

**INTERNATIONAL CODE COUNCIL (ICC)  
Code Technology Committee (CTC)**

**INTERIM REPORT NO. 1 OF THE CTC  
AREA OF STUDY – CLIMBABLE GUARDS**

**March 9, 2006  
Wyndham O'Hare  
Rosemont, IL**

The CTC held a public hearing to receive written and verbal comments regarding CTC recommendations for the ICC Board-approved area of study entitled Climbable Guards. This report includes the final interim recommendations for this area of study, approved by the CTC upon the conclusion of the public hearing on March 9, 2006. It should be noted that as an interim report, this does not complete this area of study. Other aspects of this area of study are still under investigation. The recommendations contained in this report will be forwarded to the ICC Chief Executive Officer in accordance with ICC Council Policy No. 5.

**Scope:** As noted in the CTC approved Scope & Objectives Statement, the scope of this activity is:

The study of climbable guards will focus on determining the need for appropriate measures to prevent or inhibit an individual from utilizing the elements of a guard system, including rails, balusters and ornamental patterns, to climb the guard, thereby subjecting that person to the falling hazard which the guard system is intended to prevent.

**Recommendation:** The CTC interim recommendation is to submit code changes to the 2006 International Building Code (IBC) and International Residential Code (IRC) in the 2006/2007 Cycle in order to resolve inconsistencies between the codes (see Page 2). CTC recommends further study on other aspects of this subject area.

**Considerations:**

- The CTC has reviewed injury data and studies related to falls. However, it has been determined that there is a lack of conclusive data which correlates falls with specific guard configurations. CTC intends to continue to study this issue.
- The CTC believes that some children are capable of climbing guardrails, regardless of the configuration of the guard in-fill. In an effort to determine the impact of guard configurations, further study and investigation is needed.
- CTC notes the inconsistency in language regulating guards between the IBC and IRC. Interpretive issues which may lead to inconsistent design and enforcement can be resolved without further study.

1. Proposed change to the IBC:

## SECTION 1013.0 GUARDS

**IBC 1013.1 Where required.** Guards shall be located along open-sided walking surfaces, including mezzanines, industrial equipment platforms, stairways, stairs, ramps and landings, that are located more than 30 inches above the floor or grade below. Guards shall be adequate in strength and attachment in accordance with Section 1607.7.

**IBC 1013.1.1 Glazing.** Where glass is used to provide a guard or as a portion of the guard system, the guard shall also comply with Section 2407. Where the glazing provided does not meet the strength and attachment requirements in Section 1607.7, complying guards shall also be located along glazed sides of open-sided walking surfaces, stairways, ramps and landings that are located more than 30 inches above the floor or grade below where the glazing provided does not meet the strength and attachment requirements in Section 1607.7.

**Exception:** Guards are not required for the following locations:

1. On the loading side of loading docks or piers.
2. On the audience side of stages and raised platforms, including steps leading up to the stage and raised platforms.
3. On raised stage and platform floor areas such as runways, ramps and side stages used for entertainment or presentations.
4. At vertical openings in the performance area of stages and platforms.
5. At elevated walking surfaces appurtenant to stages and platforms for access to and utilization of special lighting or equipment.
6. Along vehicle service pits not accessible to the public.
7. In assembly seating where guards in accordance with Section 1025.14 are permitted and provided.

**IBC 1013.2 Height.** Guards shall form a protective barrier not less than 42 inches high, measured vertically above the adjacent walking surfaces, adjacent fixed seat-boards or the line connecting the leading edge edges of the tread-treads, ~~adjacent walking surface or adjacent seat board.~~

**Exceptions:**

1. For occupancies in Group R-3, and within individual dwelling units in occupancies in Group R-2, ~~guards whose top rail also serves as a handrail shall have a height not less than 34 inches and not more than 38 inches measured vertically from the leading edge of the stair tread nosing.~~ guards on the open sides of stairs shall have a height not less than 34 inches measured vertically from a line connecting the leading edges of the treads.

2. For occupancies in Group R-3, and within individual dwelling units in occupancies in Group R-2, where the top of the guard also serves as a handrail on the open sides of stairs, the top of the guard shall not be not less than 34 inches and not more than 38 inches measured vertically from a line connecting the leading edges of the treads.

2.3 The height in assembly seating areas shall be in accordance with Section 1025.14.

**IBC 1013.3 Opening limitations.** ~~Open Guards shall have balusters or ornamental patterns such that a~~ not have openings which allow passage of a sphere 4-inch inches diameter sphere in diameter from the walking surface to the required guard height cannot pass through any opening up to a height of 34 inches. ~~From a height of 34 inches to 42 inches (1067 mm) above the adjacent walking surfaces, a sphere 8 inches in diameter shall not pass.~~

**Exceptions:**

1. From a height of 36 inches to 42 inches (1067 mm), guards shall not have openings which allow passage of a sphere 4-3/8 inches in diameter.

2. 4. ~~The triangular openings at the open sides of a stair, formed by the riser, tread and bottom rail, at the open side of a stairway shall be of a maximum size such that a sphere of 6 inches in diameter cannot pass through the opening.~~ not allow passage of a sphere 6 inches in diameter.

3.2. ~~At elevated walking surfaces for access to and use of electrical, mechanical or plumbing systems or equipment, guards shall have balusters or be of solid materials such that a sphere with a diameter of 21 inches cannot pass through any opening.~~ not have openings which allow passage of a sphere 21 inches in diameter.

4.3. ~~In areas which are not open to the public within occupancies in Group I-3, F, H or S, balusters, horizontal intermediate rails or other construction shall not permit a sphere with a diameter of 21 inches to pass through any opening.~~ guards shall not have openings which allow passage of a sphere 21 inches in diameter.

5.4. In assembly seating areas, guards at the end of aisles where they terminate at a fascia of boxes, balconies and galleries shall ~~have balusters or ornamental patterns such that a~~ not have openings which allow passage of a sphere 4 inch inches in diameter sphere cannot pass through any opening up to a height of 26 inches (660 mm). From a height of 26 inches to 42 inches above the adjacent walking surfaces, guards shall not have openings which allow passage of a sphere 8 inches in diameter shall not pass.

6.5. Within individual dwelling units and sleeping units in Group R-2 and R-3 occupancies, ~~openings for required guards on the sides of stair treads shall not allow a sphere of 4 3/8" to pass through.~~ guards on the open sides of stairs shall not have openings which allow passage of a sphere 4-3/8 inches in diameter.

**IBC 1013.4. Screen porches.** (No change)

**IBC 1013.5 Mechanical equipment.** Guards shall be provided where appliances, equipment, fans, roof hatch openings or other components that require service are

located within 10 feet of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches above the floor, roof or grade below. The guard shall be constructed so as to prevent the passage of a sphere 21 inches in diameter sphere. The guard shall extend not less than 30 inches beyond each end of such appliance, equipment, fan or component.

**IBC 1013.6 Roof access.** Guards shall be provided where the roof hatch opening is located within 10 feet of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches above the floor, roof or grade below. The guard shall be constructed so as to prevent the passage of a sphere 21 inches in diameter sphere

## **PART II - IRC**

### **SECTION R312 GUARDS**

**IRC R312.1 Where Guards required.** ~~Porches, balconies, ramps or raised walking floor surfaces located more than 30 inches above the floor or grade below shall have guards not less than 36 inches in height. Open sides of stairs with a total rise of more than 30 inches above the floor or grade below shall have guards not less than 34 inches in height measured vertically from the nosing of the treads. Guards shall be located along open-sided walking surfaces, including porches, decks, balconies, mezzanines, stairs, ramps and landings, which are located more than 30 inches above the floor or grade below. Insect screening shall not be considered as a guard.~~

~~Porches and decks which are enclosed with insect screening shall be equipped with guards where the walking surface is located more than 30 inches above the floor or grade below.~~

**IRC R312.2 Height.** Guards at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches high measured vertically above the adjacent walking surface, adjacent fixed seat-boards or the line connecting the leading edges of the treads.

#### **Exception:**

1. Guards on the open sides of stairs shall have a height not less than 34 inches measured vertically from a line connecting the leading edges of the treads.

2. Where the top of the guard also serves as a handrail on the open sides of stairs, the top of the guard shall not be not less than 34 inches and not more than 38 inches measured vertically from a line connecting the leading edges of the treads.

**IRC ~~R312.2~~ R312.3 **Guard Opening limitations.**** ~~Required Guards on open sides of stairways, raised floor areas, balconies and porches shall~~ not have openings intermediate

~~rails or ornamental closures which do not allow passage of a sphere 4 inches or more in diameter from the walking surface to the required guard height.~~

**Exceptions:**

1. ~~The triangular openings at the open side of a stair, formed by the riser, tread and bottom rail of a guard, at the open side of a stairway shall be permitted to be of such a size that a sphere 6 inches cannot pass through.~~ not allow passage of a sphere 6 inches in diameter.
2. ~~Openings for required guards on the open sides of stair treads shall not allow passage of a sphere 4-3/8 inches or more in diameter to pass through.~~ Guards on the open sides of stairs shall not have openings which allow passage of a sphere 4-3/8 inches in diameter

**Reason for changes to the IBC and IRC:**

Part I – IBC

IBC 1013.1. Editorial. Laundry lists of items in the code are typically not all-inclusive. The word “including” provides this clarification in the following sections as well. This section is divided into two paragraphs with the second paragraph dealing with glass and glazing without a change in intent.

IBC 1013.2: The technical portion of this change is the change which identifies that a fixed seat becomes a potential walking surface to a child and thus warrants the guard height to be measured from that point. The remainder does not change the intent but rather provides standardized text dealing with stair treads and the determination of how to measure guard height.

IBC 1013.3: The majority of the revision in this section and exception involve editorial rewording of the sentences for clarity and consistency. The technical change is to reduce the maximum opening (8 to 4-3/8” inches) for this upper portion of the guard above 36 inches.

The 8 inch limitation on openings at the upper section of the guard was based on the difference between the 34 inch height being the part of the guard that protects small children and the 42 inch height for the rest of the population. However this does not take into account that residential R-3 use groups require a minimum guard height of 36 inches. Proposed new Exception 1 raises the height for which the 4 inch opening requirement is applicable - to coincide with the minimum guard height of 36 inches in residential occupancies.

The change in maximum opening size at the upper portion of the guard, from the current 8 inch sphere criteria to a 4-3/8 inch sphere, is based on providing an equivalent level of protection as that provided by the current 4 inch opening on the lower portion of the guard. As a point of reference, the following measurements of head sizes of infants are

excerpted from Drawing #2 Measurement of Infants from a book entitled “The Measure of Man and Woman: Human Factors” by Alvin R. Tilley, first published by Whitney Library of Design in 1993, republished and copyrighted by John Wiley & Sons, New York (ISBN 0-471-09955-4) in 2002.

The publication states “We have chosen to accommodate 98% of the U.S. population, which lies between the 99 percentile and the 1 percentile, for product designs for civilians” page 10-11 headlined percentiles.

<u>Age</u>	<u>Side-to-side measurement</u>	<u>Back-to-front measurement</u>
12-15 months:	5”	6.5”
16-19 months:	5”	6.5”
20-23 months:	5.1”	6.8”

Additional point of reference, from the same book entitled “The Measure of Man and Woman: Human Factors” by Alvin R. Tilley, figure number 8, page 14, showing child age 2.5 – 3 years. The chest dimension when scaled (1” = 12”) shows a 4-3/4” dimension from the back to the front.

The following information from various resources has been compiled to illustrate how countries outside of the US are regulating the openings in guards:

<b>Country of Origin</b>	<b>Sphere Rule Metric</b>	<b>Sphere Rule Inches</b>
Canada	100mm	3.94”
United Kingdom	100mm	3.94”
United States	102mm	4”
Australia	125mm	4.92”
Germany	120mm	4.72”
France	110mm	4.33”
Mexico (no code – standard followed)	102mm – 152mm	4” – 6”
Russia	100mm	3.94”
Romania	100mm	3.94”
Trinidad & Tobago	102mm	4”
Japan (Confirmation Pending)	125mm	4.92”
Spain (Confirmation Pending)	(120mm) (125mm)	(4.72”) (4.92”)
Switzerland	120mm	4.72”
Sweden	100mm	3.94”
Taiwan (Confirmation Pending)	125mm	4.92”
Singapore (Confirmation Pending)	125mm	4.92”
Poland ( Confirmation Pending)	100mm	3.94”
Turkey	100 mm	3.94”
Netherlands (Confirmation Pending)	100mm	3.94”

## Part II - IRC

IRC R312.1: This section is being divided into two sections, similar to the IBC. The first section includes the general guard requirement, and the new section (R312.2) includes the height requirements.

IRC R312.2: This new section includes the guard height requirements. It is reformatted to place emphasis on the 36" high guard required at level surfaces. There are no technical changes to the minimum height. This section does include an added phrase - "or adjacent fixed seat-board" – intended to clarify that where there is built-in seating, the guard height is to be measured from the seat itself to provide for the minimum required height where it is assumed that children may be standing.

IRC R312.3: The majority of the revision in this section and exception involve editorial rewording of the sentences for clarity and consistency.