



ASTM Glass Standards & Defects

For A&D Professionals, Contractors, and Clients

At The French Steel Company, we strive to take great care of people: our employees, our installers, and of course, you, our customer.



We're not only in the steel door and window business, but by default, also the glass and steel businesses. Each of these trades has exacting standards that we aim to meet or exceed with every project, to create lasting beauty for homes, offices, museums, restaurants and hotels.

When it comes to glass, there are more nuanced characteristics involved than any other aspect of doors and windows, even more so than paint color.

What follows in this brochure is an attempt to share with customers what's involved with evaluating glass according to the standards that we must adhere to, namely ASTM, the American Society of Testing and Materials. Founded in 1898, this international standards organization develops and publishes technical standards for a wide range of construction materials. It's the "gold standard" used by large and small manufacturers, general contractors and courts of law.



Glass is meant to be looked through, not at. Like 99.5% of diamonds, no pane of glass is flawless. It's possible to find imperfections in any sample of glass if examined closely enough.

The natural question arises: when is a glass defect considered a *material* or substantial enough defect that would warrant replacement? According to the ASTM:

- Stand back 10 feet from the glass.
- Face the glass straight-on at 90 degrees.
- View in daylight but not direct sunlight.

Under these conditions, the ASTM standards indicate any defect would be easily viewable. This is how a field inspector will evaluate glass.



ASTM's Official Standards for Imperfections in Glass

The official ASTM version is scientifically detailed, quite long and can be difficult to follow. This document is a brief summary of some key parts of the ASTM. Keep in mind there are many different types of defects with different inspection rules.

The 10 ft. rule is a basic starting point and is not definitive for every condition. For example, on sealed units over 35 square feet, the glass is allowed to have three 1" scratches and still be within standards – even if those scratches are visible from 10 ft.

Understanding the Standards

ASTM International is the basis for determining glass and coating quality, allowable defects, and visual inspection criteria. Here are the three standards for glass most often used at The French Steel Company:

1. [ASTM C1036](#) – Specification for annealed Flat Glass (less than 5% of French Steel glass)
2. [ASTM C1048](#) – Specification for Fully Tempered Flat Glass (more than 90% of French Steel glass)
3. [ASTM C1172](#) – Specification for Laminated Architectural Flat Glass (less than 5% of French Steel glass)

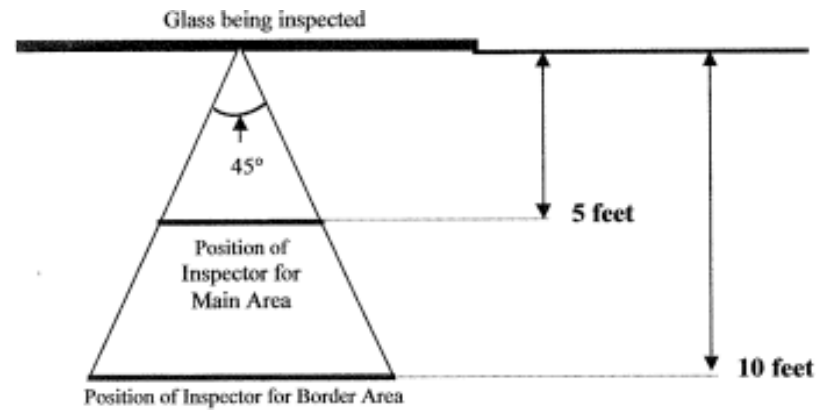
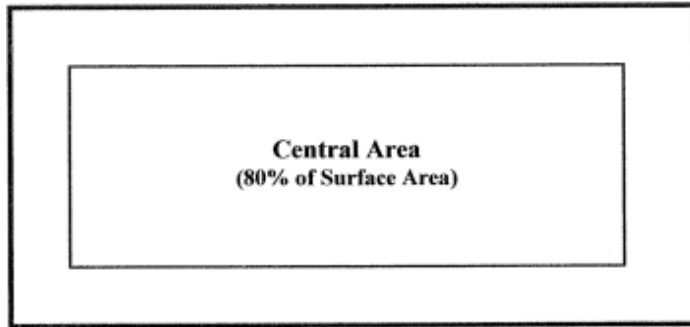
The ASTM inspection criteria are very important. They outline core principles such as inspection distance, lighting requirements, inspection duration times, etc. Ask your Account Exec. for a copy.



Examples of Visual Inspection Criteria

- Glass must be inspected using a viewing angle of 90 degrees from the glass with suitable background light (daylight without direct sunlight or a range of 500 – 1000 foot-lamberts.) If a lighting box is used as a light source, the diffusing plate shall be parallel to and at a distance of 10 feet from the glass.
- Inspection should not exceed viewing of more than 5 seconds for lites up to 6 sq. ft., 10 seconds for lites up to 35 sq. ft., and 20 seconds for lites larger than 35 sq. ft., either in transmission or reflection.
- If defects are visible beyond what is allowable as listed by sizes (in sq. ft.) using the inspection criteria, the glass may be rejected.

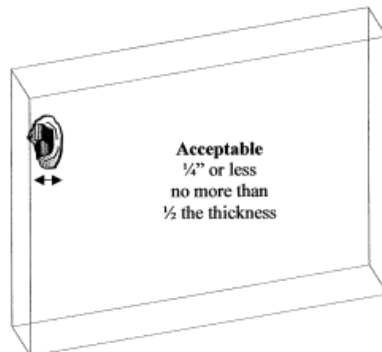
Visual Inspection Criteria Visual Aid:



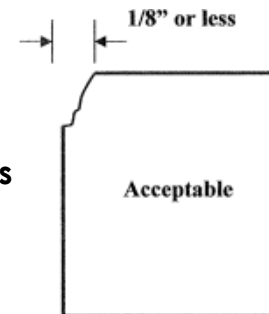
Allowable Defects

Defect	Allowable When	Max. Allowed on Lites up to 6 Square Feet	Max. Allowed on Lites 6 to 35 Square Feet	Max. Allowed on Lites Over 35 Square Feet
Scratches	Size is 1" or less	1	2	3
Debris, Dirt, Spots	Size is 1/16" or less	1	2	3
Seeds, Bubbles, Knots, Stones	Size is 1/16" or less	1	2	3
For visible defects described above: no more than 1 total defect is allowed per lite up to 6 square feet; no more than 2 total defects are allowed per lites 6 to 35 square feet; no more than 3 total defects are allowed per lite up over 35 square feet				
Shells	Located no more than 1/4" from the edge and less than 1/2 the thickness of the lite	1 per side	1 per side	1 per side
Chips	Located no more than 1/8" from the edge	1 per side	1 per side	1 per side

Glass Shells

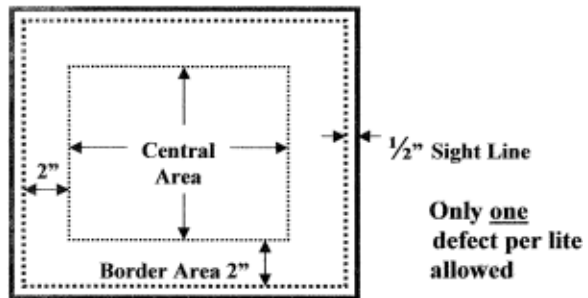


Glass Chips

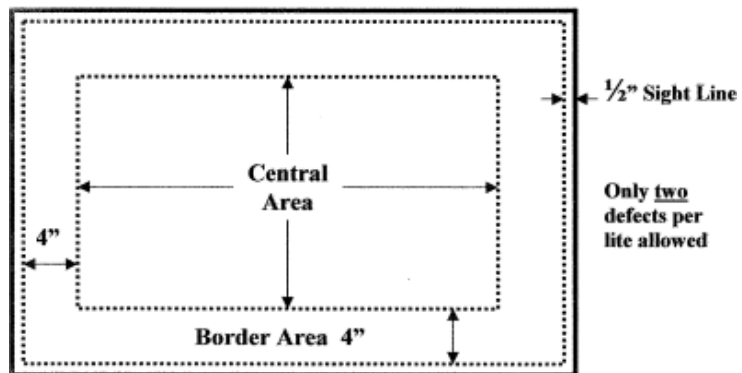


Allowable Defects Visual Aid

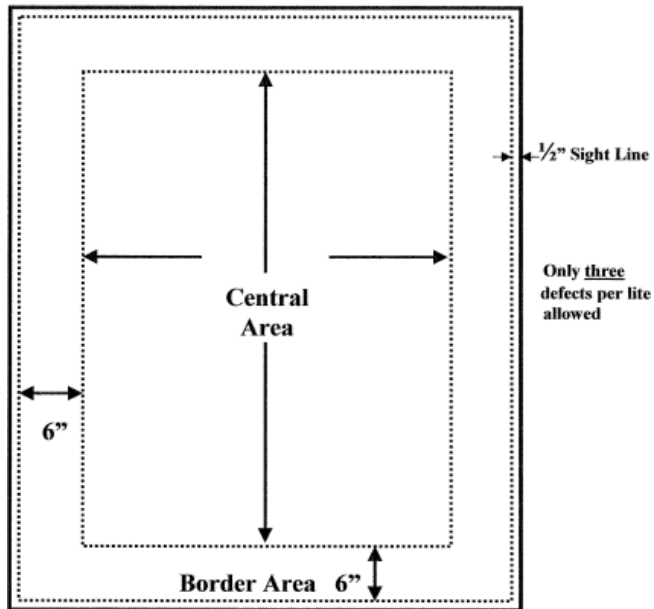
Lites up to 6 square feet



Lites 6 to 35 square feet



Lites greater than 35 square feet



- For lites up to 6 square feet, the border area is comprised of 2 1/2" from each edge of the lite. All other area is the central area.
- For lites 6 to 35 square feet, the border area is comprised of 4 1/2" from each edge of the lite. All other area is the central area.
- For lites over 35 square feet, the border area is comprised of 6 1/2" from each edge of the lite. All other area is the central area.