Glass baluster guards still present code challenges

NOMMA’s code representative Tony Leto of The Wagner Companies explains why code confusion regarding glass rail continues.

By Tony Leto

While the ICC opinion on top railing requirements for monolithic glass baluster guards has remained consistent, we continue to see installations without the required top rail. Where is the disconnect on this issue?

The confusion begins with *IBC Section 2407.1.1.2 Support.*

There are two issues:
1) The term guard is used improperly.

   The ICC defines guard as being in place to stop accidental falls and refers to the full assembly not the guard top. The intention was to refer to a top rail as is noted in the *Exception* later in that section.

For your information

- Consult the local Authority Having Jurisdiction (AHJ) regarding their position on applicable codes and standards.
- Have an engineer review and provide support information regarding the structural integrity of any glass railing system.
- If properly designed and engineered, a glass railing installation can still provide an unobstructed view while maintaining safety and code compliance.

About the author

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2) Misinterpretation of the phrase, Glass balusters shall not be installed without an attached handrail or guard.

Handrail is required on stairs and is located 34 to 38 inches above the stair nosing. A guard is required when there is a 30 inch drop. The IBC minimum for a guard is 42 inches above the walking surface.

If a stair has a drop of greater than 30 inches, it would be required to have both a handrail and a guard. However, if the stair height does not exceed 30 inches, only a handrail is required.

There are some who interpret that Section 2407.1.1.2 allows a glass baluster guard to be installed with either a handrail or a guard (top rail).

However, the section’s intention is that a glass baluster handrail must have an attached handrail and that a glass baluster guard must have an attached guard (top rail).

The presence of a handrail on a guard does not eliminate the need for a top railing.
This interpretation is supported by:

- **The ICC**
  
  In 2008, Todd Daniel of the National Ornamental and Miscellaneous Metals Association (NOMMA) asked the following question of the International Code Council (ICC):

  *Can a glass rail system be installed without a guard on top of the glass IF there is a handrail attached to the glass. In other words...no cap, exposed top edge of glass at 42 inch height with a handrail mounted on the side of the glass at handrail heights.*

  **ICC Staff Opinion: No**

  **Reason:** The application you describe can only be allowed if the glass can withstand the loads for guards and handrails in Section 1607.7

- **The 2009 IBC Exception**

  The ICC approved an exception in 2009 that a top railing was not required if laminated glass is used that meets the load requirements and is approved by the building official.

  If this is the exception to the rule, then it should be understood that a top railing is required in all other situations.

- **The Load Requirements**

  Section 2407.1.1 requires that glass baluster handrails and guards must meet the load requirements of 1607.7 with a safety factor of four.

  In a required guard, the loads must be applied to the top of the guard—not the top of the handrail. Tempered glass edges are the most susceptible to rupture under load. Directing an 800 pound concentrated load (200 lbs multiplied by a safety factor of four) to that bare edge will most likely result in failure.

**It’s up to the engineer of record**

Given the clarity provided by the ICC, the question remains, “How is it that glass railings using monolithic tempered glass are still commonly installed without a top railing?”
The answer lies in the hands of the engineer of record for the project. While the ICC staff opinion cited above is that a top railing is required, it was also noted that a top railing is not required if the “glass can withstand the loads for guards and handrails in 1607.7.”

An engineer reviewing a glass baluster guard uses *ASCE 7, Minimum Design Loads for Buildings and Other Structures* and various ASTM standards for metal and glass to determine safety factors for design.

Using their standard reference texts, engineers are able to provide calculations indicating the glass can withstand the loads set out in 1607.7. A local inspector when presented with stamped, engineered support data has little choice but to approve the system as meeting the IBC’s structural requirements.

**Tom Zuzik sought changes**

During the recently completed 2012 code cycle, Tom Zuzik — on NOMMA’s behalf — submitted changes to Section 2407 to eliminate some of the continuing confusion.

In particular, his code change limited the four times safety factor to the glass and not the “support system” which would eliminate the need to over engineer the base and attachments.

However, the IBC committee and membership were reluctant to make the change as they were unsure of the original basis for the requirement.

The code therefore remains unchanged for the next scheduled publication in 2012, the next opportunity to submit another change until the 2015 code cycle.

**What to do now**

In the meantime, varying levels of interpretation and enforcement are being applied across the country. As always, it all comes down to the local Authority Having Jurisdiction (AHJ). To alleviate issues, always consult with the AHJ regarding their position on applicable codes and standards; and have an engineer review and provide support information regarding the structural integrity of any glass railing system.

If properly designed and engineered, a glass railing installation that meets a desire for a completely unobstructed view — while still providing a safe, code compliant guard — is possible. ☑️