

Factory Direct Glass Guide

Low E coatings argon krypton and glass packages for homeowners

This Factory Direct guide explains how Low-E coatings, argon, krypton, and glass packages affect comfort and energy performance. Factory Direct offers krypton gas as an available glass-package option. Compare the certified performance of the complete window and select a package that fits your climate, sun exposure, comfort priorities, and budget.

What a glass package includes

A glass package is the combination of glass panes, coatings, spaces between panes, gas fill, spacers, and edge seals. Two or more panes joined around their edges form an insulating glass unit, often called an IGU. The IGU sits inside the window sash or frame.

Component	What it does
Glass panes	Separate the indoors from the outdoors; additional panes create additional insulating spaces.
Low-E coating	Reduces radiant heat transfer. The coating design also influences solar heat gain and daylight.
Argon or krypton	Improves insulation in the sealed spaces between panes.
Spacers and edge seals	Maintain pane spacing, retain the gas fill, and help keep moisture out of the unit.

What Low E actually means

Low-E means low emissivity. It describes a microscopically thin coating that reduces the glass surface's ability to emit radiant heat. Many coatings contain layers of metal or metal oxides. They reduce heat transfer while still allowing daylight through. Low-E does not mean low visibility, and it is not simply a dark tint.

In winter, reducing radiant heat transfer helps retain indoor warmth. In summer, solar-control versions reduce unwanted heat from the sun. Different coatings admit different amounts of solar heat, so two windows described as Low-E can behave quite differently.

Hard coat and soft coat

Hard-coat, or pyrolytic, Low-E is applied during hot-glass production and bonds to the surface. Soft-coat, or sputtered, Low-E is applied in a vacuum coating process after the glass is made. Soft-coat systems often achieve lower emissivity and stronger solar control and are usually protected inside the sealed glass unit. The word "soft" describes the coating technology; it does not mean the finished window glass is soft. Compare actual ratings instead of choosing by the coating category alone.

Low E variations and coating locations

Low-E coatings can be selected for different balances of insulation, solar heat, and daylight. “Spectrally selective” describes coatings that admit useful visible light while reducing portions of solar energy that contribute to unwanted heat.

Coating approach	Primary purpose	Selection consideration
High solar gain or passive Low-E	Retains heat while admitting more solar warmth.	Can suit heating-focused designs; check summer overheating and shading.
Moderate solar gain Low-E	Balances solar control with daylight and some solar warmth.	A useful option to compare where both heating and cooling matter.
Low solar gain or solar-control Low-E	Limits more of the sun’s heat.	Useful for hot climates or rooms that overheat; also reduces useful winter solar gain.

Single silver through quad silver

Single-silver, double-silver, triple-silver, and quad-silver describe the number of silver layers in certain coating systems. These are microscopic layers within a coating, not the number of glass panes. A double-pane window can have triple-silver Low-E. A triple-pane window may have Low-E coatings on more than one surface.

Additional silver layers allow manufacturers to engineer different solar-control and daylight combinations. They do not establish a universal ranking for every home. Compare U-factor, solar heat gain coefficient, visible transmittance, appearance, and price. Manufacturer terms such as “premium,” “platinum,” or “ultimate” also need an exact glass specification behind them.

Where the coating is placed

Glass surfaces are numbered from outdoors to indoors. Double-pane glass has four surfaces: the outside face is surface 1, the two faces inside the sealed space are surfaces 2 and 3, and the face you clean indoors is surface 4. Triple-pane glass has six surfaces. Standard cavity coatings are protected between panes; certain durable coatings are specifically designed for the room-facing surface.

A room-side coating can improve U-factor by reflecting radiant heat back into the room. However, some products also leave that pane colder than the same construction without the room-side coating, increasing the possibility of indoor condensation during cold weather. Cardinal documents this tradeoff for its LoE-i89 coating. Ask about condensation performance and cleaning instructions as well as insulation.

Will the glass look different

Coatings can change transmitted color, reflectivity, and brightness. Compare samples in natural daylight, looking both through the glass and at exterior reflections. If different packages will be used on different elevations, ask whether their appearance will match acceptably. “Clear glass” can mean glass without a deliberate tint while still including Low-E.

Argon krypton and insulating spaces

What argon contributes

Argon is a colorless, odorless, inert gas used between panes to reduce heat transfer. It insulates better than ordinary air. Argon and Low-E work together, but they perform different jobs: the gas improves insulation in the cavity, while the coating controls radiant heat transfer and, depending on its design, solar gain. Argon does not darken the view or provide the coating's solar or ultraviolet filtering.

How argon compares with krypton

Fill	Typical role	What to verify
Air	Basic insulating cavity.	Compare the finished window's U-factor with gas-filled alternatives.
Argon	Common, cost-effective insulating gas.	Pane spacing, fill specification, seal construction, and certified performance.
Krypton	Higher-cost gas that can be advantageous in narrower cavities.	Available at Factory Direct. Compare the actual U-factor improvement and upgrade price.
Gas blend	A specified mixture used for a particular design.	The composition and the ratings for the package being quoted.

Cavity width matters. Argon performs well in many conventional spaces around one-half inch wide; krypton can be useful where cavities are narrower. A wider gap does not improve insulation indefinitely because gas circulation can increase heat transfer. Choose the engineered system using its ratings, rather than assuming more space or a more expensive gas must be better.

Fill level and long term retention

"Argon-filled" or "krypton-filled" does not necessarily mean 100% of that gas. Specifications may allow residual air or a gas blend. Ask about the initial fill level and verification. Gas retention depends on the construction and condition of the sealed unit.

Small amounts of gas can gradually diffuse through seals. The rate depends on the unit; "exactly 1% per year" is not a universal guarantee. Gradual gas loss reduces the gas-fill benefit, but it does not immediately remove the insulating space or stop the Low-E coating from working.

Spacers and seals deserve attention

Warm-edge spacers reduce heat flow around the glass perimeter compared with conventional conductive spacers. This can improve overall insulation and help keep interior glass edges warmer. Spacer design, sealants, fabrication quality, and moisture-absorbing desiccants all contribute to the insulating unit's performance and durability. A premium coating cannot compensate for a poorly made edge seal.

Argon-filled and krypton-filled glass are sealed gas units, not vacuum units. They are not designed for homeowner gas refilling. If moisture appears between panes, have the unit inspected and ask about replacement coverage.

Krypton gas available at Factory Direct

Factory Direct offers krypton gas as an optional glass-package upgrade. Ask which window series and glass configurations support it and request the exact package and price in writing.

What krypton does

Krypton is a clear, odorless, inert insulating gas sealed between glass panes. Like argon, it reduces heat transfer through the space between the panes. Its lower thermal conductivity can provide additional insulation in a properly designed glass unit. It works alongside Low-E coatings, spacers, seals, and the window frame.

Where krypton is most useful

Krypton is especially useful in narrow insulating cavities, including certain triple-pane designs. Three panes create two cavities; krypton can help these spaces insulate effectively when the overall glass package must remain relatively thin. Argon performs well in many wider conventional cavities and generally costs less. The gas, pane spacing, and coatings should be engineered together.

Benefits to compare

A krypton package that delivers a lower whole-window U-factor reduces non-solar heat transfer under the same conditions. Better insulation can help improve comfort near windows in cold weather. How much improvement you notice depends on the complete window, installation, indoor conditions, and the windows being replaced.

Ask for the NFRC-certified whole-window U-factor for the argon and krypton alternatives in the same window series and style. Lower is better for insulation. Review SHGC and visible transmittance as well if coatings or glass construction change. Gas choice alone does not establish solar protection, daylight, noise reduction, or ENERGY STAR qualification.

When the upgrade may be worthwhile

Krypton deserves consideration when you want to improve winter comfort, have seating close to large windows, or are working toward a lower U-factor in a compatible package. Weigh the quoted price against the measured performance difference and your priorities. If the complete-window ratings differ only slightly, the benefit may not justify the premium for your project.

There is no universal krypton savings percentage or payback period. A percentage improvement in window U-factor does not translate directly into the same percentage reduction in household energy bills.

Details to confirm before ordering

- The exact glass package, number of panes, and whether the fill is krypton or a specified blend.
- The manufacturer's initial gas-fill specification and the certified ratings for the quoted configuration.
- The upgrade price and written seal-failure and gas-retention warranty terms.

Comparing complete glass packages

These are common configurations, not standardized quality grades. Actual performance depends on the full combination of coatings, gases, spacing, frames, and window style.

Package	What it offers	What to consider
Clear double-pane	Two panes and one insulating space.	Without Low-E, radiant heat transfer remains higher than in an otherwise comparable Low-E unit.
Double-pane Low-E with argon	Two panes, one gas-filled space, and a Low-E coating.	A practical comparison starting point; verify local ENERGY STAR qualification.
Double-pane with an additional room-side coating	Extra radiant heat control without adding a pane.	Check indoor condensation performance and care requirements.
Triple-pane Low-E with argon	Three panes and two insulating spaces, often with multiple coated surfaces.	Can improve insulation and winter comfort; compare cost, weight, daylight, and hardware design.
Triple-pane with krypton or a blend	A gas option suited to certain narrower-cavity designs.	Ask Factory Direct about compatible krypton packages and their improvement over argon.
Thin triple-pane	A thin center pane creates a third glazing layer with less added thickness and weight.	Check the actual frame compatibility, ratings, warranty, and service availability.
Vacuum insulating glass	A very narrow evacuated gap limits heat transfer between panes.	A separate technology; compare complete-product ratings, cost, and replacement support.

When triple pane may be worthwhile

Triple-pane deserves consideration when winter comfort is a priority, seats or beds are close to large windows, or a lower U-factor is important to the project. It can also help achieve demanding efficiency targets. The additional cost should be weighed against comfort, expected savings, the condition of existing windows, and how long you expect to own the home.

Pane count alone cannot establish performance. A U-factor of 0.25 does not prove that a window is triple-pane; some double-pane configurations reach that value. Similarly, a third pane does not guarantee superior noise control. Ask for the appropriate thermal and acoustic ratings.

Other multilayer options

Some insulating units use suspended films as internal glazing layers. “Triple-glazed” or “four-layer” marketing should therefore be clarified: how many layers are actual glass, how many are film, and how many insulating cavities are present? These designs should also be compared by certified whole-window performance.

Reading ratings and selecting for your home

Use the National Fenestration Rating Council, or NFRC, label to compare certified whole-window energy performance. Center-of-glass data excludes the frame and edge effects and should not be presented as the performance of the complete window. Compare the exact window style and glass option being offered.

Rating	What it tells you	How to compare
U-factor	The rate of non-solar heat transfer.	Lower means better insulation.
SHGC	Solar heat gain coefficient: the fraction of solar energy admitted as heat.	Lower admits less solar heat; the best value depends on the home.
VT	Visible transmittance: the fraction of visible light transmitted.	Higher generally means more daylight.
Air leakage	Air passing through the closed window under test conditions.	Lower means less leakage; it is separate from argon retention.
Condensation resistance	Relative resistance to indoor surface condensation.	Higher is better within the same rating system; it does not guarantee dry glass.

Air leakage and condensation ratings may not appear on every NFRC label. Request the available certified data when these issues matter. Neither U-factor nor SHGC measures sound reduction.

Interpreting numbers correctly

An SHGC of 0.25 means about 25% of incident solar energy contributes to heat entering through the rated product under standard conditions. It does not mean the glass blocks 75% of ultraviolet light. U-factor 0.20 represents one-third less non-solar heat transfer than U-factor 0.30 at equal area and temperature difference; it does not mean the home's energy bill will fall by one-third.

For matching units and the same product scope, R-value is the reciprocal of U-factor: $R = 1 \div U$. For example, U-0.25 corresponds to approximately R-4. Use whole-window U-factor for window comparisons, and do not compare a center-of-glass R-value with another product's whole-window rating.

A practical approach for Central Indiana

For a home with cold winters and warm summers, compare low-U-factor packages first, then choose solar control around each room's exposure. A west-facing room that overheats may benefit from lower SHGC; a south-facing room may benefit from some winter solar gain if summer shading is effective. Treat this as a selection framework, not a universal prescription.

Confirm ENERGY STAR certification for the home's county and exact configuration. As checked in October 2026, Version 7 remains current. Its Northern prescriptive window criteria include U-factor at or below 0.22 and SHGC at or above 0.17, with specified alternative combinations also available. A generic "under 0.30" claim is not enough to establish current qualification. Doors and skylights have different criteria.

Comfort fading noise and specialty glass

Fading and ultraviolet protection

Low-E can reduce ultraviolet transmission and slow fading of furnishings. Protection varies; a stated percentage should identify the exact glass configuration and test basis. No ordinary daylight-transmitting glass eliminates fading because visible light also contributes. Laminated glass can add UV protection, but sensitive artwork and finishes may still need shading.

Noise control requires acoustic data

Cardinal reports no measurable acoustic benefit from argon filling. For noise concerns, ask for whole-window Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC) ratings. OITC better addresses lower-frequency outdoor noise. Glass thickness, cavity spacing, laminated construction, frames, and seals affect results. Basic triple-pane glass is not automatically quieter than a double-pane acoustic package.

Tempered laminated and other options

Option	Primary purpose	Important distinction
Tempered glass	Improves breakage resistance and changes the break pattern into smaller fragments.	A safety feature; tempering alone does not establish energy efficiency.
Laminated glass	Bonds glass layers with an interlayer that helps hold fragments together.	Can support safety, sound control, UV protection, or security depending on construction.
Impact-rated glazing	Resists specified impacts within a tested system.	Ask for the rating of the entire window or door, including its installation requirements.
Tinted or obscure glass	Controls appearance, brightness, or privacy.	Confirm the effect on daylight, solar gain, and visibility.
Low-maintenance coating	Helps the exterior surface shed dirt or clean more easily.	Serves a different purpose from the insulating Low-E coating.

Safety and decorative options can be combined with Low-E and insulating gas. Ask the supplier to identify required safety glazing for each opening. “Double-strength glass” refers to glass thickness; it does not mean double-pane, tempered, or automatically more energy efficient.

Condensation has three different meanings

On the room side: moisture forms below the indoor air’s dew point. Humidity, temperature, and circulation all matter. Better glazing can reduce risk, but even efficient windows can develop condensation.

On the outdoor surface: dew can form on efficient glass in suitable weather. Exterior condensation alone does not establish a seal failure.

Between sealed panes: moisture or persistent fog that cannot be wiped from either accessible surface can indicate a failed seal. Have the insulating glass unit inspected.

Care installation warranties and buying questions

Care and service

Follow the manufacturer's instructions for the exact glass package. Use approved cleaners and soft, clean materials. Avoid abrasives and metal scraping tools unless expressly permitted. Room-side coatings require particular attention because they are on a surface you can touch and clean.

Get written approval before adding aftermarket tint, reflective film, or other applied treatments. Compatibility and warranty coverage vary; some manufacturers discourage these products. A film should not be assumed to reproduce a factory glass package's performance.

For fogging between panes, ask whether the sealed IGU or sash can be replaced while retaining a sound frame. Clearing visible fog does not, by itself, prove that the original gas fill, seal integrity, or certified thermal performance has been restored.

Installation affects the result

The glass package cannot correct an opening that leaks air or water. The installation must address fitting, shimming, insulation and air sealing around the frame, flashing, and drainage as appropriate to the product and wall. Ask how the installer will follow the manufacturer's requirements.

Compare the actual warranty

Read the glass warranty and installation warranty before signing. Ask whether coverage includes seal failure, replacement glass or sash, labor, travel, shipping, disposal, accidental breakage, and any prorated costs. Clarify the meaning of "lifetime," transfer provisions, claim procedures, and who performs service. Treat condensation coverage and gas-retention promises as separate questions; get any promise in writing.

Questions to ask before ordering

- What is the exact manufacturer, window series, glass package, pane count, and Low-E coating specification?
- Which argon or krypton option is quoted, what initial fill is specified, and what spacer and seal system is used?
- What are the certified whole-window U-factor, SHGC, and VT for each style and option being quoted, including grids?
- Does this exact configuration qualify for ENERGY STAR in my county?
- Why is this solar-control level appropriate for my rooms, sun exposure, and shading?
- Does the package include a room-side coating, and what are its condensation and cleaning considerations?
- If noise matters, what are the tested whole-window STC and OITC ratings?
- Can I compare samples, written argon and krypton upgrade prices, and the resulting whole-window ratings?
- Who handles glass and installation service, and which costs would I pay under the warranty?

Evaluate savings against the windows being replaced, the home's insulation and air leakage, HVAC efficiency, energy prices, and usage. A percentage improvement in glass performance is not the same percentage reduction in household utility bills. Ask for the assumptions behind any savings estimate.