

International Residential Code 2000

SECTION R327

FLOOD-RESISTANT CONSTRUCTION

R327.1 General.

All buildings and structures erected in areas prone to flooding as identified in Table R301.2 (1) and classified as either flood hazard areas (including A Zones) or coastal high hazard areas (including V-Zones) shall be constructed and elevated as required by the provisions contained in this section.

Exception: All buildings and structures erected in identified floodways as established in Table R301.2 (1) shall be designed and constructed as stipulated in the International Building Code.

R327.1.1 Structural systems.

All structural systems of all buildings and structures shall be designed, connected and anchored to resist flotation, collapse or permanent lateral movement due to structural loads and stresses from flooding equal to the design flood elevation.

R327.1.2 Flood-resistant construction.

All buildings and structures erected in areas prone to flooding shall be constructed by methods and practices that minimize flood damage.

R327.1.3 Establishing the design flood elevation. The design flood elevation shall be used to define areas prone to flooding, and shall describe, at a minimum, the base flood elevation at the depth of peak elevation of flooding (including wave height) which has a 1 percent (100-year flood) or greater chance of being equaled or exceeded in any given year.

R327.1.4 Lowest floor. The lowest floor shall be the floor of the lowest enclosed area, including basement, but excluding any unfinished flood-resistant enclosure that is useable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the building or structure in violation of this section.

R327.1.5 Protection of mechanical and electrical systems.

New and replacement electrical equipment, heating, ventilating, air conditioning, plumbing connections, and other service equipment shall be located at or above the design flood elevation. Electrical wiring and outlets, switches, junction boxes and panels shall be elevated to or above the design flood elevation unless they conform to the provisions of the electrical part of this code for location of such items in wet locations.

Duct systems shall not be installed below the design flood elevation.

R327.1.6 Protection of water supply and sanitary sewage systems.

New and replacement water supply systems shall be designed to minimize infiltration of flood waters into the systems in accordance with the plumbing provisions of this code. New and replacement sanitary sewage systems shall be designed to minimize infiltration of floodwaters into systems and discharges from systems into floodwaters in accordance with the plumbing provisions of this code and Chapter 3 of the International Private Sewage Disposal Code.

R327.1.7 Flood-resistant materials.

Building materials used below the design flood elevation shall comply with the following:

1. All wood, including floor sheathing, shall be pressure preservative treated in accordance with AWPA C1, C2, C3, C4, C9, C15, C18, C22, C23, C24, C28, P1, P2 and P3 or decay-resistant heartwood or redwood, black locust, or cedars.

2. Materials and installation methods used for flooring and interior and exterior walls shall conform to the provisions of FEMA/FIA-TB-2.

R327.1.8 Manufactured housing.

New or replacement manufactured housing shall be elevated in accordance with Section R327.2 and the anchor and tie-down requirements of Sections AE604 and AE605 of Appendix E shall apply. The foundation and anchorage of manufactured housing to be located in identified flood ways as established in Table R301.2 (I) shall be designed and constructed in accordance with the applicable provisions in the International Building Code.

R327.1.9 As-built elevation certifications.

A licensed land surveyor or registered design professional shall certify that the building or structure is in compliance with the elevation requirements of Section R327.2 or R327.3.

R327.2 Flood hazard areas (including A Zones).

All areas that have been determined to be prone to flooding but not subject to high velocity wave action shall be designated as flood hazard areas. All buildings and structures erected in flood hazard areas shall be designed and constructed in accordance with Sections P.327.2.1 through R327.2.3.

R327.2.1 Elevation requirements.

1. Buildings and structures shall have the lowest floors elevated to or above the design flood elevation.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated at least as high above the highest adjacent grade as the depth number specified in feet (mm) on the FIRM, or at least 2 feet (51 mm) if a depth number is not specified.
3. Basement floors that are below grade on all sides shall be elevated to or above the design flood elevation.

Exception: Enclosed areas below the design flood elevation, including basements whose floors are not below grade on all sides, shall meet the requirements of Section R327.2.2.

R327.2.2 Enclosed area below design flood elevation. Enclosed areas, including crawl spaces, that are below the design flood elevation shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings, which shall meet the following criteria:
 - 2.1. There shall be a minimum of two openings on different sides of each enclosed area; if a building has more than one enclosed area below the design flood elevation, each area shall have openings on exterior walls.
 - 2.2. The total net area of all openings shall be at least 1 square inch for each square foot (275 mm for each square meter) of enclosed area.
 - 2.3. The bottom of each opening shall be 1 foot (305 mm) or less above the adjacent ground level.
 - 2.4. Openings shall be at least 3 inches (76 mm) in diameter.
 - 2.5. Any louvers, screens or other opening covers shall allow the automatic flow of floodwaters into and out of the enclosed area.
 - 2.6. Openings installed in doors and windows, that meet requirements 2.1 through 2.5, are acceptable; however, doors and windows without installed openings do not meet the requirements of this section.

R327.2.3 Foundation design and construction.

Foundation walls for all buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4.

Exception: Unless designed in accordance with Section 404:

1. The unsupported height of 6 inches (152 mm) plain masonry walls shall be no greater than 3 feet (914 mm).
2. The unsupported height of 8 inches (203 mm) plain masonry walls shall be no greater than 4 feet (1219mm).
3. The unsupported height of 8 inches (203 mm) reinforced masonry walls shall be no greater than 8 feet (2438 mm).

For the purpose of this exception, unsupported height is the distance from the finished grade of the under-floor space and the top of the wall.

R327.3 Coastal high hazard areas (including V Zones).

Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high velocity wave action or wave-induced erosion shall be designated as coastal high hazard areas. All buildings and structures erected in coastal high hazard areas shall be designed and constructed in accordance with Sections R327.3.1 through R327.3.5.

R327.3.1 Elevation requirements.

1. All buildings and structures erected within coastal high hazard areas shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of mat or raft foundations, piling, pile caps, columns, grade beams and bracing, is located at or above the design flood elevation.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. The placement of fill beneath buildings and structures is prohibited.

Exception: Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections P327.3.3 and R327.3.4.

R327.3.2 Foundations.

All buildings and structures erected in coastal high hazard areas shall be supported on pilings or columns

and shall be adequately anchored to such pilings or columns. Piling shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water loading values used shall be those associated with the design flood. Wind loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section R327.3.5. Mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions.

R327.3.3 Walls below design flood elevation.

Walls and partitions are permitted below the elevated floor, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Are constructed with insect screening or open lattice.
2. Designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a design safe loading resistance of not less than 10 pounds per square foot (0.48 kN/m²) and no more than 20 pounds per square foot (0.96 kN/m²); or
3. Where wind-loading values of this code exceed 20 pounds per square foot (0.96 kN/m²), a registered design professional shall certify the following:
 - 3.1. Collapse of walls and partitions below the design flood elevation shall result from a water load less than that which would occur during the design flood.
 - 3.2. The elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement, or other structural damage due to the effects of wind and flood loads acting simultaneously on all building components (structural and nonstructural). Water loading values used shall be those associated with the design flood. Wind loading values used shall be those required by this code.

R327.3.4 Enclosed areas below design flood elevation.

Enclosed areas below the design flood elevation shall be used solely for parking of vehicles, building access or storage.

R327.3.5 Design certificate.

A registered design professional shall certify that the design and methods of construction to be used meet the applicable criteria of this section.