

# EC85 – 07/08

## EECC Recommended Action: Approved as Modified by the Public Comment

### Public Comment

#### Proposed Modification to Original Proposal:

Revise tables as follows. Note that only building components with edits are included below:

**TABLE 404.5.2(1)  
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing <sup>a</sup>	Total area <sup>b</sup> = (a) The proposed glazing area; where the proposed glazing area is less than 18% of the conditioned floor area (b) 18% of the conditioned floor area; where the proposed glazing area is 18% or more of the conditioned floor area Orientation: equally distributed to four cardinal compass orientation (N,E,S, & W) U-factor: from Table 402.1.2 SHGC: From Table 402.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used Interior shade fraction: Summer (all hours when cooling is required) = <del>0.90</del> <u>0.85</u> Winter (all hours when heating is required) = <del>0.90</del> <u>0.85</u> Exterior shading: none	As proposed  As proposed As proposed As proposed Same as standard reference design <sup>c</sup>  As proposed

#### Reason Statement:

EC85 is part of the EECC’s proposed package to improve the IECC residential energy provisions by 30%. As explained in detail in the reason for the original proposal, EC85 allows for the energy efficiency improvements of the home to be treated consistently throughout the year without impact from occupant behavior between seasons. In the existing *IECC*, it is assumed that shading is used more in the summer than the winter, thereby reducing the benefits of measures aimed at conserving cooling energy (because cooling energy has already been reduced by the assumption of greater shading). If EC85 is adopted, this assumption will be removed and simulated performance analysis will no longer be artificially biased. In order to make this proposal more acceptable, this public comment modifies the interior shade fractions to 0.85 year round to be consistent with currently accepted value of 0.85 for winter in the 2006 IECC.

The Development Committee noted that: “There is no technical support for changing assumptions about human behavior relative to the use of windows in different seasons.” We submit that there is no technical support for any specific assumption about human behavior in operating shades in home. However, the present code assumes that shades are used twice as much during the summer as the winter. Because there is no valid evidence as to actual human behavior, and indeed shade use is ultimately up to each individual occupant, we propose to treat all seasons equally. In order to satisfy the concerns of the committee, we propose to modify the proposal to use a shading value (0.85) already contained in the code.

## **Proposal History:**

**Committee Recommended Action on Original Proposal at Public Hearing:** Disapproved

### **Committee Reason(s) for Recommended Action:**

There is no technical support for changing assumptions about human behavior relative to use of windows in different seasons. These numbers are higher than ASHRAE 92 and, while that is not necessarily a reason not to change them, there needs to be more study to justify the assumptions.

**Initial Recommendation of EECC:** Approve

### **Initial Proposal for Reference:**

## EC85-07/08

### Table 404.5.2(1)

**Proponents:** Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Bill Prindle, American Council for an Energy Efficient Economy (ACEEE); Jeff Harris, Alliance to Save Energy (ASE); Steven Rosenstock, Edison Electric Institute (EEI)

Revise table as follows:

**TABLE 404.5.2(1) (Supp)**  
**SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing <sup>a</sup>	Total area <sup>b</sup> = (a) The proposed glazing area; where the proposed glazing area is less than 18% of the conditioned floor area (b) 18% of the conditioned floor area; where the proposed glazing area is 18% or more of the conditioned floor area  Orientation: equally distributed to four cardinal compass orientation (N,E,S, & W) U-factor: from Table 402.1.2 SHGC: From Table 402.1 except that for climates with no requirement (NR) SHGC = 0.40 shall be used Interior shade fraction: Summer (all hours when cooling is required) = <del>0.70</del> <u>0.90</u> Winter (all hours when heating is required) = <del>0.85</del> <u>0.90</u>  Exterior shading: none	As proposed    As proposed As proposed As proposed  Same as standard reference design <sup>c</sup>   As proposed

(Portions of table and footnotes not shown remain unchanged)

**Reason:** This proposal alters the assumptions regarding interior window shades in the standard reference design. It assumes that a typical occupant will not alter their behavior with regards to interior shade operation by season. It also assumes that the majority of windows will not have shades drawn during daytime hours to block solar radiation. As a result, the purchased energy estimated using the performance approach will be more accurate and representative of an actual residential building.

This proposal makes the performance path more accurate by assuming an equal interior shade fraction in all seasons. The current standard reference design assumes that 30% of the solar gain in the summer has already been blocked by shade use, while only 15% is blocked in the winter. Because the performance path assumes that interior shading is used twice as much in the summer as in the winter, the equation shows higher relative energy use in the heating months than in the cooling months. In the performance path calculation, this translates to an artificially inflated heating budget and a bias in favor of measures used to reduce heating energy. The assumption also makes no climate zone-specific distinctions, but rather assumes that shading tendencies are static nationally. The result is that the performance path may favor compliance measures that reduce heating energy over measures that reduce cooling energy, even in cooling-dominated climates.

Although it can be argued that a conscientious building occupant may reduce heating or cooling loads by operating shades to minimize sunlight during the summer and maximize sunlight during winter, there is no data to suggest that occupants actually engage in these practices for the purpose of saving energy. In fact, it is common practice in northern climates to use shades more often during the winter months for the perceived insulating benefits and to control glare. There are many reasons why shades are operated throughout the year, and almost all of them have nothing to do with energy use. For example, privacy concerns may lead occupants to leave shades closed year-round, whereas a beautiful view or daylighting interest may induce an occupant to leave shades open year-round. Every building will have unique shading characteristics based on the climate zone, shade type, window type, orientation, exterior shading, and most importantly, the occupant's priorities.

Because there is no reliable data to support the current bias in the performance path, the shading fraction should be neutralized so that heating and cooling measures will be treated similarly. Moreover, given that lack of data as to actual operation, the safer assumption is that shades are largely left open (justifying a higher fraction); after all, it is reasonable to assume that the average person buys windows for views and light. This is the only solution that makes sense, given the wide range of climate zones and circumstances to which the performance path will apply. This change is not intended to affect the overall stringency of the code, nor should it generally increase the costs of compliance.

**Cost Impact:** The code change proposal will not increase the cost of construction.