GLASS





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# GET THE FACTS ON PROVIA'S GLASS

144ComforTech™<br/>Glass PackagesTinted Glass<br/>Options

5 Privacy Glass Styles

### **UNLIMITED** INSPIRATIONS<sup>™</sup> ART GLASS DESIGN OPTIONS



3/4" & 1"+ IG Thickness

+ NO METAL ADVANTAGE

**20+** Decorative Glass Designs

5

Internal/External

Grid Types

### 5+ POINT GLASS INSPECTION PROCESS

Mylar **10-Layer** Moisture Barrier

Super Spacer®

**Up to 14.4° F** 

Warmer Temperature at Edge of Glass

### **R-Value of 10**

for TLK Glass Packages \*Embarq™ Quad glass has an R-Value of 10

Visit **provia.com** or download our iPad app to explore all of ProVia's products and options.



## WHAT IS GLASS?

It may come as a surprise, but glass is made from liquid sand. To turn ordinary sand (which is mostly silicon dioxide) into a liquid, it must be heated to 3,090° F. Once the liquid cools, it will not turn back into sand. Instead, it undergoes a complete transformation and gains a whole new inner structure. However, no matter how long this liquid cools, it will never quite settle into a solid again. Instead, it becomes a "frozen liquid," or better known as an "amorphous solid," in scientific terminology. An amorphous solid is a cross between a solid and a liquid with some of the crystalline order of a solid and some of the molecular randomness of liquid.

# HOW IS **GLASS MADE?**

In a commercial glass plant, sand is mixed with waste glass, soda ash (sodium carbonate), and limestone (calcium carbonate) and heated in a furnace. The soda ash reduces the sand's melting point, which helps to save energy during manufacturing, but it has an unfortunate drawback: it produces a kind of glass that would dissolve in water. The limestone is added to stop that from happening. The end-product is called sodalime-silica glass. Once the sand is melted, it is "floated" (poured on top of a big vat of molten tin metal) to make perfectly flat sheets of glass for windows and doors. Glass manufacturers use a slightly different process depending on the type of glass they want to make. Usually, other chemicals are added to change the appearance or properties of the finished glass.



### TYPES OF GLASS WHAT'S THE DIFFERENCE?

**Annealed Glass** is a softer glass that has been thermally treated and then slowly cooled to relieve any internal stresses. Annealed glass tends to break into longer, jagged shards which can cause significant injury. This glass is more cost effective than other types of glass. Annealed glass can be cut, drilled, notched and edge finished.

**Tempered Glass** is manufactured through a process of extreme heating and rapid cooling, making it much harder and stronger than annealed glass. Another benefit of tempered glass is the ability to stand up to moderate heat (470°F).

In general, tempered glass is four times stronger than annealed glass and if tempered glass breaks, it breaks into small pieces (shatters) and is less likely to cause injury. All fabrication needs to be done while the glass is in the softer, annealed condition. Tempering is only done once the shaping and fabrication is complete.

**Laminated Safety Glass** takes the idea of safety glass a step further. Laminated safety glass is made by adhering two pieces of annealed glass together with a vinyl interlayer. The vinyl layer holds the glass together if the glass is broken or impaled, making this a much safer alternative to regular annealed glass.

# TEMPERED GLASS USAGE

Common areas considered to be hazardous safety glazing areas requiring tempered glass are:

- () Glass in any door. This includes entry doors, storm doors and patio doors.
- Q Glass in fixed or operable panels adjacent to a door where the nearest exposed edge of the glazing is within a 24" arc of either vertical edge of the door in a closed position and where the bottom edge of the glazing is less than 60" above a walking surface.
- **3** Glass in fixed or operable panels that meet all of the following conditions:
  - Bottom edge is less than 18" above floor
  - Top edge is greater than 36" above floor
  - Total area of glass is greater than 9 sq. ft. (1,296 sq. in.)
  - One or more walking surfaces within 36" horizontally of the glazing

You can choose tempered glass for most windows you order from ProVia®, even if it is not required.

Tempered glass usage requirements vary by state. Please check local building codes for exact usage requirements.



# ANATOMY OF AN ENERGY EFFICIENT INSULATED GLASS UNIT

#### LOW-E GLASS

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

#### GAS FILLS

Energy-efficient products have either argon or krypton gases between the panes. These odorless, colorless, non-toxic gases insulate better than regular air.

#### **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<sup>®</sup> certified products include three or four panes (in Embarq<sup>™</sup> Quad glass only) for even greater energy-efficiency, increased impact resistance and sound insulation.

#### WARM EDGE SPACERS

A spacer keeps the glass panes the correct distance apart. Non-metallic spacers insulate pane edges, reducing heat transfer through the window.

When ordering glass for windows, you can choose single, double or triple strength glass.

#### SINGLE STRENGTH

2.5mm or ¾2" panes Available in Annealed Only

#### **DOUBLE STRENGTH**

3mm or ¼" panes Available in Tempered or Annealed

#### **TRIPLE STRENGTH**

5mm or ¾" panes Available in Tempered or Annealed

\* Laminated glass is available in multiple pane thicknesses.

### SUPER SPACER<sup>®</sup> Between you and the elements

Warm edge technology is more than just a low-conductive product that helps make insulated glass units more thermally efficient. The warm edge spacer is the seal that keeps the glass package in windows and doors from failing. Super Spacer is a dual-seal insulating glass system. This non-metal, structural foam spacer resists condensation, reduces energy costs, provides long-life durability and adds both comfort and value to your windows.

Super Spacer is better able to ensure NFRC ENERGY STAR certification by providing the best thermal conductivity, the lowest U-Factor among dual-seal systems and the best durability available in the industry. The all-foam formula blocks the heat escape path, improves sound absorption over traditional metal spacers and lasts up to nine times longer in durability tests than single-seal units. The all-foam formula reduces the effects of temperature changes, barometric pressure, wind load and glazing pressure, resulting in less seal failure and fewer stress cracks.

#### The warmest edge among dual-seal systems up to +14.4°F/8°C warmer temperature at the edge of the glass

**38.1° F/3.4° C** Super Spacer® Premium - butyl

**35.1° F/1.7° C** Intercept<sup>®</sup> ULTRA - butyl

**33.6° F/0.9° C** Cardinal XL Edge<sup>™</sup>

29.5° F/-1.4° C Intercept<sup>®</sup> - butyl

23.7° F/-4.6° C Aluminum spacer sealed with silicone

> Outside 0°F/-17.8°C 4 2°F/-1.1°C Inside 70°F/21.1°C 2°F/-1.1°C

Super Spacer has been tested and has met the following global standards: North America E2188 / E2189 / E2190 | European EN 1279 | Canadian CGSB 12.8 | ASTM E330 (120\* psf positive, psf negative) French Standard CSTV for CEKAL | Passive House phA+ certificate for Artic climate | Industry type P-1 testing



#### The No-Metal Advantage

Thermal efficiency through no presence of conductive metals is the Super Spacer hallmark.

#### Mylar 10-Layer Vapor Barrier

The Super Spacer thermoset foam matrix is exceptional. Moisture is kept out, gas is kept in and conductivity is virtually nonexistent.



Our Warm Edge Glazing System stands up to the natural bending and bowing from temperature changes, barometric pressure and wind load.



Enhanced Noise Reduction

The all-foam formula's excellent sound dampening properties reduce outside noise, even in industrial environments.

#### Strength

The P-1 test, the world's toughest IG durability test, exposes units to 140°, 95-100% humidity and constant UV bombardment. Each week of testing is approximately equivalent to one year of field use, and Super Spacer survives with long term P1 performance with a low seal failure history.



Super Spacer backed with hot melt butyl Butyl spacer backed with silicone Aluminum spacer backed with silicone Aluminum spacer Butyl spacer

\*Source: Glass Digest, November 1992; Test RLS08006B

# **GLASS CONDENSATION**

Many energy efficient windows and doors have glass packages with "warm edge technology." The problem is highly conductive metal-based insulating glass spacers are often used in these new windows and doors. A new window can lose up to 50% of its overall stated R-Value with a metalbased spacer at the edge of the glass. "R" stands for the "resistance" of the transfer of heat or cold through a solid object. So, a higher R-Value means better insulation against heating and cooling loss.

The edge of the insulating glass is the most vulnerable to heating and cooling loss. This usually leads to condensation. It's a problem that looks unsightly, and over time, it will stain wood, peel paint and rot frames. Not only that, but window condensation can contribute to mold growth.

### THE SOLUTION

Reduce condensation on the glass with the warmest inside surface temperatures possible.

The primary window condensation culprit is its insulating glass spacer. Traditional metal spacers can conduct heat and cold, causing condensation at the edge of the glass. Convection currents further concentrate cold air along the bottom edge of the glass, making that area the most vulnerable. However, a warmer edge all the way around will strike at the heart of the problem.

The only truly "warm edge" occurs with Super Spacer, an insulated foam spacer whose use helps reduce condensation and allows for comfortable household humidity levels. Remember, even windows with a warm edge spacer are prone to condensation when there is excess humidity in your home.

#### A FEW TIPS FOR REDUCING HUMIDITY INCLUDE:

Using exhaust fans in your kitchen, laundry and bathrooms

Venting gas burners, clothes dryers, etc. to the outdoors

Shutting off all humidifiers

Opening louvers in your attic and basement crawl spaces

Opening fireplace dampeners to allow an escape route for moisture-laden air

Airing out your house a few minutes each day



**Full Metal Spacer** With conventional metal spacers, condensation is a fact of life.



#### Less Metal Spacer

Mid-performance spacer systems that still contain metal will improve condensation resistance.



**Non-Metal** *Super Space*<sup>®</sup> All-foam design dramatically reduces interior condensation, delivering a clear view.



# **GLASS PACKAGES**











#### 

The best value in energy savings! This glass package has high performance Low-E coating applied to two panes of glass. Both insulating chambers are filled with Krypton gas.

#### ComforTech<sup>™</sup> **TLA-UV** OOOOO R-Value of 7

Combat cold weather with this triple glazed package. High performance Low-E coating is applied to two panes of glass. Both insulating chambers are filled with Argon gas.

#### ComforTech<sup>™</sup> **DLA-HC** ●●●●●●●●●●●●●●● **R-Value of 5**

Enhanced double glazed, Argon filled glass package with high performance Low-E coating applied on one pane of glass and Energy Advantage<sup>™</sup> Hardcoat Low-E on the other pane of glass. The hardcoat increases UV protection and has SHGC retention.

#### ComforTech<sup>™</sup> **DLA-UV** ●●●●●●●●●●●●●●●● **R-Value of 4**

Double glazed glass package with high performance Low-E coating applied to one pane. Insulating chamber is filled with Argon gas.

#### ComforTech<sup>™</sup> **DC** ●●○○○○○○○○○○ R-Value of 2

Baseline double glazed glass package, with two panes of clear glass and the air space acting as an insulator. No Argon gas.

Other glass packages available: DLA TLK TLA DLA-UV-HC

### ComforTech<sup>™</sup> Elevation Series

for customers in high altitude areas

Insulated glass without Argon or Krypton. Capillary tubes are open and inserted behind glazing bead. Low-E softcoat and hardcoat available for vinyl windows and vinyl patio doors.



ComforTech<sup>™</sup> **TLE** ComforTech<sup>™</sup> **TLE-UV** ●●●●●●●●●●●●● R-Value of 5



ComforTech<sup>™</sup> **DE** OOOOOOOO R-Value of 2

Some Elevation Series (TLE-UV, TLE, DLE-UV and DLE) glass offerings require a hardcoat option to be ENERGY STAR<sup>®</sup> compliant.

#### Understanding the Acronyms

<b>T</b> - Triple Glazed	<b>K</b> - Krypton
D - Double Glazed	<b>E</b> - Elevation (no gas)
L - Low E	<b>UV</b> - Ultraviolet
<b>C</b> - Clear	HC - Hard Coat
A - Argon	

R-Value reflects center of glass data only. Actual window unit R/U values will vary based on the window package chosen.

# **GLASS OPTIONS**

There are several ways to customize the glass in your windows and doors. ProVia® offers numerous styles of Decorative, Privacy, Tinted and our exclusive Inspirations<sup>™</sup> Art Glass. Refer to the window and patio door brochures for more information and style options for these glass types.







## NFRC LABEL WHAT YOU NEED TO KNOW

ENERGY STAR® Certified in All 50 States						
Grupping Energy star	Certified					
National Fenestration Rating Council®	ProVia Endure 601- Double Hung Comfortech DLA-UV Double Glaze - Low-E w/Argon/UV Frame: Vinyl					
E١	NERGY PERFOR	MANCE RATINGS				
U-Factor	(U.S/I-P) <b>27</b>	Solar Heat Gain Coefficient (SHGC)				
ADDITIONAL PERFORMANCE RATINGS						
Visible Transmittance		Air Infiltration (cfm/ft²)				
Condensatio	on Resistance					
Manufacturer stipulates that these ratings conform to applicable NFR procedures for determining whole product proformance. NFR classings are determined for a fixed set of environmental conditions and a specific product size. NFR closes not recommend any product and does not warrant the suitability of any secfic use. Consult manufacturers literature for other product performance information www.nfr.corg						

For example purposes only. Numbers will vary based on the window package chosen.

- Our Content of the entire window system. Lower numbers reflect better insulating value. Values generally range from 0.25 to 1.25.
- Solar Heat Gain Coefficient (SHGC) Amount of heat from the sun passing through the glass. Lower numbers indicate glass is keeping heat from entering your home. SHGC is measured on a scale from 0 to 1.
- **C** Visible Transmittance Amount of visible light passing through the glass. Higher numbers indicate glass is allowing more light to enter your home. Visible transmittance is measured on a scale from 0 to 1.
- Air Infiltration How much air is entering or escaping through the window. Lower numbers indicate air is kept from entering or escaping.
- Condensation Resistance Amount of moisture it takes for glass to condensate when exposed to extreme interior and exterior temperature changes. Higher numbers indicate better resistance to condensation. Condensation resistance is scored on a scale of 0 to 100.





## ENERGY STAR®

### WE'VE GOT YOU COVERED...NO MATTER THE CLIMATE

There are some important things to note about what makes a door or window ENERGY STAR certified.

ENERGY STAR certified windows and doors:

- 1. Are manufactured by an ENERGY STAR partner
- 2. Are independently tested, certified and verified by the National Fenestration Rating Council (NFRC)
- Have NFRC ratings that meet strict energy efficiency guidelines set by the U.S. Environmental Protection Agency (EPA)

Though ENERGY STAR does not require any specific technologies, certain product features are common in many certified products.

Windows and doors protect you from the elements just like a winter coat. But like a winter coat, you should pick the windows and doors that make the most sense for your climate. While some are better at keeping you warm, others excel at keeping you cool.

Doors are a little different. Many doors don't have any glass (like your front door), but even doors with lots of glass (like a sliding patio door) have lower glass-to-frame ratios than windows or skylights. This means doors can provide more insulation than a window or skylight. Performance criteria for doors are based on the amount of glass they have (glazing level) and ratings certified by the National Fenestration Rating Council (NFRC).

#### ENERGY STAR REQUIREMENTS

WINDOW			
Climate Zone	U-Factor	SHGC	
Northern	≤ 0.27	Any	Prescriptive
	= 0.28	≥ 0.32	Equivalent
	= 0.29	≥ 0.37	Energy Performance
	= 0.30	≥ 0.42	
North Central	≤ 0.30	≤ 0.40	
South Central	≤ 0.30	≤ 0.25	
Southern	≤ 0.40	≤ 0.25	

DOORS								
Glazing Level	U-Factor	SHGC						
Opaque	≤ 0.17	No Rating						
≤ ½-Llte	≤ 0.25	≥ 0.25						
> ½-Llte	≤ 0.30	Northern North-Central	≤ 0.40					
		Southern South-Central	≤ 0.25					

Air Leakage for Sliding Doors  $\leq 0.3~cfm/ft^2$  Air Leakage for Swinging Doors  $\leq 0.5~cfm/ft^2$ 



# ENERGY STAR® CERTIFIED WINDOWS

		COMFORTECH <sup>™</sup> GLASS PACKAGE											
	Model	ComforTech el DLA		ComforTech DLA-UV		ComforTech TLA		ComforTech TLA-UV		ComforTech TLK		ComforTech TLK-UV	
		U-Factor	SHGC	U-Factor	SHGC	U-Factor	SHGC	U-Factor	SHGC	U-Factor	SHGC	U-Factor	SHGC
	Double Hung	0.28	0.27	0.27	0.21	0.21	0.22	0.21	0.18	0.17	0.22	0.17	0.18
	Slider	0.28	0.27	0.28	0.21	0.21	0.22	0.21	0.18	0.18	0.22	0.17	0.18
ris™	Picture	0.27	0.33	0.26	0.23	0.19	0.28	0.19	0.20	0.15	0.28	0.14	0.19
Ae	Casement	0.26	0.26	0.25	0.18	0.20	0.23	0.20	0.16	0.17	0.23	0.16	0.16
	Casement Fixed	0.26	0.26	0.25	0.18	0.20	0.23	0.19	0.16	0.16	0.23	0.16	0.16
	Awning	0.26	0.26	0.26	0.18	0.20	0.23	0.20	0.16	0.17	0.23	0.16	0.16
	Double Hung	0.27	0.27	0.27	0.21	0.19	0.23	0.19	0.18	0.17	0.23	0.16	0.18
-	Slider	0.27	0.27	0.27	0.21	0.19	0.23	0.19	0.18	0.16	0.23	0.16	0.18
ure	Picture	0.26	0.30	0.26	0.23	0.18	0.25	0.18	0.20	0.14	0.25	0.14	0.20
End	Casement	0.25	0.27	0.25	0.21	0.18	0.23	0.18	0.18	0.15	0.23	0.15	0.18
	Casement Fixed	0.25	0.31	0.25	0.24	0.17	0.26	0.17	0.20	0.13	0.26	0.13	0.20
	Awning	0.26	0.27	0.25	0.21	0.18	0.23	0.18	0.18	0.15	0.23	0.15	0.18
		0.07	0.00	0.07	0.00	0.10	0.04	0.10	0.10	0.17	0.00	0.17	0.10
∋ct™	Double Hung	0.27	0.28	0.27	0.22	0.19	0.24	0.19	0.18	0.16	0.23	0.16	0.18
	Slider	0.27	0.27	0.27	0.21	0.19	0.23	0.19	0.18	0.16	0.23	0.16	0.18
	Picture	0.26	0.30	0.26	0.23	0.18	0.25	0.18	0.20	0.14	0.25	0.14	0.20
Asp	Casement	0.25	0.27	0.25	0.21	0.18	0.23	0.18	0.18	0.15	0.23	0.15	0.18
	Casement Fixed	0.25	0.31	0.25	0.24	0.17	0.26	0.17	0.20	0.13	0.26	0.13	0.20
	Awning	0.26	0.27	0.26	0.21	0.18	0.23	0.18	0.18	0.15	0.23	0.15	0.18

ENERGY STAR® MOST EFFICIENT WINDOW CRITERIA						
Climate Zone	U-Factor	T WINDOW CRITERIA SHGC ≥0.20 ≤0.40 ≤0.25 ≤0.25				
Northern (N)		<u>≥</u> 0.20				
North-Central (NC)	< 0.20	<u>≤</u> 0.40				
South-Central (SC)	<u>&lt;</u> 0.20	<u>≤</u> 0.25				
Southern (S)		<u>≤</u> 0.25				

Actual window unit U-Factor and SHGC values may vary based on the window package chosen.



#### SHOW US YOUR STYLE AND CONNECT WITH US!

We love seeing how you apply our products to your home. Share photos with us.



### CREATE YOUR DREAM HOME WITH PROVIA'S EXTERIOR HOME DESIGN TOOLS

Find inspiration for the exterior of your home. Download ProVia's free app for iPad or try the online Visualizer at **provia.com/visualizer**.



#### PROVIA VISUALIZER

Use ProVia's Visualizer to change the colors and styles of your home's doors, windows, siding, stone and roofing.

Let your imagination run free with this exterior home design tool. Select from a library of existing home styles, choosing one to match yours, or upload a photo of your own home.

In a few easy steps, update your siding color, add manufactured stone or a metal roof, give the windows a fresh look or personalize a new entry door.

Not sure where to start? Apply one of our pre-selected Designer Collections, then further customize the selections to reflect your own personal style.



#### PROVIA APP

Use the ProVia app to configure doors and windows or select from an extensive collection of vinyl siding, manufactured stone and metal roofing styles.

#### FEATURES

Door and Window Configurator

Vinyl Siding Profiles, Colors and Accessory Accents

Manufactured Stone Styles, Color Palettes and Grout Options

Metal Roofing Styles, Colors and Trim Accents

View Videos, Photo Galleries and Catalogs

Locate a ProVia Dealer





"To serve, by caring for details in ways others won't." It's not just our mission, but a way of letting our light shine every day at ProVia<sup>®</sup>. We continually strive to put these words into action by providing unmatched quality and service. The P-icon symbolizes each employee's commitment to devoting the utmost care, pride and quality into each building product we manufacture...it's The Professional Way.



At ProVia, we manufacture energy efficient products and exercise corporate environmental stewardship by recycling, reducing pollution emissions and much more. In fact, our company has received repeated awards from the Environmental Protection Agency such as Partner of the Year - Sustained Excellence for outstanding efforts in energy savings.

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