

Fenestration

IECC: TABLE C402.4

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2018 International Energy Conservation Code

Revise as follows:

**TABLE C402.4
BUILDING ENVELOPE FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS**

CLIMATE ZONE	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7	8
Vertical fenestration								
<u>U-factor for curtain walls, storefront, and site-built fenestration products</u>								
Fixed fenestration	0.50	0.50	0.46	0.38	0.38	0.36	0.29	0.29
Operable fenestration	0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37
<u>U-factor for Entrance Doors</u>								
Entrance doors	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77
<u>U-factor for all other vertical fenestration</u>								
	<u>0.65</u>	<u>0.40</u>	<u>0.32</u>	<u>0.32</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>	<u>0.30</u>
SHGC								
Orientation ^a	SEW	N	SEW	N	SEW	N	SEW	N
PF < 0.2	0.25	0.33	0.25	0.33	0.25	0.33	0.36	0.48
0.2 ≤ PF < 0.5	0.30	0.37	0.30	0.37	0.30	0.37	0.43	0.53
PF ≥ 0.5	0.40	0.40	0.40	0.40	0.40	0.40	0.58	0.58
Skylights								
U-factor	0.75	0.65	0.55	0.50	0.50	0.50	0.50	0.50
SHGC	0.35	0.35	0.35	0.40	0.40	0.40	NR	NR

NR = No Requirement, PF = Projection Factor.

- a. "N" indicates vertical fenestration oriented within 45 degrees of true north. "SEW" indicates orientations other than "N." For buildings in the southern hemisphere, reverse south and north. Buildings located at less than 23.5 degrees latitude shall use SEW for all orientations.

Reason Statement: The proposal modifies the fenestration table by separating requirements for “punched opening” type windows that go in a framed opening from other fenestration types such as metal curtain walls, storefront fenestration and site-built fenestration. Punched opening windows can achieve better U-factors more easily and cost-effectively than the other fenestration types, but U-factor code requirements for this window type have been held back by the technological and cost effectiveness limitations of curtain wall fenestration systems, storefronts and site-built products.

The 2018 IECC currently allows a 4 story multifamily building to install a less efficient window than an otherwise identical 3-story multifamily building. The only difference in the buildings from an energy standpoint is the number of floors, yet less efficient windows are allowed to be installed in the mid-rise building. This is a critical issue for midrise multifamily buildings where punched opening type windows are common, but is also an issue for other low- and mid-rise commercial buildings where they are also common.

This proposal is meant to close this loophole. It retains existing U-factor requirements for curtain walls, storefront fenestration, site-built fenestration and entrance doors (the types for which U-factor advancements are more difficult) and introduces a new category for all other fenestration that captures punched opening windows. The U-factor requirements for this category are drawn from the residential section of the code since punched opening requirements are the standard fenestration type in residential construction.

It is important to note that this proposal has been structured in a way so that it will be compatible with any other proposal

that changes the existing U-factors. This proposal changes the headings and leaves the actual U-factors in place, allowing them to be modified by another proposal.

There may be some specialized circumstances where these requirements could cause technical challenges, especially high-rise buildings that are utilizing punched openings or other high-wind areas. However, this table sets the minimum for performance and these projects have other compliance paths (both modeling in the IECC and ASHRAE 90.1) to give them flexibility for these specialized circumstances, and it does not make sense to hold back the performance of the entire new construction building market for a handful of rare cases that still have other compliance options.

When these requirements were modeled relative to IECC-2015 (which has essentially the same window requirements), using the mid-rise prototype that the Pacific Northwest National Lab developed for national code determination studies, the savings ranged from 1.0-2.9% depending on climate zone (climate zone 1 is effectively the same).

Cost Impact: The code change proposal will increase the cost of construction. This proposal will only increase cost for projects utilizing punched opening type fenestration. All other fenestration will be unaffected. Additionally, this proposal utilizes the values for punched openings from the residential energy code requirements where these values have been negotiated through the ICC hearing process and found cost effective in residential.

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