Bayview Windows

e-book -Almost everything you need to know about windows

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Introduction

If you are considering window replacement in your home, protect your investment before you make your purchase.

"Everything you need to know about windows" is a complimentary window guise that will help you get the most out of your window purchase.

Buying windows can be a tricky endeavor, there are so many brands, so many options, so many window installation companies. This guide will help you get a better understanding of the options available and some of the pitfalls to watch out for when shopping for new or replacement windows - so that you can find an outstanding window solution that provides optimal performance and future proof protection.

Imagine all the possibilities - everything from energy saving efficiencies to self-cleaning glass - pick a style to match your home and your personality, make informed decisions to maximize your options and suit your budget, decrease your energy costs - feel confident you've made the right choices.

Your friendly staff,
Bayview Windows

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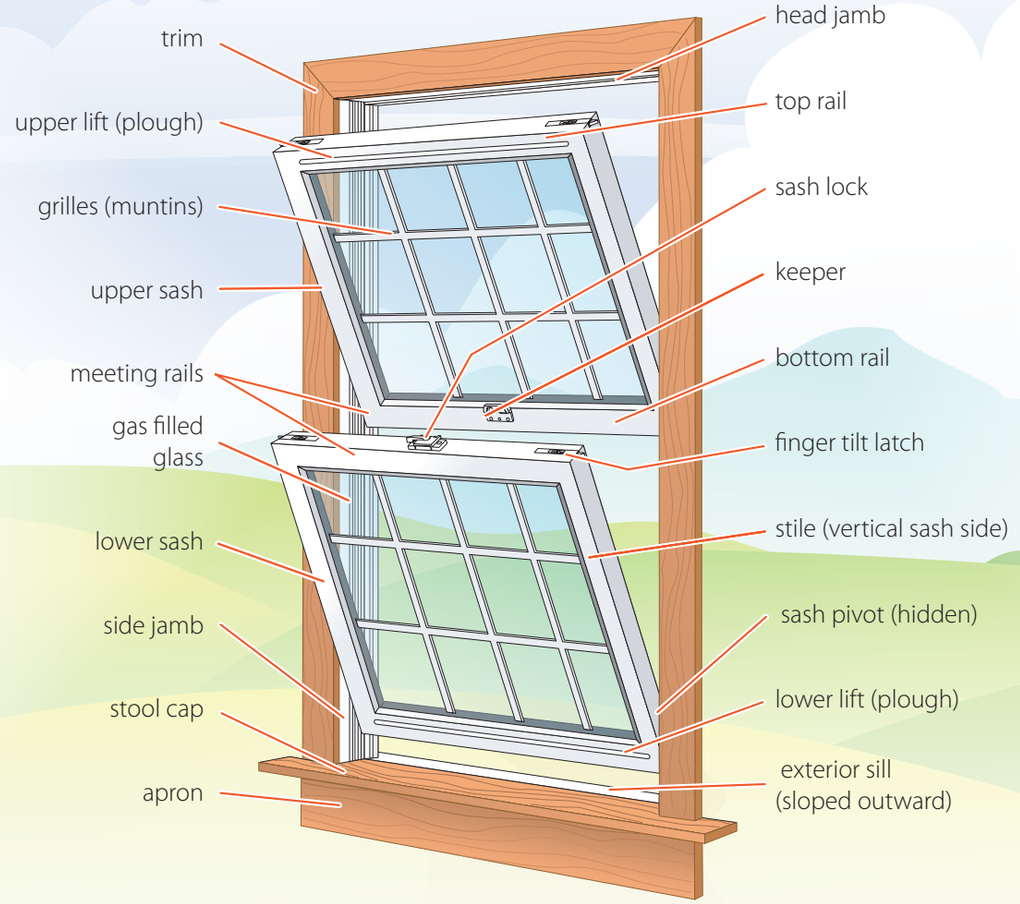
Windows - Interior Anatomy

At first glance, a window seems like a relatively simple concept, when breaking it down for the purposes of describing the individual components, a window can become a complex grouping of what-ya-ma-call-its that make it impossible to convey to others.

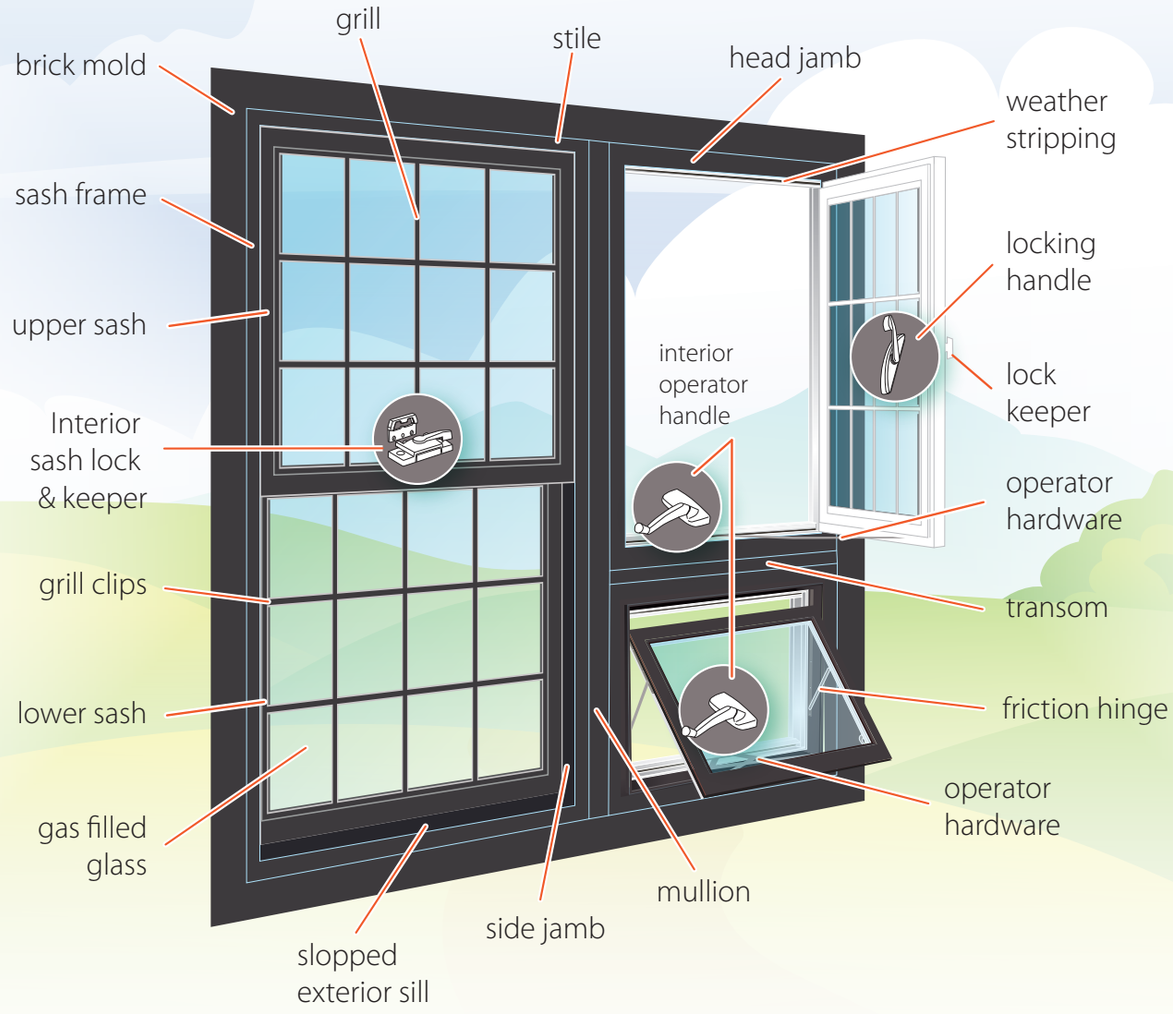
This diagram labels most, but not necessarily all of the more standard terms.



Windows - Exterior Anatomy

When looking at the exterior of a window, there are probably more parts than you'd care to remember. To make it even more confusing, multiple terms can be used to describe some of the the same components.

This diagram includes a double hung, casement and awning window in the configuration.



Windows - Exterior Finishing

There are many ways to finish the exterior of a window or door. Understanding what your finishing options could make a huge difference in how satisfied you will be with the final outcome.

Capping

Capping refers to the application of putting a framed material along the outside edge of a window where the window meets the wall frame. Historically, the process of capping was created to cover existing ageing wooden window trim, thereby freshening up the look of the window as a whole. Today capping (also referred to as cladding) is a process of finishing up the installation or replacement of windows and there are lots of ways to do this.

Brickmold

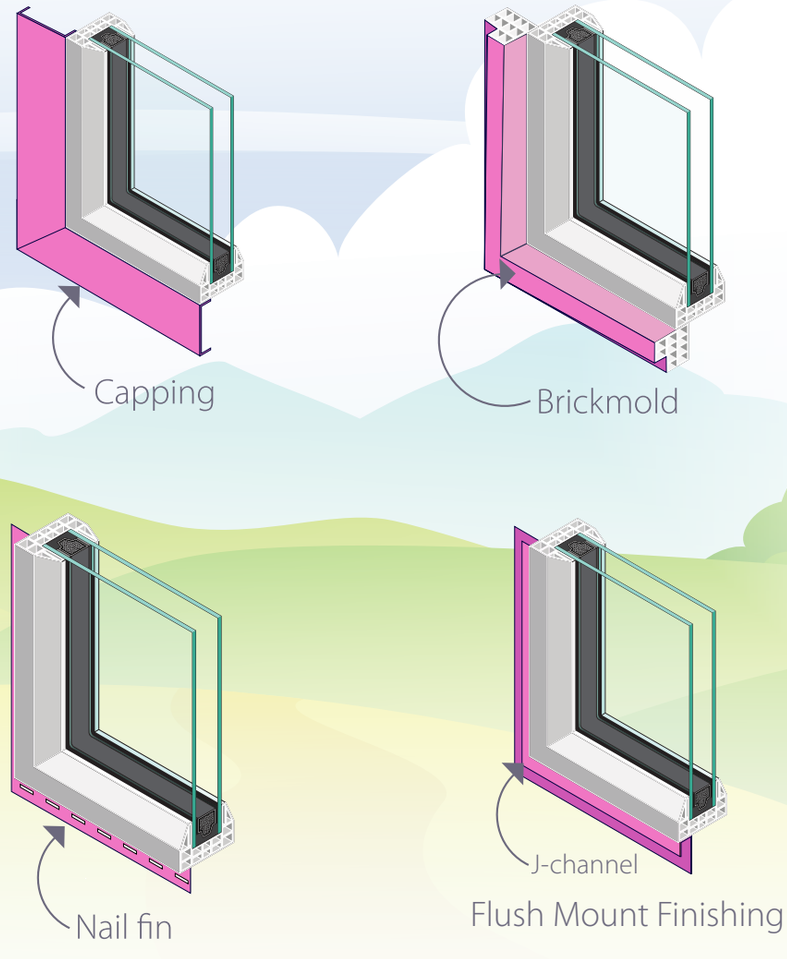
A Brickmold is a window trim finishing option in which the trim is attached to the outside of a window and is designed to cover the gap between the window frame and the exterior of the home (vinyl siding, brick, stucco, wood…). Various widths and styles of Brickmolds are available to accommodate every installation application. Brickmolds will increase the cost of your window, and because they are larger than the window frame, they must be installed from the outside rather than the inside, making installations more difficult especially for second and third story windows requirements.

Flush mount

A flush mount window option is often used in a home that has vinyl j- channel window finishing application (vinyl siding) or where windows are mounted inside a brick, stone or other material frames. It is an option intended not to have any trim application at all, however, it often entails the use of a very thin outer frame, secured by caulking and covering the thin gap between the vinyl j-channel or the brick and the window edge.

Nail Fins

Nail fins are semi-flexible strips of window material that used to attach a window frame to a stud opening. This window application is typically used in new construction and allows for a nice tight waterproof fit of vinyl or wood siding.



Windows - Styles

1. Picture Windows

Fixed non-operational window, most energy-efficient of all window types, offering largest possible surface area of all window types.

2. Casement Windows

Opens outward horizontally, these windows are more economical than sliders or hung windows and allow for the largest surface area and highest energy efficiency of all operational windows.

3. Slider Windows

One fixed plus one slider or double sliders, non-protruding, easy cleaning from inside the home. Also available in a triple lite configuration.

4. Hung Windows

One or two operational windows that slide up or down, non-protruding, easy tilt-in cleaning from inside the home.

5. Awning Windows

Hinged at the top, opens from below, great ventilation solution.

6. Bay Windows

A three-sided protruding extension, mix and match window types within configuration to create a personal and functional space.

7. Bow Windows

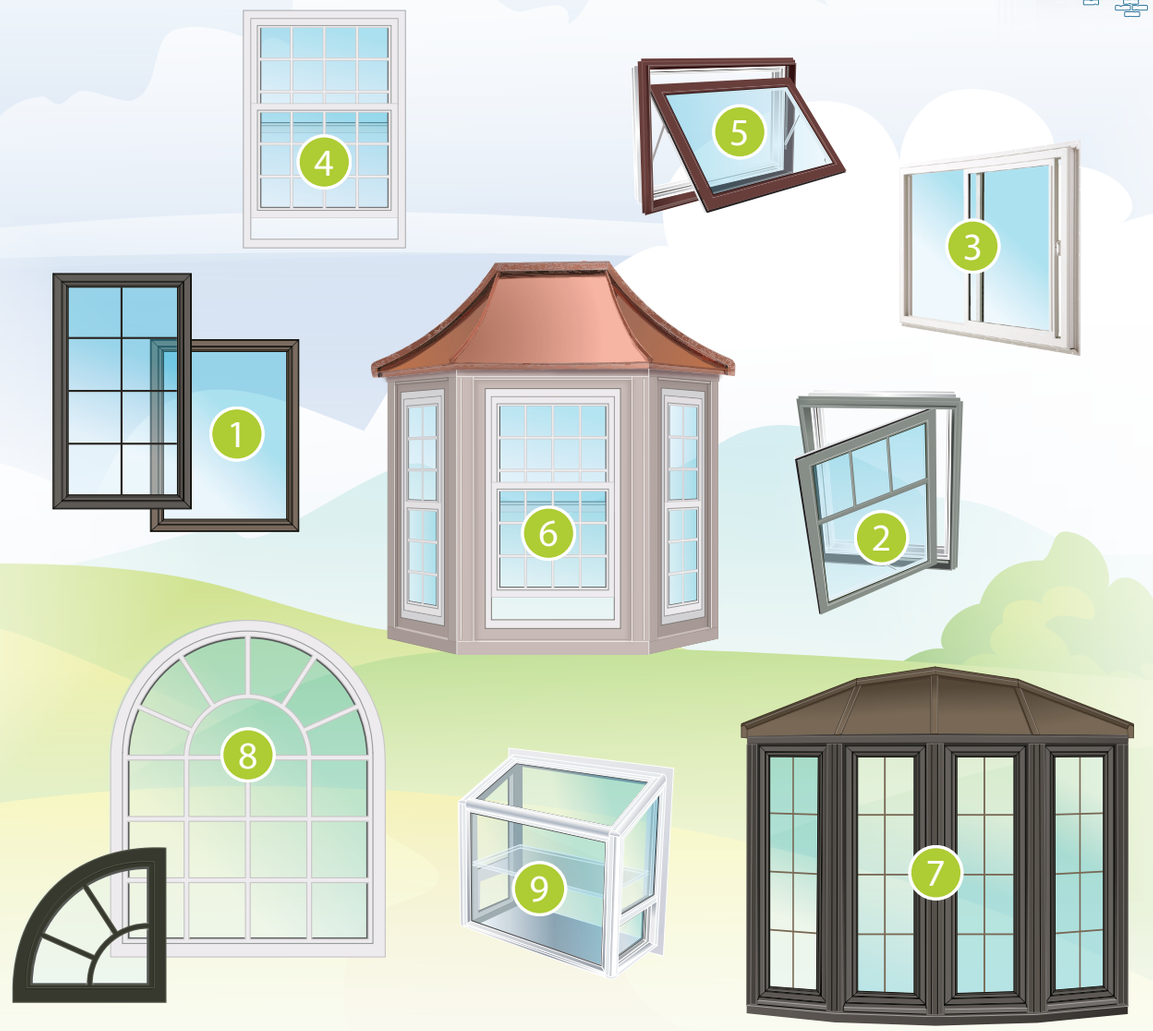
Similar to a bay window, but may be comprised of any combination of four to six individual sides forming a semi-circle. Typically made up of picture and casement windows, but can include awning and hung windows as well.

8. Custom Shapes

Fixed non-operational custom shaped window includes circular, half circle, diagonals.

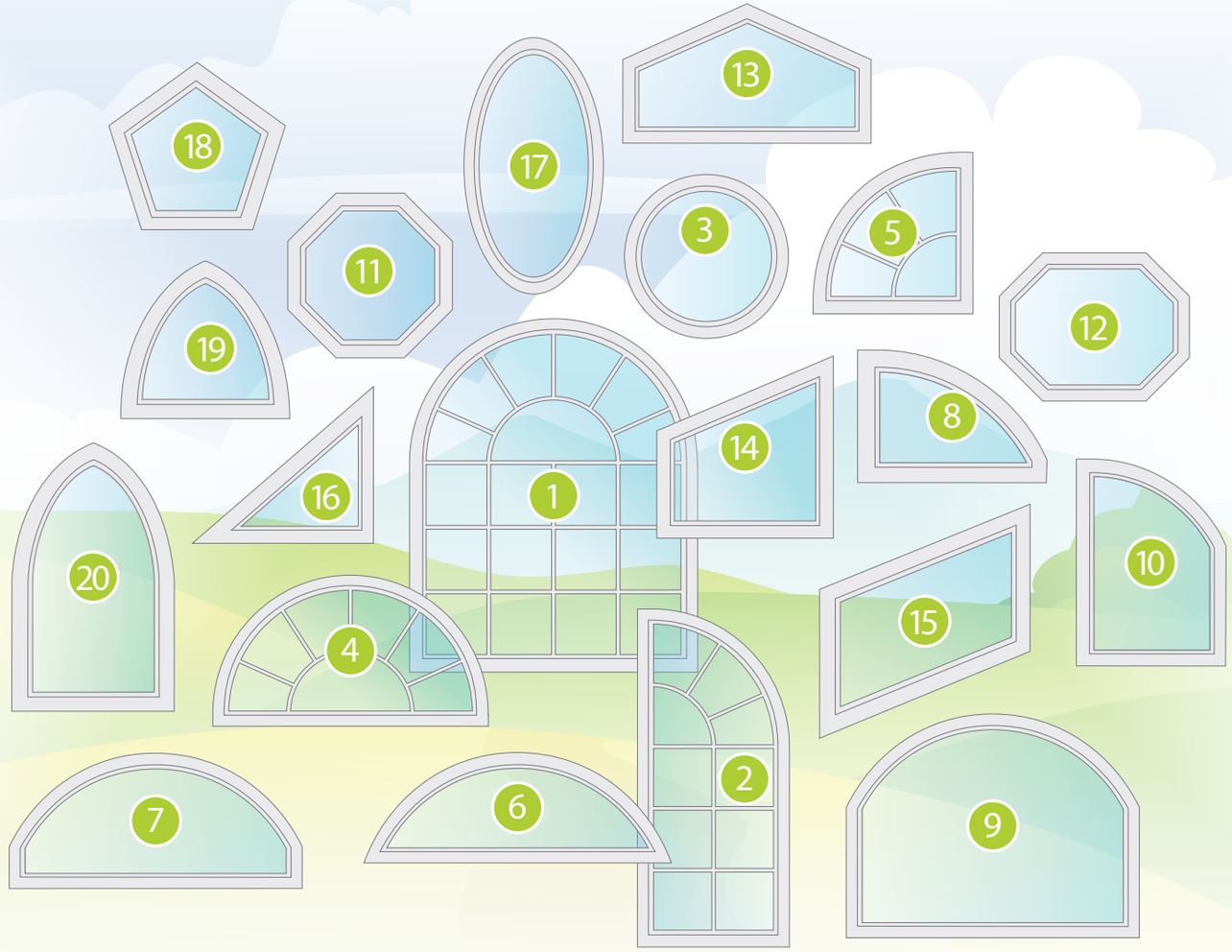
9. Garden Windows

Protrudes from home to add another dimension to a room, fitted with proper glass allows UV rays in for small plants and herbs.



Windows - Custom Shapes

1. Extended half round shaped window
2. Extended quarter round shaped window
3. Full round shaped window
4. Half round shaped window with optional grill
5. Quarter round shaped window with optional grill
6. Full chord or eyebrow shaped window
7. Extended ellipse shaped window
8. Half chord shaped window
9. Extended full chord shaped window
10. Extended half chord shaped window
11. Octagon shaped window
12. Extended Octagon shaped window
13. Peakhead shaped window
14. Rakehead shaped window
15. Quadrilateral shaped window
16. Triangular shaped window
17. Oval shaped window
18. Pentagon shaped window
19. Gothic shaped window
20. Extended gothic shaped window



Windows - Flashing

Window flashing refers to a thin often flexible material that is installed around a window frame to prevent water, moisture or wind infiltration between the window where it meets the exterior wall of a house. Flashing helps direct water down and away from the exterior of the home and prevents it from seeping in around the window where it can result in mold growth, wood rot, and structural damage.

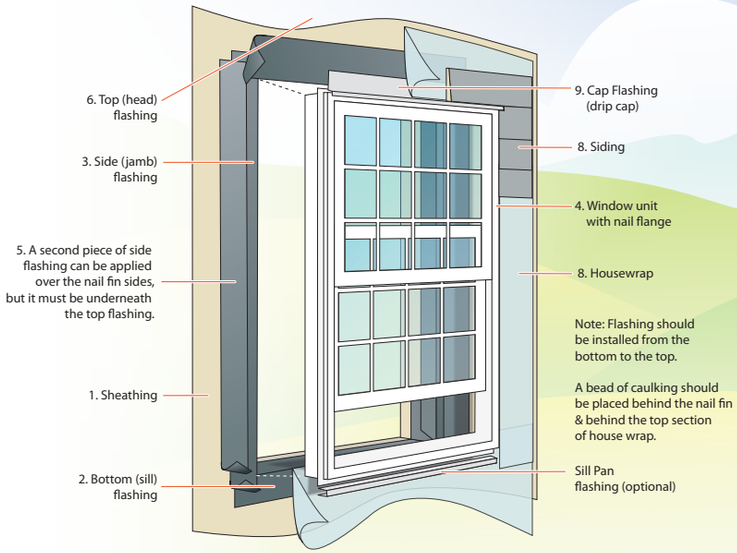
Water damage around a window, it is often the result of faulty flashing - To repair faulty flashing, sections of the house exterior may need to be temporarily removed so that the the flashing can be repaired.

Window flashing for new homes

Flashing is designed to act similar to shingles on a roof by diverting water over successive overlapping layers of flashing material. Fashing is typically fit around a window.

Most of the window flashing will hidden by exterior window framing, capping or other window applications.

The diagram to the right shows the overlapping layers required for the proper installation of flashing.

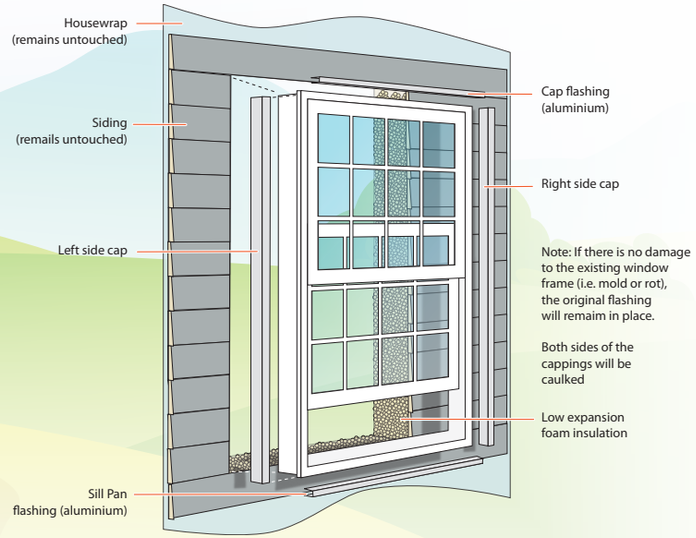


Flashing and replacement windows

The process for removing and replacing windows is very similar from one house to another, but there are exceptions. Typically the existing flashing will be reused in the installation of a replacement window.

If pre-existing issues are found within the walls of the house, the replacement process must accommodate the repair of all uncovered problems.

It is typical in the replacement process to use capping and caulking to create an additional barrior that will prevent water from leaking in around the window.



Windows - Frame Materials

Windows are available in several materials to meet consumer requirements. Offering a range of cost, colour flexibility, durability, style, energy efficiency, and comfort.

Not all windows within each category are made the same, essentially, you get what you've paid for. There are high-end and low end-products at each level, be sure to compare warranties and energy-efficiency rating specifications that include the frame and the glass.

Exterior colours

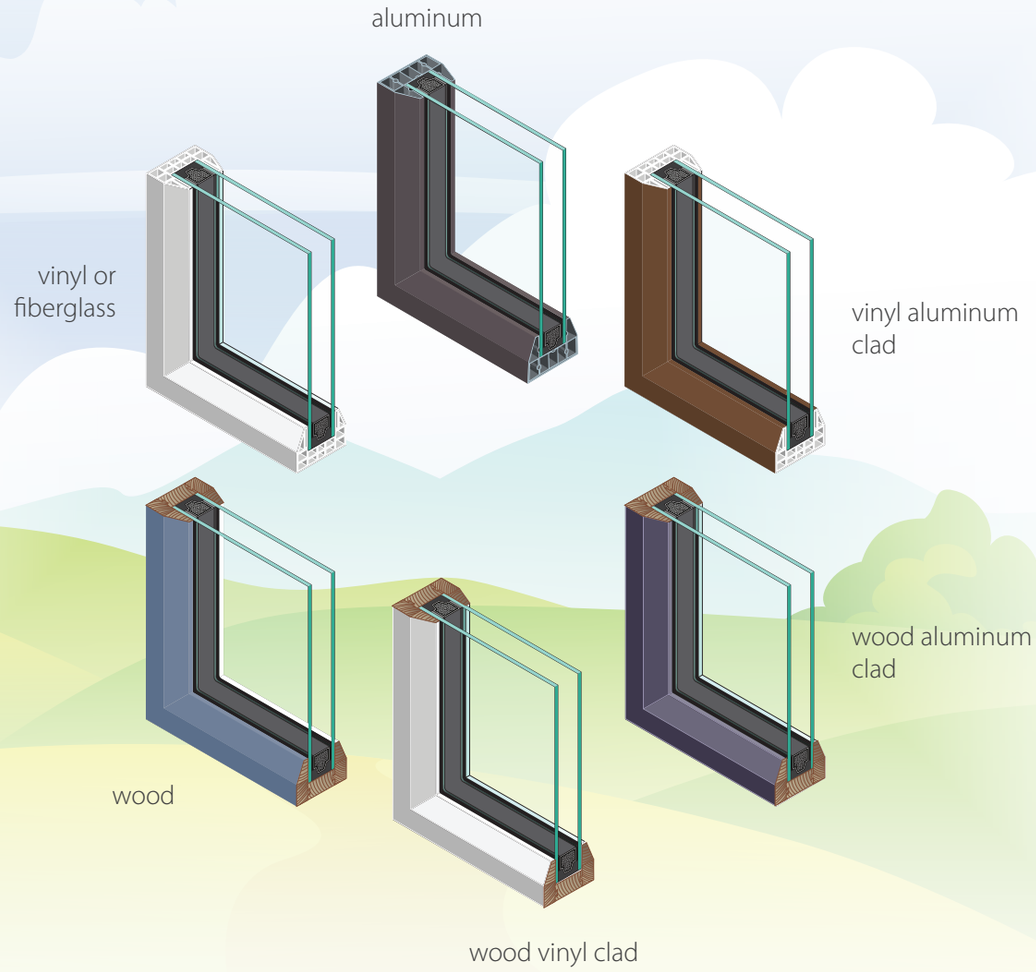
Best assortment of window colours are available with wooden windows which are virtually limitless (stains), followed by aluminum which is typically available from various manufacturers in about 30 colours (powder coated), then vinyl/fiberglass which is are limited to about 8-10 standard colours (vinyl spray or laminate).

Colour warranties vary from manufacturer to manufacturer. And prices vary considerably depending on your preferred material, so when looking at prices, be sure you are comparing like materials.

Interior colours

The standard colour for all interior windows is white, but many manufacturers offer, various woods, simulated wood, vinyl wrapped wood, or stainable vinyl materials providing plenty of interior window colour flexibility.

Prices vary depending on the material you choose.



Windows - The Sash

A window sash, is the part of the window that holds the glass. it can be fixed or operational and is a traditional window component. With the development of new style, window manufactures offer sashed or non-sashed window options.

Window manufactures are always looking for ways to make their windows better than everyone else and one way to make them seem more attractive is to make the sash smaller to allow let more light into the home.

When considering the overall look of a window, choosing the right sash option could dramatically affect the lighting and aesthetics of your home.

The sash

A sashed window is a traditional frame styled window that is typically used in fixed and operational windows. The frame which can be several inches high depending on the manufacturer, provides added window frame strength and hides the inner hardware needed to secure operational windows.

A no sash window

A sash less (or low profile) window is considered a modern window and although some companies may offer sash less operational windows, sash less windows are typically only available as a fixed picture window (also known as panoramic windows).

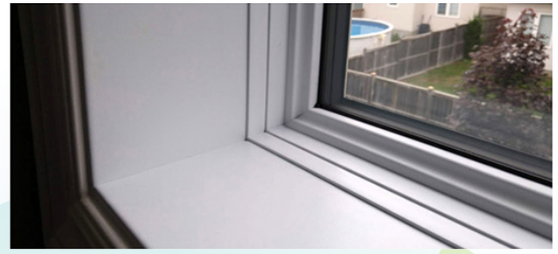
Sash less windows also allow for the reduction in width of window dividers (mullion)

Because there is little or no visible sash, these windows allow more light into the home and, create a less dramatic (subdued) look from the outside of the home.

Combinations

If you are considering having divided window combinations of fixed picture window paired with an operational window such as a hung, casement or awning window into a single-window opening, you still may want to consider retain the sash in order to make the windows look more consistent in style.

With Sash - Interior



No sash - Interior

With Sash - Exterior

No sash - Exterior

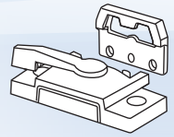
Windows - Hardware

Standard and optional window hardware is available to suit your budget, or the style of your home. Standard hardware typically comes in white only, and performs only basic functions such as manual locking and opening.

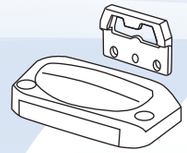
Optional hardware is usually available in metallic finishes such as nickel, pewter, and brass. Optional hardware also offers more ease-of-use and functionality.

For example nested handles provide folding handles that allows for smooth and easy movement, and an innovative low profile that tuck out of the way and gives window styles a sleek, elegant look. Self-locking locks ensure ease of mind locking with a click, or a colour indicator.

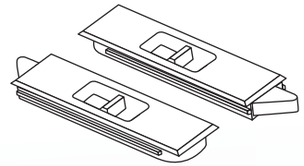
Typical Hung & Sliding Window Hardware



Standard Cam Lock

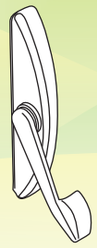


Self-locking Lock

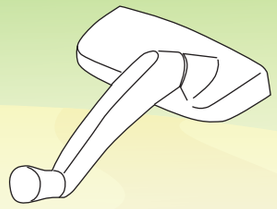


Finger-tilt Latch

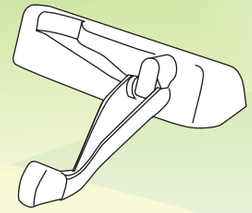
Typical Casement & Awning Window Hardware



Multi-point Lock Latch



Standard Crank Handle



Hide-away Crank Handle

Glass - Technology

Advancements in window technology, have taken window selection for the home to a whole new level by providing options and solutions that can be applied on a per room basis.

Glass can be ordered in various thicknesses, and strengths.

Smart Glass

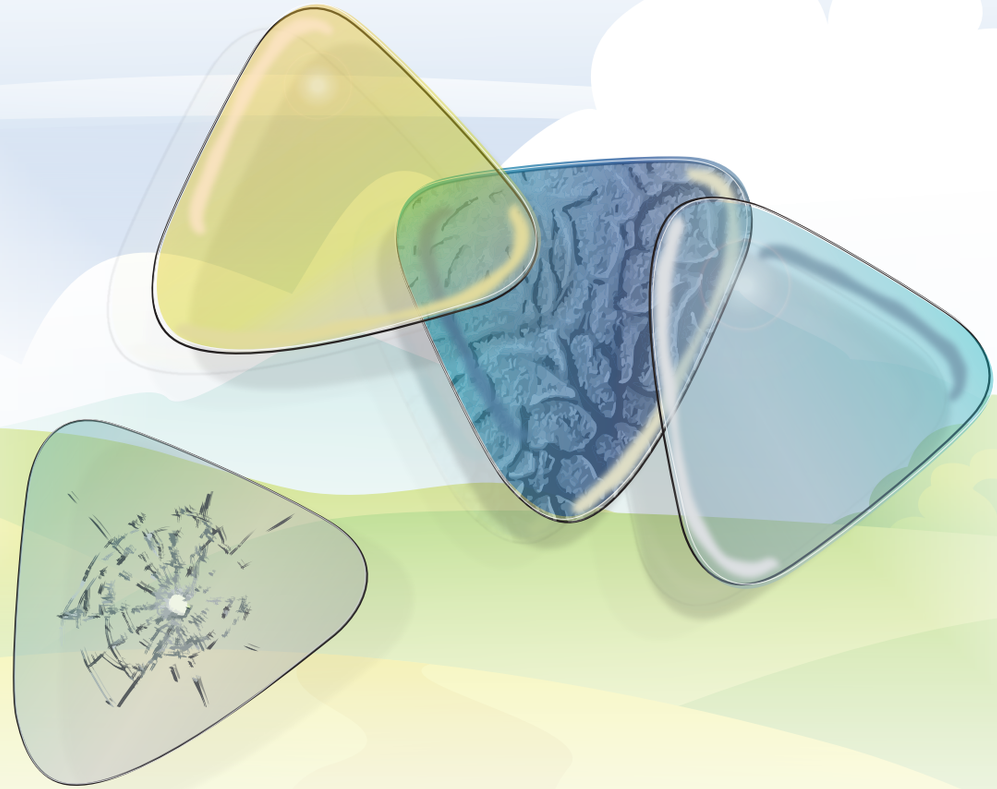
A specialty product, smart glass has special coatings that react to natural light levels by increasing reflection or darkening or both. This smart function can be activated manually or programmed to control heat gain, lighting, and add privacy.

ENERGY STAR qualified smart products are available but are qualified based on ratings achieved without using the smart features.

Glass & Safety

In today's window market, dual pane glass is pretty much the standard for new home and replacement windows. Dual pane, also known as double-glazed makes entry into a house difficult and loud.

If maximizing security is important, toughened tempered glass or laminated safety glass is available from most window manufacturers.



Glass - Glazing

Glass Panes

One of the shortcomings of glass is its relatively poor insulating qualities.

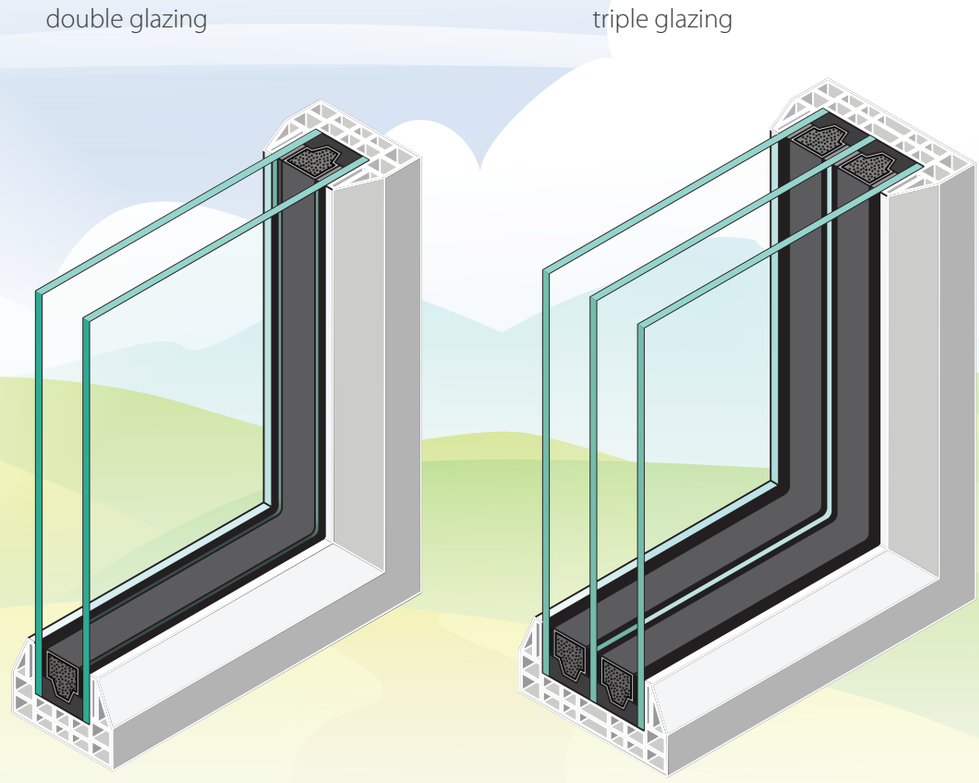
Window glazing refers to the glass framed within a window (IGU's - insulated glass units). Multiple panes of glass with air (or gas as is used today's windows) spaces in between improve the insulating value of the window considerably.

In Canada, double-gazed glass has become the standard. However triple-glazing and even quadruple-glazing windows are also available from most window manufacturers.

More is more energy efficient

Each additional pane of glass adds to the insulating value of the assembly, but it also reduces the visible light transmission and the solar heat gain coefficient. Adding a low-E coating to a surface of the double-pane unit will increase the energy performance. Adding a gas fill between the layers of glass will also improve energy efficiency.

Not all insulated glass windows are created equal, be sure to compare glass, frame and combined glass/frame ratings.



Glass - Spacers

Spacers separate panes of glass. Typically the older technologies utilize metal spacers which conduct heat and can encourage the formation of condensation (year round) and ice crystals (winter).

Newer spacer technologies focus on providing durability, gas retention and thermal performance, with the goal of keeping the edges of the window glass warmer inside the home through the reduction of heat transfer.

There are several spacer technologies available, and each manufacturer will claim to have the superior technology. When comparing windows, be sure to look at CR values and overall performance of the window.

Super Spacer®

Warm edge spacer system that uses a high-performance acrylic adhesive and foam spacer as along with a moisture vapor seal that provides a structural seal.

Intercept® Spacer

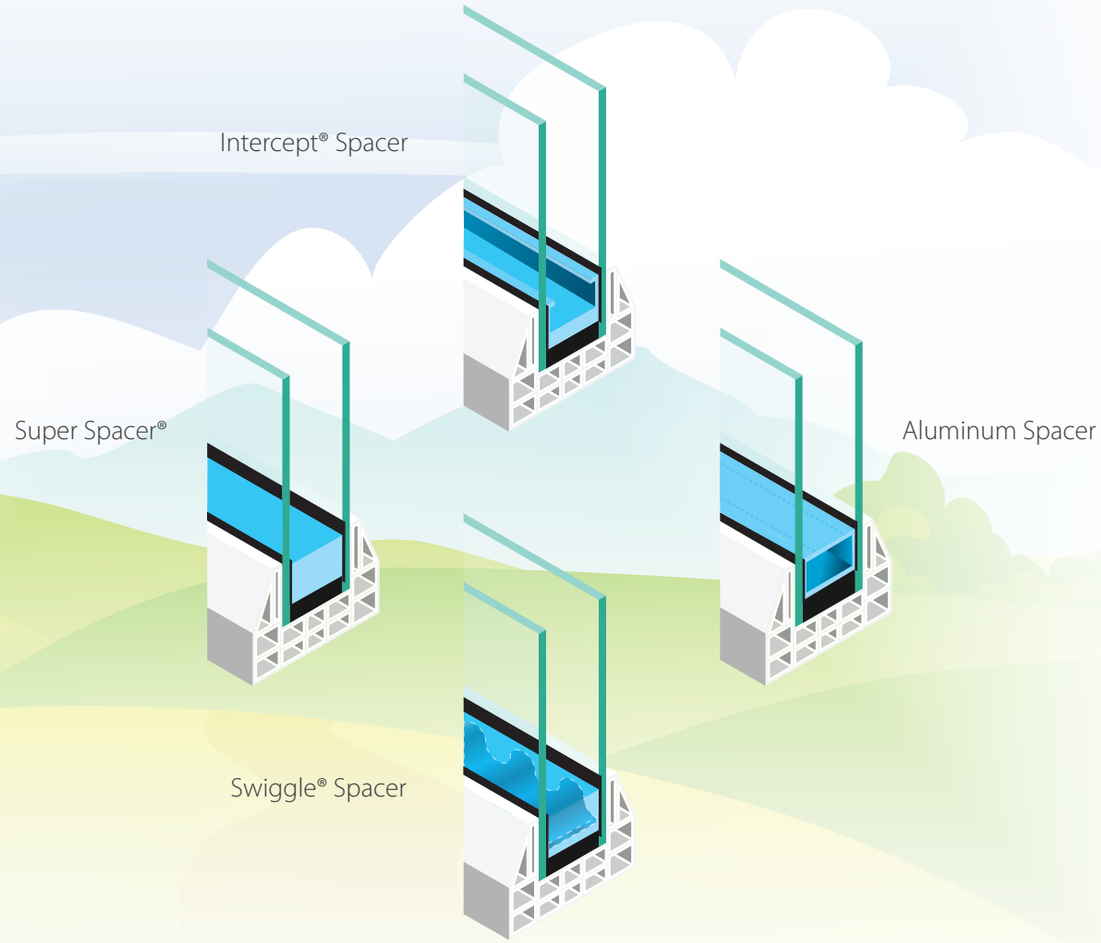
Uses a one-piece, tin-plated or stainless steel, U-channel design that absorbs flexing when temperatures shift.

Swiggle® Spacer System

The seal consists of a aluminum or stainless steel "swiggle" between a butyl rubber seal.

Aluminum Spacer

One of the first materials used as a spacer because it was rigid, however creating sealant stress and stress cracks that ultimately lead to seal failure. If you are replacing old windows at this time, they most likely have aluminum spacers.



Glass - Gas Fills

Filling the space

Initially, multiple pane window spaces were filled with air or flushed with a dehydrated nitrogen just before sealing. Through continuous testing and development window technologists discovered that air currents between the glass panes carry heat to the top of the window along the inner pane and settle down the outer pane into cold pools at the bottom.

Over time, manufacturers discovered that by filling the space between the glass with a less conductive slow-moving gas such as Argon and Krypton. These odorless, colourless & non-toxic gasses, minimize convection currents, reducing conduction through the gas and the overall heat transfer (lowering the U-factor) between the interior and exterior, thus improving the overall performance of the glazing.

Slow deterioration

Maintaining the long-term thermal performance of a window is always a concern, and many manufacturers have developed processes to seal in the gasses. But, testing has shown there is still a small breakdown in gas, less than 0.5% leakage per year in a highly ranked efficiency unit, that's only about 10% loss in total gas over a twenty-year period.

Stability in gas life increases with the quality of the window design, materials used, and efficient assembly of the glazing unit seals.

Argon

Argon is the more widely used gas as it is readily available and much less expensive than krypton. The optimal spacing for an argon-filled unit is about ½ inch. In combination, argon gas and Low-E coatings will quickly yield energy savings exceeding their cost.

Krypton

Typically Krypton is used in applications where the total glazing unit thickness must be minimized, for example, ¼ inch. Its thermal properties are more efficient than Argon but more expensive. A mixture of krypton and argon gasses can be used to compromise cost and thermal performance.

Glass - Coatings

Low Emissive Glass has a distinct microscopically thin layer of silver applied to the surface which acts to reduce the amount of heat that can flow through the glass. It reflects heat in both directions keeping heat out in the summer and in during the winter.

Coated glass is available in several configurations to produce the desired balance between solar gain, light transmission and UV blocking.

Talk to your local window consultant for a optional solution that's right for you.

LoE 180 glass

- Highest Energy Star energy rating
- U-factor of 0.31
- Maximized solar gain of SHGC 0.68
- Allows for 79% light transmission
- Blocks 70% of damaging UV rays
- Reduces energy costs in the winter

LoE 366 glass

- Best insulation option, keeps heat and sun out of home and hot & cold inside the home
- U-factor of .29
- Maximized solar gain of SHGC 0.27
- Allows for 65% light transmission
- Blocks 95% of damaging UV rays

LoE 272 glass

- Balanced option when room is hot in summer and cold in winter
- U-factor of 0.30
- Maximized solar gain of SHGC 0.41
- Allows for 72% light transmission
- Blocks 84% of damaging UV rays
- Moderate solar gain in winter and controls heat in the summer

Glass - Tints

At times the sun, heat and peeping-eyes can be very invasive and uncomfortable, especially if there are no external trees or hedges to filter them out. Glass tints are available in various colours and strengths to help make your home more private and comfortable.

Marginal Efficiency Gain

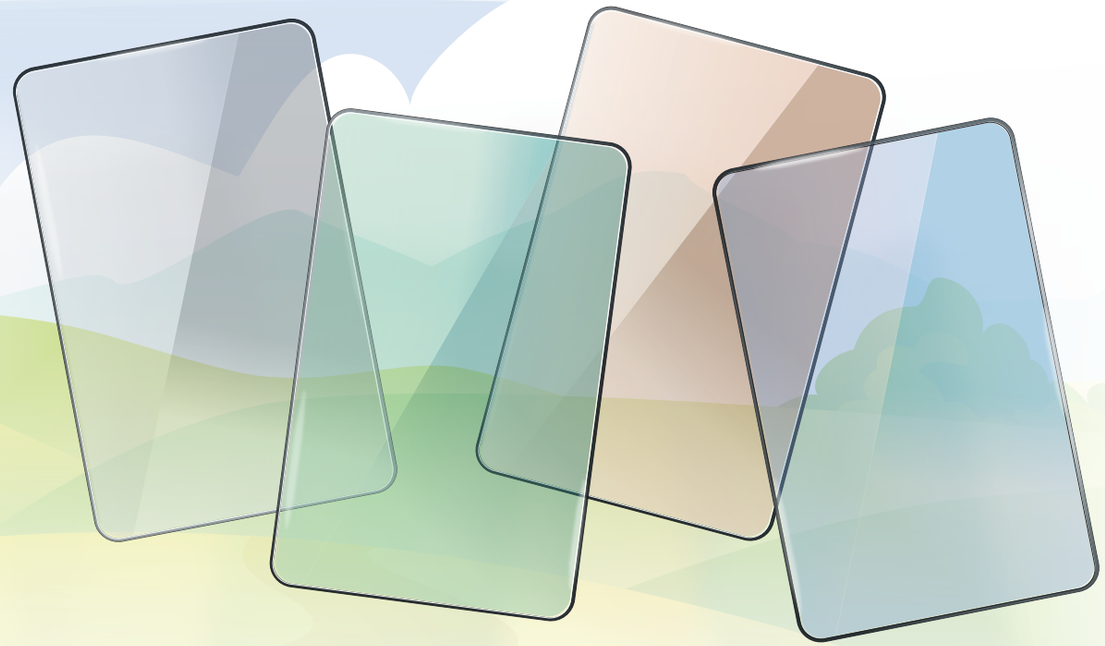
Tinted glass absorbs and re-radiates light and solar energy reducing heat, brightness, and glare in the summer, but lose heat in the winter at the same rate as non-tinted windows.

Every change in color or combination of different glass types affects visible transmittance, solar heat gain coefficient, reflectivity, and other properties. Glass manufacturers list these properties for every color, thickness, and assembly of glass type they produce.

Daytime Privacy

Tinting changes the color of the window and can increase visual privacy during the day. However, at night the effect is reversed, and it is more difficult to see outdoors from the inside.

Tinted glass is available in a number of colour tints (gray, green, bronze & blue). These colours are produced by adding metal oxides to float glass (untreated glass) during manufacture.



Glass - Privacy Solutions

Window privacy can be managed at the glass through various options offered by many window dealers. By incorporating the privacy option into the glass, the buyer can neglect window treatments that require cleaning or cluttering of living spaces.

Textured glass

Many window manufacturers offer an assortment of obscure glass options to provide privacy. There are 4-5 standard patterns, but many manufacturers offer more.

Integrated blinds

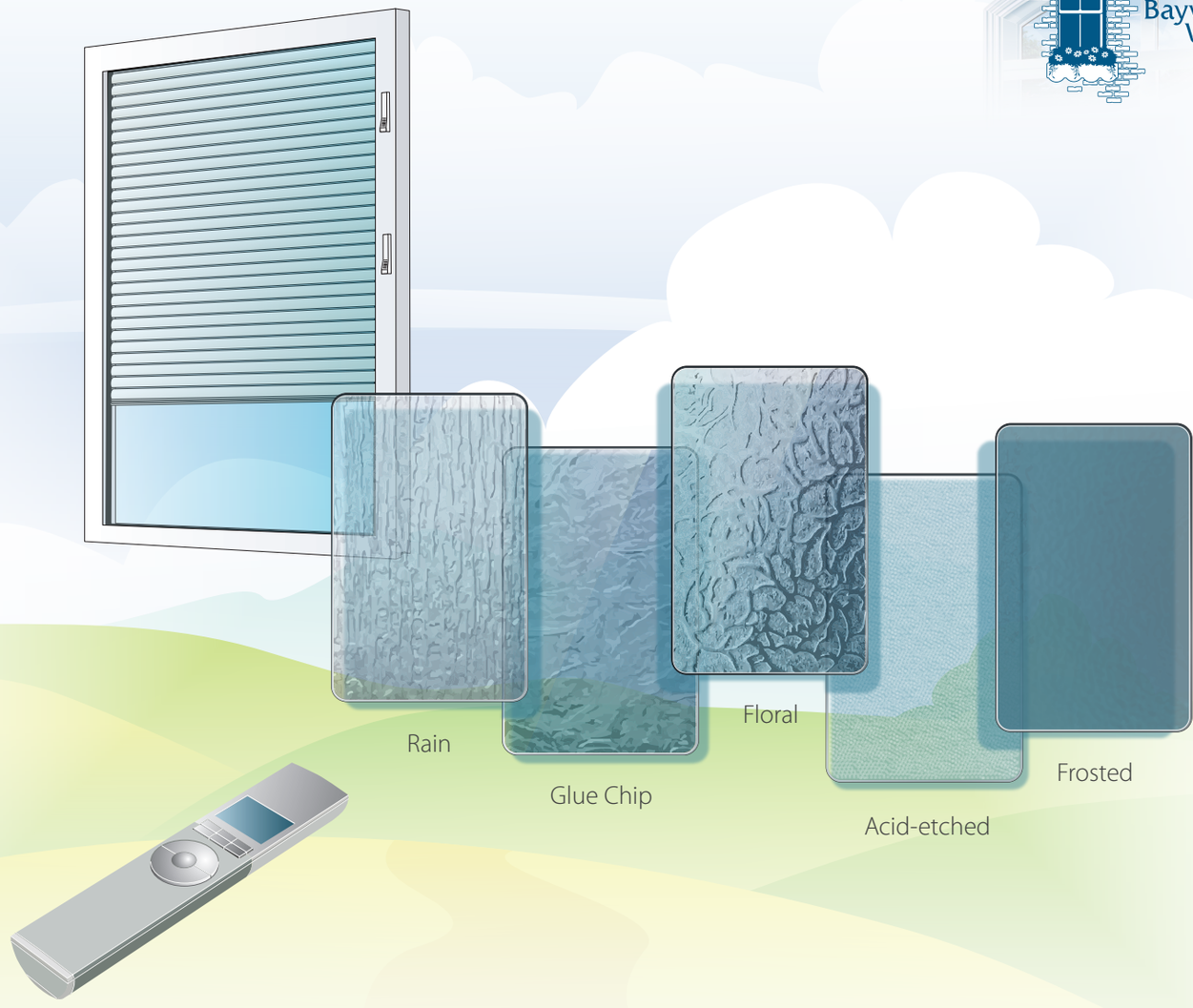
Dynamic windows have integrated insulating blinds between the panes that can be used for privacy as well as to reduce heat loss in winter and solar gain in summer.

Smart windows

Not offered by many window manufacturers, smart windows are a specialty product that is not readily available.

The glass has special coatings that react to natural light levels by increasing reflection or darkening or both. This smart function can be activated manually or programmed to control heat gain, lighting, and add privacy.

ENERGY STAR qualified smart products are available but are qualified based on ratings achieved without using the smart features.



Glass - Grills

Grills are a great way to add style and elegance to your windows. And with today's multiple window pane technologies, many manufacturers offer standard and custom configurations between the panes, and even simulated dividers on the exterior of the glass to provide a more traditional look.

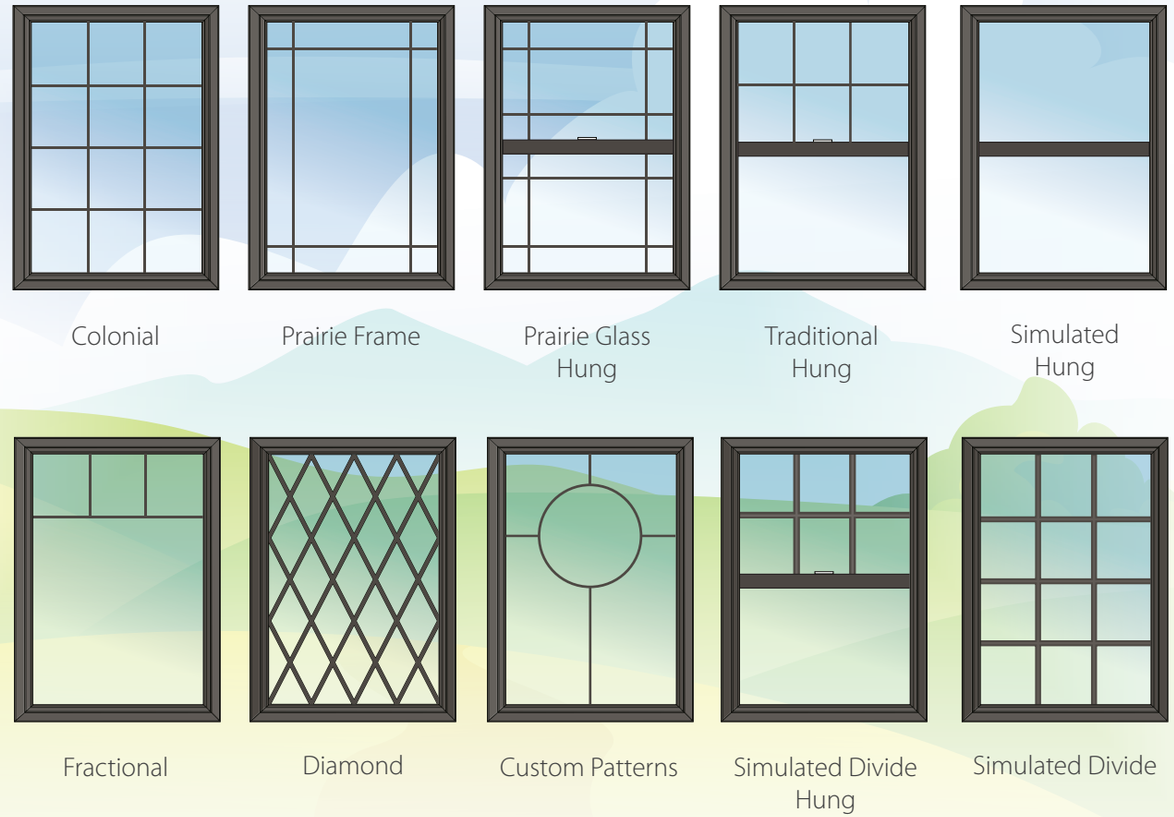
The image on the right show examples of some of the more common grill styles.

Simulated Divide Lites

A simulated Divide Lite (SDL) give a window a traditional separated window pane look. The divider is applied right to the glass on the inside and outsides surfaces.

Grill Materials

A standard grill is a white 3/4" contour, but many manufacturers also offer 1" contour as well as 5/8", 7/8" flat, 1/4" square and simulated divide lite (SDL) in a variety of colours and metallic options to help you create a perfect custom style that suits your home, or your taste.



Energy-efficiency - Energy Star Climate Zone

Even though windows do not consume energy, they can be a significant source of heating and cooling loss in a home. ENERGY STAR qualified windows will save you money by reducing the overall annual home energy costs. If you are buying new windows in the Ottawa area, Energy Star approved windows are highly recommended.

ENERGY STAR windows will also help keep your home more comfortable all-year-round and may have less condensation in cold weather compared with a conventional non-certified product.

Out with the old and in with the new!

We live in a world of ever-changing and evolving products, policies and procedures - made to make our lives easier. So, it's no surprise that in January, 2020, the Energy Star Window Standards in Canada, and the Climate Zones areas associated with these standards became much simpler.

No more thinking required

The three distinct Energy Star Climate Zones that had previously existed (2015 to 2019) in Canada have now been combined into one zone. As of January 1, 2020, the Energy Star window program which includes standards for Canadian manufacturers, installation and residential home builders has been simplified. But no worries, the new zones does not mean that the specification requirements have been lowered, in fact, for areas of Canada that experience less extreme temperatures, the bar has been raised.

Who does the ENERGY STAR certification?

When you buy ENERGY STAR certified windows, they have been tested against current Energy Star standards by an accredited laboratory, and the test results are verified by an independent third party. Windows sold in Canada may be certified for energy performance by:

- CSA International (CSA)
- Intertek Testing Services (ITS)
- Quality Auditing Institute Ltd. (QAI)
- The National Fenestration Rating Council (NFRC)
- Labtest Certifications

How are ENERGY STAR ratings formalized?

In Canada, the energy performance of a window is tested using the Canadian Standards Association (CSA) A440.2 standard. And Energy Star Certification is administered by Natural Resources Canada which uses several metrics to measure the energy-efficiency of a window or door.

U-value / U-factor

The lower the number, the more efficient the product

The U-factor is a measurement of HEAT TRANSFER through a window. The lower the U-value, the better a window is at insulating. When comparing U-values between different window manufacturers, be sure you are comparing the entire window, not just the glass. A .22 U-value is 35% more efficient than a .30 U-value.

Solar heat gain coefficient (SHGC)

The higher the number, the more solar heat the product gains

A solar heat gain coefficient is a ratio showing the amount of the sun's heat that can pass through the product.

R-value

The higher the number, the more efficient the product

The R-value is the measurement of the THERMAL RESISTANCE to conductive heat transfer. The higher the R-value, the greater the insulating effectiveness.

Visible transmittance (VT)

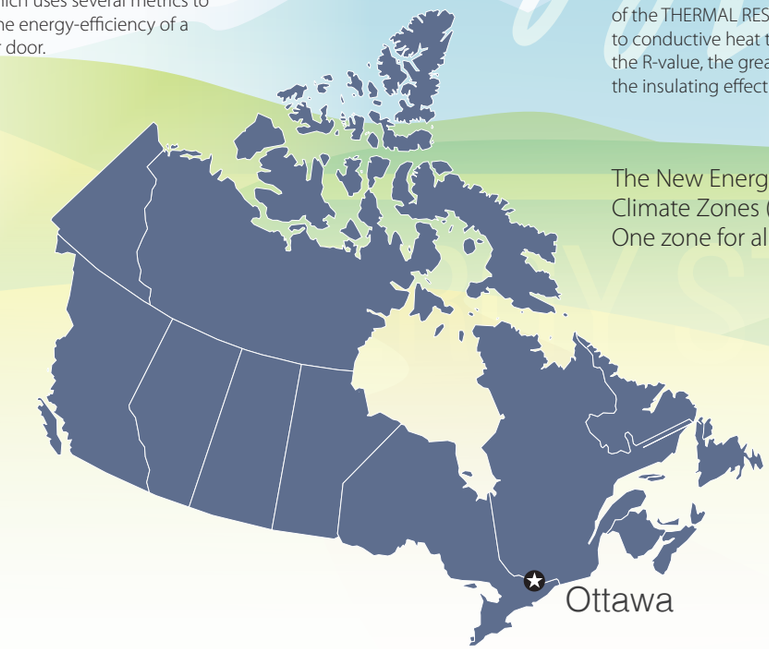
The higher the window VT measurement, the more daylight is allowed into the home

Visible transmittance is a ratio of the amount of visible light that can pass through a product.

Energy rating (ER)

(The higher the number, the more energy-efficient the window)

The ER rating is a measurement that expresses the overall performance of a window.



The New Energy Star Climate Zones (Jan, 2020) One zone for all of Canada

Energy-efficiency - Understanding Ratings & Values

Solar Heat Gain Coefficient

Let the sun shine in, or not. The Solar Heat Gain Coefficient (SHGC) measurement can help you achieve a desired increase or decrease in the amount of solar radiation (heat) passing through a window into your home.

Window U-factor

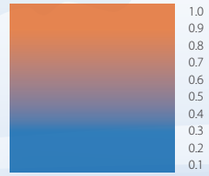
In Ottawa, our windows lose heat to the outside during the colder months and gain heat from the outside during the warmer months. U-factors allow consumers to compare the insulating properties of different window products in order to optimize home comfort.

The Energy Star Energy Rating

Although windows and doors do not consume energy, they can be a significant source of energy loss. If you are buying windows with energy efficiency in mind, then the ER will help you make standardized window product comparisons.

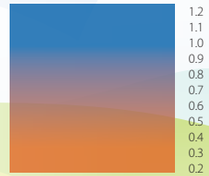
The R-value

The R-value which has actually been around for some time now has become an increasingly popular measurement for the use in window sales.



larger number means more heat gain

(SHGC)

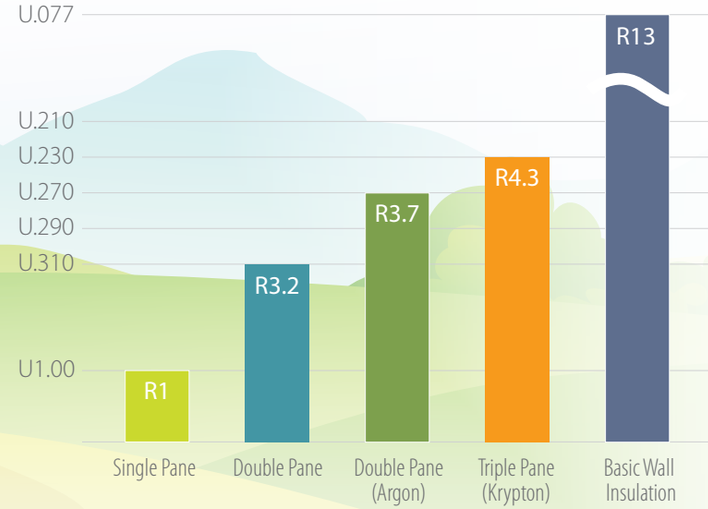


(U-value)

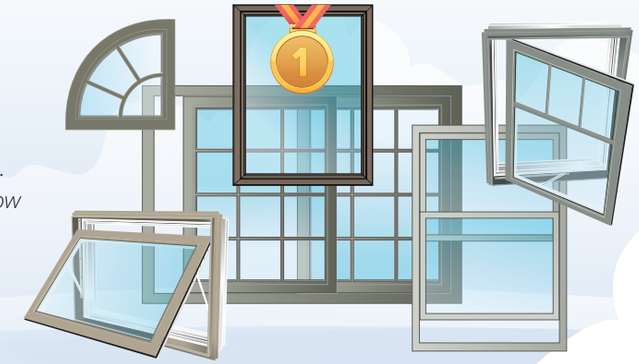
smaller number means less heat loss

larger number means more energy efficient

(ER)



Energy-efficiency - By Window Type



Improving window energy-efficiency is a primary goal for most window manufactures. There are many production and technology advances that continue to improve window energy-efficiency. Putting these advances aside, by their nature some window types have historically performed better than others.

When shopping for windows, be sure to dig deep into the specifications and window ratings. Don't assume that because a brand has an excellent window rating for one type of window, that all their other window types will have similar ratings.

Historical window performance by type

When vinyl windows were first developed, energy-efficiency by window type was pretty much in the order below (most efficient to least efficient)

1. Picture windows
2. Casement windows
3. Awning & hopper windows
4. Single-hung windows
5. Double-hung windows
6. Single-slider windows
7. Double-slider windows

Window type equality

Over the years, since the original inception of the vinyl window, window manufacturers have become very good at being able to offer balanced performance from one window type to another.

This is very important, especially when having more than one window type installed in a home.

Without this balance, assuming HVAC heating and cooling from one room to another is consistent, subtle temperature changes may cause uneven temperature distribution throughout the house creating hot and cold transitions from one room to another.

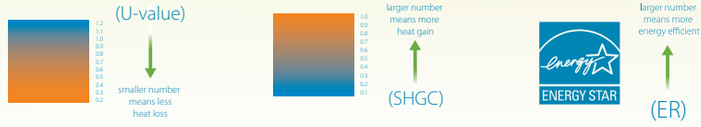
Is there really a difference?

When it comes to maximizing the fight against the weather, different window types will show differing energy-efficiency performance scores.

However, you probably would not notice it on your heating bill, or in the level comfort in your home unless there are dramatic performance differences between the windows types being selected.

Company A	U-factor	SHGC	Air Leakage - Infiltration	Air Leakage - Exfiltration	ER
Picture	1.36	0.58	0.01	0.01	44
Double Slider	1.48	0.49	0.4	0.7	35
Casement	1.42	0.44	0.23	0.28	34
Double Hung	1.48	0.49	0.53	0.61	34
Awning	1.42	0.44	0.15	0.15	34
Company A	**U-factor**	**SHGC**	**Air Leakage - Infiltration**	**Air Leakage - Exfiltration**	**ER**
Picture	1.53	0.57	0.004	0.002	39
Double Slider	1.59	0.52	0.01	0.01	35
Double Hung	1.65	0.51	0.13	0.12	33
Casement	1.53	0.42	0.05	0.04	31
Awning	1.53	0.42	0	0	31
Company A	**U-factor**	**SHGC**	**Air Leakage - Infiltration**	**Air Leakage - Exfiltration**	**ER**
Picture	1.68	0.61	0.002	0.001	38
Casement	1.66	0.47	0.01	0.02	31
Awning	1.67	0.47	0.01	0.01	31
Double Hung	1.78	0.53	0.31	0.25	31
Double Slider	1.78	0.52	0.31	0.45	30
	*(W/m^2 - K)		(l/s*m^2)	(l/s*m^2)	

Figure 1. Overall Energy-efficiency rating (ER) comparison of three window installer brands. Note: order of window performance by window type.



The balancing act

Although many people believe that certain window types offer better energy-efficiency than others, it really depends on the brand you are looking at.

To ensure that you will get the best comfort and performance results, be sure to tell your window consultant that you are looking for the same energy performance from all the windows that are going into your home.

There are many ways to balance out the energy-efficiency when configuring your windows. For example, to accommodate the loss of efficiency in a slider and hung window compared to a casement window, a window replacement company may offer optional upgrades of Krypton gas instead of Argon, or triple-glazeing rather than the standard dual-glaze options.

Since a window's overall ER energy-efficiency is calculated with measurements of heat gain, heat loss and other insulating factors, it is possible to technically rebalance a window by adjusting glazing, glass coatings and gas fill options in order to achieve a closer overall energy-rating to match several different types of windows being installed into a home.

Comparing products Figure 1.

Using the results from the NRC Energy Star efficiency testing website. Figure 1. shows a comparison of three (incognito) Ottawa window installers and their top window brands offerings.

Each company's standard line of windows (vinyl, double-glazed, Argon-filled) were compared. Window types are listed in order of their best overall performance energy-efficiency.

As you will see each company shows a different order for best ER performing window type, picture windows being the exception.

Climate - Condensation

What is window condensation?

Window condensation is a visibly physical condition that can be characterized as a fogging and ice formation that occurs on the inside of a window pane or window frame. In Ottawa, we most often see condensation on windows in frigid temperatures during the winter months, although it can happen to a lesser degree any time of the year depending on conditions.

Condensation occurs on windows when warm inside home air containing water vapor (humidity) comes in contact with a cold surface. As the warm air touches the cold surface, it is cooled causing the airborne moisture to condense into a liquid. The larger the differentiation between inside and outside temperatures, the more excessive the results of condensation.

With fluctuating inside/outside temperatures and humidity levels, condensation typically goes through a cycle of freezing and thawing, leaving puddles of water on the window frame, sill or walls, and floors. Small amounts of condensation appearing on a window surface may not necessarily be a problem, depending on the amount of moisture that forms, how long it stays, and whether it accumulates in an area that can be damaged by water.

The rate of condensation is dependent on the temperature and humidity level in your home versus the temperature outside. Condensation can be short-term during a severe cold spell or may be limited to a localized area in the home such as bathroom or kitchen where humidity is highest.

Dealing with condensation

In Ottawa, the recommended relative humidity level varies between winter and summer, but as a general rule should be maintained between 25% and 40% during the winter months accompanied by in-home temperatures between 18°C and 24°C.

Daily humidity levels will vary daily depending on activities inside the home and the volatile temperatures outside the house. Cooking, cleaning, bathing and even breathing, all increase levels of vapor in the air. High levels of humidity will cause condensation, mold, musty smells, allergic reactions and damage to walls and interior finishes. Low levels of humidity on the other hand, especially in the winter will cause breathing difficulty, sore throat, static electricity and dry skin. Finding a perfect balance can be a little tricky especially in older homes.

Windows manufactured using an energy efficient low-emissivity (or low-E) glass actually restricts heat exchange across the space between the two panes of glass. This keeps the inner pane of glass warmer thus reducing the instances when condensation can form. Also, the use of a "Warm-edge" spacer bar made of the insulating material will reduce the risk of condensation at the edges.

Climate - Condensation - The Variables

Condensation can form on the inside or outside of a window at any time of the year depending on external or internal humidity levels, the temperature, and differing environmental conditions inside and outside a home.

Whether you are buying new windows, or looking at the condition and performance of your existing windows. Condensation should always be a concern for the health of your home and it's occupants.

Most people believe that by buying energy-efficient windows, they will alleviate the problem of condensation, however, even the most efficient windows on the market can not create a 100% insulating barrier between the inside and the outside of a home. In fact, windows are still very inefficient (R4) compared to walls (R13).

Your window panes will generally be the coldest or warmest surfaces (depending on the time of year) in any given room because the glass will have direct contact with the outside air. As a result, they are prone to condensation especially as outside and inside temperature differences are extreme.

Condensation variables

To understand exactly what's going on, we need to comprehend the nature of a few important variables and how they are related:

Vapour (V)
All air contains water vapour of varying quantities. The lower the air temperature, the smaller the maximum possible capacity for vapour. Humidity is water vapour or moisture in the air. Cold air does not retain moisture as much as hot air does.

Vapour Saturation (VS)
Vapour saturation is a state in which temperature can hold a maximum amount of water vapour (in a gaseous form). The higher the temperature the more water it can hold.

Absolute humidity (AH)
Absolute humidity is the measure of water vapour (moisture) in the air, REGARDLESS of temperature.

Relative humidity (RH)
The relative humidity is the measure of water vapour in the air, but RELATIVE to the temperature of the air.
As relative humidity increases, so does the dew point. The temperature must increase to increase relative humidity.

Dew Point (DP)
Dew Point is the temperature that air has to be cooled to in order to reach vapour saturation. The higher the Dew point, the higher the water content in the air. Dew point is calculated using air temperature and relative humidity.

When air is cooled, relative humidity increases until it reaches a dew point (air becomes saturated). Further cooling below the dew point will induce condensation.

The temperature of the dew point will depend upon the absolute content of water vapour, that is the absolute humidity (AH), measured in g/m3 (grams per cubic metre). The dew point of humid air will be higher than the dew point of dry air.

Temperature (T)
When temperatures are high (hot), the air in the atmosphere can handle more water vapour than when the temperature is low (cold). As a temperature increases, so does the dew point.

When an object is cooler than the air around it, the water molecules in the air come together and stick to its surface, forming a thin layer of water droplets. Both air temperature and absolute humidity will determine what type of condensation will occur when the air is cooled.

Condensation (C)
Condensation occurs when water vapour in the air is returned to its original liquid state. Condensation is not a matter of one particular temperature but of a difference between two. Condensation of water vapour occurs when the temperature of the air is lowered to its dew point.

Condensed water is called dew when it forms on a solid surface, or frost if it freezes. Window condensation is a simple occurrence that takes place under the right conditions of temperature and humidity.

Differing environments

Another important factor when looking at window condensation is the difference in temperatures between the inside and outside of a home, there will always be a transference of hot or cold on the window glass.

Other considerations

Extreme hot and cold temperature changes in a short period of time inside or outside the home can result in condensation on the window glass.

Climate - Where's the Sun?

Windows provide light, warmth and ventilation, but they also decrease home energy-efficiency and can affect the comfort in your home. Choosing the right glass option will allow you to find a balance between energy costs and the desired level of home comfort.

Keep energy costs down and comfort level up with window orientation optimization that takes the position of the sun into consideration

No matter what the season, when it comes to energy-efficient windows there are several factors to think about:

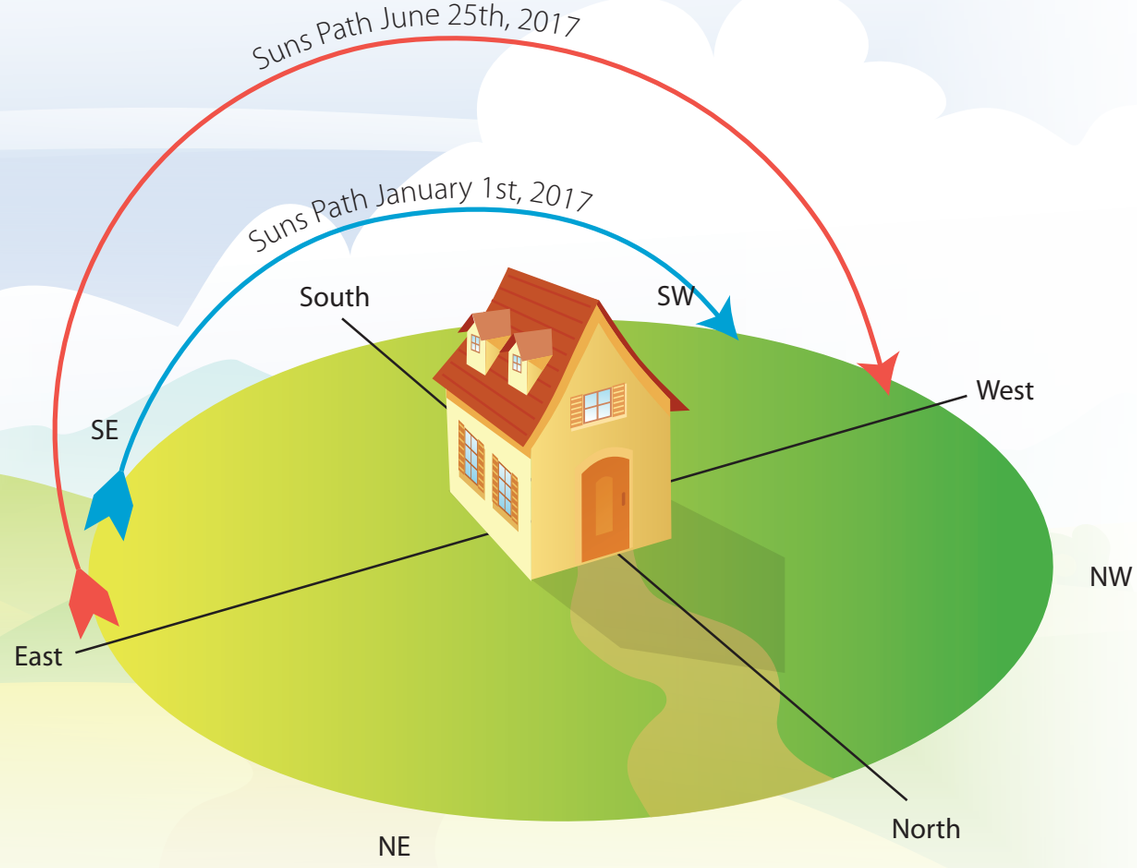
- Orientation of home with respect to the sun
- Seasonal shading elements such as trees or buildings
- Interior window treatments
- Permanent awnings or shutters

We all know the sun rises from the east and sets in the west. However, that's not entirely true. In Ottawa for example, the sun actually rises somewhat south-east in the summer and even more south-east in the winter and it sets somewhat south-west.

Knowing where the sun is going to be, allows us to take advantage of glass options (coatings, glazing and tints) that can help us produce a desired comfort level on a room-by-room basis.

In Ottawa as a general rule:

1. The sun is never directly above us at any point during the day no matter what time of the day, or month of the year.
2. Windows that face the direct south are exposed to the sun for almost the entire waking day.
3. Windows that face east get morning sun exposure.
4. Windows that face west get afternoon and early evening sun exposure.
5. In the summer, the sun shines more from above than in the winter.



Installation- Full-frame vs Pocket

When considering window replacement, there are two types of installations. Choosing one solution over the other has its advantages. Which one is right for you?

Full-frame window installation

A full-frame window replacement is the complete removal of a window right down to the STUDS and the installation of the new window in the opening. This is a typical procedure used by most window replacement services.

A full-frame replacement window solution will assist in preventing potential issues for years to come.

Pros

- Better energy-efficiency
- The best option for severely deteriorating windows and frames
- Window opening size can be made larger to accommodate a larger window
- Potential for thinner sash design to let more light in
- More customization opportunities, different framing capping, different colour
- Contemporary and modern brick mold solutions
- Full window and frame warranty

Cons

- More costly
- Requires more material, more work, and more time
- May change the original look and styling of the old windows

Pocket window installation

A pocket installation (insert window installation) requires keeping the existing window frame and sill and inserting a full window insert frame/ window sash in the opening. This practice is usually only recommended if the existing outside/ inside window frame/trim/siding is uniquely special and it is desirable to keep.

This process requires that the existing window frame be square, plum and level. It must also be in good condition and free of rot.

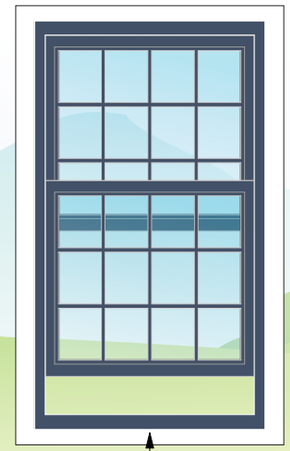
Pros

- Easier to install than the full-frame option
- Involves minimal dismantling of the existing installation
- May provide some cost savings
- Keeps the style, authenticity and craftsmanship of the original window frame

Cons

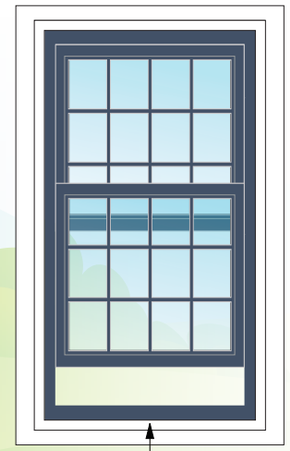
- Older frames often do not meet current installation standards
- A smaller frame opening means less light and visibility
- May not be as energy-efficient depending on the original framing
- The window frame must be level, plumb and undamaged, there may be hidden issues lurking inside the frame
- Warranty coverage will not include the frame and could reduce coverage for replacement windows

Full-frame Installation



Existing frame is removed
(allows for a bigger window and more light into house)

Pocket Insert Installation



Existing frame remains
(requries more frame and a smaller window - as a result allows less light into house)

Installation - Professional vs DIY

If you are going to have windows installed by a window replacement company, you can expect to pay anywhere from 20% to 50% of the cost for installation.

If you have the skills, know-how, confidence, patience, and to take on a window installation project, you may be tempted to do the installation yourself. But, before you commit to a new do-it-yourself project, there are plenty of reasons why you may find much more value by having the professionals install for you.

The benefits of using professional installers

Time

Experienced professional installers work in teams and are fast, proficient and attentive to detail. Some window replacement companies efficiently install and repair windows in all 4 seasons with winter being the least busy season of the year.

Professional installers can remove and install an average-sized window in as little as 1-2 hrs. A home with 20 average-sized windows will typically only take 2 days to complete.

Insurance

Worker's insurance:
A reputable replacement window company will have insurance coverage for accidental injury to their employees.

Property insurance:
A reputable replacement window company will have insurance coverage to cover accidental damage to a customer's home and property.

Protection

Your home:
Installers will protect your home with tarp and floor mats, they'll make all necessary machine cuts outside your home, and they'll clean everything up when they are done.

Damaged products:
If a product is damaged through the installation process (glass, hardware, window framing...) the installation company will fix or replace the window at no charge.

Labour warranty:
Some companies provide labour and material warranties on defective installations performed by their installation crews.

Tools & materials

Installers typically have a truck full of proper tools and installation materials to ensure that the removal of old windows and the installation of new windows will be correct and efficient.

Training & professionalism

Working with heights:
All window replacement companies in Ontario are required to have their installation crews trained for working with heights.

Product training:
All installers are typically trained in the proper installation procedures for each brand and type of window or door, they are installing.

Renovation training:
Trained installers know how to deal with hidden problems that may be uncovered during the removal stage.

Waste disposal

A good replacement window company will clean up thoroughly and dispose of all waste including the old windows to an appropriate waste disposal facility.

Why you may NOT want to do it yourself

Time

Depending on experience, it could take 3 to 5 times longer for a do-it-yourselfer to install a window than a professional installer.

Assistance:
Most window installations require at least 2 people to get things in place safely and correctly.

Damage

Personal injury:
Most do-it-yourselfers will be prone to injury unless they have specialized training for lifting heavy materials, working with heights, and specialized tools.

Property damage:
There are lots of ways to damage property when installing windows - accidents happen, and when they do, household insurance probably won't cover it. So you'll be out of pocket for any damage done. You will also need to protect your furniture and the inside of your home from dust and waste materials.

Product damage:
If you break it, you pay for the repairs or replacement and you could also void the product warranty.

Incorrect installation

Preparation:
Preparation is an important step to the installation process. It is also an opportunity to fix items that may not have been put in place correctly in the first place. It is not uncommon to find leaks, rot, mould, hazardous materials, missing structural components or poor construction practises - all of which will need to be taken care of in order to ensure the health and longevity of the new installation.

Adaptive engineering:
An experienced installer will see potential installation issues right away and utilize adaptive solutions to fix the problem (sill extenders, sill adapters, frame extenders...), but a do-it-yourselfer may not discover issues, may not know how to resolve specific problems and they find performance issues after the installation.

Bends, bows and poor practices:
Window installation is not terribly complicated, but it does have to be done according to some standard practices. The overtightening of screws can lead to bends and bows in the frame as well as problems with operational windows. Screws (or wrong-sized screws) in the wrong places and blockage of weeping holes can cause window leakage and breaks. Over inflation of foam insulation or the incorrect type of insulation can also cause performance and operation of windows.

Tools, equipment and materials:
Window installation can require specialized tools including ladders, scaffolding, benders, suction cups and even cranes for bigger windows. Adhesive tapes, vapour barriers, caulking and flashing may also be required and in some cases will require other specialized tools that may not be in the arsenal of an average do-it-yourselfers toolbox.

Warranty:
The incorrect installation of new windows may void any product warranty you may have and you will need to take care of the expenses and materials required for any installation problems that may occur in the future.

Finishing

You'll have to finish the inside and outside of each window on your own (capping, caulking, trim, insulation materials)

Cleaning and waste disposal

Once the installation is complete, you will need to dispose of your old windows and all other waste materials to the appropriate disposal facilities. You will also need to do your own cleanup.

Installation - What to Expect

Buying replacement windows is not always an easy task. what should be a very simple process, can be more complicated than most of us would care to deal with.

To help put your mind at ease, and so you know what to expect, you'll find the typical steps and procedures that are required to get you through the entire process.

Contact

- After researching prospective installation companies it is a good idea to request quotes from at least 3 candidates (by phone or website form). This will help you get the best price, products, service and schedules available as well as help you get a better understanding of what's available in a window product.
- Once contact is made, your coordinates will be passed on to a window expert who will call you to set up an appointment to discuss your requirements and to make initial measurements for quoting purposes.

Consultation & measurements

Discuss what you want and don't want (energy efficiency, UV protection, privacy, colours…).

- Don't be afraid to ask questions
- List all concerns - will your blinds, shutters, window treatments still fit?
- Ask about inside and outside finishing options and if there are any costs involved.
- Name your rooms - tell your consultant (this will ensure that you are both on the same page for questions, ordering and window placement).
- Trust your gut, if you want a certain type of window (for example a hung window or sliding window, but the window expert recommends a casement, ask why they are making that recommendation - some brands do not offer all window types).
- Make sure the windows you'll be ordering are all the same brand, not all windows are made alike and subtle differences may be noticeable after installation.

The quote

- Some companies/sales personnel will offer on-the-spot quotes, while others will go back to the office and take the time to ensure that you are quoting exactly what you are looking for (there are so many glass configurations available).If your intent is energy efficiency, then all your windows should have the same energy efficiency ratings, no matter what type of window you are ordering.
- If the quotes do not include energy-star window ratings and specifications, ask for them - price differences from one company to another are often hidden in the details.
- If you have any questions or concerns, be sure to point them out, don't assume anything.

Deposit and ordering

- Most installation companies will require a 15% to 25% deposit to secure an order.
- Be sure to read the terms and conditions in the quote and ask questions that may be of concern to you.
- Once the deposit has cleared your order will be placed.

Scheduling

- Scheduling is dependent on many factors including market demand, government incentives and continuous bad weather.
- Most companies follow a queue that is base on a first-come, first-serve basis.
- In Ottawa, permits are not required for contracted window replacement, so permit requirements won't slow down the process.

Potential delays

- Weather is often the biggest contributor to installation day delay, it can set the installation day back days or and sometimes even weeks.
- Most window companies will provide a rough idea as to when an installation will occur, they typically will not provide exact details until they are certain that they can meet their proposed dates (usually a week in advance).
- No matter whom you are purchasing your windows from, the manufacturing of windows is also influenced by consumer demand, facility capabilities, supply-demand and industry incentives.

Preparing for installation day

- Turn off the window and door security, remove security devices, or have a specialist remove/reinstall them for you.
- Make room for any required equipment (ladders, workbenches…) Keep in mind most of the required cutting will be done outside.
- Decide which doors can be used (that you feel most comfortable with for home access).
- Find a safe place for your pets, where they will not be bothered by installers.
- Ensure that children are away from the work area for the entire install.

Installation day

- If weather is very windy or rainy, or snowy (winter installation) there is always a possibility that the installation will be cancelled. Your installer will usually call the day before the installation if it looks like there may be a problem.
- When the installer arrives, they will typically introduce themselves and then take a quick tour of the rooms to get an understanding where all the windows are going.
- Before they start work, the installation team will prep the project area with protective coverings.
- Depending on the size of the crew, the weather… As a general rule, only one window is removed and replaced, at a time.
- Until a window is removed, the installer won't know if there are underlying issues that may need attention.

Installation plan

- Replacement window installation is a messy job and it is easier and more efficient if the installer starts at the top floors and works their way down.
- The installer will typically suggest a structured order for the installation.
- If there are any preferences to the order, you should inform the installer before they start the process.

Protection

- Prepare for the Mess: The installation crew will work as carefully and cleanly as possible, but replacing windows is an unavoidably messy job.
- The installer will typically lay down carpeting or other protective materials in your home drop cloths in your yard or over your garden. This will help catch dust and debris and make clean up much quicker.

Removal of old window

- The installation crew will remove each window and inspect the opening hole framing for leaks and rot.
- If issues should occur, your installation expert will assess the situation and explain a process that will produce the best results.
- If materials need to be replaced, you will be appraised of any issues and informed if there will be any additional cost associated.
- The frame will then be prepped and made ready for installation.

Installation

- Windows are usually replaced from the outside, however, some situations may require them to be installed outside.
- Generally speaking, there will be one installer working on the outside and one on the inside.
- They will put the window in place then, using shims on the bottom and side will position the window to adjust to plumb and level.
- The sides and bottom of the window will be screwed in as per the manufactures specifications.
- Low expansion foam insulation will be injected between the wall frame and window frame.
- The inside trim (usually pre-primed in white) and outside capping treatment will be put in place.
- Caulking will be applied to both the interior and exterior of the window.
- The installer will typically leave all labelling on the windows, so you can cross-check their specifications.
- Window cleaning is generally left up to the homeowner.

Inspection

- After your windows have been installed, perform a walkthrough with your installer.
- Test all operational windows to make sure they are working correctly.
- Windows should sit flush again the wall with no gaps.
- Note any deficiencies (scratches, broken glass, difficult operation…)

Cleanup and disposal of old windows and waste materials

Once all the work has been completed, tarps will be removed and all waste materials will be collected and disposed of. Your old windows will also be properly disposed of by your contractor.

Settlement of the final bill

When all the work has been completed, including the cleanup, it is typical for the installers to request the balance due.

Warranty package

Once you have approved all the installed windows and settled your account, it is typical for the window installation company to hand over a warranty package.

Summary

Upgrading your windows and doors is a great opportunity to improve the energy efficiency in your home, but there are lots of things to think about. When talking to your window consultant, be sure to explain what you are trying to achieve - they'll provide excellent advice to help you choose a product style and brand that's just right for you.

Installation - Finding the Best Window Warranty

There are many window replacement and installation companies in and around the Ottawa area that claim they have the best window warranty in the business. What does this really mean?

If you are in the market for new windows, it's essential that you look into the product and installation warranty offered. Not only can a good warranty ensure the longevity and good health of your windows, if transferable it will also increase the value of your home on resale.

Every window company is different and even companies that sell and install the same products often practice differing warranties.

Many companies claim to have the best window warranty in the business. Unfortunately warranty language can be vague, awkwardly suggestive, and full of fine print that is difficult to interpret.

Warranty periods should not be implied, and if a seller neglects to inform you about important details, don't assume you are covered. It's in your best interest to scrutinize the all information that you are provided with and to ask lots of questions when dealing with a window company.

If the warranty is important to you, then comparative homework is a must. Know exactly what you are getting so that there are no surprises if something goes wrong in the future.

What is a lifetime warranty?

There's much confusion regarding what a lifetime warranty is and unfortunately to date, there are no government standards to police them. For most window manufacturers, a lifetime warranty (25 years) is an expression of their commitment to the quality and longevity of their products and their support to their customers, should an issue arise.

What's not typically covered?

Damage to windows from acts of nature such as hail or extreme wind or accidental damage from flying projectiles.

What is the best warranty in the business?

In the window business, there are several window components such as insulated glass units (IGU's), hardware, frames and colour that may have their own independent conditions and terms under a warranty. The installation and materials used will often carry a separate warranty as well.

How do you know if you are getting the best? The list below indicates the typical best you might get for each these components.

Best case labour & installation scenario

- Lifetime installation warranty against defective installation that may result in damage to the window, frame and finishing
- Lifetime no-charge labour and parts on warranty repair work
- Lifetime no-charge on repair materials required to perform the warranty repair work

Best case product scenario

- Lifetime window warranty against all product defects that affect stated performance ratings at the time of manufacturing
- Lifetime thermal pane/IGUs replacement - gas leakage, cracks or obvious visual defects
- Lifetime hardware replacement - screws, handles, gears, locks
- All warranty registration will be done for you by the company that sells and installs the product
- Free transferable warranty (remaining balance on lifetime warranty)

Ottawa Area window dealer warranty comparisons

	White	Colour	Glass	IGU Seals	Hardware	Installation	Labour
Company A	25 yrs	20 yrs	No	25 yrs	25 yrs	25 yrs	25 yrs
Company B	25 yrs	20 yrs	No	25 yrs	25 yrs	NA	2 yrs
Company C	20 yrs	10 yrs	No	NA	20 yrs	20 yrs	20 yrs
Company D	20 yrs	NA	No	20 yrs	20 yrs	20 yrs	2 yrs
Company E	25 yrs	NA	*Yes	25 yrs	25 yrs	25 yrs	25 yrs
Company F	25 yrs	15 yrs	Yes	20 yrs / 5 yrs labour	25 yrs	25 yrs	25 yrs

- Best
- Good
- Not so good
- NA not available from website or not a typical warranty item
- * Only if related to broken seal

The table above shows five different Ottawa (incognito) area installers and manufacturing/installers and their accompanying warranty coverage terms. Data collected August, 2019.

Installation
Window Company Check List

Your time is valuable, and your investment should be appreciated.

Not all window installation companies are equal, and the ones that don't perform well, don't last long. See what your prospective services' customers are saying, look for Homestar, BBB, and Google reviews.

Here's a list of items that might help you decide what companies are more deserving of your business.

- ☐ Punctuality
- ☐ Good references, reviews & referrals
- ☐ Established business record
- ☐ BBB Accreditation - good standing
- ☐ Knowledgeable and up-to-date with current technologies
- ☐ Great window brand options to match your budget
- ☐ Full time installation teams
- ☐ Labour warranty that covers the installation and installation materials
- ☐ Respectful of your property
- ☐ Friendly and pleasant to deal with and able to answer any of your concerns
- ☐ Accurate measurements
- ☐ Safety conscious
- ☐ Qualified & bonded installers
- ☐ Detail oriented
- ☐ Clean up & disposal of waste
- ☐ Satisfaction guarantee
- ☐ Follow up after the installation
- ☐ Timely service calls if problems are detected after the install
- ☐ Flexible payment options

- Free in-home consultation & quotes
- 4-season installation & repair services
- Non-prorated lifetime labour/parts warranty
- A large selection of custom products
- A great reputation for quality & service
- After-hours showroom appointments
- Sawdac & Window Wise qualified installer
- Financing available

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