



5070 North 124<sup>th</sup> Street, Milwaukee, WI 53225, Tel. 414-461-9900  
[www.wascowindows.com](http://www.wascowindows.com)

November 8<sup>th</sup>, 2011

Joe Hart  
D & R International

**Re: Comments regarding draft 2013 EnergyStar Framework**

Dear Mr. Hart:

The following are my comments on the draft 2013 EnergyStar framework for windows and doors.

**Air Leakage**

The addition of an air leakage test requirement is a reasonable measure. WASCO Windows currently either tests our windows to NFRC 400 or relies on our extruder (Rehau) to test the windows in the AAMA test. In the latter case, we typically accept the values Rehau has achieved using a window of the same exact design, but not manufactured by us. We have also had Rehau physically test a window produced in our factory in order to assure we are achieving the same performance.

In order to make certification as friendly as possible to small, local manufacturers, I would urge acceptance of any of the following for proof of meeting air leakage requirements:

1. An NFRC 400 test report
2. AAMA certification of the window
3. A reissued AAMA test report that includes air infiltration, originally commissioned by an extruder

Through personally spending time testing windows for air leakage, I have learned how sensitive values are to minor variances once a high level of performance is achieved. It would be perhaps best to label windows 0.3, 0.2, 0.1 and less than 0.1 (<0.1).

With the above three pathways open for air leakage testing, there would be essentially no added cost to windows produced by WASCO.



### **Installation Instructions**

WASCO Windows directly installs approximately 90% of the windows it builds. In these cases, installation instructions are unnecessary. The remainder is either installed by the customer or a third party. In this case we recommend:

1. The ATI InstallationMasters<sup>®</sup> manual should be followed.
2. Any additional requirements from WASCO, specified in an “installation addendum”, must be followed.

Because of the work done by AAMA and ATI, I believe comprehensive installation instructions are superfluous. It is not unreasonable, however, to require that window design-specific installation instructions be provided when windows are installed by a third party, and this requirement would have little impact on the cost of windows.

### **Revisions to Product Criteria**

WASCO supports a tightening of EnergyStar criteria for 2013. The 30% tax credits of 2009 to 2010 have resulted in less market differentiation between budget and quality windows.

WASCO does **not** support the elimination of the Equivalent Energy Performance for the northern climate zone, especially with target U-factors between 0.25 and 0.27 Btu/hr-ft<sup>2</sup>°F. These U-Factors are achievable in dual-pane windows, provided low-SHGC soft coat low-e coatings are used, such as LoE<sup>3</sup> 366. The problem with the use of such coatings to meet these requirements is it results in far too low of an SHGC for the northern climate.

The best way to examine this tradeoff is to look at center of glass U-factors and SHGC's. WASCO uses Cardinal's LoE 180 dual-pane where a high SHGC is desired. (We do use it on surface #2 as opposed to surface #3, accepting a small drop in SHGC for a large drop in summer interior glass temperature.) We also offer a low SHGC option (Cardinal LoE<sup>3</sup> 366) for customers with large expanses of north- or west-facing windows. Table 1 shows the center of glass properties for these two options.

*Table 1: Center of glass properties in WASCO Windows dual pane units*

<b>Glass Package</b>	<b>U-Factor (Btu/hr-ft<sup>2</sup>°F)</b>	<b>SHGC</b>
<b>High SHGC</b>	0.269	0.643
<b>Low SHGC</b>	0.251	0.271

By current EnergyStar specification, an increase in SHGC by 0.05 is considered equivalent to a decrease in U-factor of 0.01 in the northern climate zone. As seen in the above table, WASCO's high SHGC dual pane glass greatly outperforms this equivalence, increasing SHGC by 0.372 with only a 0.018 drop in U-factor.



5070 North 124<sup>th</sup> Street, Milwaukee, WI 53225, Tel. 414-461-9900

[www.wascowindows.com](http://www.wascowindows.com)

As a specific example, WASCO's 700/DH double hung window has  $U=0.27$  and  $SHGC=0.20$  with low SHGC glass. The same window has  $U=0.29$  and  $SHGC=0.48$  with high SHGC glass (Cardinal LoE 180). If the standard is set with a maximum U-Factor of 0.27, the former window would meet the requirements, the latter would not. Yet, a ResFen calculation for a 2000 ft<sup>2</sup> house in Milwaukee, WI shows 6.8 MBtu/yr (source) less energy use for the non-EnergyStar window!

Not allowing Equivalent Energy Performance, while not prohibiting higher-performing, high SHGC windows, will effectively eliminate them from the market. It will be more expensive to build a window meeting EnergyStar standards with high SHGC glass than low SHGC glass. The relative difference in cost between the glass packages is very small. However, making up for the increase in center of glass U-Factor will result in significant cost increases to framing materials. Eliminating energy equivalence might be desirable for large companies who want to ship the same window everywhere in the United States, but it will hurt small, local manufacturers in northern states who have designed their products for their climates. Consumers in the northern climate zone will have less access to higher performing products.

If Equivalent Energy Performance is eliminated, WASCO urges setting the maximum U-Factor for the northern climate zone to 0.24. This will encourage healthy competition between triple-glazed products and dual-glazed products with a hard-coat low-e coating on surface 4, without (essentially) forcing the use of low SHGC glass.

Additionally, doors for the northern climate zone should not be forced to meet artificially low SHGC requirements. WASCO Windows has built European-style windows and doors for several passive solar house designs, where customers are specifically looking for high SHGC triple pane all glass doors. Although such doors are not suitable for a west-wall installation, they outperform framework energy performance on a south or north wall in Wisconsin.

If the Equivalent Energy Performance is retained and the U-Factor set at around 0.27, the marginal cost to a consumer of a double-hung window will increase by approximately \$60.00 over WASCO's current best-selling, EnergyStar window. Beyond thermal performance, the added cost would also give the consumer a heavier-duty window with higher structural performance. If the Equivalent Energy Performance is eliminated or the threshold set closer to 0.25, hung windows will likely require a triple-pane design (even with high-performance frames and spacers), resulting in an additional cost of around \$140.00 to consumers.

WASCO's casement and Tilt & Turn windows will need little or no improvement to meet these standards, especially if Equivalent Energy Performance is retained.

### **Conclusions**

The proposed EnergyStar standards for windows and doors are achievable at a reasonable cost. WASCO Windows has two chief concerns: the retention of Equivalent Energy Performance, and, allowing the



5070 North 124<sup>th</sup> Street, Milwaukee, WI 53225, Tel. 414-461-9900

[www.wascowindows.com](http://www.wascowindows.com)

multiple choices for air leakage testing as proposed in this document. The former will provide consumers in northern climate zones a greater choice of windows. Without Equivalent Energy performance, the proposed range of U-factors is achievable with dual-pane glass, but only with very low SHGC characteristics. With Equivalent Energy Performance, a change to a higher-performance northern glass does increase the whole-window U-factor by 0.1 to 0.2, but raises the SHGC by up to 0.2, which yields better overall energy performance in states like WI.

Allowing multiple choices in air leakage testing will allow small, custom companies like WASCO Windows to meet the standard at minimal additional cost.

Best regards,

David Paulus, P.E., PhD.  
Director of Engineering  
WASCO Windows