



Glass Quality: What To Expect

We find it a great privilege each time a homeowner chooses NT Window® to be a part of their home. Our family takes great pride in your decision – it is this pride that is the driving force behind our commitment to exceed your expectations with your NT Window experience.

In order to exceed your expectations it is first necessary to ensure that proper industry standards are understood – **Remember, our goal is to exceed them!**

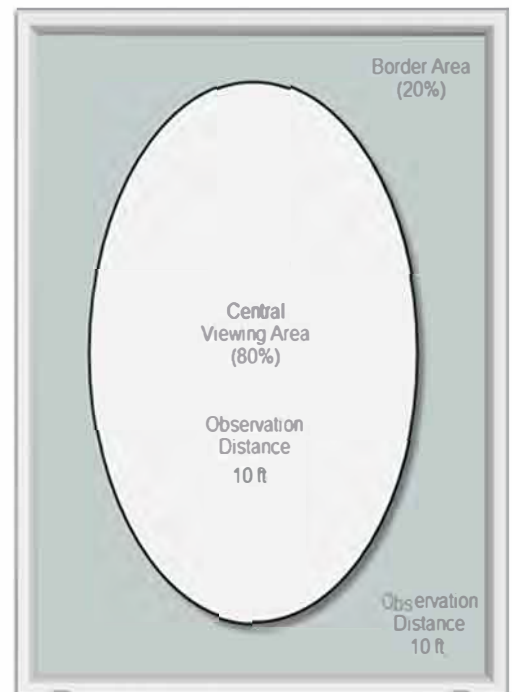
This technical bulletin will explain the differences between the quality standards that your NT Window high performance window or door product will be built to compared to the Industry Standard Specifications for Architectural Glass Quality as established by ASTM C1036-06 & ASTM C1048-04 (ASTM.org).

VISUAL INSPECTION CRITERIA

Central Viewing Area - The middle 80% of the lite in an oval shape is considered the Central Area. Glass shall be inspected in transmission at a distance of 10 feet (exterior) or 6 feet (interior) from the observer. *Industry standard uses a distance of 14'9"*.

Border Area - the Border area is comprised of the outer 20% edge of the lite. Glass shall be inspected in transmission at a distance of 10 feet from the observer. *Industry standard uses a distance of 14'9"*.

Utilize a viewing angle of 90 degrees from the glass, with suitable background light (daylight without direct sunlight or a minimum of 160 foot candles). Inspection should not exceed viewing of more than 5 seconds for lites up to 6 square feet, 10 seconds for lites up to 35 square feet, and 20 seconds for lites larger than 35 square feet. If defects are visible beyond what is allowable as listed by sizes (square feet) below using the inspection criteria, the glass may be rejected for visual defect.





Glass Quality: What To Expect

GLASS INSPECTION FOR THE HOMEOWNER

The glass industry has developed consensus standards/specifications that address quality aspects of various types of glass used in windows, doors and skylights. These standards are very comprehensive and typically written for manufacturers who have expertise in applying them. The standards are also very specific to a given glass type. These types include raw flat (annealed) glass, heat-treated glass (ex. tempered), coated glass (ex. Low-E), laminated glass and IGUs. Unfortunately, the methods of inspection and the blemish or issue criteria are not always the same for each type of glass.

In most cases, a homeowner will have a window, door or skylight that contains an IGU that is comprised of two or more panes of flat glass. Typically, this glass will also have some type of Low-E coating. If there is a safety concern or a code requirement for safety glazing, the window may also contain tempered or laminated glass. With a combination of all these glass types in one window, door or skylight, sorting out the appropriate criteria to the respective standard is at best a complicated, if not confusing, endeavor. How then is a homeowner to know whether an issue or blemish is a legitimate concern?

The following is a general guideline offered to simplify the inspection of glass issues for the homeowner. This is not necessarily a definitive guide covering all glass related concerns; that's the job of the industry standards. Rather, this guideline is a check for a homeowner to flag whether an issue merits consideration for replacement.

Home Inspection Directions:

1. Thoroughly clean the glass on both sides with glass cleaner.
2. Stand 10 feet away, directly in front of the glass (90° to the surface).
3. The glass should be illuminated with daylight, but not direct sun.
4. If an issue or blemish is readily apparent, measure the size of the blemish.
5. Contact the manufacturer if the blemish is noticeable and is outside the *following limits*.

	Maximum Size (if readily seen from the exterior at 10 ft.)	Separation (between blemishes)
Point blemishes (dirt, debris, residue, pinhole, spot, finger print, etc.)	1/16"	24" min.
Linear blemishes (scratches, rubs, marks, etc.)	2" (Lites ≤ 40 sq ft.) 3" (Lites ≥ 40 sq ft.)	24" min.

OTHER ISSUES

	Definition	Comments
Bow	Deviation in flatness spanning the entire pane of glass. Commonly seen in tempered glass and IGUs.	Not measurable on site or in an IGU. Positive and deflection is a natural occurrence with seasonal and barometric pressure cycling.
Distortion	Localized deviation in flatness that can look like ripples across the glass, or pockets of indentations.	Allowed and very common in tempered glass. Not measurable on site or in an IGU.
Strain pattern	An optical effect that results from the tempering process appearing as a pattern of dark spots on the glass. The intensity of the issue increases when viewed at steep angles to the glass and with polarized sun glasses.	Allowed. This optical issue is characteristic of tempered glass and cannot be completely controlled. It will vary from pane to pane.
Fringes	An optical effect that appears as a faint, random, pattern resembling an oil stain.	Allowed. This is the result of having exactly matched thickness of glass panes in an IGU (less than 0.0001" difference in thickness).
Newton rings	This is an optical issue that appears as concentric rings of rainbow colors near the center of an IGU that has its panes touching each other.	There is no industry standard covering this issue. Contact the manufacturer.
Color uniformity	Readily apparent glass color variation from window to window, or within a window. It can be the result of the glass tint or glass coating.	Allowed within reason. Can be measured with special instrumentation if needed. Consult with manufacturer.
Suction cup marks and label residue	Telltale impressions on the glass where a suction cup or label was applied.	Allowed if on the outdoor or indoor surfaces of an IGU, and seen only when the glass is wet with rain or condensation. Not allowed if the marks are inside the IGU and noticeable at 10 feet or less.
Fogging	A moisture or chemical deposit between the panes of an IGU.	Not allowed. Indicates seals have failed or outgassing of materials has occurred.
Sightline infringement	An extension into the daylight opening of an IGU by the sealant, spacer, or area of coating deletion.	1/8" maximum



Glass Quality: What To Expect



GLASS TYPES

There are many different glass types in the world. Each glass type has been designed for a specific use and is manufactured to a different quality standard that meets the requirements of the application (See example illustration below).

The glass used within the window and door industry is designed to meet the ASTM standards for architectural applications as described above.

By choosing from the NT Window® family of products you can be assured that the quality provided will surpass these industry standards in more ways than one.



Optical Glass Grade

Glass Area – Less than 8 sq. inches

Average Cost - \$150 - \$300



Architectural Glass Grade

Glass Area – More than 16 Sq. Feet

Average Cost - \$450 - \$850

Revised October 2018