



1. End-to-end performance

1.1 PH Performance empowers your business

1.1.1 Product performance: PH at the top of its game



1.1.1.5 Energy efficiency

In accordance with ENERGY STAR® door, window, and skylight technical specifications, all thermal efficiency values must be certified by a body specializing in fenestration products and accredited by the National Fenestration Rating Council (NFRC) in the United States. The linchpin of the Rating System is a procedure for determining the thermal transmittance ("U-factor") of a product.

In Canada, the following bodies certify ENERGY STAR® fenestration products:

- CSA International
- Intertek Testing Services (ITS)
- Quality Auditing Institute
- National Fenestration Rating Council (NFRC) of the United States

NFRC allows test reports to be transferred from the extruder to the manufacturer, provided the manufacturer undertakes to manufacture the windows using the same techniques. The CSA does not allow transfers of this kind and requires that performance and energy efficiency tests be started from scratch again.

P.H. Tech has already done simulations and laboratory tests for most of the product series. At least one simulation is available for each series. The basic glass package selected by P.H. Tech allows validating by simulation the majority of other options of glass packages. These tests can later be used by clients who would like to obtain ENERGY STAR certification, this is an added plus that help both the environment and users.

1.1.1.5 Energy efficiency | continued

Here are different energy performance properties that describe how energy is transferred and how performance is quantified.

US National Fenestration Rating Council (NFRC)	Canadian Standard Association (CSA)
U-factor: assesses resistance to heat flow. Quantifies the insulation value of a window assembly (glazing, edge effects, sash, and frame) and can depend on weather conditions. The lower the number, the better the performance.	ER (Energy Rating): assesses thermal performance based on solar heat gain, heat loss (through frames, spacers, and glass), and air leakage heat loss. The higher the ER, the better the performance
SHGC (solar heat gain coefficient): relates to the amount of heat transmitted by sunlight. The lower the rating, the less heat is transmitted.	R-factor: measures the insulation value of a material or product and is in fact the inverse of the U-factor. The higher the number, the better the insulation.
Infiltration: Heat loss and gain by air leakage through cracks or joins in the window assembly. The lower the number, the better the performance.	

In the United States, the ENERGY STAR criteria for residential windows, doors, and skylights are tailored to four Climate Zones. A product's energy efficiency for a given climate is based on its impact on heat gain and loss in cold weather and heat gain in warm weather. Windows that are energy efficient in Florida will not necessarily be energy efficient in Michigan and vice-versa. Climate Zones for ENERGY STAR Qualification Criteria

The four Climate Zones for ENERGY STAR qualified windows, doors, and skylights are:

- Northern: mostly heating
- North/Central: heating and cooling
- South/Central: cooling and heating
- Southern: mostly cooling



To be eligible for the ENERGY STAR, products must be rated, certified, and labeled for both U-Factor and Solar Heat Gain Coefficient (SHGC) in accordance with the procedures of the National Fenestration Rating Council (NFRC) at levels which meet the following ENERGY STAR qualification criteria in one or more Climate Zone.

1.1.1.5 Energy efficiency | continued



Windows & Doors			
Climate Zone	U-Factor ¹	SHGC ²	
Northern	<= 0.35	Any	
North/Central	<= 0.40	<= 0.55	
South/Central	<= 0.40	<= 0.40	Prescriptive
	<= 0.41	<= 0.36	Equivalent Performance (Excluding CA) <i>Products meeting these criteria also qualify in the Southern zone</i>
	<= 0.42	<= 0.31	
	<= 0.43	<= 0.24	
Southern	<= 0.65	<= 0.40	Prescriptive
	<= 0.66	<= 0.39	Equivalent Performance
	<= 0.67		
	<= 0.68	<= 0.38	
	<= 0.69	<= 0.37	
	<= 0.70		
	<= 0.71	<= 0.36	
	<= 0.72	<= 0.35	
	<= 0.73		
	<= 0.74	<= 0.34	
	<= 0.75	<= 0.33	

¹ Btu/h.ft².0F

² Fraction of incident solar radiation

³ U-Factor qualification criteria based on 2001 NFRC simulation and certification procedures that rate skylights at a 20-degree angle. Although reported U-Factor is higher than RES97 rated products, energy performance at the ENERGY STAR minimum qualifying level is equivalent.

⁴ NFRC certification using the 1997 NFRC procedures for residential windows (RES 97) that rated skylights at a 90-degree angle. Skylights rated under this procedure may be present in the marketplace until March 31, 2008. NFRC labels for products using this procedure state: "RES97 rated at 90 degrees."

Source: http://www.energystar.gov/index.cfm?c=windows_doors.win_elig#windows

1.1.1.5 Energy efficiency | continued

In Canada, products conform according to their U or R value; or because of their energy efficiency ratio. The climate zones are determined as follows:



All glass sliding doors and windows that meet the ENERGY STAR high efficiency requirements must have an airtight rate of at least A2. Panoramic windows must be classified under the category “fixed”. The following chart illustrates the scale of each product:

Zone	Maximum U-values and Minimum R-Values			Minimum Energy Rating (ER) Values (Maximum U-value 2.00 W/m ² •K)				
	U-value (W/m ² •K)	U-value (Btu/h•ft. ² •°F)	R-Value (ft. ² •h•°F/Btu)	Most Windows and All Doors (includes fixed casement style windows)		Picture Windows Only		
				1998	2004*	1998	2004*	
A	2.00	0.35	2.9	or	-16	17	-6	27
B	1.80	0.32	3.2	or	-12	21	-2	31
C	1.60	0.28	3.6	or	-8	25	+2	35
D	1.40	0.25	4.0	or	-5	29	+5	39