66.84%	0.109	0.99
	30.00%	21.96%	65.89%	0.122	1.10
	35.00%	21.64%	64.93%	0.134	1.22
	40.00%	21.33%	63.98%	0.147	1.34
	45.00%	21.01%	63.02%	0.160	1.45
	50.00%	20.69%	62.06%	0.173	1.57
Setting wall U at 0.110 would allow 25% glass area if U <sub>g</sub> = 0.30					
Typical house is below 20% glass area					
Using higher performance glass would allow more than 25% glass					

The heat losses of a wall are calculated using the formula  $U_oA (T_{inside}-T_{outside})$ . As can be noted, even 50% glass area will satisfy the equivalency calculation even though the overall wall has 57% greater heat losses than the limited 0.110 calculation, which limits the maximum glass area to about 25%. Summer heat gains would be similarly impacted, although more difficult to compare due to solar gains.

2. Why is the proposed code change a reasonable solution?  
This proposed change provides clarity to the calculation methods and eliminates the possibility of allowing buildings with much greater heat losses and gains than are intended by the code. This added wording is very similar to what was in the 1994 Minnesota Residential Energy Code. The deletion of the SHGC requirements was because they do not apply to Zones 6 and 7.
3. What other factors should the TAG consider?

### **Cost/Benefit Analysis**

1. Will the proposed code change increase or decrease costs? Please explain and provide estimates if possible.  
No change. It provides clarification to how calculations are to be performed.
2. If there is an increased cost, will this cost be offset by a safety or other benefit? Please explain. If the benefit is quantifiable (for example energy savings), provide an estimate if possible.
3. If there is a cost increase, who will bear the costs? This can include government units, businesses, and individuals.
4. Are there any enforcement or compliance cost increases or decreases with the proposed code change? Please explain.  
No
5. Will the cost of complying with the proposed code change in the first year after the rule takes effect exceed \$25,000 for any one small business or small city ([Minn. Stat. § 14.127](#))? A small business is any business that has less than 50 full-time employees. A small city is any statutory or home rule charter city that has less than ten full-time employees. Please explain.  
No

### **Regulatory Analysis**

1. What parties or segments of industry are affected by this proposed code change?  
General contractors, architects, engineers
2. Can you think of other means or methods to achieve the purpose of the proposed code change? What might someone opposed to this code change suggest instead? Please explain what the alternatives are and why your proposed change is the preferred method or means to achieve the desired result.  
No

Proposed change is the correct method to assure consistency in how the UA alternative calculations are performed.

3. What are the probable costs or consequences of not adopting the code change, including those costs or consequences borne by identifiable categories of affected parties, such as separate classes of government units, businesses, or individuals?  
Increased energy consumption of residential buildings.
4. Are you aware of any federal or state regulation or requirement related to this proposed code change? If so, please list the federal or state regulation or requirement and your assessment of any differences between the proposed code change and the federal regulation or requirement.  
The goal of the energy code is to save energy, which is being promoted by the DOE.

\*\*\*Note: Incomplete forms may be returned to the submitter with instruction to complete the form. Only completed forms can be considered by the TAG.