

R311.5.8 Special stairways. Circular stairways, spiral stairways, winders and bulkhead enclosure stairways shall comply with all requirements of Section R311.5 except as specified below.

R311.5.8.1 Spiral stairways. Spiral stairways are permitted for interior use as a component of the means of egress from a habitable room, a basement or an attic, provided the minimum width shall be 26 inches (660 mm) with each tread having a 7½-inch (190 mm) minimum tread depth at 12 inches from the narrower edge. All treads shall be identical, and the rise shall be no more than 9½ inches (241 mm). A minimum headroom of 6 feet 6 inches (1982 mm) shall be provided. A spiral stair is not permitted to be the only means of egress from a story of a building.

R311.5.8.2 Bulkhead enclosure stairways. Stairways serving bulkhead enclosures, not part of the required building egress, providing access from the outside grade level to the basement shall be exempt from the requirements of Sections R311.4.3 and R311.5 where the maximum height from the basement finished floor level to grade adjacent to the stairway does not exceed 8 feet (2438 mm), and the grade level opening to the stairway is covered by a bulkhead enclosure with hinged doors or other approved means.

R311.6 Ramps.

R311.6.1 Maximum slope. Ramps shall have a maximum slope of one unit vertical in eight units horizontal (12.5-percent slope).

R311.6.2 Landings required. A minimum 3-foot-by-3-foot (914 mm by 914 mm) landing shall be provided:

1. At the top and bottom of ramps,
2. Where doors open onto ramps,
3. Where ramps change direction.

R311.6.3 Handrails required. Handrails shall be provided on at least one side of all ramps exceeding a slope of one unit vertical in 12 units horizontal (8.33-percent slope).

R311.6.3.1 Height. Handrail height, measured above the finished surface of the ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

R311.6.3.2 Handrail grip size. Handrails on ramps shall comply with Section R311.5.6.3.

R311.6.3.3 Continuity. Handrails where required on ramps shall be continuous for the full length of the ramp. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1.5 inches (38 mm) between the wall and the handrails.

**SECTION R312
GUARDS**

R312.1 Guards required. Porches, balconies or raised floor surfaces located more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 36 inches (914

mm) in height. Open sides of stairs with a total rise of more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 34 inches (864 mm) in height measured vertically from the nosing of the treads.

Porches and decks which are enclosed with insect screening shall be provided with guards where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.

R312.2 Guard opening limitations. Required guards on open sides of stairways, raised floor areas, balconies and porches shall have intermediate rails or ornamental closures which do not allow passage of a sphere 4 inches (102mm) or more in diameter.

Exceptions:

1. The triangular openings formed by the riser, tread and bottom-rail of a guard at the open side of a stairway are permitted to be of such a size that a sphere 6 inches (152 mm) cannot pass through.
2. Openings for required guards on the sides of stair treads shall not allow a sphere 4⅜ inches (107 mm) to pass through.

**SECTION R313
SMOKE ALARMS, AUTOMATIC SPRINKLER
SYSTEMS AND CARBON MONOXIDE ALARMS**

[F] R313.1 Smoke alarms. Smoke alarms shall be installed in the following locations:

1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional story of the dwelling, including basements but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

When more than one smoke alarm is required to be installed within an individual dwelling unit the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

Exception: Interconnection is not required where smoke alarms are permitted to be battery operated in accordance with Section R313.1.2.

All smoke alarms shall be listed and installed in accordance with the provisions of this code and the household fire warning equipment provisions of NFPA 72.

R313.1.1 Existing buildings undergoing repair, alteration, change of occupancy, addition or relocation shall be provided with smoke alarms as required by Appendix J.

[F] R313.1.2 Power source. In new construction, the required smoke alarms shall receive their primary power from the building wiring when such wiring is served from a com-

mercial source, or an on-site electrical power system and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection. Smoke alarms shall be permitted to be battery operated when installed in buildings without commercial power or an on-site electrical power system or in buildings that undergo repair, alteration, change of occupancy, addition or relocation in accordance with Appendix J.

R313.2 Combination smoke and carbon monoxide alarms. Combination smoke and carbon monoxide alarms are permitted, provided the alarm is listed for such use. Combination smoke and carbon monoxide alarms shall have distinctly different alarm signals for smoke or carbon monoxide alarm activation.

R313.3 Automatic sprinkler systems. Buildings having a height of three stories above a basement shall be equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13D.

R313.3.1 Existing dwellings. Alterations to an existing attic which create a building height of three stories above a basement shall be permitted in conformance with Section AJ604.3.

R313.4 Carbon monoxide alarms. Carbon monoxide alarms shall be installed in the following locations:

Exception: Conformance with this section is not required where fuel-fired appliances and equipment, solid-fuel burning appliances and equipment, fireplaces, or motor-vehicle-related occupancies are not located within the structure.

1. Within each dwelling unit on any story having a sleeping area.
2. On any story of a dwelling unit where fuel-fired appliances and equipment, solid-fuel burning appliances and equipment, fireplaces or attached garages are located. A carbon monoxide alarm installed on any story of a dwelling unit having a sleeping area shall suffice for that story where fuel-fired appliances and equipment, solid-fuel burning appliances and equipment, fireplaces or attached automotive parking garages are also located.

When more than one carbon monoxide alarm is required to be installed within an individual dwelling unit, the alarms shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms in the individual unit. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

Exception: Interconnection is not required where carbon monoxide alarms are permitted to be battery operated in accordance with Section R313.4.3.

All carbon monoxide alarms shall be listed and labeled as complying with UL 2034 or CAN/CSA 6.19, and shall be installed in accordance with the manufacturer's installation instructions and this code.

R313.4.1 Prohibited locations. Carbon monoxide alarms shall not be located within or near the openings to garages, bathrooms or furnace rooms. Carbon monoxide alarms shall

also not be located in or near locations specified in the manufacturer's installation instructions.

R313.4.2 Existing buildings. Carbon monoxide alarms shall be installed in existing buildings undergoing repair, alteration, change of occupancy, addition or relocation as required by Appendix J.

R313.4.3 Power source. In new construction, the required carbon monoxide alarms shall receive their primary power from the building wiring when such wiring is served from a commercial source or an on-site electrical power system, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection. Carbon monoxide alarms shall be permitted to be battery operated when installed in buildings without commercial power or an on-site electrical power system or in buildings that undergo repair, alteration, change of occupancy, addition or relocation in accordance with Appendix J.

SECTION R314 FOAM PLASTIC

R314.1 General. The provisions of this section shall govern the requirements and uses of foam plastic insulation.

R314.1.1 Surface burning characteristics. Except where otherwise noted in Section R314.2, all foam plastic or foam plastic cores in manufactured assemblies used in building construction shall have a flame-spread rating of not more than 75 and shall have a smoke-developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84.

R314.1.2 Thermal barrier. Foam plastic, except where otherwise noted, shall be separated from the interior of a building by minimum $\frac{1}{2}$ -inch (12.7 mm) gypsum board or an approved finish material equivalent to a thermal barrier to limit the average temperature rise of the unexposed surface to no more than 250°F (121°C) after 15 minutes of fire exposure to the ASTM E 119 standard time temperature curve. The gypsum board shall be installed using a mechanical fastening system in accordance with Section R702.3.5. Reliance on adhesives to ensure that the gypsum board will remain in place when exposed to fire shall be prohibited.

R314.2 Specific requirements. The following requirements shall apply to all uses of foam plastic unless specifically approved in accordance with Section R314.3 or by other sections of the code.

R314.2.1 Masonry or concrete construction. Foam plastics may be used without the thermal barrier described in Section R314.1 when the foam plastic is protected by a minimum 1-inch (25.4 mm) thickness of masonry or concrete.

R314.2.2 Roofing. Foam plastic may be used in a roof-covering assembly without the thermal barrier when the foam is separated from the interior of the building by wood structural panel sheathing in accordance with Section R803, not less than $\frac{15}{32}$ inch (11.9 mm) in thickness bonded with exterior glue and identified as Exposure 1, with edge