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## RE: Comment on the proposed revision of ENERGY STAR for windows, doors, and skylights. Recommended changes in Phase 2 draft windows criteria for climate zones ES4 and ES5

Dear Rich:

Comparing the proposed Phase 2 windows criteria for climate zones ES4 and ES5, we have identified two issues that suggest the need to modify the proposed ENERGY STAR criteria:

1. Windows with an SHGC of 0.45 or higher in climate zone ES5, as currently proposed, would have to meet *less stringent* U-factor criteria than windows with an equivalent SHGC in climate zone ES4. Given that ES5 represents a colder climate than ES4, we would expect that windows with an equivalent SHGC should meet at least as stringent U-factor criteria in ES5 as in ES4.
2. Although the proposed tradeoff criteria between U-factor and SHGC in ES4 and ES5 are based on the same principles in both phases, the tradeoff in Phase 2 covers the full allowed range up to SHGC 0.55, whereas this tradeoff stops at SHGC 0.41 in Phase 1. The Phase 2 criteria thus “reward” a higher SHGC with a higher allowed U-factor up to the very point where it is capped. We believe the approach used in Phase 1 makes more sense, as discussed below.

In response to these issues, we suggest the following modifications:

1. **Require at least equally stringent maximum U-factors in ES5 as in ES4.** An example of how this could be achieved is shown in the tables below. These tables also provide an example of how to address the second issue we raise:
2. **Eliminate the tradeoff between U-factor and SHGC for an SHGC range close to the upper bound, in both Phase 1 and Phase 2.** The rationale for raising the U-factor criteria for windows with a higher SHGC is based on the assumption that a higher SHGC can provide passive solar heating benefits in cooler climates. Capping the SHGC at 0.55, on the other hand, is based on the assumption that allowing too high an SHGC is potentially problematic, even in heating-dominated climates, due to the potential for unwanted solar gain (depending on the application). This suggests that there is a certain SHGC range, as the SHGC approaches its upper bound, within which the potential benefits and potential problems are of similar weight. Within this range, there should be no added “reward” for a higher SHGC. This could be achieved by eliminating the tradeoff for SHGC values between 0.41 and 0.55 in both the Phase 1 and Phase 2 criteria.

The following tables provide an example of how the proposed criteria should be modified to address both of the above-mentioned issues (the stringency of U-factor criteria in ES5 vs. ES4 and eliminating the trade-off for SHGC vs. U-factor close to the upper bound for U-factor).

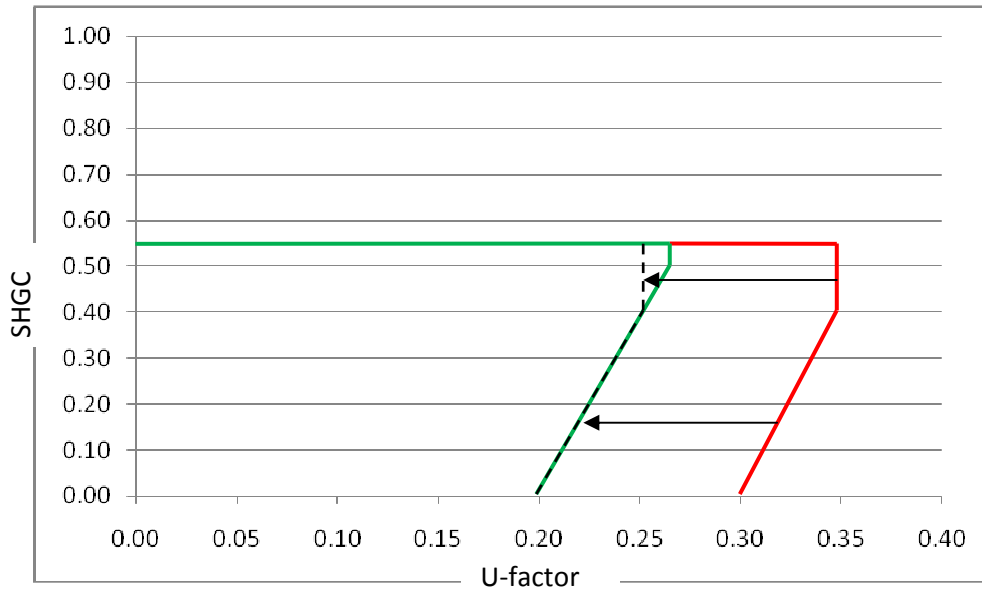
These recommended changes are graphically displayed below the tables.

As indicated by the arrows in the graphic display above, our suggested criteria mean a parallel shift on the X-axis between Phases 1 and 2, or in other words a tightening of the U-factor criteria in Phase 2 without a change in the pattern of the U-factor-SHGC tradeoff.

ES4, Phase 2	
U-factor ( $\leq x$ )	SHGC ( $\geq x$ and $\leq 0.55$ )
<del>0.26</del>	<del>0.49</del>
0.25	0.41
0.24	0.33
0.23	0.25
0.22	0.17
0.21	0.09
0.20	0.01

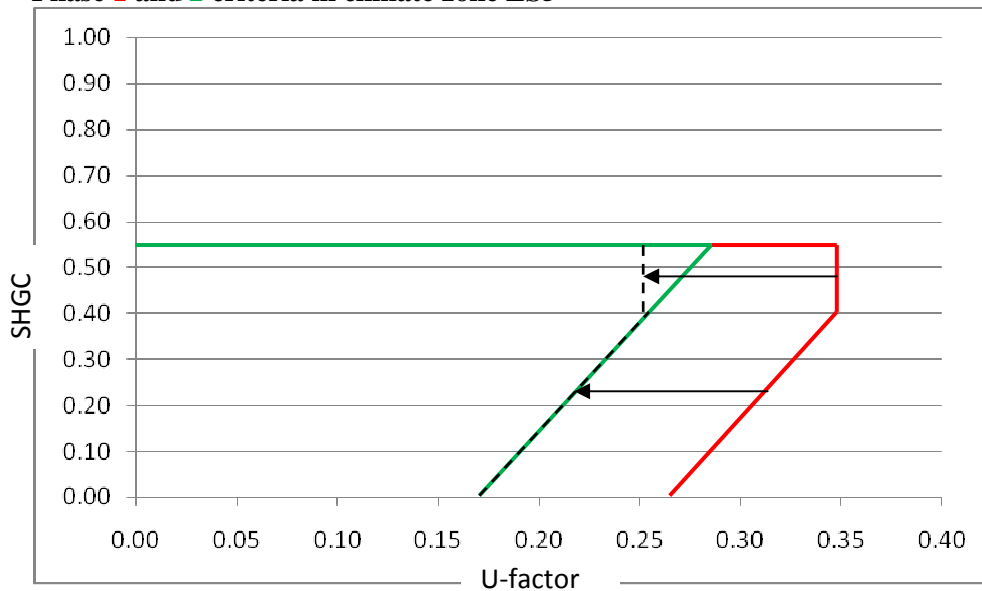
ES5, Phase 2	
U-factor ( $\leq x$ )	SHGC ( $\geq x$ and $\leq 0.55$ )
<del>0.28</del>	<del>0.55</del>
<del>0.27</del>	<del>0.50</del>
<del>0.26</del>	<del>0.45</del>
0.25	0.40
0.24	0.35
0.23	0.30
0.22	0.25
0.21	0.20
0.20	0.15
0.19	0.10
0.18	0.05
0.17	0

Phase 1 and 2 criteria in climate zone ES4



— Phase 1 — Phase 2 - - - Suggested Criteria

Phase 1 and 2 criteria in climate zone ES5



— Phase 1 — Phase 2 - - - Suggested Criteria

Sincerely,

Nils Petermann  
Project Manager, Efficient Windows Collaborative  
Alliance to Save Energy