

From: [Eric Lacey](#)
To: [Dwayne Garriss](#)
Cc: [Ted Miltiades](#); [Jim Reynolds](#); [Construction Codes and Industrialized Buildings \(Codes\)](#)
Subject: RECA Comments on 4 Proposals to be Heard by SCAC January 25
Date: Wednesday, January 24, 2024 3:15:13 PM
Attachments: [CE94-19 \(002\).pdf](#)
[CE248-19 \(002\).pdf](#)

Chairman Garriss,

I hope you are doing well. I'm emailing you because I was planning on attending the GA SCAC meeting tomorrow, but I unfortunately picked up COVID and am currently quarantining at home. I don't know whether there is an opportunity to provide written comments on proposals that you will be hearing tomorrow, but I'm hopeful that you will consider (and share with your Committee, if appropriate) the following comments.

I recommend that the Committee reject all four proposals relating to automated window shading (Items 2025-4, 2025-5, 2025-6, and 2025-7). Three of the four proposals were submitted and rejected unanimously by the Code Development Committees in the 2021 IECC Code Development Cycle. (They were not re-submitted in the 2024 cycle, as far as I'm aware.) As a matter of principle, I don't think Georgia should be adopting new provisions that were not approved for the I-codes. The fourth proposal (2025-4) does include language that appears in the draft 2024 IECC, but out of context and with no substantiation for equivalency. Here are a few brief notes on each of the four proposals:

Item 2025-4 (C406) - This commercial proposal would create a new "Additional Efficiency Package Option" in section C406 for automated interior or exterior shading devices.

- Although the proponent claims that similar language is found in the draft 2024 IECC, the context is very important: These measures earn points in the *renewables and load management credits* table – not the base energy credits table. The two tables were designed to serve related, but different purposes. Adopting this proposal could open the door to a wide range of new credits focused on renewables, load management, etc. that may or may not be appropriate for Georgia's current energy code.
- The proponent does not provide any analysis indicating that these measures are equivalent to the existing Additional Efficiency Package Options.
- We recommend not incorporating any new credits until Georgia revises all of C406 (via adoption of 2021 or 2024 IECC).

Item 2025-5 (C402.4.3.3) – This commercial proposal would allow automated shading devices to satisfy prescriptive SHGC requirements in a way similar to the code's treatment of dynamic glazing.

- A similar proposal (CE94-19) was disapproved unanimously by the Code Development Committee in the 2021 IECC process. Of the proposal, the committee said "We should not allow non-permanent devices for tradeoff."
- The proponent does not provide analysis demonstrating equivalence between fenestration SHGC and internal or external shading. And the proposal does not include details about how the devices are required to operate.
- Internal shading, in particular, cannot compete one-for-one with low-SHGC fenestration because solar radiation still enters the enclosure through the glass (even though visible light might be reduced by interior shading).
- Even automated shades can be deactivated by an occupant, reversing the efficiency savings (particularly if used as a trade-off against low-SHGC fenestration).

Item 2025-6 (C407.5.1(1)) – This commercial proposal allows code users to get efficiency credit in the performance path for automatic shading devices – for vertical fenestration and for skylights. Because this credit does not currently exist in the performance path, adding it through this amendment would serve to reduce the overall efficiency of the code (since it could be traded against SHGC or other measures that save energy).

- A nearly identical proposal (CE248-19 Part 1) was disapproved unanimously by the Code Development Committee in the 2021 IECC update process. About the proposal, the Commercial Development Committee said “The performance path should not allow non-permanent solutions.”
- As with other proposals, the proponent does not provide analysis demonstrating energy savings or equivalence with other measures.
- This proposal would allow credit for window or skylight shading to be used to trade away efficiency of other energy saving measures, such as insulation R-values.
- Even automated shades can be deactivated by an occupant, reversing the efficiency savings (particularly if used as a trade-off against low-SHGC fenestration).

Item 2025-7 (R405.5.2(1)) – This is a residential proposal that is similar to Item 2025-6.

- A nearly identical proposal (CE248-19 Part 2) was disapproved (at the request of the proponent) by the Residential Code Development Committee in the 2021 IECC update process. Part 1 of the proposal had already been disapproved by the Commercial Development Committee. The proposal was not re-submitted for the 2024 IECC, and as far as I am aware, has not been adopted in any state code.
- As with other proposals, proponent does not provide analysis demonstrating energy savings or equivalence with other measures.
- Automatic shades cannot provide the same level of energy savings as a permanent overhang or low-SHGC coatings because the shades can be disabled by occupants.
- Internal shading, in particular, cannot compete one-for-one with low-SHGC fenestration because solar radiation still enters the enclosure, even though visible light might be reduced by interior shading.

I apologize for not being able to attend the meeting in-person, but I hope that the information above is helpful to your Committee’s consideration. For reference, I will attach copies of the proposals that were reviewed by the Code Development Committees in the 2021 IECC Development Cycle. If you or any member of your Committee has any questions, please feel free to call or email me.

Thank you,

Eric

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CE94-19

IECC C402.4.3.4(New); Chapter 6CE (New)

Proponent: Erika Burns, D+R International, representing Attachments Energy Rating Council (AERC)
(aerc316@gmail.com)

2018 International Energy Conservation Code

Add new text as follows:

C402.4.3.4 Automated Dynamic Shades Where interior or exterior shades, blinds, louvers, or drapes are used to improve the overall SHGC of the fenestration system, the combined performance calculated in accordance with Appendix B of AERC 1 and multiplied by 1.1 shall be permitted to satisfy the SHGC requirements found in Table C402.4 provided the shading device complies with all of the following:

1. The shading device is permanently attached.

2. The shading device is automatically controlled and capable of automatically modulating the amount of solar gain and light transmitted into the space in multiple steps in response to daylight levels or solar intensity.

3. The shading device is capable of providing not less than 90 percent coverage of the fenestration in the closed position.

4. Any manual control of the shading device shall not override automatic operation for longer than 4 hours per actuation.

AERC

Attachments Energy Rating
Council
355 Lexington Avenue
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Add new standard(s) as follows:

AERC

Attachments Energy Rating
Council
355 Lexington Avenue
New York New York 10017
US

AERC 1-2018: Procedures for Determining Energy Performance Properties of Fenestration Attachments

Reason: Window and skylight shading systems can provide significant improvement in SHGC of fenestration systems. The only way to guarantee that these systems block solar heat gain when needed is through automatic control based on light or heat at the façade.

There already is an allowance for dynamic glazing (C402.4.3.3 Dynamic Glazing) to be allowed to help comply with SHGC. This proposal is similar but for permanent automated window shading devices. These automated shading devices are typically permanently attached to the interior or exterior of the wall or roof, are hardwired into the building and are as permanent as any luminaire.

The combined SHGC for the combination of the selected shading system with any window or skylight system is

readily available from the shading manufacturers or computed in free validated software such as WINDOW from Lawrence Berkeley National Laboratory.

There are industry standards that are used to measure the combined SHGC performance of windows with shading devices. Performance tests for Solar Heat Gain Coefficient SHGC (G-Value), Solar Transmittance (Ts), Solar Reflectance (Rs), Solar Absorptance (As), Visible Light Transmission VLT (Tv) can be conducted in accordance with EN 14501:2005, ASTM E891, and ASTM E903-96. Glass performance tests can be conducted using the Lawrence Berkeley National Laboratory Window NFRC certified software.

An example study showing how automated shading systems with high solar reflectance fabrics (example from Mermet : <http://www.mermetusa.com/transparent/t-screen-with-koolblack-3-5.html>) save significant cooling energy can be found at: <http://performanceshadingadvisor.com/#thermalmanagement>

In addition to solar heat gain improvement, this technology inherently saves other energy. When the shade is open, there will be more savings on the electric lighting side due to daylight dimming. Automation closes the shade when there is glare or increased solar energy, but opens the shade to allow more natural light when glare or solar heat gain is not a problem.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This proposal does not require use of dynamic shading; it just allows combined SHGC to be used if a project is already using dynamic shades.

Analysis: A review of the standard proposed for inclusion in the code, AERC 1, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2019.

Proposal # 4991

CE94-19

CE248-19 Part I

PART I — IECC: Part I: TABLE C407.5.1(1)

IECC: Part II: TABLE R405.5.2(1) [(TABLE N1105.2(1)]

PART II — IECC: TABLE R405.5.2(1) [IRC N1105.2(1)]

Proponent: Erika Burns, D+R International, representing Attachments Energy Rating Council (AERC) (aerc316@gmail.com)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC- COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2018 International Energy Conservation Code

Revise as follows:

TABLE C407.5.1(1)

SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

Portions of table not shown remain unchanged.

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Vertical fenestration other than opaque doors	Area 1.The proposed vertical fenestration area; where the proposed vertical fenestration area is less than 40 percent of above-grade wall area. 2.40 percent of above-grade wall area; where the proposed vertical fenestration area is 40 percent or more of the above-grade wall area.	As proposed
	U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used	As proposed
	<u>Shading:</u> External shading and PF: None <u>Automatic and manually controlled shading devices such as blinds or shades are not required to be modeled.</u>	As proposed <u>Manual blinds or shades shall be modeled the same as in the standard reference design.</u> <u>Automatically controlled blinds or shades shall be modeled.</u>

Skylights	Area 1.The proposed skylight area; where the proposed skylight area is less than that permitted by Section C402.1.	As proposed
	2.The area permitted by Section C402.1; where the proposed skylight area exceeds that permitted by Section C402.1 U-factor: as specified in Table C402.4	As proposed
	SHGC: as specified in Table C402.4 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed
	<u>Shading: Automatic and manually controlled shading devices such as blinds or shades are not required to be modeled.</u>	<u>Manual blinds or shades shall be modeled the same as in the standard reference design. Automatically controlled blinds or shades shall be modeled.</u>

SWHF = Service water heat recovery factor, DWHR = Drain water heat recovery.

- a. Where no heating system exists or has been specified, the heating system shall be modeled as fossil fuel. The system characteristics shall be identical in both the standard reference design and proposed design.
- b. The ratio between the capacities used in the annual simulations and the capacities determined by sizing runs shall be the same for both the standard reference design and proposed design.
- c. Where no cooling system exists or no cooling system has been specified, the cooling system shall be modeled as an air-cooled single-zone system, one unit per thermal zone. The system characteristics shall be identical in both the standard reference design and proposed design.
- d. If an economizer is required in accordance with Table C403.5(1) and where no economizer exists or is specified in the proposed design, then a supply-air economizer shall be provided in the standard reference design in accordance with Section C403.5.
- e. The SWHF shall be applied as follows:
 1. Where potable water from the DWHR unit supplies not less than one shower and not greater than two showers, of which the drain water from the same showers flows through the DWHR unit then $SWHF = [1 - (DWHR \text{ unit efficiency} \cdot 0.36)]$.
 2. Where potable water from the DWHR unit supplies not less than three showers and not greater than four showers, of which the drain water from the same showers flows through the DWHR unit then $SWHF = [1 - (DWHR \text{ unit efficiency} \cdot 0.33)]$.
 3. Where potable water from the DWHR unit supplies not less than five showers and not greater than six showers, of which the drain water from the same showers flows through the DWHR unit, then $SWHF = [1 - (DWHR \text{ unit efficiency} \cdot 0.26)]$.
 4. Where Items 1 through 3 are not met, $SWHF = 1.0$.

Proposal # 4670

CE248-19 Part I

CE248-19 Part II

IECC: TABLE R405.5.2(1) [IRC N1105.2(1)]

Proponent: Erika Burns, D+R International, representing Attachments Energy Rating Council (AERC) (aerc316@gmail.com)

2018 International Energy Conservation Code

**TABLE R405.5.2(1) [IRC N1105.2(1)]
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

Portions of table not shown remain unchanged.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Vertical fenestration other than opaque doors	Total area ^h = (a) The proposed glazing area, where the proposed glazing area is less than 15 percent of the conditioned floor area (b) 15 percent of the conditioned floor area, where the proposed glazing area is 15 percent or more of the conditioned floor area.	As proposed
	Orientation: equally distributed to four cardinal compass orientations (N, E, S & W).	As proposed
	U-factor: as specified in Table R402.1.4.	As proposed
	SHGC: as specified in Table R402.1.2 except for climate zones without an SHGC requirement, the SHGC shall be equal to 0.40.	As proposed
	Interior shade fraction: 0.92-(0.21 × SHGC for the standard reference design).	Interior shade fraction: 0.92-(0.21 × SHGC as proposed)
	External shading: <u>Automatic and manually controlled shading devices such as blinds or shades are not required to be modeled.</u>	<u>Manual blinds or shades shall be modeled the same as in the standard reference design. Automatically controlled blinds or shades shall be modeled.</u>
Skylights	None. <u>Shading: Automatic and manually controlled shading devices such as blinds or shades are not required to be modeled.</u>	As proposed <u>Manual blinds or shades shall be modeled the same as in the standard reference design. Automatically controlled blinds or shades shall be modeled.</u>

For SI: 1 square foot = 0.93 m², 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m², 1 gallon (US) = 3.785 L,

°C = (°F-32)/1.8, 1 degree = 0.79 rad.

a. Where required by the *code official*, testing shall be conducted by an *approved* party. Hourly

calculations as specified in the ASHRAE *Handbook of Fundamentals*, or the equivalent, shall be used to determine the energy loads resulting from infiltration.

- b. The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE *Handbook of Fundamentals*, page 26.24 and the "Whole-house Ventilation" provisions of 2001 ASHRAE *Handbook of Fundamentals*, page 26.19 for intermittent mechanical ventilation.
- c. Thermal storage element shall mean a component that is not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element shall be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or shall be connected to such a room with pipes or ducts that allow the element to be actively charged.
- d. For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.
- e. For a proposed design without a proposed heating system, a heating system having the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.
- f. For a proposed design home without a proposed cooling system, an electric air conditioner having the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.
- g. For a proposed design with a nonstorage-type water heater, a 40-gallon storage-type water heater having the prevailing federal minimum energy factor for the same fuel as the predominant heating fuel type shall be assumed. For a proposed design without a proposed water heater, a 40-gallon storage-type water heater having the prevailing federal minimum efficiency for the same fuel as the predominant heating fuel type shall be assumed for both the proposed design and standard reference design.
- h. For residences with conditioned basements, R-2 and R-4 residences, and for townhouses, the following formula shall be used to determine glazing area:

$$AF = A_s \times FA \times F$$

where:

AF	=	Total glazing area.
A_s	=	Standard reference design total glazing area.
FA	=	(Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 × below-grade boundary wall area).
F	=	(above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.

Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.

Below-grade boundary wall is any thermal boundary wall in soil contact.

Common wall area is the area of walls shared with an adjoining dwelling unit.

L and *CFA* are in the same units.

Reason: The IECC is not currently clear on how manual or automated shades and blinds are to be addressed in the performance path, other than specifying an interior shade fraction. This could lead to potential gaming using different assumptions for shading in the reference and proposed designs, so should be clarified. First, this proposal specifies that manual blinds and shades are to be modeled the same in the reference and proposed designs. This ensures manual shades are treated neutrally, with no credit for manual shades since occupant behavior and the performance of manual controls cannot be guaranteed. Second, it does allow automatically controlled shades to be modeled in the proposed building, as this can provide advanced energy performance without relying on an occupant's behavior. To avoid proprietary issues, the control scheme for how the automated shades are modeled is not specified and is left up to the designer or builder, subject to approval by the code official. This is similar to how automated shades are already addressed in ASHRAE 90.1 for commercial applications, and a similar proposal has been submitted for the commercial IECC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. This change simply clarifies how manual and automated blinds and shades are to be addressed in the performance path, and does not impact cost of construction.

Proposal # 4985

CE248-19 Part II