NOMMA Guard Research Study

Request For Proposal (RFP)
December 6, 2006

NOTE: This Request for Proposals (RFP) was drafted by NOMMA member Lee Rodrigue and reviewed/amended by members of the NOMMA Code Advisory Council. All reference to the International Code Council (ICC) and the Code Technology Committee (CTC) are for informational purposes only, and have not been reviewed by either of these bodies. Statements made relating to the ICC and CTC are based solely on NOMMA's understanding of their positions.

Introduction

For a number of years, the International Code Council (ICC) has had code changes submitted for consideration regarding climbability of barriers. In the case of pool fencing, a barrier with a very specific application, the ICC has gone to great lengths to specify how pool fencing must be designed, built, and installed to prevent unauthorized and/or unsupervised individuals, (primarily children) from gaining access to pools.

In recent years, individuals have requested that the ICC take similar action with guards, which must be used wherever a specified (usually greater than 30") change in elevation occurs. The proponents of these potential code changes assert that rails with certain types of designs, namely horizontal elements, facilitate the climbing of a guard which, in turn, leads to a higher incidence of rail related falls / injuries. Additionally, they have suggested that the similarities between guards containing horizontal elements and certain types of playground equipment may encourage climbing of a guard.

Proponents successfully lobbied to have the term 'ladder effect' introduced into the 2000 model codes in order to restrict the use of horizontal members in the fabrication of new guards. However, the 'ladder effect' wording was removed from subsequent revisions to the model codes due mainly to the challenges the wording created in terms of interpretation and measurability.

The National Ornamental and Miscellaneous Metals Association (NOMMA) has taken the position that guards are intended to prevent accidental falls, not prevent falls from intentional acts such as climbing. For this reason, NOMMA asserts that guards should not be made to meet the same restrictions as 'barriers' such as pool fences.

Furthermore, NOMMA has searched vainly to accurately document the number of falls from children climbing guards. Falls directly related to climbing of rails do not seem to be recorded as separate, distinct incidents by organizations that track accident volume. One potential explanation is that these types of incidents occur too infrequently to warrant a separate classification.

The ICC has assigned the task of investigating this issue to their Code Technology Committee (CTC). The specific objective of this investigation is outlined as follows:

"The objective of this investigation includes a determination of the parameters necessary in order to achieve code requirements for providing necessary and reasonable protection against the climbing of guards. These parameters include, but are not limited to:

1. Review code development history.
2. Demographics of persons to be protected.
3. Identify occupancies where protection is required.
4. Acquire and review statistical injury data relating to the scope of the study.
5. Identify patterns or arrangements of guard elements which implement or prohibit climbing by those meeting demographics.
6. Develop code requirements which are responsive to identified public safety needs while providing reasonable latitude for the design and construction of alternative guard systems.
7. Develop an impact statement concerning the probable reduction of deaths and injuries resulting from a code requirement."

In past CTC meetings, members of the ornamental and miscellaneous metals industries, represented by NOMMA, have claimed that the logic behind the assertions summarized above is flawed and that available data does not suggest a correlation between guard design and accidental falls as a result of climbing. Furthermore, existing research dealing with railing design as it relates to climbability does not account for many of the factors that make guards unique in their application (as opposed to the specific roles of windows guards, queuing barriers, pool fences, and other building devices which are designed to afford individuals very specific benefits / protections). It has been suggested that additional research will be required to determine the extent to which railing design affects climbability of guards. NOMMA has offered to solicit specific research proposals in an effort to more closely study issues related to parameters #4, #5, and provide recommendations to the CTC with per parameter #6.

Potential Issues

NOMMA has committed resources to investigating this research, primarily in the form of funding acquisition, technical services, presentation at CTC meetings, and discussion of the specific issues that affect climbability of guards. Part of this investigation is identification and description of the possible factors that may affect climbability, which are formally defined in this document.

This list is not intended to be a complete list of all the factors that might affect climbability, and potential research vendors are invited to supplement this list with additional considerations of their own, based on their academic assessments of the peripheral issues. Similarly, not every factor in this list needs to be addressed. Each research vendor responding to this request for proposal is encouraged to specifically discuss the factors that they feel are germane to investigating the issue of guard climbability. Consideration should be given to the existing body of research as it relates to the climbability of other barriers as well as the body of knowledge encompassing physical and psychological aspects of human development.

Summaries and discussions of some of this research may be found at the CTC website made for information sharing on the issue of climbability of guards. The URL for this site is (http://www.iccsafe.org/cs/cc/ctc/Climbable.html). All respondents are encouraged to review the information posted at this site prior to submitting proposals. Additionally, Kevin Whorton, the primary research liaison for NOMMA and Principal of Whorton Marketing and Research, can provide researchers with a list of citations for similar research.

Proposals

It is NOMMA's immediate goal to obtain at least three brief research proposals, not to exceed 3,000 words, outlining the following minimum scope of work:

- Re-research of the existing published data.
- Defining factors that might affect climbability and the reasons why these factors warrant investigation.
- A concise discussion of experimental techniques that can be used to measure the effect of these factors is expected.
- A budget cost for said research should be provided.

After the proposals are received, reviewed and discussed at the Dec. 13, 2006 meeting of the CTC, they will be further reviewed by the NOMMA Board of Directors and the NOMMA Code Advisory Council. The NOMMA board, in concert with the NOMMA CAC, will ultimately decide whether to proceed by funding one or more of the studies.

Design Factors Potentially Affecting Climbability of Guards by Children aged 0-36 Months

HEIGHT	Residential codes typically require minimum guard rail heights of 36 inches. Commercial codes require minimum guard rail heights of 42 inches. Taller guards may be more difficult to climb. Furnishings, built in seating and other factors often compromise the height of guards
SPACING	Most codes require elements within a guard to be spaced such that they prevent the passage of a 4" sphere. This is designed to prevent a child from passing through the guard. Most of the current data indicates that the majority of accidents involving children and guards occur when a child slips between the guard members because they are wider than 4". While this allows most subjects to insert their hands, feet, or digits in the railing, smaller spaces might inhibit the use of feet or hands, making the guard less climbable. Simultaneously, the more opaque a panel becomes, the easier it becomes to climb by certain demographics.
ORIENTATION	There are currently no restrictions on the orientation of members within guards. However, two proposals have been made for code changes, relating to the minimum angle from horizontal that elements may have. Elements oriented closer to vertical may be more difficult to climb than those closer to horizontal.
SIZE	Guards may be made from any size material that meets load requirements, from 1/8" diameter cable to theoretically 12" diameter pipe or larger. Very few designs use materials much larger than 2" in profile, primarily for aesthetic and cost-related reasons. Larger size materials may be more difficult to grasp, and smaller materials may affect the comfort of the subject while climbing.
RIGIDITY	Guards may theoretically use flexible materials like wire meshes and slackened cables, although these are rarely seen in real-world scenarios. Flexible elements may make guards less climbable by affecting balance during climbing.
OVERHANG	Most guards are built with a vertical orientation, but in some applications, the top of the guard may overhang the base of the guard toward the subject, requiring more strength and balance to climb.
OFFSET	It is possible to locate the top element of a guard in an overhanging position so that the majority of the guard is vertical, except that the top element is offset to the side of the subject, which may make a guard less climbable.
PITCH	Guards are required on level surfaces as well as many sloped surfaces, like stairs and ramps. A guard that is pitched (or sloped) may be less climbable because of the angled top element, relative to gravity. Alternately, this pitch may make the guard more climbable due to the effect of decreased HEIGHT on one side of the subject.
TOEHOLDS	Features may be present in ornamental designs that enable a subject to securely place a foot on the guard, which may make the guard more climbable.

Human Factors Potentially Affecting Climbability of Guards

DEVELOPMENTAL AGE	Subjects who are older (or developmentally equivalent to an older subject) may be more able to climb a guard
HEIGHT	Subjects who are taller may be more able to climb a guard
SEX	Male subjects may be more able to climb a guard (although the specific reasons may be due to other factors)
STRENGTH	Stronger subjects (measured as grip, upper body, lower body, and other measures) may be more able to climb guards.
CLIMBING TECHNIQUE	Specific techniques may prove to be more effective in climbing a specific guard.
CLOTHING	Specific types of clothing (e.g. long dresses) may make climbing guards more difficult.
SHOES	Characteristics of shoes (rigidity, shape, tightness of fit) or lack of shoes may affect climbability.
PERCEPTION OF HEIGHT	The subject's ability to perceive the difference in elevation between the climbing side and the opposite side may affect the subject's desire or willingness to climb a guard.
ATTRACTION TO STIMULUS	The type of attractant on the other side of the guard may affect the subject's desire or willingness to climb a guard.
PRIOR EXPERIENCE	The number of exposures, outcomes of previous exposures, and knowledge of exposures with others may affect the subject's desire or willingness to climb a guard.
PRACTICE	The number or duration of attempts may affect both the subject's ability and the subject's desire or willingness to climb a guard.
STRENGTH OF WARNING	The absence or presence (and consequently, the sternness) of a warning may affect the subject's desire or willingness to climb a guard.
TYPE OF WARNING	The presence of a verbal, visual, or other warning may affect the subject's desire or willingness to climb a guard.