



STATE OF WASHINGTON

STATE BUILDING CODE COUNCIL

Washington State Energy Code Development Standard Energy Code Proposal Form

May 2018

Log No. Env037-2018 REV

Code being amended: Commercial Provisions Residential Provisions

Code Section # C202, C402.1.5, C402.4.1, C402.4.1.1, new sections C402.4.1.1.1-C402.4.1.1.4

Brief Description: *This proposal addresses ambiguity in the Code with regards to how maximum allowed window-to-wall ratio (WWR) and skylight-to-roof ratio (SRR) are calculated and applied to various compliance options and alternatives. It clarifies WWR and SRR as whole building level parameters, or per space conditioning area if the building has more than one space conditioning category. It also defines how interior partitions separating spaces with different levels of space conditioning are accounted for.*

Proposed code change text: (Copy the existing text from the Integrated Draft, linked above, and then use underline for new text and ~~strikeout~~ for text to be deleted.)

C402.4.1 Fenestration maximum area. The total building vertical fenestration area (not including opaque doors and opaque spandrel panels) shall not exceed 30 percent of the total building gross above-grade wall area (window-to-wall ratio). The total building skylight area shall not exceed 5 percent of the total building gross roof area (skylight-to-roof ratio).

For buildings with more than one space conditioning category, compliance with the maximum allowed window-to-wall ratio and skylight-to-roof ratio shall be demonstrated separately for each space conditioning category. Interior partition ceiling, wall, fenestration and floor areas that separate space conditioning areas shall not be applied to the window-to-wall ratio and skylight-to-roof ratio calculations.

C402.4.1.1 Vertical fenestration maximum area with high performance alternates. For buildings that comply with C402.4.1.1.1, C402.4.1.1.3 or C402.4.1.1.4, the total building vertical *fenestration* area is permitted to exceed 30% but shall not exceed 40% of the gross above grade wall area for the purpose of prescriptive compliance with Section C402.1.4.

For the component performance alternative per Section C402.1.5, the total building vertical fenestration area allowed in Equation 4-2 is 40% of the above grade wall area for buildings that comply with the vertical fenestration alternates described in this section. These alternates are not permitted to be used for Total Building Performance compliance in Section C407.

~~C402.4.1.1.1 Increased vertical fenestration area with daylight responsive controls~~ **Optimized daylighting.** A maximum of 40 percent of the gross above grade wall area shall be permitted to be vertical fenestration for the purpose of prescriptive compliance with Section C402.1.4 or for the component performance alternative in Section C402.1.5, provided All of the following requirements are shall be met:

1. In buildings not greater than two stories above grade, no less than 50 percent of the total conditioned floor area in the building is within a *daylight zone*.
2. In buildings three or more stories above grade, not less than 25 percent of the total net floor area in the building is within a *daylight zone*.
3. *Daylight responsive controls* complying with Section C405.2.4.1 are installed in *daylight zones*.
4. Visible transmittance (VT) of all vertical fenestration in the building is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 4.

C402.4.1.1.2 Reserved.

C402.4.1.1.3 Increased vertical fenestration area with High-performance fenestration. ~~The vertical fenestration area (not including opaque doors and opaque spandrel panels) is permitted to exceed 30% but shall not exceed 40% of the gross above-grade wall area, for the purpose of prescriptive compliance with Section C402.1.3 provided that each of the following conditions are met: All of the following requirements shall be met:~~

1. ~~The All vertical fenestration in the building shall have comply with~~ the following U-factors:
 - a. Non-metal framing (all) = 0.28
 - b. Metal framing (fixed) = 0.34
 - c. Metal framing (operable) = 0.36
 - d. Metal framing (entrance doors) = 0.60
2. The SHGC of the vertical fenestration shall be less than or equal to 0.35, adjusted for projection factor in compliance with C402.4.3.

An area-weighted average shall be permitted to satisfy the U-factor requirement for each fenestration product category listed in Item 1 of this section. Individual fenestration products from different fenestration product categories shall not be combined in calculating the area-weighted average *U*-factor.

~~The compliance path described in this section is not permitted to be used for the Total Building Performance compliance path in Section C407. The compliance path described in this section is permitted to be used for the component performance alternative in Section C402.1.5, provided that the requirements of Section C402.1.5 are met.~~

C402.4.1.1.4 Increased vertical fenestration area with high-performance Optimized mechanical systems. ~~The vertical fenestration area (not including opaque doors and opaque spandrel panels) is permitted to exceed 30 percent but shall not exceed 40 percent of the gross above-grade wall area, for the purpose of prescriptive compliance with Section C402.1.4 or for the component performance alternative in Section C402.1.5, provided that the mechanical system complies with all requirements of Section C403.3.5C, dedicated outdoor air systems (DOAS) without utilizing the exceptions to Section C403.3.5. This increased glazing fraction is not permitted to be used to establish the reference case for the Total Building Performance compliance path in Section C407. All occupied spaces in the building that require ventilation per the *International Mechanical Code* shall be served by a dedicated outdoor air system (DOAS) per section C403.3.5, without utilizing any of the exceptions to Section C403.3.5.~~

C402.1.5 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-2 shall be permitted in lieu of compliance with the *U*-factors and *F*-factors in Table C402.1.4 and C402.4 and the maximum allowable fenestration areas in Section C402.4.1.

For buildings with more than one *space conditioning category*, component performance compliance shall be demonstrated separately for each space conditioning category. Interior partition ceilings, walls, fenestration and floors that separate space conditioning areas shall be applied to the component performance calculations for the space conditioning category with the highest level of space conditioning.

SPACE CONDITIONING CATEGORY. Categories are based on the allowed peak space conditioning output capacity per square foot of conditioned floor area, or the design setpoint temperature, for a building or space. Space conditioning categories from lowest to highest include: low energy, semi-heated, conditioned, refrigerated walk-in and warehouse coolers, and refrigerated walk-in and warehouse freezers.

Purpose of code change:

The implied intent in the WSEC is that the scope of the maximum allowed WWR and maximum allowed SRR applies to the total building. However, this is not clearly stated in the Code. This has led to inconsistent interpretation and enforcement. Defining these parameters at the total building level is the most straight-forward interpretation. This proposal also recommends applying this interpretation to the vertical fenestration alternates by requiring that the higher performance elements defined in this section are applied at the whole building level to justify the increase in allowed total building WWR.

Economic Impact Data Sheet

Briefly summarize your proposal's primary economic impacts and benefits to building owners, tenants and businesses.

The primary benefits of this proposal are to clarify these requirements so building owners and designers have clear instructions of how to comply with the envelope provisions, and to improve consistency with jurisdictional enforcement. This has the potential to prevent costly time delays during the permitting process.

Provide your best estimate of the construction cost (or cost savings) of your code change proposal? (See OFM Life Cycle Cost [Analysis tool](#) and [Instructions](#); use these [Inputs](#). **Webinars on the tool can be found [Here](#) and [Here](#)**)

Indeterminate (For residential projects, also provide \$[Click here to enter text.](#)/ dwelling unit)

Show calculations here, and list sources for costs/savings, or attach backup data pages

NA

Provide your best estimate of the annual energy savings (or additional energy use) for your code change proposal?

[Click here to enter text.](#)KWH/ square foot (or) 375 KBTU/ square foot

(For residential projects, also provide [Click here to enter text.](#)KWH/KBTU / dwelling unit)

Show calculations here, and list sources for energy savings estimates, or attach backup data pages

NA

List any code enforcement time for additional plan review or inspections that your proposal will require, in hours per permit application:

This proposal does not change the amount of time required to verify Code compliance of envelope provisions, however, it does provide clarity with which jurisdictions can use to defend their enforcement decisions.

All questions must be answered to be considered complete. Incomplete proposals will not be accepted.