Argon or Krypton Gas in Windows – Which is Better?

In this blog, you will learn:

- How Do Gases Make Windows More Energy Efficient?
- Argon-filled Gas Windows
- Krypton-filled Gas Windows
- Comparing Krypton and Argon Gas Windows
- Which is the Best Choice – Argon or Krypton?

Installing energy-efficient replacement windows improves comfort and reduces heating and cooling costs. To figure out which versions of high-efficiency replacement windows are right for your home, start by comparing Argon and Krypton. These are the two gases most often used for maximizing the effectiveness of energy-efficient windows. But, how do today's advanced window designs use these gasses to help prevent thermal energy inside a home from being lost through windows and keep unwanted heat and cold from coming in? And, which offers the best value as a window insulator — Argon or Krypton gas?

How Do Gases Make Windows More Energy Efficient?

The majority of modern energy-efficient windows are built with multiple glass panes, and either Argon or Krypton gas is used to fill the space between the panes. The gases serve to help keep energy from easily passing through the panes. This reduction in the free transfer of energy through windows, means lower heating and cooling bills. That's because the HVAC system does not have to run as much to keep the inside of the home at a comfortable temperature.

Krypton and Argon gases are pumped into the areas between the panes in energy-efficient windows because they are heavier than air. These gases move more slowly than air does. So, when enclosed between the glass panes, the gases slow down energy that is passing through the window, to help prevent it from leaving from the inside of your house, or entering it from the outside.

A study by the Penn State College of Earth and Mineral Sciences concluded that by further combining technologies such as low-E applications and multiple glazing with gas-filling, today's most energy-efficient window models can deliver spectacular R-values of up to R-9.

What's the Difference Between Argon and Krypton Gas?

Both Argon and Krypton are colorless and odorless inert gases commonly used between glass panes as an insulator, to increase energy efficiency in the best of high-performance windows. Neither of these two non-toxic gases poses any risks to humans or animals in the event of gas leaking.

Argon — The majority of energy-efficient windows are filled with Argon gas, while a small percentage have Krypton gas. Generally, Argon gas is used in double-pane windows that have a 1/2 inch or wider space between the glass panes, because Argon performs very well in this space width.

Krypton — Krypton gas is usually used in triple-pane windows with a 1/4 to 3/8 inch space between glass panes. This is because filling with Krypton is more cost-efficient when used in smaller spaces, and also because Krypton performs best as an insulator when used in such configurations.

Although most thermal windows are filled with either Argon or Krypton gas, frequently manufacturers blend the two gases together. They may also add other gas types, such as nitrogen, xenon, or oxygen with them, in order to more ideally balance their windows' costs with their insulation quality.

Argon gas is six times denser than air, whereas Krypton is twelve times more dense than air. Therefore, Krypton is about twice as effective as Argon in slowing down or stopping thermal energy from passing through a window. So, why is *Argon* chosen for the majority of energy-efficient windows?

Comparing Krypton and Argon Gas Windows

Estimates of cost differentials between windows containing Krypton and Argon gas vary between reports. One report estimates that Krypton-filled window costs are 40 percent higher than Argon windows. An extensive research report by Pacific Northwest National Laboratory (PNNL) estimates the cost of Krypton filled triple-pane windows at 200-300 percent higher than double-pane Argon-filled alternatives.

The PNNL study (June 2019) found that some double-pane window designs can deliver a thermal value of U=0.22, though achieving this low U value requires adding low-E to the glass, which increases the cost. But, the research report also discussed input from survey respondents who reason that justifying the high cost of triple-pane Krypton-filled windows would require a much *bigger* performance improvement than the U=0.20 thermal level they can be anticipated to achieve.

The reason why Krypton windows are so expensive to manufacture is because Krypton gas is much more scarce and difficult to produce than Argon. Argon gas makes up only about *one percent* of the earth's atmosphere, whereas Krypton is found in merely *trace amounts*. This forces up the cost of Krypton gas and causes Argon to be, by comparison, far more available and much more cost-efficient for use in filling windows to increase their thermal effectiveness.

Which is the Best Choice – Argon or Krypton?

So, the primary differences between Krypton and Argon gas windows are their levels of energy efficiency and their cost. Making a choice between the two is typically a question of comparing the lifetime cost of each of the two types of windows. That calculation involves the purchase price of the windows and the energy cost savings of the windows over their expected lifespan, and perhaps other factors unique to your home and lifestyle, along with other considerations. Ask your windows installer to assist you in performing thorough product evaluations.

Ultimately, by all objective accounts, Argon normally presents a better overall value for homeowners, especially for double-pane window installations. However, if you're unsure whether Krypton-filled or Argon-filled windows offer the right solution for your needs, consider the quality of your HVAC system and the number and locations of the windows in your home.

If you have an exceptional home temperature control system and an average or a lesser amount of wall and ceiling space covered by windows, then triple-pane Krypton windows may be worth the additional expense. But, if your home has many large windows and your HVAC system has to work hard to heat and/or cool your home, then double-pane Argon windows may be the best investment for you.

For more information about replacement windows, or to schedule a free in-home estimate, contact Advanced Window Products, Salt Lake City UT at (801) 505-9622, or browse our windows online.