



November 14, 2008

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US Department of Energy

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Re: Comments and Recommendations on Modifications to the Criteria for ENERGY STAR® Windows and Doors as Outlined in the Draft Criteria and Analysis Originally Published on August 6<sup>th</sup>, 2008; Revised on August 11, 2008.

Dear Rich and Emily:

Thank you for this opportunity to provide Andersen Corporation's (Andersen's) comments and recommendations on the proposed changes to the criteria for the Department of Energy's ENERGY STAR® windows program.

We have supported the ENERGY STAR windows program from its inception and continue to support the Department's objective to improve program criteria and promote increased energy efficiency. However, we are very concerned with the Department's specific proposals in a few key areas and believe that the proposal requires essential modifications and refinements for the program to be effective. We will summarize these key areas below.

### **Background**

As you know, Andersen is the nation's largest manufacturer of energy efficient residential fenestration products. In addition to Andersen Windows (vinyl clad and Fibrex® material (vinyl/wood composite) sash/frames), Andersen-owned companies include Renewal by Andersen (sale and installation of replacement windows made from Fibrex® material), Silver Line Building Products (vinyl sash/frames), Eagle Window & Door (aluminum clad sash/frames), KML Windows (specialty wood or aluminum clad sash/frames), EMCO Doors (storm doors), and Dashwood Industries (vinyl sash/frames sold in Canada). As a result, we have substantial experience with virtually all energy efficient window and door types and, in particular, customer acceptance of and response to those products. We hope that the DOE and D & R Int'l will carefully consider our comments within the context of our broad experience in designing, marketing and selling these products for many decades.

As you are aware, we have also been an avid supporter and active participant in the National Fenestration Rating Council (NFRC). We believe that we were the first major manufacturer to adopt NFRC U-Factor and Solar Heat Gain Coefficient (SHGC) labeling across all of its products lines nationwide. We were the first fenestration company to introduce low-E glass and make it our standard glass offering, not an optional upgrade. We think it is likely that we have labeled more window and door products with an ENERGY STAR® label than any other manufacturer in the program. We have actively participated in energy code development either directly or indirectly for many years; we developed and sponsored the NFRC labeling requirements in the MEC/IECC in the 1990s, as well as the southern SHGC requirements, among other important proposals. We worked with allies to develop the federal window tax credits and support their adoption. We actively participated in previous revisions to Energy Star criteria. In short, we have consistently been an advocate for more energy efficient products in all regulatory arenas.

An important part of our success has been the ability to deliver energy efficiency at various price points in the marketplace. One of the primary cautions we have regarding the direction DOE is heading is that the Phase 2 criteria, which call for very aggressive energy efficiency levels, will likely require product re-design and/or glazing technology and sash/frame materials that are either not commercially viable, are not proven to be durable or even more concerning, are at a price point in the marketplace that most customers simply cannot afford or will not consider purchasing. As we have indicated to you in previous discussions, DOE and the country only benefit from energy savings when customers actually purchase and install energy efficient products. Setting stringent energy performance criteria that look good on paper, but that few customers actually purchase, does not advance the public interest.

We have been working continuously with our industry association, WDMA, to develop an industry response to the proposed new criteria. As a result, we support the recommendations outlined in the WDMA comments and urge you to adopt them.

### **Summary of Recommendations and Requests**

In addition to the WDMA recommendations, we have identified specific recommendations and requests for both proposed phases outlined in the DOE August 6, 2008 report. They are as follows:

1. We request that the Phase 1 criteria be limited to products manufactured on and after January 1, 2010 and Phase 2 criteria be limited to products manufactured on and after January 1, 2015.
2. Climate Zone and Criteria:
  - a. Establish a climate zone map with no more than four zones for either Phase 1 or 2. Use the climate zones and U-Factor/SHGC values recommended in the WDMA comments. Most importantly, **do not** create a six zone map and in particular, eliminate Zone 5a with the corresponding U-Factor of 0.30 for Phase 1.

- b. **Do not** create U-Factor/SHGC trade-offs in ENERGY STAR® proposed Zones 4 and 5 in either Phase 1 or Phase 2.
  - c. If, despite our objection, any SHGC trade-off is established for Phase 1, establish more flexibility by basing the trade-off on a more reasonable baseline window: start with a 0.32 U-Factor; 0.15 SHGC.
  - d. Establish an ENERGY STAR® Heating Plus and Cooling Plus concept that can be utilized by utility programs and set the requirements for Phase 1 at the most stringent U-Factor of 0.30 (for Heating Plus) and SHGC of 0.25 (for Cooling Plus).
  - e. Add sliding doors into the same qualifying category under the same table as side-hinged doors.
  - f. For skylights and roof windows, establish requirements in Phase 1 that are no more stringent than a maximum 0.53 U-Factor; maximum 0.30 SHGC. Skylight requirements for Phase 2 require further study to determine reasonable performance characteristics for re-designed products.
  - g. Do not set the Phase 2 criteria beyond what is reasonably achievable with a triple-glazing technology and, as recommended by WDMA, delay the Phase 2 decision and announcement until after adoption of final criteria for Phase 1 in 2009 (to allow further analysis and comments on Phase 2 based on the final Phase 1 criteria and climate zones).
  - h. If DOE is unwilling to delay consideration of Phase 2 requirements until after Phase 1 is announced, then adopt Andersen's specific Phase 2 recommendations as follows:
    - i. If DOE intends to require performance equivalent to triple glazing in ES 4-5, set a maximum U-Factor no lower than 0.28 and no SHGC requirement (alternatively, a reasonable maximum SHGC should be set).
    - ii. If, despite our objection, an SHGC trade-off matrix is adopted for ES 4-5, establish more flexibility by basing the trade-off on a more reasonable baseline window: start with a 0.26 U-Factor; 0.15 SHGC;
    - iii. Set the maximum SHGC no lower than a 0.25 SHGC in any zone due to visible light considerations.
    - iv. Set the maximum U-Factor for zones 1-3 no lower than 0.32.
3. Allow a U-Factor add-on (0.03 - 0.04) to the qualification criteria for products in high altitude regions where breather tubes are used and the air space is filled with air instead of an argon or other gas blend.

4. Allow a standard product without laminated or tempered glass or grilles or grids to represent a product with these features for purposes of Energy Star qualification.
5. Remove the requirement for the U.S. climate zone map to be on the product label.

### **Rationale for Recommendations**

The supporting rationale for these recommendations follows.

#### **1. Phase 1 criteria should only apply to products manufactured on and after January 1, 2010 and Phase 2 criteria should only apply to products manufactured on and after January 1, 2015.**

We request that DOE use a “manufacturing date” approach for implementation of the program requirements. Under this approach, all deadlines should apply to the date of manufacturing and not to products already in the supply chain. It would not be cost-effective (and would likely be impossible to effectively accomplish) to attempt to change labels for products that have already been labeled and left the manufacturing floor. This would particularly be a problem for large manufacturers, who often have extensive distribution channels. Manufacturers have little or no control over the product in the distribution channel or once it has reached a retailer. Using a “manufacturing date” approach is far more practical and reasonable. Moreover, it is similar to the approach used for appliance standards, where the need for ensuring compliance is equally, if not more important.

Setting the effective manufacturing date for the Phase 1 criteria and program requirements for January 1, 2010 will allow for needed time to prepare for the many necessary changes required to participate in the program:

- Necessary product changes.
- Product labeling changes.
- Display labeling.
- Promotional literature.
- Website promotion.
- Sales training, etc.

For Phase 2, a January 1, 2015 effective manufacturing date would allow the time necessary for design, development and commercialization of new products to meet more aggressive criteria and would permit us to attempt to develop a market for such products.

**2.a. Establish a climate zone map with no more than four zones for either Phase 1 or 2. Use the climate zones and U-Factor/SHGC values as recommended by WDMA. Most importantly, do not create a six zone map and in particular do not create Zone 5a with the corresponding U-Factor of 0.30 for Phase 1.**

We support WDMA's recommendation to modify the proposed climate zones and specific U-Factor/SHGC requirements for Phase 1. We believe that this proposal better accomplishes the objectives DOE has identified while being more cost-effective and providing more flexibility and simplicity. We believe WDMA's recommendations (for both the proposed WDMA four zone structure and the DOE proposed zones) would save as much energy (within the margin of error) as the proposed approach, with less complexity.

In the event WDMA's approach is not adopted, we would certainly like to see a reduced number of climate zones; five or six is too many; three climate zones would be preferable. Our experience tells us that more climate zones lead to more confusion and makes it harder to market and label energy efficient windows and to manage our distribution channel; this is particularly true when there are not significant differences in requirements between zones (in particular, the difference in requirements between zones 4 and 5 is insignificant; combining the zones is much more practical). The unnecessary extra costs imposed by these extra zones result in more costs to the consumer. At some point, the costs would outweigh the benefits.

The proposed 0.30 U-Factor requirement in proposed zone 5a is too aggressive and not cost-effective, as shown by the Department's own analysis, particularly given the Department's stated objectives of modest improvements in Phase 1. It does not seem reasonable to rely on utility programs, which may not continue, to make the product cost-effective. Such a U-Factor requirement would likely exclude qualification of several framing material types even with double pane low e glass. This proposed requirement makes sense, if at all, in the Northern Climate Zone discussed in the WDMA proposal rather than the proposed 5a zone, particularly considering the comparative winter design temperatures and heating degree days for these climates. The Department can meet the needs of utilities and other users in the Pacific Northwest by adopting the "Heating Plus" concept detailed below and setting the value at a 0.30 U-Factor for Phase 1.

**2.b. Do not create U-Factor/SHGC trade-offs in ENERGY STAR® proposed Zones 4 and 5.**

We strongly oppose creating U-Factor/SHGC trade-offs. Instead, we recommend retaining the current "No Requirement" standard for northern climate zones. When this issue arose in the last round of criteria changes for Energy Star, DOE made the correct decision – to establish no SHGC requirement for this region of the country. This decision properly recognized that whether high or low solar glazing would be the best choice in these northern climates depended entirely on orientation, home design and homeowner operating decisions. Nothing has changed to alter the correctness of this decision.

Andersen, like most of the nation's window companies, has found that low solar gain glass is the optimal choice in all US climates, absent a properly designed and operated passive solar home. Despite climate variations, most of the Andersen window companies have independently evaluated various glazing types and each has selected spectrally selective low solar gain low-E as the primary (and preferred) glazing.

Andersen Windows did so primarily for customer acceptance due to occupant comfort issues; Andersen Windows originally offered high solar gain low e glass exclusively, but determined based on customer response that high solar gain low e glass requires the proper design (particularly overhangs and proper orientation) for comfort, and so now it is only offered as an option. It seems to us that under the Department's proposed trade-off approach, a reasonably certain energy efficiency benefit from a lower U-Factor is being traded for the uncertain benefit of a higher SHGC (the effect of higher SHGC in northern climates is highly dependent on numerous home design and operating factors). For example, in Phase 1, your proposed trade-off would permit higher U-Factor windows in climate zones 4 and 5 than in climate zone 3 (in fact, windows with U-Factors of 0.35, no better than code, could qualify as long as they offered higher SHGCs). This approach does not make sense to us. A simple 0.32 U-Factor, with no SHGC requirement would be a better approach for zones 4-5. While we have no objection to others selling high solar gain glass (hence our support for no requirement), we do not think trade-offs should be designed that have the effect of pushing manufacturers, builders and homeowners to an improper glass selection in many circumstances, particularly given impacts on possible increased energy use, increased energy costs, emissions, peak demand and HVAC sizing.

**2.c. If, despite our objections, any SHGC trade-off is established for Phase 1, establish more flexibility by basing the trade-off on a more reasonable baseline window; we recommend starting with 0.32 U-Factor; 0.15 SHGC baseline.**

The proposed SHGC trade-off matrix for Phase 1, climate zone 5 uses a 0.32 U-Factor, 0.25 SHGC window as the baseline. We believe that all 0.32 U-Factor windows should qualify (regardless of SHGC), and the trade-offs should be established, if at all, only for windows with higher U-Factors. If a trade-off is implemented for windows with a 0.32 U-Factor, at a minimum, based on our review of window products, a more reasonable and flexible window baseline would be a 0.32 U-Factor, 0.15 SHGC. Use of a 0.15 SHGC would avoid excluding a number of products based on the use of grilles and more unique configurations. It would also more easily permit one window to qualify in all climate zones with relative economies of scale, making the window more competitive and increasing its market penetration. We also do not believe that a 0.35 window should qualify, as it would only be equal to minimum code requirements.

Therefore, our proposed matrix (any U-Factor less than 0.32 would qualify with any SHGC) is laid out below in comparison to the proposed DOE ES5 matrix and ES4 matrix:

## Proposed Phase 1 ES5 & ES 4 Trade-off Matrix Comparison

U-Factor	DOE ES5 Proposed, SHGC Min.	DOE ES4 Proposed, SHGC Min.	Andersen Proposed SHGC Min.
0.35	0.40	0.41	Not Allowed
0.34	0.35	0.33	0.25
0.33	0.30	0.25	0.20
0.32	0.25	0.17	No Requirement for SHGC or a baseline of 0.15

We believe our proposal will generally foster greater energy efficiency as well as greater flexibility.

### **2.d. DOE should establish an “ENERGY STAR® Heating Plus” and “ENERGY STAR® Cooling Plus” designation for all climate zones.**

This approach would permit utilities and other voluntary programs to specify a window with better characteristics than the standard ENERGY STAR® requirements for heating and/or for cooling. This would meet the political objective of responding to the desires of certain users of the program for a more stringent target, without setting basic ENERGY STAR® requirements above reasonable levels that may be unattainable for many manufacturers or gerrymandering specific climate zones to meet those desires. For example, such an approach should meet the needs of utilities in the Pacific Northwest who want a specification of a lower U-Factor (such as 0.30). Similarly, utilities that want to provide incentives for peak demand reduction could specify an ENERGY STAR® Cooling Plus window, even if the utility is located in a part of the country with limited or no solar gain limits defined by the applicable ENERGY STAR® criteria.

Under this approach, a “Heating Plus” window would have a lower U-Factor and a “Cooling Plus” window would have a lower SHGC. To illustrate this concept for Phase 1, the Heating Plus window could be set at a 0.30 U-Factor and the Cooling Plus window could be set at an SHGC of 0.25.

The standards would need to be revised for Phase 2, based on the final criteria chosen. To qualify for the “Plus” designation, the window would need to meet the criteria for the specific climate zone as well as meet the lower U-Factor or SHGC for the “Plus” designation. Windows could potentially qualify for both the Heating Plus and Cooling Plus designations.

**2.e. Add sliding doors into the same qualifying category under the same table as side-hinged doors.**

Andersen believes that it should be able to qualify all of its doors under the same standard to avoid confusion and inconsistent results, instead of sliding patio doors meeting the window requirement and swinging patio doors meeting the door requirement (where they both have the same type and amount of glazing, but only differ in how they operate- one swings and one slides). We recommend that sliding doors be combined into the same table as side-hinged doors listed in Table 25 of the DOE August 6 proposal.

**2.f. For skylights and roof windows, Andersen supports a single requirement nationwide; specifically a maximum 0.53 U-Factor; maximum 0.30 SHGC in Phase 1. Skylight requirements for Phase 2 require further study to determine reasonable performance requirements for re-designed products.**

If DOE decides to have different requirements for different climate zones, we urge that you not adopt more restrictive values than these. A 0.53 U-Factor, 0.30 SHGC is a substantial improvement over existing Energy Star levels for these products. Given DOE's objective of a modest improvement in Phase 1, these are reasonable values, particularly if these requirements are applied as a single nationwide set of criteria.

**2.g. Do not set the Phase 2 criteria beyond what is reasonably achievable with a triple-glazing technology and, as recommended by WDMA, delay the Phase 2 decision and announcement until after adoption of final criteria for Phase 1 in 2009 (to allow further analysis and comments on Phase 2 based on the final Phase 1 criteria and climate zones).**

We have a number of concerns with Phase 2. However, we think many of the issues depend on the resolution to the climate zones and the Phase 1 criteria, making it very difficult to analyze or comment on Phase 2 criteria at this time. As a result, we believe that the best approach would be to further analyze and comment on Phase 2 criteria once the Phase 1 criteria and climate zones are set. Therefore, we support delaying the Phase 2 decision and permitting additional analysis and comments after Phase 1 is finalized.

**2.h. If DOE is unwilling to delay consideration of Phase 2 until after Phase 1 is announced, then carefully consider Andersen's specific Phase 2 recommendations: (1) If DOE intends to require performance equivalent to triple glazing in ES 4-5, set a maximum U-Factor no lower than 0.28 and either no SHGC requirement or a reasonable maximum; (2) If an SHGC trade-off matrix is adopted (despite our objection) for zones 4-5, establish more flexibility by basing the trade-off on a more reasonable baseline window: start with 0.26 U-Factor; 0.15 SHGC; (3) Set the maximum SHGC no lower than a 0.25 SHGC in any zone due to visible light considerations; and (4) Set the maximum U-Factor for zones 1-3 no lower than 0.32.**



As noted above, we have a number of concerns with Phase 2. While we understand DOE's desire to set aggressive targets, we believe that the draft proposal frequently errs heavily on the side of aggressiveness over practicality.

First, we do not support SHGC trade-offs in ES 4-5. We recommend simply setting a maximum U-Factor with no requirement for SHGC (or a maximum). We are also concerned about establishing very low U-Factor requirements in these climate zones given the likelihood that this will exclude several framing material types and drive the prices for qualifying products above cost effective levels. However, if DOE is intent on moving towards substantially more aggressive U-Factors for northern climate zones in Phase 2, we believe that triple glazing is the only realistic, commercially viable option for doing so. Even so, triple glazing carries substantial challenges, such as cost-effectiveness, increased weight and overall thickness, and has not been proven out on a mass-produced basis in the U.S., let alone at a cost that consumers are willing to bear.

In reviewing the specific values proposed:

1. The maximum U-Factor in ES 4 (0.26) is lower than the maximum U-Factor in ES 5 (0.28); a lower maximum U-Factor in a warmer climate zone does not make sense.
2. The maximum allowable U-Factor of 0.28 (and most certainly 0.26) will likely exclude several framing material types from qualifying for the Energy Star Program.
3. The baseline values for ES 5 only allow a product with a U-Factor of 0.28 to have an SHGC of 0.55. In other words, a product with a U-Factor of 0.28 and an SHGC of 0.54 or 0.56 would not qualify. This does not seem reasonable.
4. The proposed baselines are far too aggressive, and the U-Factors combined with the SHGCs create a substantial risk that efficient triple glazed products will not meet the requirements.

Therefore, we recommend that the maximum U-Factor be set no lower than 0.28, with either an SHGC maximum or no SHGC requirement.

If an SHGC trade-off is adopted, despite our opposition, we recommend that a more reasonable and flexible baseline be established to allow all glass types to reasonably compete. The proposed SHGC trade-off matrix for Phase 2, ES 5 uses a 0.22 U-Factor, 0.25 SHGC window as the baseline (the Phase 2, ES4 baseline is a 0.23 U-Factor, 0.25 SHGC). We believe that these baseline windows are far too aggressive and that more flexibility needs to be added. Given that very few triple glazed windows are sold in the US, we believe that there is considerable design uncertainty at this point as to what combination of U-Factors and SHGCs is reasonably achievable, particularly given all of the other factors that have to be incorporated into the complete redesign of a window that can be mass-produced in substantial quantities.

At a minimum, a more reasonable and flexible window baseline would be a 0.26 U-Factor, 0.15 SHGC. We have selected a U-Factor consistent with triple glazing, low-e and a reasonably efficient frame. As for SHGC, we selected the same baseline SHGC as in our proposal for Phase 1, recognizing that, by definition, triple glazed units will have lower SHGCs than the double pane units required to meet Phase 1 requirements. We used the 5 to 1 SHGC to U-Factor trade-off proposed in the Draft Analysis for ES5. Our proposed matrix is set forth below in comparison to the proposed Phase 2 DOE ES5 matrix and ES4 matrix (as with Phase 1, our matrix can be used with both ES4 and ES5):

**Proposed Phase 2 ES5 & ES4 Trade-off Matrix Comparison**

U-Factor	DOE ES5 Proposed, SHGC Min.	DOE ES4 Proposed, SHGC Min.	Andersen Proposed SHGC Min.
0.28	0.55	Not Allowed	0.25
0.27	0.50	Not Allowed	0.20
0.26	0.45	0.49	0.15
0.25	0.40	0.41	0.10
0.24	0.35	0.33	0.05
0.23	0.30	0.25	0.00
0.22	0.25	0.17	0.00

We are also concerned with the 0.20 SHGC proposed for ES1 in Phase 2. Based on our analysis, we believe that this value will force the market to move to much more heavily tinted products and has the potential to sharply reduce visible light. This would likely lead to increased use of artificial lighting and reduced customer acceptance. As a result, we do not recommend going below 0.25 SHGC in any climate zone at any Phase of the program.

Finally, we are concerned with the 0.30 U-Factor proposed for ES 2 and ES3. Again, this U-Factor seems too aggressive for these climate zones. We recommend using 0.32 instead, which is far more readily achievable, but still represents a substantial savings for these markets.

**3. Allow a U-Factor add-on for products in high altitude regions where breather tubes are used and the air space is filled with air rather than argon gas blend or other gases.**

The effect of providing units with breather tubes, which are necessary to equalize the pressure of the insulated glass units in high altitude regions, is that there is air in the insulated glass space instead of an argon gas blend or other gas blends. The net result of using air instead of argon or other gas blends is a higher U-Factor for units with breather tubes. There is no reason that high altitudes should not have Energy Star products readily available. Given that these

products have air only, it would be reasonable to establish a “high altitude allowance” of a 0.03 to 0.04 U-Factor adder for windows with breather tubes.

**4. DOE should allow a standard product without laminated or tempered glass or grilles or grids to represent a product with these features for purposes of Energy Star qualification.**

DOE should consider allowing a manufacturer to use a standard product without grilles or grids as the representative product to qualify an entire product line in which the same product type using the same glazing, coatings, spacer and air space width contains options for tempered glass, laminated glass and/or grilles or grids. This would allow consistency across a product line, rather than having the standard product qualify and not the product with various enhancements, like grilles and tempering. Otherwise, there will be situations where moving to tempered glass and/or the addition of grilles or grids can increase the U-Factor just enough to put the product just outside the qualifying criteria. This would be confusing to consumers who are paying more for these features, but in doing so, could remove the product from qualifying as an ENERGY STAR® product.

**5. We request that DOE eliminate the climate zone map from the label (or make it optional).**

We have no objection to stating on the label what climate zones the window is qualified in, but the room on labels becomes more limited every day due to increasing regulatory requirements both at a national and state/regional level, as well as labeling for Canada ENERGY STAR®. We believe that the need for the U.S. map as part of point of purchase materials/displays is important when customers are in the selection and purchasing decision phase of the process and need to understand what climate zone they are in and which type of product to select. We do not see any real benefits for the map (U.S. or Canada) on the product label when the purchase decision is already made. The purpose of the label on the product should be to simply confirm that the right product has been delivered.

Thank you for the opportunity to offer our recommendations on ENERGY STAR® windows. Please contact me with any questions or comments you may have at (651) 264-5570 or via email at [mark.mikkelson@andersencorp.com](mailto:mark.mikkelson@andersencorp.com). We hope to have an opportunity to meet with DOE and its analysis team in person to review our specific recommendations and answer any questions you may have.

Best regards,



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