JLG
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DUPONT
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WHAT MAKES A WINDOW ENERGY-EFFICIENT?

LEARN MORE AT energystar.gov

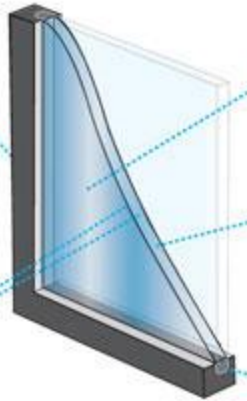
Today, manufacturers use an array of technologies to make ENERGY STAR qualified windows.

QUALITY FRAME MATERIALS

A variety of durable, low-maintenance framing materials reduce heat transfer and help insulate better.

MULTIPLE PANES

Two panes of glass, with an air-or gas-filled space in the middle, insulate much better than a single pane of glass. Some ENERGY STAR qualified windows include three or more panes for even greater energy-efficiency, increased impact resistance, and sound insulation.



LOW-E GLASS

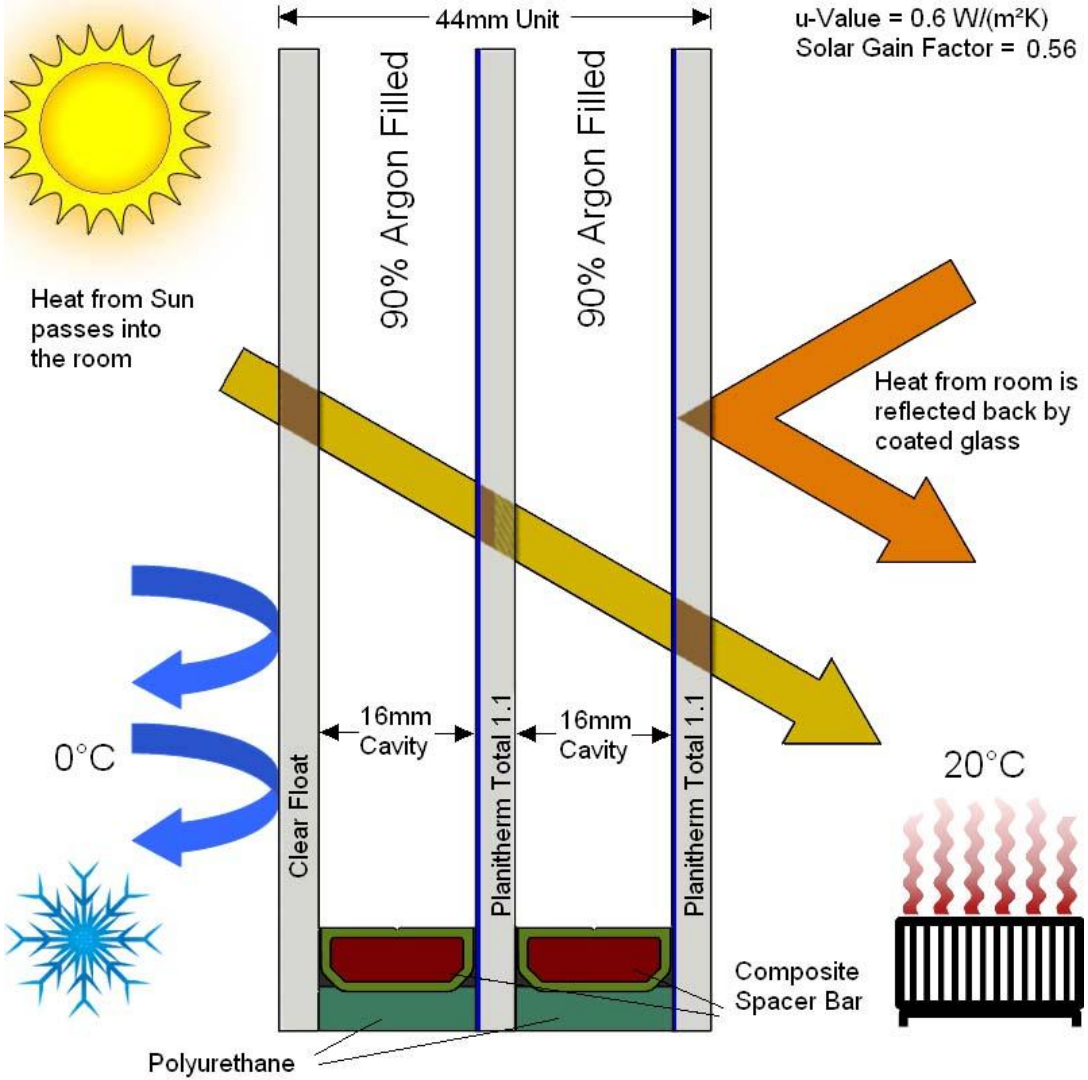
Special coatings reflect infrared light, keeping heat inside in winter and outside in summer. They also reflect damaging ultraviolet light, which helps protect interior furnishings from fading.

GAS FILLS

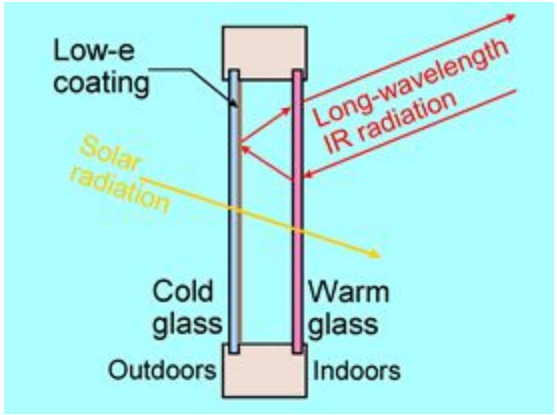
Some energy-efficient windows have argon, krypton, or other gases between the panes. These odorless, colorless, non-toxic gases insulate better than regular air.

WARM EDGE SPACERS

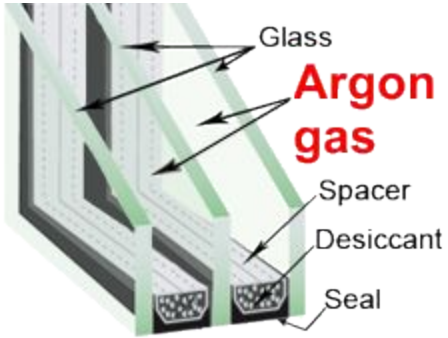
A spacer keeps a window's glass panes the correct distance apart. Non-metallic and metal/non-metal hybrid spacers also insulate pane edges, reducing heat transfer through the window.


44mm Unit
u-Value = 0.6 W/(m²K)
Solar Gain Factor = 0.56
90% Argon Filled
90% Argon Filled
Heat from Sun passes into the room
Heat from room is reflected back by coated glass
0°C
20°C
16mm Cavity
16mm Cavity
Clear Float
Planitherm Total 1.1
Planitherm Total 1.1
Composite Spacer Bar
Polyurethane

Low e coating



Gas between panes of glass



Visible light transmittance

NFRC
National Fenestration Rating Council®
CERTIFIED
World's Best Window Co.
Series "2000"
Casement
Vinyl Clad Wood Frame
Double Glazing•Argon Fill•Low E
ABC-X-1-00001-00001
ENERGY PERFORMANCE RATINGS
U-Factor (U.S. / I-P)
0.35
Solar Heat Gain Coefficient
0.32
ADDITIONAL PERFORMANCE RATINGS
Visible Transmittance
0.51
Air Leakage (U.S. / I-P)
≤0.3
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

ENERGY STAR® Certified in Highlighted Regions

ENERGY STAR

National Fenestration Rating Council®
CERTIFIED

World's Best Window Co.

Millennium 2000+

Vinyl-Clad Wood Frame
Double Glazing • Argon Fill • Low E
Product Type: **Vertical Slider**
(per NFRC 100-97)

ENERGY PERFORMANCE RATINGS

U-Factor (U.S./I-P)	Solar Heat Gain Coefficient
0.27	**0.30**

ADDITIONAL PERFORMANCE RATINGS

Visible Transmittance	Air Leakage (U.S./I-P)
0.51	**≤0.3**

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

WINDOWS

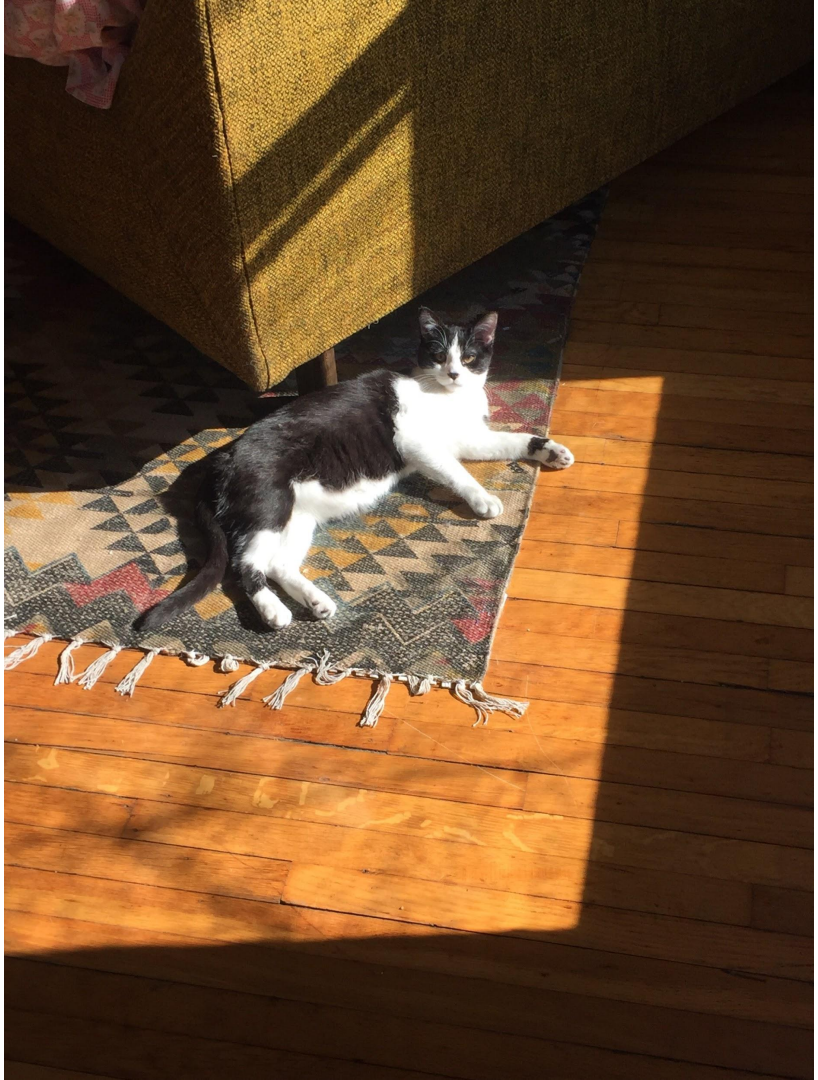
CLIMATE ZONE	U-FACTOR[1]	SHGC[2]	
Northern	≤0.27	Any	Prescriptive
	=0.28	≥0.32	Equivalent Energy Performance
	=0.29	≥0.37	
	=0.30	≥0.42	
North Central	≤ 0.30	≤ 0.40	
South Central	≤ 0.30	≤ 0.25	
Southern	≤ 0.40	≤ 0.25	

SKYLIGHTS

CLIMATE ZONE	U-FACTOR[1]	SHGC[2]
Northern	≤ 0.50	Any
North Central	≤ 0.53	≤ 0.35
South Central	≤ 0.53	≤ 0.28
Southern	≤ 0.60	≤ 0.28

Air Leakage ≤ 0.3 cfm/ft2

[1] Btu/h ft2-°F
[2] Solar Heat Gain Coefficient



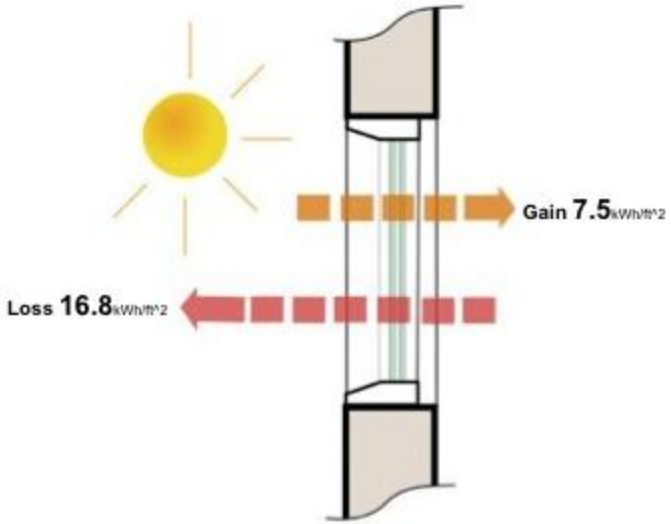
www.freeworldmaps.net

Standards & Certification

- All windows sold in Canada also have an ER Rating. This is a comparative performance rating based on three factors;

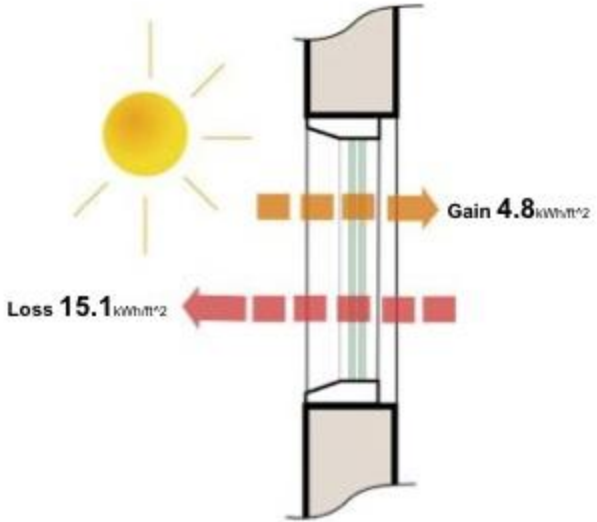
  - Solar heat gains
  - Heat loss through frames, spacers, and glass
  - Air leakage

Solar Gain Low-e



Net Loss 9.4 kWh/ft^2

Solar Shade Low-e



Net Loss 10.3 kWh/ft^2

Improper window flashing

CERTIFIED
PROFESSIONAL

From Energy Efficient Homes 2011, pg.69

*

MISSOURI DEPARTMENT OF NATURAL RESOURCES
ENERGY CENTER - ENERGY LOAN PROGRAM
WINDOW REPLACEMENT WORKSHEET

BUILDING	LOCATION	DATE

To estimate the savings of replacing existing windows with efficiency upgrades, the following information must be known:

The U-Factor of the existing window (See U-Value table below).
The U-Factor of the replacement window (See U-Value table below).
The total area of the windows being replaced (square feet).
The heating energy cost ($/million Btu).
The heating plant efficiency (in percent).

SAVINGS CALCULATIONS

1. Enter the U-Factor of the existing windows ..... _____
2. Enter the U-Factor of the replacement windows ..... _____
3. Subtract line 2 from line 1 ..... _____
4. Add 0.86 to line 3 ..... _____
5. Enter the total area of the windows to be replaced ..... _____
6. Multiply line 4 by line 5 ..... _____
7. Multiply 0.1 by line 6 ..... _____
8. Enter the heating plant efficiency (percent divided by 100) ..... _____
9. Divide line 7 by line 8 ..... _____
10. Enter the energy cost ($/million Btu) ..... _____

YEARLY SAVINGS

11. Multiply line 9 by line 10 ..... $ _____ /year

PROJECT COST

12. Enter the total cost of the window replacement including material, labor and design ..... $ _____

SIMPLE PAYBACK

13. Divide line 12 by line 11 ..... _____ years

WINDOW U-VALUE TABLE

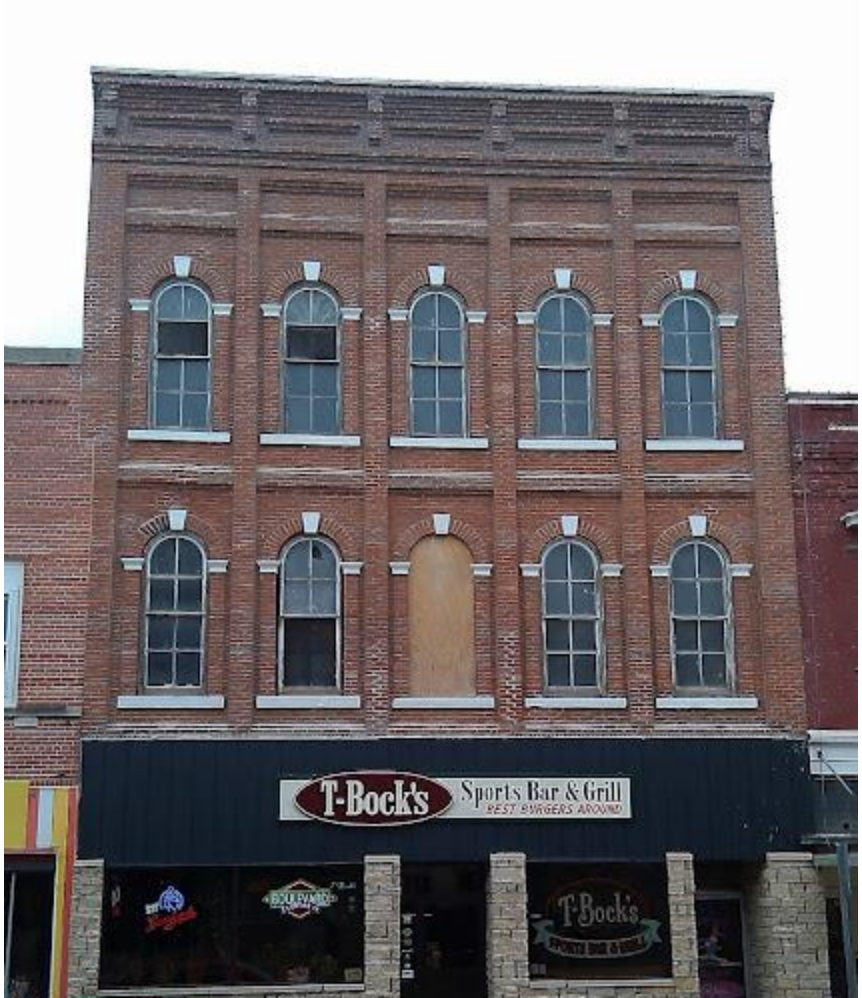
Window System Type	U-Factor*
Single Glass	1.10
Single Glass with storm window	0.50
Single Glass, low E coating	0.91
Single Glass, low E coating with storm window	0.44
Insulating Glass (double glass)	0.55
Insulating Glass (double glass) with storm window	0.35
Insulating Glass (double glass), low E coating	0.38
Insulating Glass (double glass), low E coating with storm window	0.32
Insulating Glass (triple glass)	0.35
Insulating glass (triple glass) with storm window	0.25

* U-Factor values adapted from the 1985 ASHRAE Fundamentals Handbook.

MO 780-1363 (5-98) DNR/TAREQV 3.5 (5-98)

Fig. 2. Many excellent worksheets are available for calculating payback of replacement windows; this one is produced by the Missouri Department of Natural Resources. Results of payback calculations often reveal grossly overstated claims. Courtesy of the Missouri Department of Natural Resources.

Air Inflilltration/Loss is the principal cause of energy loss in a home.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