

Consumer Tax Credits for Energy Efficient Windows and Doors

INTRODUCTION

On February 17th, the American Recovery and Reinvestment Act of 2009 became law. This law extends and modifies the tax credits for windows, doors, and skylights established in the Energy Policy Act of 2005. The 2009 Law includes tax credit incentives for homeowners to purchase energy efficient windows and doors. The language contained in the Law regarding qualification criteria and performance validation has led to confusion and misinformation within the window and door industry. The purpose of this Product Application Bulletin is to provide guidance regarding the use of Guardian low-E glass in qualifying windows and doors. The following guidance is not intended as legal advice, and you should consult a tax professional with specific questions.



OVERVIEW

The recently enacted Law includes a homeowner tax credit incentive of 30 percent of the cost of qualifying products, including energy efficient windows and doors to a maximum of \$1,500 per household for 2009 and 2010. Homeowners that previously claimed tax credits in 2006 or 2007 are eligible for the full \$1,500 limit.

The qualification guidelines include the following restrictions:

- The tax credit for energy efficient windows and doors is only available for existing homes.
- Windows purchased must have a U-Factor ≤ 0.30 and a Solar Heat Gain Coefficient of ≤ 0.30 .
 - The Stimulus Law does not specify whether the qualification criteria are for center of glass (COG) or total window performance, but there is broad industry endorsement of total window performance as the appropriate measure of window U-Factor and SHGC. Total window performance values are required to demonstrate compliance or qualification with IECC, NFRC and Energy Star and it is expected that total window values will be required for the current Law, as well.
 - The Energy Policy Act of 2005 contained tax credits for windows and doors that were similar to those in the current Law. Soon after the 2005 bill was signed into law, the IRS issued regulations stipulating that total window performance values were required to demonstrate qualification for the tax credit. With this recent and directly related precedent as a guide, there is strong likelihood that total window performance will be required to satisfy the requirements of the new Law.
- Homeowners are required to maintain records that the windows meet the qualification requirements. These records are to include receipts and the Manufacturer Certification Statement.

- A Manufacturer's Certification is a signed statement from the manufacturer certifying that the product or component qualifies for the tax credit. In this context, "component" refers to a building component, not a component of a product. Taxpayers must keep a copy of the certification statement for their records, but do not have to submit a copy with their tax return.
- The IRS Regulations pertaining to the 2005 Law are available at www.irs.gov/pub/irs-drop/n-06-26.pdf, and stakeholders are encouraged to refer to the IRS website for developments and further guidance regarding the current tax credit.

ANALYSIS

The current version of the NFRC Certified Products Directory (CPD) contains information and ratings for over 100,000 products that are eligible to be certified. The sheer number of unique component combinations makes it impossible to provide window and door system characterizations that are universally applicable.

There are a great many windows listed in the CPD that contain Guardian or competitive low-E that easily meet the qualification criteria for this program. Many of these window products meet the qualification criteria with standard double-glazed low-E glass packages. Additionally, the CPD contains many complex triple-glazed window systems containing one or more lites of low-E and inert gas that exceed the program requirements. When these configurations are enhanced with exotic gases or solar management tints, it is possible to far exceed the U-factor and SHGC requirements.

There are also many window configurations that contain Guardian or competitive low-E products that do not meet the qualification criteria for this program. For example, Aluminum and Thermally-Broken Aluminum windows are not generally available in configurations that will qualify, regardless of which low-E is used.

- Non-thermally broken aluminum windows with low solar gain low-E that are listed in the CPD commonly have a U-factor in the range of 0.55 – 0.65, and SHGC in the range of 0.32 – 0.39.
- Thermally-broken aluminum windows with low solar gain low-E that are listed in the CPD commonly have a U-factor in the range of 0.42 – 0.48, and SHGC in the range of 0.32 – 0.39

In order to assess the potential for ClimaGuard low-E products to meet the qualification criteria of ≤ 0.30 U-Factor and Solar Heat Gain Coefficient, Guardian used the total window performance values contained in the NFRC CPD as a guide.

Just as there are many windows that don't qualify for Energy Star, there were many windows that did not meet the qualification criteria for this tax credit even though they included Guardian or competitive low-E products. For the products that met the qualification criteria there were many windows that exceeded the requirements of this program.

Common window and patio door operator-types with U-Factor and SHGC values below 0.30 were compiled to illustrate the range¹ of qualifying products containing ClimaGuard low-E that already exist in the CPD. The range of values below 0.30 reflected in Table 1 demonstrates that it is possible to meet or exceed the qualification criteria for this tax credit using any low solar gain ClimaGuard low-E product.

Table 1.		Performance Range of Tax Credit Compliant Products	
Window Operator Type	Guardian or Equivalent low-E	U-factor	SHGC
Casement	ClimaGuard 71/38	0.26 - 0.30	0.20 - 0.29
	ClimaGuard 70/36	0.28 - 0.30	0.15 - 0.30
	ClimaGuard 55/27	0.27 - 0.30	0.14 - 0.27
Fixed	ClimaGuard 71/38	0.24 - 0.30	0.19 - 0.30
	ClimaGuard 70/36	0.27 - 0.30	0.19 - 0.30
	ClimaGuard 55/27	0.28 - 0.30	0.14 - 0.27
Vertical Slider	ClimaGuard 71/38	0.25 - 0.30	0.19 - 0.30
	ClimaGuard 70/36	0.27 - 0.30	0.21 - 0.29
	ClimaGuard 55/27	0.27 - 0.30	0.16 - 0.30
Horizontal Slider	ClimaGuard 71/38	0.25 - 0.30	0.22 - 0.30
	ClimaGuard 70/36	0.27 - 0.30	0.21 - 0.29
	ClimaGuard 55/27	0.27 - 0.30	0.16 - 0.30
Sliding Patio Door	ClimaGuard 71/38	0.27 - 0.30	0.19 - 0.30
	ClimaGuard 70/36	0.27 - 0.30	0.21 - 0.30
	ClimaGuard 55/27	insufficient listings to fully evaluate	

¹The performance ranges are the result of differences in window design, sash and frame material, spacer systems, gap width, gas-fill and other performance-influencing details.

A FEW WORDS ABOUT PERFORMANCE

Although a window may contain high performance coated glass, a poorly performing spacer system or a poorly performing sash and framing system may reduce total window system performance. Similarly, a high performance spacer or sash and framing system may lose energy efficiency when paired with a poorly performing glass product. Window configuration also affects performance. Different types of windows in the same product line with the same glazing systems and frame material will likely have different ratings. For example, fixed windows typically have the lowest U-factors (because they do not have center mullions), followed by casements and awnings (because the hardware required to operate these types of windows is minimal). Horizontal sliding windows and vertical sliding windows (also called single or double-hung) windows have more operating hardware in the frame cavity that results in a higher U-factor. Sliding glass doors usually have a metal sill that does not perform as well as the rest of the frame and also results in a higher U-factor.

The window performance criteria that are used by the Stimulus Law to determine tax credit qualification are the U-factor (thermal properties) and the SHGC (solar properties). While it may appear logical to use center of glass performance as a guide, doing so may lead to incorrect decisions and unnecessary expense. The following window system performance primer is offered to assist in the decision process.

- U-factor is the amount of heat transfer that results from a temperature difference across the fenestration product. The smaller the U-factor, the less heat transfer there is between the inside and outside due to a temperature difference. U-factors for residential windows typically range from 1.30 (single-glazing in a metal frame) to 0.15 (triple glazing with multiple low-E coatings, inert gas, low-conductance spacers and advanced frames).
- SHGC is the relative amount of solar gain through a fenestration product. The SHGC range is from 1.00 to 0.00. The total window SHGC (including the frame which absorbs and transmits some solar energy) ranges from 0.75 for clear single glazing to nearly 0.10 for windows with enhanced solar control properties. The smaller the SHGC, the less solar heat gain there is through the product.
- Low-E glass is designed to reflect radiation of specific wavelengths. Low-E coatings can be designed to reflect heat back into a room for warmth or reflect unwanted solar heat out to help keep a room cooler.
 - A typical COG U-factor for a low solar gain low-E is approximately 0.30 with an air-filled gap. Replacing the air with an inert gas such as argon to reduce convection and conduction through the air space can reduce the COG U-factor to approximately 0.24. Krypton provides even better performance, but it is significantly more expensive and increasingly difficult to source. For glazing systems with air or argon-filled gaps, the optimum gap-width for thermal performance is approximately ½ inch. For krypton gas, the optimum gap-width is approximately 5/16 inch.
 - While the most commonly used low-E products offer very similar COG thermal performance (U-factor), there is a broad range of solar performance (SHGC) available depending on the specific product selected. Center of glass SHGC values range from 0.27 – 0.41 for the most commonly used low-E products.
- Low conductivity or warm edge spacers improve the edge of glass performance. These spacer materials have lower thermal conductivity than traditional aluminum. Examples include stainless steel, tin plated steel, polymers or foamed silicone.
- Advanced frame materials that incorporate composites or low-conductivity elements improve energy performance. Aluminum frames with and without standard thermal breaks can have a U-factor as high as 1.5 - 3.0 for the frame alone. Typical wood and vinyl frames have U-factors nearer to 0.5, and insulated fiberglass and vinyl frames can have U-factors as low as 0.3 for the frame alone.

With so many variables in the performance equation of a window, the only way to directly and accurately compare products of different construction and components is to use total window performance as opposed to center of glass performance as a guide.

CONCLUSIONS

It is critical that total window performance is understood in order to draw accurate conclusions regarding qualification for the energy efficient window and door tax credits contained in the American Recovery and Reinvestment Act of 2009. Relying on center of glass performance may result in significantly underestimating or overestimating U-Factor and SHGC values.

There is a broad range of existing NFRC certified windows that meet the criteria for the tax credit utilizing ClimaGuard low-E. As a general guide to program qualification, Guardian offers the following conclusions drawn from an analysis of CPD-listed window designs that are broadly offered throughout the United States.

- ClimaGuard 71/38 has a center of glass U-factor of 0.24 and SHGC of 0.38. Many wood, vinyl and composite windows in the CPD that incorporate ClimaGuard 71/38 meet the program qualification requirements based on total window U-factor and SHGC.
 - Across all operator-types, windows and doors incorporating ClimaGuard 71/38 had qualifying total window performance values in the range of 0.24 – 0.30 for U-factor and in the range of 0.19 – 0.30 for SHGC.
- ClimaGuard 70/36 has a center of glass U-factor of 0.24 and SHGC of 0.36. Many wood, vinyl and composite windows in the CPD that incorporate ClimaGuard 70/36 meet the program qualification requirements based on total window for U-factor and SHGC.
 - Across all operator-types, windows and doors incorporating ClimaGuard 70/36 had qualifying total window performance values in the range of 0.27 – 0.30 for U-factor and in the range of 0.15 – 0.30 for SHGC.
- ClimaGuard 55/27 has a center of glass U-factor of 0.24 and SHGC of 0.27. Many wood, vinyl and composite windows in the CPD that incorporate ClimaGuard 55/27 meet the program qualification requirements based on total window for U-factor and SHGC.
 - Across all operator-types, windows and doors incorporating ClimaGuard 55/27 had qualifying total window performance values in the range of 0.27 – 0.30 for U-factor and in the range of 0.14 – 0.30 for SHGC.

Each window manufacturer will need to review their product lines to identify which products meet the qualification criteria for this program. Most of the window manufacturer's product lines that were reviewed for this analysis have multiple options for meeting the criteria with ClimaGuard 71/38, 70/36 or 55/27. Window and door manufacturers are encouraged to contact an accredited simulation laboratory for a detailed analysis of the product lines that they would like to qualify for this program.

ASK AN EXPERT

If you have questions regarding glass performance, glazing configuration options or total window system dynamics, please contact the Guardian Customer Engineering Group at (888) 521-9734. Please refer to the IRS website for guidance regarding how to claim the tax credits offered in the current law.