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Railings and Balustrades

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Ensuring a Safe Railing Installation

by Ellen Rogers

Glass railings and balustrades continue to be a popular feature in a variety of interior and exterior applications. While recent codes have put forth increasingly stringent mandates to ensure safe installations, there are still questions and concerns related to what is acceptable. As codes continue to evolve and architectural demands becoming increasingly complex, suppliers, manufacturers and installers have an important role to play, and can provide their own expertise with the glass and system recommendations.

Know the Codes

While building codes are being updated and revised constantly, it's important to remember that different jurisdictions can choose to enforce different versions. This can sometimes be challenging to know which products need to be used, given the varying locations.

"My biggest concern is with the ambiguity of the codes," says Rob Carter, chief estimator with Giroux Glass. "At times, codes seem to contradict one another. Too often, they are left to the city officials' individual interpretation."

He adds that some of these issues stem from the architectural designs, and says it's during the design phase that research should be conducted to identify what the city or jurisdiction will approve as a design.

"We, as the professionals, have to make safety our priority. If that means walking away from the scope of work, that's what we collectively need to do."

—Rob Carter, Giroux Glass

"Code regulations vary widely depending on your state and region," says Chris Hanstad, vice president of architectural sales with CR Laurence (CRL). "Each region has a set of specific performance requirements that a system must meet. To avoid discrepancies, we recommend that installers work directly with the local authority having jurisdiction during the shop drawing phase. This will ensure proper compliance."

The 2018 version of the International Building Code (IBC) is now available and includes changes related to provisions regarding the use of top cap rails on glass balustrades. While the code requires that guards with structural glass baluster panels be installed with an attached top rail or handrail, there is an

exception that notes that when the baluster panels are laminated with two or more glass plies of equal thickness and of the same glass type, the attached top rail or handrail is not required.

"From a manufacturer's perspective, [these changes] would appear to suggest the building code official will look to the manufacturer to provide satisfactory evidence its system not only meets the ASTM standard (a pre-requisite), but

also conforms to ASTM E 2353 (*Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades*)," says Andrew Chatfield, director of marketing for the Wagner Companies based in Milwaukee. "In the past, the code official would just make a determination. Now they have a specific reference to point toward, which has to be supported by the manufacturer."

Chatfield says one important consideration is the type of laminated glass interlayer material used, as some are stronger than others.

"Laminated glass can be supplied with a number of interlayer materials, some of which do not offer the same robustness as others," he says. "The concern, and I would surmise the change



in wording, is to mitigate against this. The changes will also invoke a cost implication because the more robust products are more expensive.”

Chatfield goes on to say that one of the biggest challenges going forward into 2018 will be the requirement for manufacturers to prove their systems meet the loading requirements established by the code with and without a top rail. For example, in a three-panel setup connected by a top rail, the three panels bear the imposed load. When no top rail is used, the individual glass panel bears the load and has to remain in place. The outcome of this, Chatfield says, is thicker glass with more robust interlayers, which are more expensive.

“The other challenge is that with any code change each state adopts the code at its own speed,” says Chatfield, pointing out that some states may skip IBC 2015 and go directly to the 2018 version “or, from a cost perspective, they will remain with 2015. Only time will tell,” he says.

Another challenge related to the code, according to Andrew Haring, vice president of marketing with CRL, concerns glass deflection.

“There is nothing in the code book that limits the acceptable amount of deflection on glass railings. It simply states that it must withstand the load and return to the installed position,” he says.

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“We’re seeing a lot more installations without a top cap or handrail on laminated systems. While these installations can meet code, they neglect to address other factors that arise when you don’t attach contiguous panels. Without a maximum acceptable deflection, a glass railing installation can meet the code but not perform to the satisfaction of the owner.”

“Just because an application meets the code and the spec, doesn’t mean that the end-user’s (and public safety) best interest is being looked after or prioritized,” he says. “Glass shift that can occur during the laminating process is becoming more of an issue, which can yield varying degrees of edge quality on exposed edges (i.e., no top cap),” he says.

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—Andrew Haring, CRL

“No hospitality or retail owner wants to have 3 to 4 inches of movement in their railing system. This looks unsafe, cheap, and like shoddy workmanship. It also makes these systems susceptible to finger pinch, which is a huge liability,” he says.

He continues, “Without a top cap or handrail maintaining the rigidity, lites will move independently, which creates gaps that can and will pinch fingers ... then come the lawyers. In ‘no cap rail’ applications, we recommend a minimum of ¹³/₁₆-inch with an Ionoplast interlayer to retain as much strength and rigidity as possible.”

Dan Stachel, vice president of Trex Commercial Products (formerly SC Railing), agrees that the fact that the code does not clearly define deflection limitations is a challenge.

“Although a guard may be code-compliant, often the deflection in the railing can feel unsafe,” he says. “[Our company] suggests that deflection limitations be addressed in the design phase and further clarified in project specifications to assure the system is code compliant and provides a feeling of safety to the end user.”

Haring also stresses that it’s important to consider the end-user’s needs and expectations.

Contract glaziers often can identify these issues and make recommendations that aren’t on the drawings or in the spec, “whether it’s adding a cap rail, bracing clamps, glass thickness or tying the system into the structure via stabilizing end caps,” says Haring.

Carter says when they are involved with a project that specifies monolithic glass in lieu of laminated glass and doesn’t require a top cap, his company bids with laminated glass and adding a top cap.

“We, as the professionals, have to make safety our priority,” he says. “If that means walking away from the scope of work, that’s what we collectively need to do. Whenever you are in doubt, err on the side of caution.”

Let’s Talk About It

Getting involved early on in the design process can be beneficial for suppliers and the contract glaziers. Both groups can help by providing valuable information related to the system’s performance and capabilities.

While Carter says his company isn’t always heavily involved with the architects, it does provide guidance when asked.

“In an ideal world, architects would



consult with hardware manufacturers during the design process and before we’re handed plans to bid on,” he says. “Hardware manufacturers have entire teams dedicated to glass rails. These guys are experts at knowing what makes a safe railing. If designs resulted from consultations with such experts before being handed to us, that would be ideal,” he adds. “If that were the normal practice, we, the glazing contractors, would be given those final plans, and we could all bid the projects apples-to-apples.”

Hanstad says educating and partnering with architects is a top priority.

“Over the last 15 years, we’ve worked hard to design code-compliant glass railing systems that make the specification process easier for architects and designers. By offering CAD drawings, and certified testing and engineering



Photo: Courtesy of Trex Commercial Products

The Colorado State University Health and Medical Center features the Vista stainless and glass railings supplied by Trex Commercial Products. The stairs called for fascia-mounted Vista railing, and overlooks were top-mounted.

data, we take the mystery out of meeting safety standards and the code,” he says. “We also get involved early in the design phase whenever possible. A lot of costly pitfalls can be avoided if identified early on.”

Stachel agrees and adds that architects can eliminate many issues by working with a reputable partner who can help perform initial member sizing in the early stages of the projects design. “Often, projects designed under a performance specification defer the member sizing to the manufacturer, who gains a risky advantage over other bidders by working with an engineer willing to sign off on thinner glass or smaller posts,” he says.

Chatfield adds that working with a single-source supplier can also be beneficial.

“More and more, we are finding that the architectural community, and increasingly the fabrication industry, is looking for a single resource to provide its technical support,” he says.

What’s Next?

While the 2018 version of the IBC is now available, it will likely be some time before it’s adopted on a wide scale—and some jurisdictions may continue to follow an older version. Regardless of what version of the code an area has adopted, safety is the number-one priority, and companies can continue to make recom-

mendations that could help improve the design and installation.

As Haring stresses, “it may be appealing to install as specified and get off one project and on to the next one,” but industry companies can and should make recommendations that will increase safety, performance and aesthetics to ensure the best installation possible. ■

the author



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