SECTION R312
GUARDS AND WINDOW FALL PROTECTION

R312.1 Guards.

Guards shall be provided in accordance with Sections R312.1.1 through R312.1.4.

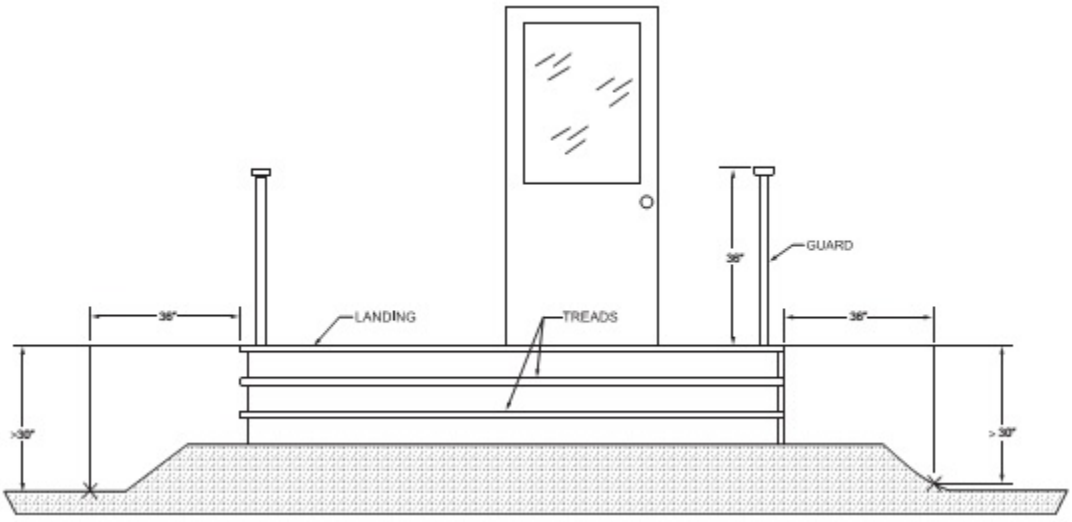
❖ The guard provisions of the code address the issue of protecting occupants from falling from any type of elevated walking surface. The provisions in Section R312 provide the scoping requirements, as well as the general construction requirements for the guards. Besides this section, code users should be aware that Section R301.5 contains the design load criteria for guards.

R312.1.1 Where required.

Guards shall be located along open-sided walking surfaces, including stairs, ramps and landings that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard*.

❖ Section R312.1.1 establishes stairs, ramps and landings as examples of open-sided walking surfaces, but this is not an all-inclusive list of locations where guards are required. This section gives further specifics, to define the minimum elevation of the walking surface as greater than 30 inches (762 mm) that requires a guard. It also recognizes that a guard is needed to minimize falls if the elevation exceeds the 30-inch (762 mm) height at any point within 36 inches (914 mm) of the edge of the walking surface in consideration of such conditions as a sloping site or sudden drop. The scoping requirement for guards along open sides of stairs only applies to that portion of the stairway that is more than 30 inches (762 mm) above the determined point on the grade or floor below (see Commentary Figure R312.1.1).

Insect screening lacks sufficient strength to prevent someone from falling under a top rail. For this reason a guard is required for porches and decks enclosed with insect screening where the walking surface is located more than 30 inches (762 mm) above a floor or grade below.



For SI: 1 inch = 25.4 mm.

Figure R312.1.1

DROP OFF AND GUARD HEIGHT REQUIREMENTS

R312.1.2 Height.

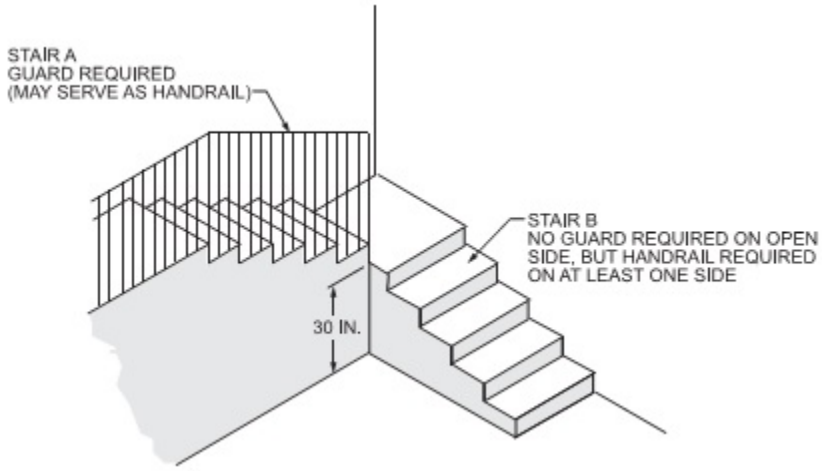
Required *guards* at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches (914 mm) in height as measured vertically above the adjacent walking surface or the line connecting the leading edges of the treads.

Exceptions:

1. *Guards* on the open sides of stairs shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
2. Where the top of the *guard* serves as a handrail on the open sides of stairs, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) as measured vertically from a line connecting the leading edges of the treads.

❖ Where guards are required by Section R312.1.1, Section 312.1.2 specifies a minimum height for those guards. The code requires guards at open sides along walking surfaces and gives examples, but this list is not to be considered all inclusive. Required guards must be of an adequate height to minimize the chances of someone from falling off the edge of the walking surface. Therefore, the code establishes 36 inches (914 mm) as the minimum acceptable height for most guards at walking surfaces. However, Exceptions 1 and 2 recognize that the minimum height for handrails along stairways is 34 inches (864 mm), therefore, there is a special allowance at the top of the guard along stairways that is consistent with the height of such handrails.

Guard heights are determined by measuring vertically from the walking surface or the line connecting the nosings of the treads on stairways; however, when fixed seating is adjacent to a guard the height of the guard is to be measured from the seat where children might be inclined to stand or walk. See Commentary Figures R312.1.1 and R312.1.2 for examples of how this provision is applied.



For SI: 1 inch = 25.4 mm.

Figure R312.1.2
STAIRWAY GUARD

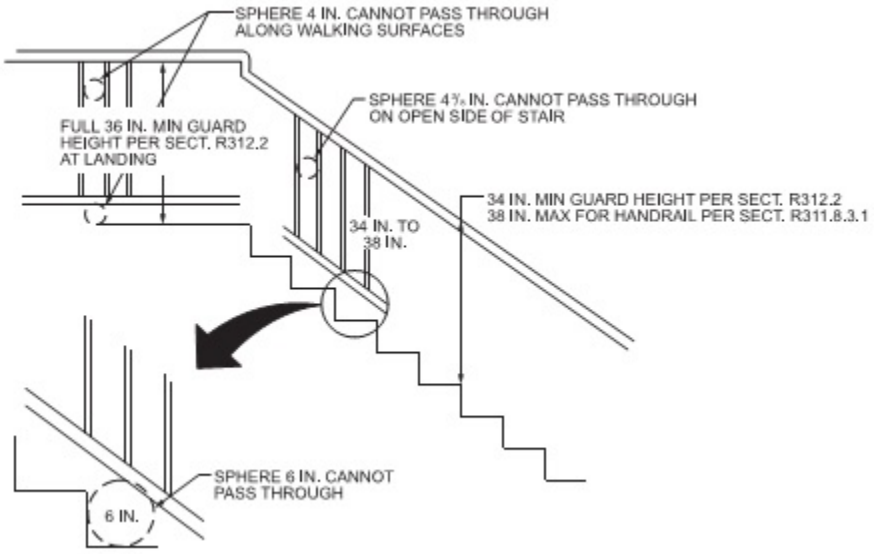
R312.1.3 Opening limitations.

Required *guards* shall not have openings from the walking surface to the required *guard* height that allow passage of a sphere 4 inches (102 mm) in diameter.

Exceptions:

1. The triangular openings at the open side of stair, formed by the riser, tread and bottom rail of a *guard*, shall not allow passage of a sphere 6 inches (153 mm) in diameter.
2. *Guards* on the open side of stairs shall not have openings that allow passage of a sphere $4^{3}/_{8}$ inches (111 mm) in diameter.

❖ Guards must be constructed so that they prohibit smaller occupants, such as children, from falling through them. To prohibit people from slipping through a guard, any required guard would need to have supports, spindles, intermediate rails or some type of ornamental pattern so that a 4-inch (102 mm) sphere cannot pass through it. This spacing was chosen based on the head size and the chest depth of a child who had not yet developed an ability to crawl. The code does allow two exceptions for this spacing requirement. A $4^{3}/_{8}$-inch (111 mm) sphere rule is used for the guard on the open side of stair treads. This minor difference of just $^{3}/_{8}$ inch (9.5 mm) allows the use of just two balusters at each tread greatly reducing costs with no limitation of safety. A 6-inch (152 mm) sphere rule is used for the triangular area formed by the riser, tread and bottom rail of a guard along the open side of a stair because the triangular shape is more restrictive (see Commentary Figure R312.1.3).



For SI: 1 inch = 25.4 mm.

Figure R312.1.3
GUARD REQUIREMENTS

R312.1.4 Exterior plastic composite guards.

Plastic composite exterior *guards* shall comply with the requirements of Section R317.4.

❖ Guards made of wood or plastic composite materials must meet the requirements for installation and labeling, and must comply with ASTM D7032, as stated in Section R317.4, in addition to the general requirements for guards in this section.

R312.2 Window fall protection.

Window fall protection shall be provided in accordance with Sections R312.2.1 and R312.2.2.

❖ Section R312.2 requires compliance with Sections R312.2.1 and R312.2.2 for window fall protection.

Section R312.2.1 indicates that the window fall protection is only required for windows that meet all of the following conditions:

1. Are operable,
2. Are located more than 72 inches (1829 mm) above finished grade or other exterior surface below, and
3. Have a sill height of less than 24 inches, as measured vertically from the floor surface of the room in which they are located.

Where a window meets all of these conditions, Section R312.2.1 requires that they comply with at least one of the following:

1. Have openings which will not allow passage of a 4-inch-diameter (102 mm) sphere,
2. Be equipped with a window fall prevention device in accordance with ASTM F2090, or
3. Be equipped with opening control devices in accordance with Section R312.2.2 (see Commentary Figure R312.2.1).

Where a window opening device in accordance with ASTM F2090 is used, Section R312.2.2 requires that the device must not reduce the net clear opening area of the window in its fully open position to less than that required for required emergency escape and rescue openings (Section R310.2.1).

The intent of these provisions is to prevent small children from falling out of open windows. An opening control device installed on any window must have an emergency release device that is clearly identified and that operates without the need for a key, tool or special knowledge. These operation criteria match the language in the provisions for emergency escape and rescue openings.

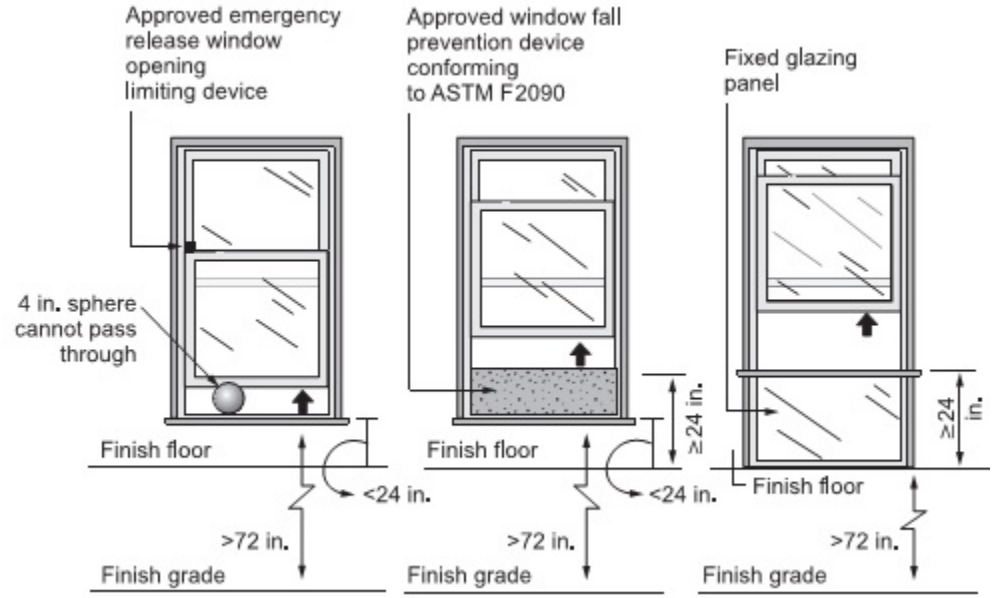
The code references ASTM F2090, *Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms* for the device requirements. The standard requires window fall prevention devices to be constructed such that a 4-inch-diameter (102 mm) sphere cannot pass through. Window fall prevention devices installed on any window must conform to ASTM F2090, thereby complying with the operation provisions for emergency escape and rescue openings in Section R310.

R312.2.1 Window sills.

In dwelling units, where the top of the sill of an operable window opening is located less than 24 inches (610 mm) above the finished floor and greater than 72 inches (1829 mm) above the finished *grade* or other surface below on the exterior of the building, the operable window shall comply with one of the following:

1. Operable windows with openings that will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening where the opening is in its largest opened position.
2. Operable windows that are provided with window fall prevention devices that comply with ASTM F2090.
3. Operable windows that are provided with window opening control devices that comply with Section R312.2.2.

❖ See the commentary to Section R312.2.



For SI: 1 inch = 25.4 mm.

Figure R312.2.1
WINDOW SILL HEIGHT

R312.2.2 Window opening control devices.

Window opening control devices shall comply with ASTM F2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the net clear opening area of the window unit to less than the area required by Section R310.2.1.

❖ See the commentary to Section R312.2.