

DOCKETED

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Additional submitted attachment is included below.

California Energy Commission Docket 19-BSTD-003 2022 Energy Code Pre-Rulemaking

November 3, 2020

Comments on Proposed Changes to the Nonresidential High Performance Envelope for the 2022 Energy Code (Specifically Fenestration)

Thank you for the opportunity to submit comments on the proposed changes (as set out in the Final CASE Report on Nonresidential High Performance Envelope submitted in the docket on October 9, 2020) to the 2022 Energy Code related nonresidential fenestration. I appreciate the efforts of everyone involved in developing the CASE proposal. For the most part, the proposed changes related to fenestration in the CASE Report seem reasonable and I support them.

However, I suggest that some refinements should also be considered to build upon and improve the prescriptive values in the proposal, such as:

- Retain the current policy of uniform prescriptive window values for all climate zones (this would spread the improved efficiency benefits across the state instead of limiting the benefits to a few zones).
- Combine the two categories of “Curtain wall or Storefront” and “Fixed Window” into a single “Fixed Window” category with one set of values.
- Set the RSHGC/SHGC for all vertical fenestration at 0.23 (consistent with residential windows).
- Set the VT for all vertical fenestration (including Fixed and Curtainwall/Storefront) at 0.32 (the same as the “Operable Window” category).
- Switch to the use of SHGC instead of RSHGC for prescriptive compliance values.

I have elaborated on these items in my Recommended Improvements below. But first, let me offer some comments in support of certain aspects of the CASE proposal.

Support for CASE Proposals:

- 1. Support for CASE Proposal to Eliminate the 200 Square Foot Nonresidential Appendix NA6 Exception:** The CASE proposal revises Exceptions 1 and 2 to Section 110.6(a)2, Section 110.6(a)3 and Section 110.6(a)4 in order to delete the option to calculate default values per Reference Nonresidential Appendix NA6 for site-built vertical fenestration up to 200 square feet. The Commission has progressively shrunk this exception in previous code change cycles; now is the time to finish the process.

Fenestration performance is a very important measure. Using only NFRC certified performance values and or limited defaults will increase the likelihood of actually getting at least the performance called for in the energy code. Accurate product ratings

are critical for the building standards to produce the intended benefits. NFRC labels have been successfully required for all residential fenestration (subject to limited default values) for many years; the same approach should apply for all nonresidential buildings.

- 2. Support for CASE Proposal to Improve Fixed Window and Curtain wall Prescriptive U-factors:** It has been a number of years since these prescriptive requirements have been upgraded. The proposed 0.34 prescriptive U-factor for the Fixed Window category in certain zones appears to be a reasonable improvement over the current code requirements and is consistent with prescriptive values in ASHRAE 90.1 (2019) and recently approved changes for the 2021 IECC (specifically ASHRAE/IECC zone 6). The proposed improvement in the prescriptive U-factor for the Curtain wall or Storefront category to 0.38 (from 0.41) in a few zones is a reasonable small step forward, but the value could certainly be more robust (ASHRAE 90.1 and the IECC have more stringent values – 0.36 in ASHRAE/IECC zones 4-5 and 0.34 in zone 6) and extend to more California climate zones.

Recommended Improvements

Below are some observations and comments on improvements/modifications to the CASE proposal that I also recommend be considered:

- 1. Combine Curtain wall and Storefront with Fixed Windows into a Single Category:** A reasonable approach to improve the performance of curtain wall/storefront would be to treat it the same as other fixed windows – this would further improve the U-factor and SHGC for these products. This is the approach taken in both ASHRAE 90.1 and the IECC, where curtainwall/storefront glazing (as an alternative to standard fixed windows) is not a separate category but is instead required to meet the same U-factor as other fixed fenestration. Combining all fixed fenestration into one category would also serve to save energy that would otherwise be lost in California nonresidential buildings when curtain wall/storefront glazing (with weaker values) is used instead of other fixed windows.
- 2. Maintain Uniform Prescriptive Requirements:** The current energy code establishes the same set of prescriptive nonresidential fenestration requirements statewide. This is an important and valuable feature in the energy code that should not be casually tossed aside. I strongly favor continuing uniform U-factors and SHGCs for all climate zones just as in the current energy code. While climate zone differentiation for these products may appear attractive on the surface, I think it undercuts the powerful practical market transformation impact of one set of statewide values for these products (having a single target can be expected to produce economies of scale and improve code

compliance). Ideally, the new prescriptive values proposed for the “Fixed Window” and “Curtain wall or Storefront” categories for some climate zones could be applied in all climate zones.

3. **Establish 0.23 Maximum SHGC/RSHGC Prescriptive Value for All Fenestration:** I suggest simplifying the proposed SHGC values by setting one SHGC (or RSHGC if retained) area weighted average prescriptive value for all fenestration types used in a building. Given how close the values are among the categories, there is simply no good reason for different SHGCs/RSHGCs by product type (the values are all met by the same type of products). A reasonable approach would be to adopt the same 0.23 SHGC approved last cycle for residential fenestration for all non-residential fenestration, including fixed and operable fenestration and curtain wall. This simplification will also reduce confusion and improve enforcement. Note that under both ASHRAE 90.1 and the IECC, curtainwall and fixed fenestration have the same SHGC requirements.
4. **Establish 0.32 Minimum VT Prescriptive Value for Fixed as well as Operable Windows:** I suggest simplifying the proposed minimum VT values by setting one weighted average VT value of 0.32 (the current Operable value) for all fenestration (Fixed, Operable, and Curtain wall/Storefront). While tightening RSHGC/SHGC requirements can produce significant energy and peak savings, it is important to realistically adjust minimum VT downward concurrently or reasonable products to achieve lower SHGC will be blocked by the minimum VT requirement.

Minimum VT and maximum SHGC are connected. Lower SHGC products block more transmittance of light, which also reduces VT (yet there is no proposal to adjust the maximum VT along with the proposed SGHC reductions). In other words, any significant reduction to SHGC should be accompanied by an appropriate reduction to VT. It should also be recognized that the SHGC levels currently specified in the energy code already maximize control of solar gain for the most part from the non-visible light portion of the spectrum; as a result, any further reductions in SHGC will have to come mostly from the visible light part of the spectrum resulting in a disproportionate reduction in VT.

The need for a corresponding reduction in VT to go along with a lower SHGC for Fixed windows is illustrated by current prescriptive Operable Window requirements. Such windows must meet a maximum 0.22 SHGC and a minimum 0.32 VT. Note that the Operable SHGC is only 0.03 lower than the current 0.25 SHGC for Fixed windows, but the VT is 0.10 lower than the current 0.42 VT for Fixed windows. Given the proposal to lower current Fixed window SHGC requirements to 0.22 (the same as Operable), it is reasonable to lower the minimum VT for Fixed windows to 0.32.

- 5. Replace RSHGC with SHGC:** Elimination of the RSHGC concept for compliance on a prescriptive basis would improve compliance and enforcement under the prescriptive compliance approach. Instead of RSHGC, the prescriptive path could simply specify SHGC, just as in homes. This approach would simplify prescriptive compliance and enforcement by relying on the labeled and certified SHGC value of the fenestration product instead of requiring the computation of an RSHGC (measurement and computation of RSHGC for all fenestration in a building is a point where significant errors can be introduced in compliance).

Further, the benefits of shading are better accounted for under the performance compliance approach, which would more accurately model any benefits from shading as compared with a prescriptive RSHGC. The RSHGC approach (and any credit for overhangs or other exterior shading) would work best if limited to the performance compliance approach.

Finally, elimination of a prescriptive RSHGC trade-off would also save more energy. Without the prescriptive RSHGC trade-off, the building would see the benefits of both the lower SHGC and any exterior shading (note that exterior shading may often be added for reasons other than energy efficiency), rather than offsetting the benefit of exterior shading with a higher SHGC through a prescriptive trade-off.

Thank you again for the opportunity to offer these views.

Respectfully submitted,

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