



Understanding Energy Performance Ratings For Dynamic Glazing Products

In today's marketplace, architects, builders, and consumers have the option to choose between many different window and door products. With the arrival of Dynamic Glazing products, how can you choose what product is best for your home or office? If you have questions about a window or door's energy performance, the National Fenestration Rating Council (NFRC) has the answers.

About Dynamic Glazing

Dynamic Glazing (DG) products are any fenestration product with the ability to change its performance properties, allowing the occupant to control their environment by tinting (or darkening) a window with the flip of a switch or by raising and lowering a shade positioned between panes of glass. Some windows and doors can change their performance automatically in response to a control or environmental signal.

These high-performance windows, sometimes referred to as "smart windows," provide a variety of benefits, including reduced energy costs due to controlled daylighting and unwanted heat gain (or loss). While still a relatively new technology, they are expected to grow substantially in the coming years.

Look for the NFRC Dynamic Glazing Label to Compare Products

The NFRC-certified Dynamic Glazing label helps consumers understand the contrast in energy performance for these new products. Its unique rating identifiers help consumers understand the "dynamics" of the product, and allow comparison on a fair and equal basis, apples to apples.

The label references the following information:

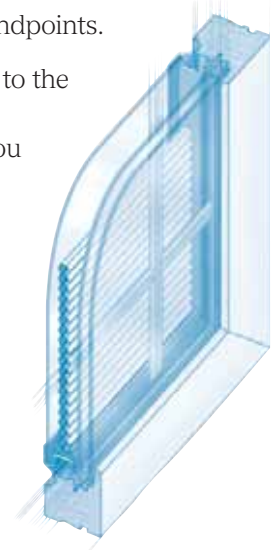
U-factor measures the rate of heat loss through a product. Therefore, the lower the U-factor, the lower the amount of heat loss. In cold climates where heating bills are a concern, choosing products with lower U-factors will reduce the amount of heat that escapes from inside your house. Some DG products can affect U-factor.

The Solar Heat Gain Coefficient (SHGC) measures the rate of heat gain from solar energy passing through a product. Therefore, the lower the SHGC, the less amount of solar heat gain. In hot climates where air-conditioning bills are a concern, choosing products with a lower SHGC will reduce the amount of heat that comes in from the outside. All DG products can affect SHGC.

Visible Transmittance (VT) measures the amount of light that comes through a product. The higher the VT rating, the more light is allowed through a window or door. All DG products can affect VT.

The Variable Arrow – If the product can operate at intermediate states, a dual directional arrow, (↔), with the word "Variable" underneath will appear on the label. Some DGs are able to adjust to intermediate states allowing for a performance level between the endpoints.

The low value rating is displayed to the left and the high value rating is displayed to the right. This lets you know at a glance the best and worst case performance of the product you are viewing and what the default or de-energized performance level will be.



Example of an Internal Shading Window product.

Comparing Switchable Glazing Products

 World's Best Window Co. Millennium 2000+ Vinyl-Clad Wood Frame Double Glazing • Dynamic Glazing • Low E Product Type: Vertical Slider	
ENERGY PERFORMANCE RATINGS	
U-Factor (U.S./I-P)	Solar Heat Gain Coefficient
0.32 <small>On</small> 0.32 <small>Off</small>	0.10 <small>On</small> 0.50 <small>Off</small>
ADDITIONAL PERFORMANCE RATINGS	
Visible Transmittance	—
0.03 <small>On</small> 0.65 <small>Off</small>	—
<small>Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. www.nfrc.org</small>	

Switchable glazing products include electrochromic glass systems that can be tinted or untinted in response to an electronic control signal or environmental change. Adjusting the product results in

changes to its SHGC and VT. The U-factor for these particular systems remains constant.

NFRC labels for switchable glazing technologies will reflect the endpoints of performance.

- The **ON** position signifies the performance level when the switchable glazing system is powered, activated or otherwise “ON.”
- The **OFF** position signifies the performance level when the switchable glazing system is de-energized, de-activated or otherwise “OFF.”

NOTE: Some switchable dynamic glazing systems are at their maximum tinted state in the “ON” position, and some are at their maximum tinted state in the “OFF” position. The NFRC label will always clearly state the powered and unpowered state of the system.

Comparing Internal Shading Systems

 World's Best Window Co. Millennium 2000+ Vinyl-Clad Wood Frame Double Glazing • Dynamic Glazing • Low E Product Type: Vertical Slider	
ENERGY PERFORMANCE RATINGS	
U-Factor (U.S./I-P)	Solar Heat Gain Coefficient
0.30 <small>On</small> 0.40 <small>Off</small>	0.10 <small>On</small> 0.50 <small>Off</small>
ADDITIONAL PERFORMANCE RATINGS	
—	—
<small>Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. www.nfrc.org</small>	

Internal shading systems include blinds positioned between glass panes that can open and close. The labels for internal shading systems will reflect the endpoints of the product's performance for

U-factor and SHGC ratings only.

- The **OPEN** position is the orientation or condition of a product with an internal shading system that allows the maximum daylighting.
- The **CLOSED** position is the orientation or condition of a product with an internal shading system that allows the minimum daylighting.

NOTE: In the future, labels for internal shading systems will also include VT ratings.

Things to Consider

- In most cases, the actual performance level of DGs will fall between the endpoint ratings due to user operation. You will need to decide what average performance rating is acceptable to you based on your specific needs.
- If integrated into a building management system or other control system that ensures the technology will be used when required for energy performance, you can use the best case ratings.
- The worst case ratings will not likely represent the actual energy performance of the product. People invest in DG products to increase energy efficiency, so using worst case ratings will generally understate actual energy performance.



Example of an electrochromic glass system (switchable glazing product)

NFRC: Your Source for Energy Performance Ratings

NFRC also rates and certifies standard windows, doors, skylights, window film products, and commercial curtain wall systems. For more information on all of NFRC's programs, visit www.nfrc.org, or visit www.nfrc.org/windowshop to compare NFRC-certified products online.

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