Safer Glass Railings
With Laminated Glass
Laminated Glass

- Two or more lites of flat or bent glass and one or more interlayers
- Glass adhesion to interlayers after breakage
- Minimizes cutting/piercing injuries
- Minimizes falling glass
- No boarding up until replacement can be made
Types of Interlayers

- **Flexible**
  - Polyvinyl butyral
    - Ultra-clear
    - Translucent
    - Colors

- **Stiff**
  - Ionoplast
    - 100x stiffer than standard PVB
    - 5x more tear resistant
    - Ultra-clear or Translucent White

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Stiffness and Strength

- Unobstructed vision onto playing field
- Thinner, lighter laminates
- Safety performance, even after breakage

Load ramped to 330 kg.
Test Demonstration: Point-supported railing
Test Demonstration: Cantilever
Falling Handrail Glass – North America

- Toronto
- Austin
- Houston
- Seattle
- New York City
- Chicago
- Dallas
- Cleveland

W Hotel
2015 International Building Code

- Glass used in a handrail, guardrail or a guard section shall be laminated glass constructed of fully tempered or heat-strengthened glass and shall comply with Category II or CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1.

- Glazing in railing in-fill panels shall be of an approved safety glazing material that conforms to the provisions of Section 2406.1.1. For all glazing types, the minimum nominal thickness shall be ¼ inch (6.4 mm).

- Exception – Single fully tempered glass complying with Category II of CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1 shall be permitted to be used in handrails and guardrails where there is no walking surface beneath them or the walking surface is permanently protected from the risk of falling glass.
Exposed Edge Durability

- Ionoplast laminate’s ability over time to resist the formation of defects along the edge as a result of temperature and humidity
- 20+ years natural weathering data for Ionoplast Interlayers
- PVB laminates are durable, but moisture sensitive
Condominiums and Hotels

- Exterior balcony railings enrich the visitor/living experience by preserving the view.
- Translucent white interlayers can be incorporated to add privacy between units.
- Ionoplast interlayers provide improved post-breakage glass retention.
Stadiums

- Laminated glass railings give spectators a direct view onto the playing field.
- Glass railings have been designed with and without a top cap.
Stores & Shopping Malls

WTC Transit Hub, NYC

Genoa Theater, Italy

Westfield Mall, UK

Nike Flagship Store, NYC
Museums

Onassis Cultural Center, NYC

Gateway Arch, St. Louis

Victoria & Albert Museum UK

Queens Museum NYC

Ultraclear SentryGlas® Interlayer complements low iron glass used in the railing systems.
Taller panels on the tops of buildings

US Bank Tower, Los Angeles

Four Seasons Hotel, India

Top of the Rock, NYC

Space Needle, Seattle
Quality Issues

- Laminate Quality

Excerpt from ASTM C1172 …
8.5.3 For some laminated applications, such as, point supported glass and balustrades, where the edges of the laminate are exposed, tighter length and width tolerances may be requested by the customer. Consult the supplier to determine their capabilities.

- Sealant Compatibility

Research has shown that moisture plus a highly alkaline cement-based grout can attack the laminate interlayer resulting in delamination. Therefore, do not use cement-based grout with laminated glass in wet-glazed railing systems. Many dry-glazed systems on the market today.
Conclusions

- Railing systems designed with laminated glass provide safety and glass retention after breakage
- Ionoplast interlayers are stronger, deflect less, and provide better post-glass breakage performance in minimally supported railings
- Interlayers available in clear, ultra-clear, translucent white, and colors
- Sealant compatibility and glazing support details require special attention
- Building codes require heat-treated laminated glass
- Laminated glass available from glass fabricators throughout the world
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