

RECD1-6-22

IECC: R405.2

Proponents: Ian Finlayson, representing IECC RE Economics, Modeling, Metrics subcommittee

2024 International Energy Conservation Code [CE Project]

Revise as follows:

R405.2 Simulated performance compliance. Compliance based on total building performance requires that a *proposed design* meets all of the following:

1. The requirements of the sections indicated within Table R405.2.
2. The proposed total building thermal envelope UA, which is the sum of the U-factor times assembly area, shall be less than or equal to the building thermal envelope UA using the prescriptive U-factors from Table R402.1.2 multiplied by 1.15 in accordance with Equation 4-1. the building thermal envelope UA using the prescriptive U-factors from Table R402.1.2 multiplied by 1.15 in accordance with Equation 4-1. The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be:

(Equation #)

For Climate Zones 0-2: $UA_{\text{Proposed design}} \leq 1.08 \times UA_{\text{Prescriptive reference design}}$

For Climate Zones 3-8: $UA_{\text{Proposed design}} \leq 1.15 \times UA_{\text{Prescriptive reference design}}$

3. An annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's State Energy Data System Prices and Expenditures reports. Code officials shall be permitted to require time-of-use pricing in energy cost calculations.

Exceptions:

1. The energy use based on source energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost. The source energy multipliers for electricity shall be 2.74. The source energy multiplier for fuels other than electricity shall be 1.09. ~~multipliers for all energy sources shall be obtained from ASHRAE Standard 105 (Tables K2, K4, or K8) or from another data source approved by the code official.~~
2. The energy use based on site energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost ~~for an all electric building with on-site renewable energy installed.~~

Reason: Based on discussion during the 2-28 SC meeting on numerous Panel 1 proposals that sought to remove, add, or delete the reference to Appendix K Tables from ASHRAE Standard 105, the Sub-Committee questioned whether the complexity of adding this Standard was worth it. While the Main Committee supported the inclusion of this Standard in the 1st round of comment, upon closer examination, the Table references offer 6 different site-to-source multipliers for electricity which could lead to unnecessary complexity for the code official and software implementers. Additionally, the need for the site-based Exception was called into question given that it yields the same result as the energy cost calculation. This proposal is similar to RED1-47, which removes the Exception 2 and restores a more simple approach for source energy savings calculation, when it is selected as an alternative to energy cost savings. It also recognizes that the multipliers have decreased, as evidenced by the values in ASHRAE Std 105. This simplifies the code without negatively affecting energy performance.

For reference, how this Section is stated in PCD1 of 2024 IECC-C:

C407.2 Mandatory requirements. Compliance based on total building performance requires that a proposed design meet all of the following:

1. The requirements of the sections indicated within **Table C407.2(1)**.
2. An annual energy cost that is less than or equal to ~~80~~^{the} percent of the annual energy cost (PAEC) of the *standard reference design* calculated in Equation 4-32. Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's *State Energy Data System Prices and Expenditures* reports. *Code officials* shall be permitted to require time-of-use pricing in energy cost calculations. The reduction in energy cost of the proposed design associated with *on-site renewable energy* shall be not more than 5 percent of the total energy cost. The amount of renewable energy purchased from off-site sources shall be the same in the *standard reference design* and the *proposed design*.

Exceptions:

1. Jurisdictions that require site energy (1 kWh = 3413 Btu) rather than energy cost as the metric of comparison.
2. Where energy use based on source energy expressed in Btu or Btu per square foot of conditioned floor area is substituted for the energy cost, the energy use shall be calculated using source energy factors from Table C407.2(2) For electricity, U.S. locations shall use values eGRID subregions. Locations outside the United States shall use the value for "All other electricity" or locally derived values.

$$PAEC = 100 \times (0.85 + 0.025 - EC_r/1000)$$

PAEC = Percentage of annual energy cost applied to standard reference design (Equation 4-32)
EC_r = Energy efficiency credits required for the building in accordance with Section C406.1 (do not include load management and renewable credits)

Cost Impact: The code change proposal will neither increase nor decrease the cost of construction.
No cost impact

See cost effectiveness calculator <https://www.iccsafe.org/wp-content/uploads/Copy-of-Source-Multipliers.xlsx>