



Glass Guide: Distortion

Homeowner Information

For more than 92 years, Arcadia has helped the architectural community complete successful projects by providing high performance and high-quality windows and doors that stand the test of time.

To ensure exceptional performance, the glass goes through intensive manufacturing processes that can cause visual distortion like bubbles, discolorations, and scratches which are sometimes an inherent characteristic of glass.

We follow the guidelines established by ASTM, the American Society for Testing and Materials International on annealed glass, heat-strengthened glass, coated glass, laminated glass, and insulated glass units. Glass is inspected upon receipt from our glass manufacturers to meet our stringent quality standards.

This document includes general guidelines to help you determine if a glass-related concern is eligible for replacement. Please reference the ASTM standards at astm.org for a complete overview of industry policies.

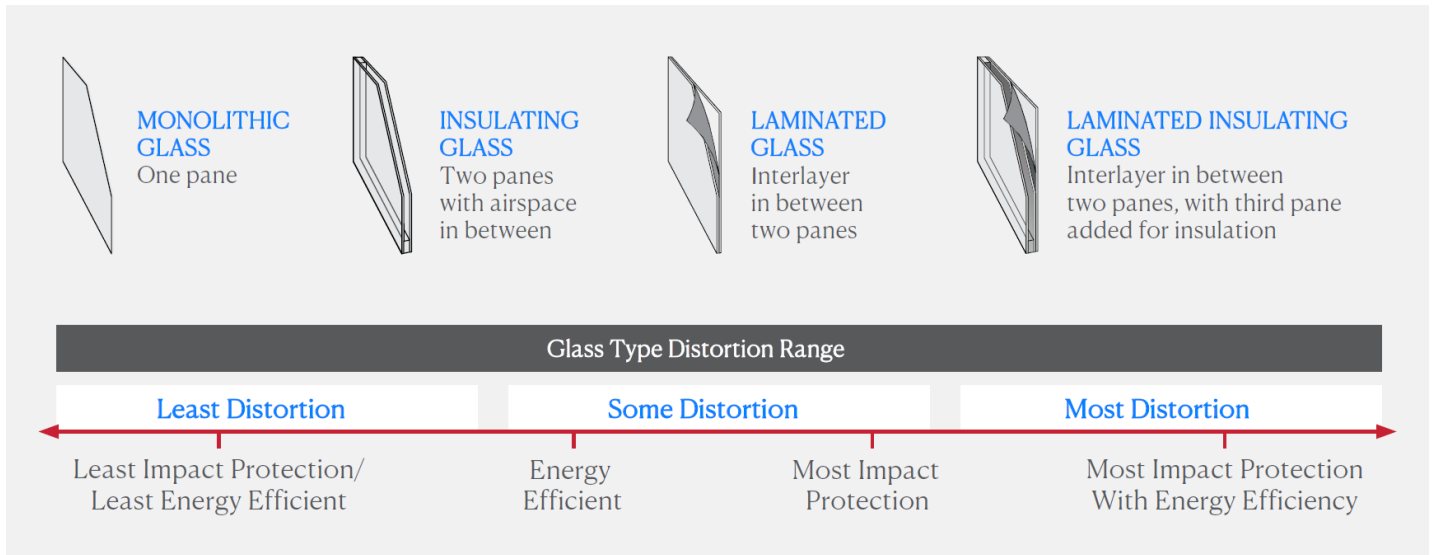
Possible Causes of Glass Distortion

1. **Glass Manufacturing** - Necessary processes that are used to create glass products, pressures, glazing, and heat treatments increase strength, safety, and/or efficiency. However, they can cause visible distortions.
2. **Environmental Factors** – Factors like barometric pressure and elevation can affect glass.
3. **Climate** – Constantly changing temperature fluctuations based on the time of day, season, and other environmental factors will also distort glass.

Terms Glossary

American Society for Testing and Materials International (ASTM) - An organization that develops and publishes technical standards for a wide range of materials and products.	Laminated Glass - Two or more pieces of glass bonded together with a strong, clear interlayer.
Annealed Glass - Raw glass that has not been heat-treated.	Low-E (Emissivity) Glass - Glass with a transparent, metallic oxide coating applied onto or into a glass surface. The coating typically allows short-wave energy to pass through but reflects long-wave infrared energy, which improves the U-value.
Heat-Strengthened Glass - Glass that is reheated to below melting point and cooled quickly; nearly two times stronger than annealed glass.	Tempered Glass - Glass that is reheated to below melting point and cooled twice as fast as heat-strengthened glass; nearly four times stronger than annealed glass. When shattered, it breaks into small pieces.
Insulated Glass Units - Window panes separated by an air- or other gas-filled space to reduce heat transfer.	

What Level of Glass Distortion Should I Expect?



What Is Not Considered Glass Distortion?

The following cases are not considered glass distortions, as it is difficult to control glass manufacturing outcomes as glass configurations become more and more advanced.

Name	Definition	Why It Occurs
Roller Waves	A pattern of ripples / waves across heat-treated glass	This occurs during the heating process, and patterns may vary on each pane of glass
Coloration	Low-E coating may exhibit a hue or coloration especially under different lighting	This coloration is inherent to the coating process
Suction Cup Marks and Label Residue	Residue from lable adhesive or marks from suction cups holding the glass may appear on the glass surface	This occurs during the handling / packaging process and may be seen when condensation is present. However, there marks can be removed.

How Do I Inspect My Glass?

In order to determine if your glass is eligible for replacement, please inspect it with the industry-wide standards featured below. This ensures that every glass pane is measured consistently.

- Inspect glass with the naked eye in the vertical position
- View it at a 90-degree angle to the glass
- Make all inspections during the daytime (*without direct sunlight*)
- Stand at the distance specified by each defect type for the noted amount of time (*Refer to ASTM C1048 for details*)