

# Part I—Administrative

## CHAPTER 1 SCOPE AND ADMINISTRATION

### User note:

**About this chapter:** Chapter 1 establishes the limits of applicability of this code and describes how the code is to be applied and enforced. Chapter 1 is in two parts: Part 1—Scope and Application (Sections R101–R102) and Part 2—Administration and Enforcement (Sections R103–R114). Section R101 identifies which buildings and structures come under its purview and references other I-Codes as applicable. Standards and codes are scoped to the extent referenced (see Section R102.4).

The one- and two-family dwelling code is intended to be adopted as a legally enforceable document, and it cannot be effective without adequate provisions for its administration and enforcement. The provisions of Chapter 1 establish the authority and duties of the building official appointed by the authority having jurisdiction and also establish the rights and privileges of the design professional, contractor and property owner.

### PART 1—SCOPE AND APPLICATION

#### SECTION R101 SCOPE AND GENERAL REQUIREMENTS

**R101.1 Title.** These provisions shall be known as the *Residential Code for One- and Two-family Dwellings* of [NAME OF JURISDICTION], and shall be cited as such and will be referred to herein as “this code.”

**R101.2 Scope.** The provisions of this code shall apply to the construction, *alteration*, movement, enlargement, replacement, *repair*, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and *townhouses* not more than three stories above *grade plane* in height with a separate means of egress and their *accessory structures* not more than three stories above *grade plane* in height.

**Exception:** The following shall be permitted to be constructed in accordance with this code where provided with an automatic sprinkler system complying with Section P2904:

1. Live/work units located in townhouses and complying with the requirements of Section 508.5 of the *International Building Code*.
2. Owner-occupied *lodging houses* with five or fewer guestrooms.
3. A care facility with five or fewer persons receiving custodial care within a *dwelling unit*.
4. A care facility with five or fewer persons receiving medical care within a *dwelling unit*.
5. A care facility for five or fewer persons receiving care that are within a single-family dwelling.

**R101.3 Purpose.** The purpose of this code is to establish minimum requirements to provide a reasonable level of safety, health and general welfare through affordability, structural strength, means of egress, stability, sanitation,

light and ventilation, energy conservation and safety to life and property from fire and other hazards and to provide a reasonable level of safety to fire fighters and emergency responders during emergency operations.

#### SECTION R102 APPLICABILITY

**R102.1 General.** Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

**R102.2 Other laws.** The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

**R102.3 Application of references.** References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

**R102.4 Referenced codes and standards.** The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections R102.4.1 and R102.4.2.

**Exception:** Where enforcement of a code provision would violate the conditions of the *listing* of the *equipment* or *appliance*, the conditions of the *listing* and manufacturer’s instructions shall apply.

**R102.4.1 Conflicts.** Where conflicts occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

**R102.4.2 Provisions in referenced codes and standards.** Where the extent of the reference to a referenced code or standard includes subject matter that is within the

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scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

**R102.5 Appendices.** Provisions in the appendices shall not apply unless specifically referenced in the adopting ordinance.

**R102.6 Partial invalidity.** In the event any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

**R102.7 Existing structures.** The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the *International Property Maintenance Code* or the *International Fire Code*, or as is deemed necessary by the *building official* for the general safety and welfare of the occupants and the public.

**R102.7.1 Additions, alterations or repairs.** *Additions, alterations* or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with the requirements of this code, unless otherwise stated. *Additions, alterations, repairs* and relocations shall not cause an existing structure to become less compliant with the provisions of this code than the existing building or structure was prior to the *addition, alteration* or *repair*. An existing building together with its *additions* shall comply with the height limits of this code. Where the *alteration* causes the use or occupancy to be changed to one not within the scope of this code, the provisions of the *International Existing Building Code* shall apply.

## PART 2—ADMINISTRATION AND ENFORCEMENT

### SECTION R103 DEPARTMENT OF BUILDING SAFETY

**R103.1 Creation of enforcement agency.** The department of building safety is hereby created and the official in charge thereof shall be known as the *building official*.

**R103.2 Appointment.** The *building official* shall be appointed by the *jurisdiction*.

**R103.3 Deputies.** In accordance with the prescribed procedures of this *jurisdiction* and with the concurrence of the appointing authority, the *building official* shall have the authority to appoint a deputy *building official*, the related technical officers, inspectors, plan examiners and other employees. Such employees shall have powers as delegated by the *building official*.

### SECTION R104 DUTIES AND POWERS OF THE BUILDING OFFICIAL

**R104.1 General.** The *building official* is hereby authorized and directed to enforce the provisions of this code. The *building official* shall have the authority to render interpreta-

tions of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

**R104.2 Applications and permits.** The *building official* shall receive applications, review *construction documents* and issue *permits* for the erection and *alteration* of buildings and structures, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

**R104.3 Notices and orders.** The *building official* shall issue necessary notices or orders to ensure compliance with this code.

**R104.4 Inspections.** The *building official* shall make the required inspections, or the *building official* shall have the authority to accept reports of inspection by *approved agencies* or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such *approved agency* or by the responsible individual. The *building official* is authorized to engage such expert opinion as deemed necessary to report on unusual technical issues that arise, subject to the approval of the appointing authority.

**R104.5 Identification.** The *building official* shall carry proper identification when inspecting structures or premises in the performance of duties under this code.

**R104.6 Right of entry.** Where it is necessary to make an inspection to enforce the provisions of this code, or where the *building official* has reasonable cause to believe that there exists in a structure or upon a premises a condition that is contrary to or in violation of this code that makes the structure or premises unsafe, dangerous or hazardous, the *building official* or designee is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises is unoccupied, the *building official* shall first make a reasonable effort to locate the *owner*, the *owner's* authorized agent, or other *person* having charge or control of the structure or premises and request entry. If entry is refused, the *building official* shall have recourse to the remedies provided by law to secure entry.

**R104.7 Department records.** The *building official* shall keep official records of applications received, *permits* and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official records for the period required for the retention of public records.

**R104.8 Liability.** The *building official*, member of the board of appeals or employee charged with the enforcement of this code, while acting for the *jurisdiction* in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered civilly or criminally liable personally and is hereby relieved from personal liability for any damage accruing to

persons or property as a result of any act or by reason of an act or omission in the discharge of official duties.

**R104.8.1 Legal defense.** Any suit or criminal complaint instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representatives of the *jurisdiction* until the final termination of the proceedings. The *building official* or any subordinate shall not be liable for cost in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

**R104.9 Approved materials and equipment.** Materials, *equipment* and devices *approved* by the *building official* shall be constructed and installed in accordance with such approval.

**R104.9.1 Used materials and equipment.** Used materials, *equipment* and devices shall not be reused unless *approved* by the *building official*.

**R104.10 Modifications.** Where there are practical difficulties involved in carrying out the provisions of this code, the *building official* shall have the authority to grant modifications for individual cases, provided the *building official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

**R104.10.1 Flood hazard areas.** The *building official* shall not grant modifications to any provisions required in flood hazard areas as established by Table R301.2 unless a determination has been made that:

1. There is good and sufficient cause showing that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section R322 inappropriate.
2. Failure to grant the modification would result in exceptional hardship by rendering the lot undevelopable.
3. The granting of modification will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.
4. The modification is the minimum necessary to afford relief, considering the flood hazard.
5. Written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation and stating that construction below the design flood elevation increases risks to life and property, has been submitted to the applicant.

**R104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code

are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code. The *building official* shall have the authority to approve an alternative material, design or method of construction upon application of the *owner* or the *owner's* authorized agent. The *building official* shall first find that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Compliance with the specific performance-based provisions of the International Codes shall be an alternative to the specific requirements of this code. Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons why the alternative was not *approved*.

**R104.11.1 Tests.** Where there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *building official* shall have the authority to require tests as evidence of compliance to be made at no expense to the *jurisdiction*. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *building official* shall approve the testing procedures. Tests shall be performed by an *approved* agency. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

## SECTION R105 PERMITS

**R105.1 Required.** Any *owner* or *owner's* authorized agent who intends to construct, enlarge, alter, *repair*, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, *repair*, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be performed, shall first make application to the *building official* and obtain the required *permit*.

**R105.2 Work exempt from permit.** Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction*. *Permits* shall not be required for the following:

### Building:

1. Other than *storm shelters*, one-story detached *accessory structures*, provided that the floor area does not exceed 200 square feet (18.58 m<sup>2</sup>).
2. Fences not over 7 feet (2134 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing

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- to the top of the wall, unless supporting a surcharge.
- 4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
- 5. Sidewalks and driveways.
- 6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
- 7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
- 8. Swings and other playground equipment.
- 9. Window awnings supported by an exterior wall that do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
- 10. Decks not exceeding 200 square feet (18.58 m<sup>2</sup>) in area, that are not more than 30 inches (762 mm) above *grade* at any point, are not attached to a dwelling and do not serve the exit door required by Section R311.4.

### Electrical:

- 1. *Listed* cord-and-plug connected temporary decorative lighting.
- 2. Reinstallation of attachment plug receptacles but not the outlets therefor.
- 3. Replacement of branch circuit overcurrent devices of the required capacity in the same location.
- 4. Electrical wiring, devices, *appliances*, apparatus or *equipment* operating at less than 25 volts and not capable of supplying more than 50 watts of energy.
- 5. Minor repair work, including the replacement of lamps or the connection of *approved* portable electrical equipment to *approved* permanently installed receptacles.

### Gas:

- 1. Portable heating, cooking or clothes drying *appliances*.
- 2. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
- 3. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

### Mechanical:

- 1. Portable heating *appliances*.
- 2. Portable ventilation *appliances*.
- 3. Portable cooling units.
- 4. Steam, hot- or chilled-water piping within any heating or cooling *equipment* regulated by this code.

- 5. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
- 6. Portable evaporative coolers.
- 7. Self-contained refrigeration systems containing 10 pounds (4.54 kg) or less of refrigerant or that are actuated by motors of 1 horsepower (746 W) or less.
- 8. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

### Plumbing:

- 1. The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code.
- 2. The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

**R105.2.1 Emergency repairs.** Where *equipment* replacements and repairs must be performed in an emergency situation, the *permit* application shall be submitted within the next working business day to the *building official*.

**R105.2.2 Repairs.** Application or notice to the *building official* is not required for ordinary repairs to structures, replacement of lamps or the connection of *approved* portable electrical equipment to *approved* permanently installed receptacles. Such repairs shall not include the cutting away of any wall, partition or portion thereof, the removal or cutting of any structural beam or load-bearing support, or the removal or change of any required means of egress, or rearrangement of parts of a structure affecting the egress requirements; nor shall ordinary repairs include *addition* to, *alteration* of, replacement or relocation of any water supply, sewer, drainage, drain leader, gas, soil, waste, vent or similar piping, electric wiring or mechanical or other work affecting public health or general safety.

**R105.2.3 Public service agencies.** A *permit* shall not be required for the installation, *alteration* or *repair* of generation, transmission, distribution, metering or other related equipment that is under the ownership and control of public service agencies by established right.

**R105.3 Application for permit.** To obtain a *permit*, the applicant shall first file an application therefor in writing on a form furnished by the department of building safety for that purpose. Such application shall:

- 1. Identify and describe the work to be covered by the *permit* for which application is made.



2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by *construction documents* and other information as required in Section R106.1.
5. State the valuation of the proposed work.
6. Be signed by the applicant or the applicant's authorized agent.
7. Give such other data and information as required by the *building official*.

**R105.3.1 Action on application.** The *building official* shall examine or cause to be examined applications for *permits* and amendments thereto within a reasonable time after filing. If the application or the *construction documents* do not conform to the requirements of pertinent laws, the *building official* shall reject such application in writing stating the reasons therefor. If the *building official* is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the *building official* shall issue a *permit* therefor as soon as practicable.

**R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas.** For applications for reconstruction, rehabilitation, *addition*, *alteration*, *repair* or other improvement of existing buildings or structures located in a flood hazard area as established by Table R301.2, the *building official* shall examine or cause to be examined the *construction documents* and shall make a determination with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamaged condition. If the *building official* finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the proposed work is a substantial improvement or *repair* of substantial damage and the building official shall require existing portions of the entire building or structure to meet the requirements of Section R322.

For the purpose of this determination, a substantial improvement shall mean any *repair*, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or *repair* is started. Where the building or structure has sustained substantial damage, repairs necessary to restore the building or structure to its predamaged condition shall be considered substantial improvements regardless of the actual repair work

performed. The term shall not include either of the following:

1. Improvements to a building or structure that are required to correct existing health, sanitary or safety code violations identified by the building official and that are the minimum necessary to ensure safe living conditions.
2. Any *alteration* of a *historic building* or structure, provided that the *alteration* will not preclude the continued designation as a *historic building* or structure. For the purposes of this exclusion, a *historic building* shall be any of the following:
  - 2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
  - 2.2. Determined by the Secretary of the US Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
  - 2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

**R105.3.2 Time limitation of application.** An application for a *permit* for any proposed work shall be deemed to have been abandoned 180 days after the date of filing unless such application has been pursued in good faith or a *permit* has been issued; except that the *building official* is authorized to grant one or more extensions of time for additional periods not exceeding 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

**R105.4 Validity of permit.** The issuance or granting of a *permit* shall not be construed to be a *permit* for, or an *approval* of, any violation of any of the provisions of this code or of any other ordinance of the *jurisdiction*. *Permits* presuming to give authority to violate or cancel the provisions of this code or other ordinances of the *jurisdiction* shall not be valid. The issuance of a *permit* based on *construction documents* and other data shall not prevent the *building official* from requiring the correction of errors in the *construction documents* and other data. The *building official* is authorized to prevent occupancy or use of a structure where in violation of this code or of any other ordinances of this *jurisdiction*.

**R105.5 Expiration.** Every *permit* issued shall become invalid unless the work authorized by such *permit* is commenced within 180 days after its issuance or after commencement of work if more than 180 days pass between inspections. The building official is authorized to grant, in writing, one or more extensions of time, for periods not more

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than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

**R105.6 Suspension or revocation.** The *building official* is authorized to suspend or revoke a *permit* issued under the provisions of this code wherever the *permit* is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

**R105.7 Placement of permit.** The building *permit* or a copy shall be kept on the site of the work until the completion of the project.

**R105.8 Responsibility.** It shall be the duty of every *person* who performs work for the installation or *repair* of building, structure, electrical, gas, mechanical or plumbing systems, for which this code is applicable, to comply with this code.

**R105.9 Preliminary inspection.** Before issuing a *permit*, the *building official* is authorized to examine or cause to be examined buildings, structures and sites for which an application has been filed.

## SECTION R106 CONSTRUCTION DOCUMENTS

**R106.1 Submittal documents.** Submittal documents consisting of *construction documents*, and other data shall be submitted in two or more sets, or in a digital format where allowed by the *building official*, with each application for a *permit*. The *construction documents* shall be prepared by a *registered design professional* where required by the statutes of the *jurisdiction* in which the project is to be constructed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a *registered design professional*.

**Exception:** The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a *registered design professional* if it is found that the nature of the work applied for is such that reviewing of *construction documents* is not necessary to obtain compliance with this code.

**R106.1.1 Information on construction documents.** *Construction documents* shall be drawn upon suitable material. Electronic media documents are permitted to be submitted where *approved* by the *building official*. *Construction documents* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the *building official*.

**R106.1.2 Manufacturer's installation instructions.** Manufacturer's installation instructions, as required by this code, shall be available on the job site at the time of inspection.

**R106.1.3 Information on braced wall design.** For buildings and structures utilizing braced wall design, and where required by the *building official*, *braced wall lines* shall be identified on the *construction documents*. Parti-

nent information including, but not limited to, bracing methods, location and length of *braced wall panels* and foundation requirements of *braced wall panels* at top and bottom shall be provided.

**R106.1.4 Information for construction in flood hazard areas.** For buildings and structures located in whole or in part in flood hazard areas as established by Table R301.2, *construction documents* shall include:

1. Delineation of flood hazard areas, floodway boundaries and flood zones and the design flood elevation, as appropriate.
2. The elevation of the proposed lowest floor, including *basement*; in areas of shallow flooding (AO Zones), the height of the proposed lowest floor, including *basement*, above the highest adjacent *grade*.
3. The elevation of the bottom of the lowest horizontal structural member in coastal high-hazard areas (V Zone) and in Coastal A Zones where such zones are delineated on flood hazard maps identified in Table R301.2 or otherwise delineated by the *jurisdiction*.
4. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the *building official* and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.

**R106.1.5 Information on storm shelters.** *Construction documents* for *storm shelters* shall include the information required in ICC 500.

**R106.2 Site plan or plot plan.** The *construction documents* submitted with the application for *permit* shall be accompanied by a site plan showing the size and location of new construction and existing structures on the site and distances from *lot lines*. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The *building official* is authorized to waive or modify the requirement for a site plan where the application for *permit* is for *alteration* or *repair* or where otherwise warranted.

**R106.3 Examination of documents.** The *building official* shall examine or cause to be examined *construction documents* for code compliance.

**R106.3.1 Approval of construction documents.** Where the *building official* issues a *permit*, the *construction documents* shall be *approved* in writing or by a stamp that states "REVIEWED FOR CODE COMPLIANCE." One set of *construction documents* so reviewed shall be retained by the *building official*. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the *building official* or a duly authorized representative.

**R106.3.2 Previous approvals.** This code shall not require changes in the *construction documents*, construction or designated occupancy of a structure for which a lawful *permit* has been heretofore issued or otherwise

lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

**R106.3.3 Phased approval.** The *building official* is authorized to issue a *permit* for the construction of foundations or any other part of a building or structure before the *construction documents* for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such *permit* for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a *permit* for the entire structure will be granted.

**R106.4 Amended construction documents.** Work shall be installed in accordance with the *approved construction documents*, and any changes made during construction that are not in compliance with the *approved construction documents* shall be resubmitted for approval as an amended set of *construction documents*.

**R106.5 Retention of construction documents.** One set of *approved construction documents* shall be retained by the *building official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

## SECTION R107 TEMPORARY STRUCTURES AND USES

**R107.1 General.** The *building official* is authorized to issue a *permit* for temporary structures and temporary uses. Such *permits* shall be limited as to time of service, but shall not be permitted for more than 180 days. The *building official* is authorized to grant extensions for demonstrated cause.

**R107.2 Conformance.** Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, light, *ventilation* and sanitary requirements of this code as necessary to ensure the public health, safety and general welfare.

**R107.3 Temporary power.** The *building official* is authorized to give permission to temporarily supply and use power in part of an electric installation before such installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or power in NFPA 70.

**R107.4 Termination of approval.** The *building official* is authorized to terminate such *permit* for a temporary structure or use and to order the temporary structure or use to be discontinued.

## SECTION R108 FEES

**R108.1 Payment of fees.** A *permit* shall not be valid until the fees prescribed by law have been paid, nor shall an

amendment to a *permit* be released until the additional fee, if any, has been paid.

**R108.2 Schedule of permit fees.** On buildings, structures, electrical, gas, mechanical and plumbing systems or *alterations* requiring a *permit*, a fee for each *permit* shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

**R108.3 Building permit valuations.** Building *permit* valuation shall include total value of the work for which a *permit* is being issued, such as electrical, gas, mechanical, plumbing equipment and other permanent systems, including materials and labor.

**R108.4 Related fees.** The payment of the fee for the construction, *alteration*, removal or demolition for work done in connection to or concurrently with the work authorized by a building *permit* shall not relieve the applicant or holder of the *permit* from the payment of other fees that are prescribed by law.

**R108.5 Refunds.** The *building official* is authorized to establish a refund policy.

**R108.6 Work commencing before permit issuance.** Any *person* who commences work requiring a *permit* on a building, structure, electrical, gas, mechanical or plumbing system before obtaining the necessary *permits* shall be subject to a fee established by the applicable governing authority that shall be in addition to the required *permit* fees.

## SECTION R109 INSPECTIONS

**R109.1 Types of inspections.** For on-site construction, from time to time the *building official*, upon notification from the *permit* holder or his agent, shall make or cause to be made any necessary inspections and shall either approve that portion of the construction as completed or shall notify the *permit* holder or his or her agent wherein the same fails to comply with this code.

**R109.1.1 Foundation inspection.** Inspection of the foundation shall be made after poles or piers are set or trenches or *basement* areas are excavated and any required forms erected and any required reinforcing steel is in place and supported prior to the placing of concrete. The foundation inspection shall include excavations for thickened slabs intended for the support of bearing walls, partitions, structural supports, or equipment and special requirements for wood foundations.

**R109.1.2 Plumbing, mechanical, gas and electrical systems inspection.** Rough inspection of plumbing, mechanical, gas and electrical systems shall be made prior to covering or concealment, before fixtures or *appliances* are set or installed, and prior to framing inspection.

**Exception:** Backfilling of ground-source heat pump loop systems tested in accordance with Section M2105.28 prior to inspection shall be permitted.

**R109.1.3 Floodplain inspections.** For construction in flood hazard areas as established by Table R301.2, upon



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placement of the lowest floor, including *basement*, and prior to further vertical construction, the *building official* shall require submission of documentation, prepared and sealed by a *registered design professional*, of the elevation of the lowest floor, including *basement*, required in Section R322.

**R109.1.4 Frame and masonry inspection.** Inspection of framing and masonry construction shall be made after the roof, masonry, framing, firestopping, draftstopping and bracing are in place and after the plumbing, mechanical and electrical rough inspections are *approved*.

**R109.1.5 Other inspections.** In addition to inspections in Sections R109.1.1 through R109.1.4, the *building official* shall have the authority to make or require any other inspections to ascertain compliance with this code and other laws enforced by the *building official*.

**R109.1.5.1 Fire-resistance-rated construction inspection.** Where fire-resistance-rated construction is required between *dwelling units* or due to location on property, the *building official* shall require an inspection of such construction after lathing or gypsum board or gypsum panel products are in place, but before any plaster is applied, or before board or panel joints and fasteners are taped and finished.

**R109.1.6 Final inspection.** Final inspection shall be made after the permitted work is complete and prior to occupancy.

**R109.1.6.1 Elevation documentation.** If located in a flood hazard area, the documentation of elevations required in Section R322.1.10 shall be submitted to the *building official* prior to the final inspection.

**R109.2 Inspection agencies.** The *building official* is authorized to accept reports of *approved* agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

**R109.3 Inspection requests.** It shall be the duty of the *permit* holder or their agent to notify the *building official* that such work is ready for inspection. It shall be the duty of the *person* requesting any inspections required by this code to provide access to and means for inspection of such work.

**R109.4 Approval required.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *building official*. The *building official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or shall notify the *permit* holder or an agent of the *permit* holder wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *building official*.

## SECTION R110 CERTIFICATE OF OCCUPANCY

**R110.1 Use and change of occupancy.** A building or structure shall not be used or occupied in whole or in part, and a

*change of occupancy* of a building or structure or portion thereof shall not be made, until the *building official* has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the *jurisdiction*. Certificates presuming to give authority to violate or cancel the provisions of this code or other ordinances of the *jurisdiction* shall not be valid.

### Exceptions:

1. Certificates of occupancy are not required for work exempt from *permits* under Section R105.2.
2. Accessory buildings or structures.

**R110.2 Change in use.** Changes in the character or use of an existing structure shall not be made except as specified in Sections 506 and 507 of the *International Existing Building Code*.

**R110.3 Certificate issued.** After the *building official* inspects the building or structure and does not find violations of the provisions of this code or other laws that are enforced by the department, the *building official* shall issue a certificate of occupancy containing the following:

1. The *permit* number.
2. The address of the structure.
3. The name and address of the *owner* or the owner's authorized agent.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code.
6. The name of the *building official*.
7. The edition of the code under which the *permit* was issued.
8. Where an automatic sprinkler system is provided and whether the sprinkler system is required.
9. Any special stipulations and conditions of the building *permit*.

**R110.4 Temporary occupancy.** The *building official* is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the *permit*, provided that such portion or portions shall be occupied safely. The *building official* shall set a time period during which the temporary certificate of occupancy is valid.

**R110.5 Revocation.** The *building official* is authorized to suspend or revoke a certificate of occupancy issued under the provisions of this code, in writing, wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of the provisions of this code or other ordinance of the *jurisdiction*.



## SECTION R111 SERVICE UTILITIES

**R111.1 Connection of service utilities.** A *person* shall not make connections from a utility, a source of energy, fuel, or power to any building or system that is regulated by this code for which a *permit* is required, until *approved* by the *building official*.

**R111.2 Temporary connection.** The *building official* shall have the authority to authorize the temporary connection of the building or system to the utility, source of energy, fuel or power.

**R111.3 Authority to disconnect service utilities.** The *building official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section R102.4 in case of emergency where necessary to eliminate an immediate hazard to life or property or where such utility connection has been made without the approval required by Section R111.1 or R111.2. The *building official* shall notify the serving utility and where possible the *owner* or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnection, the *owner*, the owner's authorized agent or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

## SECTION R112 BOARD OF APPEALS

**R112.1 General.** In order to hear and decide appeals of orders, decisions or determinations made by the *building official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The *building official* shall be an ex officio member of said board but shall not have a vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render decisions and findings in writing to the appellant with a duplicate copy to the *building official*.

**R112.2 Limitations on authority.** An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equally good or better form of construction is proposed. The board shall not have authority to waive requirements of this code.

**R112.3 Qualifications.** The board of appeals shall consist of members who are qualified by experience and training to pass judgment on matters pertaining to building construction and are not employees of the *jurisdiction*.

**R112.4 Administration.** The *building official* shall take immediate action in accordance with the decision of the board.

## SECTION R113 VIOLATIONS

**R113.1 Unlawful acts.** It shall be unlawful for any *person*, firm or corporation to erect, construct, alter, extend, *repair*, move, remove, demolish or occupy any building, structure or equipment regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code.

**R113.2 Notice of violation.** The *building official* is authorized to serve a notice of violation or order on the *person* responsible for the erection, construction, *alteration*, extension, *repair*, moving, removal, demolition or occupancy of a building or structure in violation of the provisions of this code, or in violation of a detail statement or a plan *approved* thereunder, or in violation of a *permit* or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

**R113.3 Prosecution of violation.** If the notice of violation is not complied with in the time prescribed by such notice, the *building official* is authorized to request the legal counsel of the *jurisdiction* to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful occupancy of the building or structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

**R113.4 Violation penalties.** Any *person* who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the *approved construction documents* or directive of the *building official*, or of a *permit* or certificate issued under the provisions of this code, shall be subject to penalties as prescribed by law.

## SECTION R114 STOP WORK ORDER

**R114.1 Authority.** Where the *building official* finds any work regulated by this code being performed in a manner contrary to the provisions of this code or in a dangerous or unsafe manner, the *building official* is authorized to issue a stop work order.

**R114.2 Issuance.** The stop work order shall be in writing and shall be given to the *owner* of the property, the owner's authorized agent or the *person* performing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work is authorized to resume.

**R114.3 Emergencies.** Where an emergency exists, the *building official* shall not be required to give a written notice prior to stopping the work.

**R114.4 Failure to comply.** Any *person* who shall continue any work after having been served with a stop work order, except such work as that *person* is directed to perform to remove a violation or unsafe condition, shall be subject to fines established by the authority having jurisdiction.

## Part II—Definitions

### CHAPTER 2 DEFINITIONS

#### User notes:

**About this chapter:** Codes, by their very nature, are technical documents. Every word, term and punctuation mark can add to or change the meaning of a technical requirement. It is necessary to maintain a consensus on the specific meaning of each term contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purpose of the code.

**Code development reminder:** Code change proposals to definitions in this chapter preceded by a bracketed letter are considered by the IRC—Building Code Development Committee [RB], the IRC—Mechanical/Plumbing Code Development Committee [MP] or the IECC—Residential Code Development Committee [RE] during the Group B (2022) Code Development Cycle.

#### SECTION R201 GENERAL

**R201.1 Scope.** Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings indicated in this chapter.

**R201.2 Interchangeability.** Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

**R201.3 Terms defined in other codes.** Where terms are not defined in this code such terms shall have the meanings ascribed in other code publications of the International Code Council.

**R201.4 Terms not defined.** Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

#### SECTION R202 DEFINITIONS

**[RE] ABOVE-GRADE WALL.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] ACCESS (TO).** That which enables a device, an *appliance* or equipment to be reached by *ready access* or by a means that first requires the removal or movement of a panel, door or similar obstruction.

**[RB] ACCESSORY STRUCTURE.** A structure that is accessory to and incidental to that of the *dwelling(s)* and that is located on the same *lot*.

**[RB] ADDITION.** An extension or increase in floor area, number of stories or height of a building or structure. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] ADHERED STONE OR MASONRY VENEER.** Stone or masonry veneer secured and supported through the adhesion of an *approved* bonding material applied to an *approved* backing.

**[MP] AIR ADMITTANCE VALVE.** A one-way valve designed to allow air into the plumbing drainage system where a negative pressure develops in the piping. This device shall close by gravity and seal the terminal under conditions of zero differential pressure (no flow conditions) and under positive internal pressure.

**[RE] AIR BARRIER.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] AIR BREAK (DRAINAGE SYSTEM).** An arrangement where a discharge pipe from a fixture, *appliance* or device drains indirectly into a receptor below the flood-level rim of the receptor and above the trap seal.

**[MP] AIR CIRCULATION, FORCED.** A means of providing space conditioning utilizing movement of air through ducts or plenums by mechanical means.

**[MP] AIR GAP, DRAINAGE SYSTEM.** The unobstructed vertical distance through free atmosphere between the outlet of a waste pipe and the flood-level rim of the fixture or receptor into which it is discharging.

**[MP] AIR GAP, WATER-DISTRIBUTION SYSTEM.** The unobstructed vertical distance through free atmosphere between the lowest opening from a water supply discharge to the flood-level rim of a plumbing fixture.

**[MP] AIR-CONDITIONING SYSTEM.** A system that consists of heat exchangers, blowers, filters, supply, exhaust and return-air systems, and shall include any apparatus installed in connection therewith.

**[RB] AIR-IMPERMEABLE INSULATION.** An insulation having an air permeance equal to or less than 0.02 L/s-m<sup>2</sup> at 75 Pa pressure differential as tested in accordance with ASTM E283 or E2178.

**[RB] ALTERATION.** Any construction, retrofit or renovation to an existing structure other than *repair* or *addition* that requires a *permit*. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, *addition* or change to the arrangement, type or purpose of the original installation that requires a *permit*. For the definition applicable in Chapter 11, see Section N1101.6.

## DEFINITIONS

**[RB] ALTERNATING TREAD DEVICE.** A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.

**[RB] ANCHORED STONE OR MASONRY VENEER.** Stone or masonry veneer secured with *approved* mechanical fasteners to an *approved* backing.

**[MP] ANCHORS.** See “*Supports*.”

**[MP] ANTISIPHON.** A term applied to valves or mechanical devices that eliminate siphonage.

**[MP] APPLIANCE.** A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.

**[RB] APPROVED.** Acceptable to the *building official*.

**[RB] APPROVED AGENCY.** An established and recognized agency that is regularly engaged in conducting tests, furnishing inspection services or furnishing product certification, and has been *approved* by the building official.

**[MP] APPROVED SOURCE.** An independent person, firm or corporation, *approved* by the *building official*, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

**[RB] ASPECT RATIO.** The ratio of longest to shortest perpendicular dimensions, or for wall sections, the ratio of height to length.

**[RB] ATTIC.** The unfinished space between the ceiling assembly and the *roof assembly*.

**[RB] ATTIC, HABITABLE.** A finished or unfinished *habitable space* within an attic.

**[RE] AUTOMATIC.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] BACKFLOW, DRAINAGE.** A reversal of flow in the drainage system.

**[MP] BACKFLOW, WATER DISTRIBUTION.** The flow of water or other liquids into the potable water-supply piping from any sources other than its intended source. Back-siphonage is one type of backflow.

**[MP] BACKFLOW PREVENTER.** A backflow prevention assembly, a backflow prevention device or other means or method to prevent backflow into the potable water supply.

**[MP] BACKFLOW PREVENTER, REDUCED-PRESSURE-ZONE TYPE.** A backflow-prevention device consisting of two independently acting check valves, internally force loaded to a normally closed position and separated by an intermediate chamber (or zone) in which there is an automatic relief means of venting to atmosphere internally loaded to a normally open position between two tightly closing shutoff valves and with means for testing for tightness of the checks and opening of relief means.

**[MP] BACKPRESSURE.** Pressure created by any means in the water distribution system that by being in excess of the pressure in the water supply mains causes a potential back-flow condition.

**[MP] BACKPRESSURE, LOW HEAD.** A pressure less than or equal to 4.33 psi (29.88 kPa) or the pressure exerted by a 10-foot (3048 mm) column of water.

**[MP] BACKSIPHONAGE.** The flowing back of used or contaminated water from piping into a potable water-supply pipe due to a negative pressure in such pipe.

**[MP] BACKWATER VALVE.** A device installed in a drain or pipe to prevent backflow of sewage.

**[MP] BALANCED VENTILATION.** Any combination of concurrently operating mechanical exhaust and mechanical supply whereby the total mechanical exhaust airflow rate is within 10 percent of the total mechanical supply airflow rate.

**[MP] BALANCED VENTILATION SYSTEM.** A ventilation system where the total supply airflow and total exhaust airflow are simultaneously within 10 percent of their averages. The balanced ventilation system airflow is the average of the supply and exhaust airflows.

**[RB] BASEMENT.** A *story* that is not a *story above grade plane* (see “*Story above grade plane*”).

**[RE] BASEMENT WALL.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] BASIC WIND SPEED.** Three-second gust speed at 33 feet (10 058 mm) above the ground in Exposure C (see Section R301.2.1) as given in Figure R301.2(5)A.

**[MP] BATHROOM GROUP.** A group of fixtures, including or excluding a bidet, consisting of a water closet, lavatory, and bathtub or shower. Such fixtures are located together on the same floor level.

**[MP] BEND.** A drainage fitting, designed to provide a change in direction of a drain pipe of less than the angle specified by the amount necessary to establish the desired slope of the line (see “*Elbow*” and “*Sweep*”).

**[MP] BOILER.** A self-contained *appliance* from which hot water is circulated for heating purposes and then returned to the boiler, and that operates at water pressures not exceeding 160 pounds per square inch gage (psig) (1102 kPa gauge) and at water temperatures not exceeding 250°F (121°C).

**[RB] BOND BEAM.** A horizontal grouted element within masonry in which reinforcement is embedded.

**[RB] BRACED WALL LINE.** A straight line through the building plan that represents the location of the lateral resistance provided by the wall bracing.

**[RB] BRACED WALL LINE, CONTINUOUSLY SHEATHED.** A *braced wall line* with structural sheathing applied to all sheathable surfaces including the areas above and below openings.

**[RB] BRACED WALL PANEL.** A full-height section of wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material and anchors. The panel’s length meets the requirements of its particular bracing method, and contributes toward the total amount of bracing required along its *braced wall line* in accordance with Section R602.10.1.

**[MP] BRANCH.** Any part of the piping system other than a riser, main or stack.



## DEFINITIONS

**[MP] BRANCH, FIXTURE.** See “*Fixture branch, drainage.*”

**[MP] BRANCH, HORIZONTAL.** See “*Horizontal branch, drainage.*”

**[MP] BRANCH, MAIN.** A water-distribution pipe that extends horizontally off a main or riser to convey water to branches or fixture groups.

**[MP] BRANCH, VENT.** A vent connecting two or more individual vents with a vent stack or stack vent.

**[MP] BRANCH INTERVAL.** A vertical measurement of distance, 8 feet (2438 mm) or more in *developed length*, between the connections of *horizontal* branches to a drainage stack. Measurements are taken down the stack from the highest *horizontal* branch connection.

**[MP] BTU/H.** The *listed* maximum capacity of an *appliance*, absorption unit or burner expressed in British thermal units input per hour.

**[RB] BUILDING.** Any one- or two-family dwelling or *town-house*, or portion thereof, used or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, or any *accessory structure*. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] BUILDING, EXISTING.** Existing building is a building erected prior to the adoption of this code, or one for which a legal building *permit* has been issued.

**[MP] BUILDING DRAIN.** The lowest piping that collects the discharge from all other drainage piping inside the house and extends 30 inches (762 mm) in *developed length* of pipe, beyond the exterior walls and conveys the drainage to the *building sewer*.

**[RB] BUILDING LINE.** The line established by law, beyond which a building shall not extend, except as specifically provided by law.

**[RB] BUILDING OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative. For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] BUILDING SEWER.** That part of the drainage system that extends from the end of the *building drain* and conveys its discharge to a public sewer, private sewer, individual sewage-disposal system or other point of disposal.

**[RE] BUILDING SITE.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] BUILDING THERMAL ENVELOPE.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] BUILDING-INTEGRATED PHOTOVOLTAIC PRODUCT.** A building product that incorporates *photovoltaic modules* and functions as a component of the building envelope.

**[RB] BUILDING-INTEGRATED PHOTOVOLTAIC ROOF PANEL (BIPV Roof Panel).** A *photovoltaic panel* that functions as a component of the building envelope.

**[RB] BUILT-UP ROOF COVERING.** Two or more layers of felt cemented together and surfaced with a cap sheet, mineral aggregate, smooth coating or similar surfacing material.

**[RB] CAP PLATE.** The top plate of the double top plates used in *structural insulated panel* (SIP) construction. The cap plate is cut to match the *panel thickness* such that it overlaps the wood structural panel facing on both sides.

**[RB] CARBON MONOXIDE ALARM.** A single- or multiple-station alarm intended to detect carbon monoxide gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit.

**[RB] CARBON MONOXIDE DETECTOR.** A device with an integral sensor to detect carbon monoxide gas and transmit an alarm signal to a connected alarm control unit.

**[RB] CEILING HEIGHT.** The clear vertical distance from the finished floor to the finished ceiling.

**[RB] CEMENT PLASTER.** A mixture of Portland or blended cement, Portland cement or blended cement and hydrated lime, masonry cement or plastic cement and aggregate and other *approved* materials as specified in this code.

**[RB] CHANGE OF OCCUPANCY.** A change in the use of a building or portion of a building that involves a change in the application of the requirements of this code.

**[MP] CHIMNEY.** A primary vertical structure containing one or more flues, for the purpose of carrying gaseous products of combustion and air from a fuel-burning *appliance* to the outside atmosphere.

**[MP] CHIMNEY CONNECTOR.** A pipe that connects a fuel-burning *appliance* to a chimney.

**[MP] CHIMNEY TYPES.**

**Residential-type appliance.** An *approved* chimney for removing the products of combustion from fuel-burning, residential-type *appliances* producing combustion gases not in excess of 1,000°F (538°C) under normal operating conditions, and capable of producing combustion gases of 1,400°F (760°C) during intermittent forces firing for periods up to 1 hour. All temperatures shall be measured at the *appliance* flue outlet. Residential-type *appliance* chimneys include masonry and factory-built types.

**[MP] CIRCUIT VENT.** A vent that connects to a horizontal drainage branch and vents two traps to not more than eight traps or trapped fixtures connected into a battery.

**[MP] CIRCULATING HOT WATER SYSTEM.** A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] CLADDING.** The exterior materials that cover the surface of the building envelope that is directly loaded by the wind.

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**[MP] CLEANOUT.** An access opening in the drainage system utilized for the removal of obstructions. Types of cleanouts include a removable plug or cap, and a removable fixture or fixture trap.

**[RE] CLIMATE ZONE.** A geographical region based on climatic criteria as specified in this code. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] CLOSET.** A small room or chamber used for storage.

**[RB] COLLAPSIBLE SOILS.** Soils that exhibit volumetric reduction in response to partial or full wetting under load.

**[MP] COLLECTION PIPE.** Unpressurized pipe used within the collection system that drains on-site nonpotable water or rainwater to a storage tank by gravity.

**[MP] COMBINATION WASTE AND VENT SYSTEM.** A specially designed system of waste piping embodying the horizontal wet venting of one or more sinks, lavatories or floor drains by means of a common waste and vent pipe adequately sized to provide free movement of air above the flow line of the drain.

**[RB] COMBUSTIBLE MATERIAL.** Any material not defined as noncombustible.

**[MP] COMBUSTION AIR.** The air provided to fuel-burning equipment including air for fuel combustion, draft hood dilution and *ventilation* of the equipment enclosure.

**[MP] COMMON VENT.** A single pipe venting two trap arms within the same *branch interval*, either back-to-back or one above the other.

**[RB] COMPRESSIBLE SOILS.** Soils that exhibit volumetric reduction in response to the application of load even in the absence of wetting or drying.

**[MP] CONDENSATE.** The liquid that separates from a gas due to a reduction in temperature; for example, water that condenses from flue gases and water that condenses from air circulating through the cooling coil in air conditioning equipment.

**[MP] CONDENSING APPLIANCE.** An *appliance* that condenses water generated by the burning of fuels.

**[RB] CONDITIONED AIR.** Air treated to control its temperature, relative humidity or quality.

**[RE] CONDITIONED FLOOR AREA.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] CONDITIONED SPACE.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] CONSTRUCTION DOCUMENTS.** Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building *permit*. Construction drawings shall be drawn to an appropriate scale.

**[MP] CONTAMINATION.** A high-hazard or health-hazard impairment of the quality of the potable water that creates an actual hazard to the public health through poisoning or through the spread of disease by sewage, industrial fluids or waste.

**[RE] CONTINUOUS AIR BARRIER.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] CONTINUOUS INSULATION (ci).** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] CONTINUOUS WASTE.** A drain from two or more similar adjacent fixtures connected to a single trap.

**[MP] CONTROL, LIMIT.** An automatic control responsive to changes in liquid flow or level, pressure, or temperature for limiting the operation of an *appliance*.

**[MP] CONTROL, PRIMARY SAFETY.** A safety control responsive directly to flame properties that senses the presence or absence of flame and, in event of ignition failure or unintentional flame extinguishment, automatically causes shutdown of mechanical equipment.

**[MP] CONVECTOR.** A system incorporating a heating element in an enclosure in which air enters an opening below the heating element, is heated and leaves the enclosure through an opening located above the heating element.

**[RB] CORE.** The lightweight middle section of a *structural insulated panel*, composed of foam plastic insulation, that provides the link between the two facing shells.

**[RB] CORROSION RESISTANCE.** The ability of a material to withstand deterioration of its surface or its properties where exposed to its environment.

**[RB] COURT.** A space, open and unobstructed to the sky, located at or above *grade* level on a *lot* and bounded on three or more sides by walls or a building.

**[RB] CRAWL SPACE.** An underfloor space that is not a *basement*.

**[RE] CRAWL SPACE WALL.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] CRIPPLE WALL.** A framed wall extending from the top of the foundation to the underside of the floor framing of the first *story above grade plane*.

**[RB] CRIPPLE WALL CLEAR HEIGHT.** The vertical height of a *cripple wall* from the top of the foundation to the underside of floor framing above.

**[MP] CROSS CONNECTION.** Any connection between two otherwise separate piping systems that allows a flow from one system to the other.

**[RB] CROSS-LAMINATED TIMBER.** A prefabricated engineered wood product consisting of not less than three layers of solid-sawn lumber or *structural composite lumber* where the adjacent layers are cross-oriented and bonded with structural adhesive to form a solid wood element.

**[RE] CURTAIN WALL.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] DALLE GLASS.** A decorative composite glazing material made of individual pieces of glass that are embedded in a cast matrix of concrete or epoxy.

**[MP] DAMPER, VOLUME.** A device that will restrict, retard or direct the flow of air in any duct, or the products of combustion of heat-producing equipment, vent connector, vent or chimney.

## DEFINITIONS

**[RB] DEAD LOADS.** The weight of the materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, *stairways*, built-in partitions, finishes, cladding, and other similarly incorporated architectural and structural items, and fixed service equipment.

**[RB] DECORATIVE GLASS.** A carved, leaded or Dalle glass or glazing material with a purpose that is decorative or artistic, not functional; with coloring, texture or other design qualities or components that cannot be removed without destroying the glazing material; and with a surface, or assembly into which it is incorporated, that is divided into segments.

**[RE] DEMAND RECIRCULATION WATER SYSTEM.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] DESIGN PROFESSIONAL.** See “*Registered design professional*.”

**[MP] DEVELOPED LENGTH.** The length of a pipeline measured along the center line of the pipe and fittings.

**[MP] DIAMETER.** Unless specifically stated, the term “diameter” is the nominal diameter as designated by the *approved* material standard.

**[RB] DIAPHRAGM.** A horizontal or nearly horizontal system acting to transmit lateral forces to the vertical resisting elements. Where the term “*diaphragm*” is used, it includes horizontal bracing systems.

**[MP] DILUTION AIR.** Air that enters a draft hood or draft regulator and mixes with flue gases.

**[MP] DIRECT SYSTEM.** A solar thermal system in which the gas or liquid in the solar collector loop is not separated from the load.

**[MP] DIRECT-VENT APPLIANCE.** A fuel-burning *appliance* with a sealed combustion system that draws all air for combustion from the outside atmosphere and discharges all flue gases to the outside atmosphere.

**[MP] DRAFT.** The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of combustion through the gas passages of the *appliance* to the atmosphere.

**Induced draft.** The pressure difference created by the action of a fan, blower or ejector, that is located between the *appliance* and the chimney or vent termination.

**Natural draft.** The pressure difference created by a vent or chimney because of its height, and the temperature difference between the flue gases and the atmosphere.

**[MP] DRAFT HOOD.** A device built into an *appliance*, or a part of the vent connector from an *appliance*, that is designed to provide for the ready escape of the flue gases from the *appliance* in the event of no draft, backdraft or stoppage beyond the draft hood; prevent a backdraft from entering the *appliance*; and neutralize the effect of stack action of the chimney or gas vent on the operation of the *appliance*.

**[MP] DRAFT REGULATOR.** A device that functions to maintain a desired draft in the *appliance* by automatically reducing the draft to the desired value.

**[RB] DRAFT STOP.** A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and *attics*.

**[MP] DRAIN.** Any pipe that carries soil and waterborne wastes in a building drainage system.

**[MP] DRAINAGE FITTING.** A pipe fitting designed to provide connections in the drainage system that have provisions for establishing the desired slope in the system. These fittings are made from a variety of both metals and plastics. The methods of coupling provide for required slope in the system.

**[MP] DRAIN-BACK SYSTEM.** A solar thermal system in which the fluid in the solar collector loop is drained from the collector into a holding tank under prescribed circumstances.

**[RE] DUCT.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] DUCT SYSTEM.** A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling *equipment* and *appliances*.

For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] DWELLING.** Any building that contains one or two *dwelling units* used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

**[RB] DWELLING UNIT.** A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation. For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] DWV.** Abbreviated term for drain, waste and vent piping as used in common plumbing practice.

**[MP] EFFECTIVE OPENING.** The minimum cross-sectional area at the point of water-supply discharge, measured or expressed in terms of diameter of a circle and if the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable to *air gap*.)

**[MP] ELBOW.** A pressure pipe fitting designed to provide an exact change in direction of a pipe run. An elbow provides a sharp turn in the flow path (see “*Bend*” and “*Sweep*”).

**[RB] EMERGENCY ESCAPE AND RESCUE OPENING.** An operable exterior window, door or other similar device that provides for a means of escape and access for rescue in the event of an emergency. (See also “*Grade floor emergency escape and rescue opening*.”)

**[RE] ENERGY ANALYSIS.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] ENERGY COST.** For the definition applicable in Chapter 11, see Section N1101.6.



## DEFINITIONS

**[RE] ENERGY SIMULATION TOOL.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] ENERGY STORAGE SYSTEMS (ESS).** One device or multiple devices, assembled together, capable of storing electrical energy to be supplied at a future time.

**[RB] ENGINEERED WOOD RIM BOARD.** A full-depth *structural composite lumber*, wood structural panel, structural glued laminated timber or prefabricated wood I-joist member designed to transfer horizontal (shear) and vertical (compression) loads, provide attachment for *diaphragm* sheathing, siding and exterior deck ledgers and provide lateral support at the ends of floor or roof joists or rafters.

**[MP] EQUIPMENT.** Piping, ducts, vents, control devices and other components of systems other than *appliances* that are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

**[MP] EQUIVALENT LENGTH.** For determining friction losses in a piping system, the effect of a particular fitting equal to the friction loss through a straight piping length of the same nominal diameter.

**[RE] ERI REFERENCE DESIGN.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] ESCARPMENT.** With respect to topographic wind effects, a cliff or steep slope generally separating two levels or gently sloping areas.

**[MP] ESSENTIALLY NONTOXIC TRANSFER FLUIDS.** Fluids having a Gosselin rating of 1, including propylene glycol; mineral oil; polydimethyl oil oxane; hydrochlorofluorocarbon, chlorofluorocarbon and hydrofluorocarbon refrigerants; and FDA-approved boiler water additives for steam boilers.

**[MP] ESSENTIALLY TOXIC TRANSFER FLUIDS.** Soil, water or graywater and fluids having a Gosselin rating of 2 or more including ethylene glycol, hydrocarbon oils, ammonia refrigerants and hydrazine.

**[MP] EVAPORATIVE COOLER.** A device used for reducing air temperature by the process of evaporating water into an airstream.

**[MP] EXCESS AIR.** Air that passes through the combustion chamber and the *appliance* flue in excess of what is theoretically required for complete combustion.

**[MP] EXHAUST HOOD, FULL OPENING.** An exhaust hood with an opening not less than the diameter of the connecting vent.

**[MP] EXISTING INSTALLATIONS.** Any plumbing system regulated by this code that was legally installed prior to the effective date of this code, or for which a *permit* to install has been issued.

**[RB] EXPANSIVE SOILS.** Soils that exhibit volumetric increase or decrease (swelling or shrinking) in response to partial or full wetting or drying under load.

**[RB] EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS).** EIFS are nonstructural, nonload-bearing exterior wall cladding systems that consist of an insulation

board attached either adhesively or mechanically, or both, to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

**[RB] EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) WITH DRAINAGE.** An EIFS that incorporates a means of drainage applied over a *water-resistive barrier*.

**[RE] EXTERIOR WALL.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] EXTERIOR WALL COVERING.** A material or assembly of materials applied on the exterior side of exterior walls for the purpose of providing a weather-resistive barrier, insulation or for aesthetics, including but not limited to, veneers, siding, exterior insulation and finish systems, architectural *trim* and embellishments such as cornices, soffits, and fascias.

**[RB] FACING.** The wood structural panel facings that form the two outmost rigid layers of the *structural insulated panel*.

**[MP] FACTORY-BUILT CHIMNEY.** A *listed* and *labeled* chimney composed of factory-made components assembled in the field in accordance with the manufacturer's instructions and the conditions of the *listing*.

**[MP] FACTORY-MADE AIR DUCT.** A *listed* and *labeled* duct manufactured in a factory and assembled in the field in accordance with the manufacturer's instructions and conditions of the *listing*.

**[RE] FENESTRATION.** Products classified as either vertical fenestration or *skylights and sloped glazing*, installed in such a manner as to preserve the weather-resistant barrier of the wall or roof in which they are installed. Fenestration includes products with glass or other transparent or translucent materials.

For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] FENESTRATION, VERTICAL.** Windows that are fixed or movable, opaque doors, glazed doors, glazed block and combination opaque and glazed doors installed in a wall at less than 15 degrees (0.26 rad) from vertical.

For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] FENESTRATION PRODUCT, SITE-BUILT.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] FIBER-CEMENT (BACKERBOARD, SIDING, SOFFIT, TRIM AND UNDERLAYMENT) PRODUCTS.** Manufactured thin section composites of hydraulic cementitious matrices and discrete nonasbestos fibers.

**[RB] FIRE SEPARATION DISTANCE.** The distance measured from the building face to one of the following:

1. To the closest interior *lot line*.
2. To the centerline of a street, an alley or public way.
3. To an imaginary line between two buildings on the *lot*.

The distance shall be measured at a right angle from the face of the wall.

## DEFINITIONS

**[RB] FIREBLOCKING.** Building materials or materials *approved* for use as fireblocking, installed to resist the free passage of flame to other areas of the building through concealed spaces.

**[RB] FIREPLACE.** An assembly consisting of a hearth and fire chamber of *noncombustible material* and provided with a chimney, for use with solid fuels.

**[MP] FIREPLACE STOVE.** A free-standing, chimney-connected solid-fuel-burning heater designed to be operated with the fire chamber doors in either the open or closed position.

**[RB] FIREPLACE THROAT.** The opening between the top of the firebox and the smoke chamber.

**[RB] FIRE-RETARDANT-TREATED WOOD.** Wood products that, when impregnated with chemicals by a pressure process or other means during manufacture, exhibit reduced surface burning characteristics and resist propagation of fire.

**Other means during manufacture.** A process where the wood raw material is treated with a fire-retardant formulation while undergoing creation as a finished product.

**Pressure process.** A process for treating wood using an initial vacuum followed by the introduction of pressure above atmospheric.

**[MP] FIXTURE.** See “*Plumbing fixture.*”

**[MP] FIXTURE BRANCH, DRAINAGE.** A drain serving two or more fixtures that discharges into another portion of the drainage system.

**[MP] FIXTURE BRANCH, WATER-SUPPLY.** A water-supply pipe between the fixture supply and a main water-distribution pipe or fixture group main.

**[MP] FIXTURE DRAIN.** The drain from the trap of a fixture to the junction of that drain with any other drain pipe.

**[MP] FIXTURE FITTING.**

**Supply fitting.** A fitting that controls the volume or directional flow or both of water and that is either attached to or accessed from a fixture or is used with an open or atmospheric discharge.

**Waste fitting.** A combination of components that conveys the sanitary waste from the outlet of a fixture to the connection of the sanitary drainage system.

**[MP] FIXTURE GROUP, MAIN.** The main water-distribution pipe (or secondary branch) serving a plumbing fixture grouping such as a bath, kitchen or laundry area to which two or more individual fixture branch pipes are connected.

**[MP] FIXTURE SUPPLY.** The water-supply pipe connecting a fixture or fixture fitting to a fixture branch.

**[MP] FIXTURE UNIT, DRAINAGE (d.f.u.).** A measure of probable discharge into the drainage system by various types of plumbing fixtures, used to size DWV piping systems. The drainage fixture-unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation and on the average time between successive operations.

**[MP] FIXTURE UNIT, WATER-SUPPLY (w.s.f.u.).** A measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures used to size water-piping systems. The water-supply fixture-unit value for a particular fixture depends on its volume rate of supply, on the time duration of a single supply operation and on the average time between successive operations.

**[RB] FLAME SPREAD.** The propagation of flame over a surface.

**[RB] FLAME SPREAD INDEX.** A comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E84 or UL 723.

**[MP] FLEXIBLE AIR CONNECTOR.** A conduit for transferring air between an air duct or plenum and an air terminal unit, an air inlet or an air outlet. Such conduit is limited in its use, length and location.

**[RB] FLIGHT.** A continuous run of rectangular treads or *winders* or combination thereof from one landing to another.

**[MP] FLOOD-LEVEL RIM.** The edge of the receptor or fixture from which water overflows.

**[MP] FLOOR DRAIN.** A plumbing fixture for recess in the floor having a floor-level strainer intended for the purpose of the collection and disposal of wastewater used in cleaning the floor and for the collection and disposal of accidental spillage to the floor.

**[MP] FLOOR FURNACE.** A self-contained furnace suspended from the floor of the space being heated, taking air for combustion from outside such space, and with means for lighting the *appliance* from such space.

**[MP] FLOW PRESSURE.** The static pressure reading in the water-supply pipe near the faucet or water outlet while the faucet or water outlet is open and flowing at capacity.

**[MP] FLUE.** See “*Vent.*”

**[MP] FLUE, APPLIANCE.** The passages within an *appliance* through which combustion products pass from the combustion chamber to the flue collar.

**[MP] FLUE COLLAR.** The portion of a fuel-burning *appliance* designed for the attachment of a draft hood, vent connector or venting system.

**[MP] FLUE GASES.** Products of combustion plus excess air in *appliance* flues or heat exchangers.

**[MP] FLUSH VALVE.** A device located at the bottom of a flush tank that is operated to flush water closets.

**[MP] FLUSHOMETER TANK.** A device integrated within an air accumulator vessel that is designed to discharge a predetermined quantity of water to fixtures for flushing purposes.

**[MP] FLUSHOMETER VALVE.** A flushometer valve is a device that discharges a predetermined quantity of water to fixtures for flushing purposes and is actuated by direct water pressure.

## DEFINITIONS

**[RB] FOAM BACKER BOARD.** Foam plastic used in siding applications where the foam plastic is a component of the siding.

**[RB] FOAM PLASTIC INSULATION.** A plastic that is intentionally expanded by the use of a foaming agent to produce a reduced-density plastic containing voids consisting of open or closed cells distributed throughout the plastic for thermal insulating or acoustic purposes and that has a density less than 20 pounds per cubic foot (320 kg/m<sup>3</sup>) unless it is used as interior *trim*.

**[RB] FOAM PLASTIC INTERIOR TRIM.** Exposed foam plastic used as picture molds, chair rails, crown moldings, baseboards, *handrails*, ceiling beams, door *trim* and window *trim* and similar decorative or protective materials used in fixed applications.

**[RB] FUEL CELL POWER SYSTEM, STATIONARY.** A stationary energy generation system that converts the chemical energy of a fuel and oxidant to electric energy (DC or AC electricity) by an electrochemical process.

**Field-fabricated fuel cell power system.** A *stationary fuel cell power system* that is assembled at the job site and is not a preengineered or prepackaged factory-assembled fuel cell power system.

**Preengineered fuel cell power system.** A *stationary fuel cell power system* consisting of components and modules that are produced in a factory, and shipped to the job site for assembly.

**Prepackaged fuel cell power system.** A *stationary fuel cell power system* that is factory assembled as a single, complete unit and shipped as a complete unit for installation at the job site.

**[MP] FUEL-PIPING SYSTEM.** All piping, tubing, valves and fittings used to connect fuel utilization equipment to the point of fuel delivery.

**[MP] FULL-OPEN VALVE.** A water control or shutoff component in the water supply system piping that, where adjusted for maximum flow, the flow path through the component's closure member is not a restriction in the component's through-flow area.

**[MP] FULLWAY VALVE.** A valve that in the full open position has an opening cross-sectional area that is not less than 85 percent of the cross-sectional area of the connecting pipe.

**[MP] FURNACE.** A vented heating *appliance* designed or arranged to discharge heated air into a *conditioned space* or through a duct or ducts.

**[RB] GLASS MAT GYPSUM PANEL.** A gypsum panel consisting of a noncombustible core primarily of gypsum, surfaced with glass mat partially or completely embedded in the core.

**[RB] GLAZING AREA.** The interior surface area of all glazed fenestration, including the area of sash, curbing or other framing elements, that enclose *conditioned space*. Includes the area of glazed fenestration assemblies in walls bounding conditioned *basements*.

**[RB] GRADE.** The finished ground level adjoining the building at all exterior walls.

**[MP] GRADE, PIPING.** See “*Slope*.”

**[RB] GRADE FLOOR EMERGENCY ESCAPE AND RESCUE OPENING.** An emergency escape and rescue opening located such that the bottom of the clear opening is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening. (See also “*Emergency escape and rescue opening*.”)

**[RB] GRADE PLANE.** A reference plane representing the average of the finished ground level adjoining the building at all exterior walls. Where the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the *lot line* or, where the *lot line* is more than 6 feet (1829 mm) from the building between the structure and a point 6 feet (1829 mm) from the building.

**[MP] GRAYWATER.** Waste discharged from lavatories, bathtubs, showers, clothes washers and laundry trays.

**[MP] GRIDDED WATER DISTRIBUTION SYSTEM.** A water distribution system where every water distribution pipe is interconnected so as to provide two or more paths to each fixture supply pipe.

**[RB] GROSS AREA OF EXTERIOR WALLS.** The normal projection of all *exterior walls*, including the area of all windows and doors installed therein.

**[MP] GROUND-SOURCE HEAT PUMP LOOP SYSTEM.** Piping buried in horizontal or vertical excavations or placed in a body of water for the purpose of transporting heat transfer liquid to and from a heat pump. Included in this definition are closed loop systems in which the liquid is recirculated and open loop systems in which the liquid is drawn from a well or other source.

**[RB] GUARD.** A building component or a system of building components located near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to the lower level.

**[RB] GUESTROOM.** Any room or rooms used or intended to be used by one or more guests for living or sleeping purposes.

**[RB] GYPSUM BOARD.** The generic name for a family of sheet products consisting of a noncombustible core primarily of gypsum with paper surfacing. Gypsum wallboard, gypsum sheathing, gypsum base for gypsum *veneer* plaster, exterior gypsum soffit board, predecorated gypsum board and water-resistant gypsum backing board complying with the standards listed in Section R702.3 and Part IX of this code are types of gypsum board.

**[RB] GYPSUM PANEL PRODUCT.** The general name for a family of sheet products consisting essentially of gypsum.

**[RB] GYPSUM SHEATHING.** Gypsum panel products specifically manufactured with enhanced water resistance for use as a substrate for exterior surface materials.

**[RB] GYPSUM WALLBOARD.** A gypsum board used primarily as interior surfacing for building structures.



**[RB] HABITABLE SPACE.** A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered *habitable spaces*.

**[RB] HANDRAIL.** A horizontal or sloping rail intended for grasping by the hand for guidance or support.

**[MP] HANGERS.** See “*Supports*.”

**[MP] HAZARDOUS LOCATION.** Any location considered to be a fire hazard for flammable vapors, dust, combustible fibers or other highly combustible substances.

**[MP] HEAT PUMP.** An *appliance* having heating or heating and cooling capability and that uses refrigerants to extract heat from air, liquid or other sources.

**[RE] HEATED SLAB.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] HEIGHT, BUILDING.** The vertical distance from *grade plane* to the average height of the highest roof surface.

**[RB] HEIGHT, STORY.** The vertical distance from top to top of two successive tiers of beams or finished floor surfaces; and, for the topmost *story*, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.

**[RE] HIGH-EFFICACY LIGHT SOURCES.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] HIGH-TEMPERATURE (H.T.) CHIMNEY.** A high-temperature chimney complying with the requirements of UL 103. A Type H.T. chimney is identifiable by the markings “Type H.T.” on each chimney pipe section.

**[RB] HILL.** With respect to topographic wind effects, a land surface characterized by strong relief in any horizontal direction.

**[RB] HISTORIC BUILDING.** A building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing, by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places in the National Register of Historic Places.
2. Designated as historic under an applicable state or local law.
3. Certified as a contributing resource within a National Register-listed, or a state-designated or locally designated historic district.

For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] HORIZONTAL BRANCH, DRAINAGE.** A drain pipe extending laterally from a soil or waste stack or *building drain*, that receives the discharge from one or more *fixture drains*.

**[MP] HORIZONTAL PIPE.** Any pipe or fitting that makes an angle of less than 45 degrees (0.79 rad) with the horizontal.

**[MP] HOT WATER.** Water at a temperature greater than 120°F (49°C).

**[RB] HURRICANE-PRONE REGIONS.** Areas vulnerable to hurricanes, defined as the US Atlantic Ocean and Gulf of Mexico coasts where the ultimate design wind speed,  $V_{ult}$ , is greater than 115 miles per hour (51 m/s), and Hawaii, Puerto Rico, Guam, Virgin Islands and America Samoa.

**[MP] HYDROGEN-GENERATING APPLIANCE.** A self-contained package or factory-matched packages of integrated systems for generating gaseous hydrogen. Hydrogen-generating *appliances* utilize electrolysis, reformation, chemical or other processes to generate hydrogen.

**[MP] IGNITION SOURCE.** A flame, spark or hot surface capable of igniting flammable vapors or fumes. Such sources include *appliance* burners, burner ignitions and electrical switching devices.

**[RB] IMPACT PROTECTIVE SYSTEM.** Construction that has been shown by testing to withstand the impact of test missiles and that is applied, attached, or locked over exterior glazing.

**[MP] INDIRECT SYSTEM.** A solar thermal system in which the gas or liquid in the solar collector loop circulates between the solar collector and a heat exchanger and such gas or liquid is not drained from the system or supplied to the load during normal operation.

**[MP] INDIRECT WASTE PIPE.** A waste pipe that discharges into the drainage system through an *air gap* into a trap, fixture or receptor.

**[MP] INDIVIDUAL SEWAGE DISPOSAL SYSTEM.** A system for disposal of sewage by means of a septic tank or mechanical treatment, designed for use apart from a public sewer to serve a single establishment or building.

**[MP] INDIVIDUAL VENT.** A pipe installed to vent a single *fixture drain* that connects with the vent system above or terminates independently outside the building.

**[MP] INDIVIDUAL WATER SUPPLY.** A supply other than an *approved* public water supply that serves one or more families.

**[RE] INFILTRATION.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] INSULATED SIDING.** A type of continuous insulation, with manufacturer-installed insulating material as an integral part of the cladding product, having a minimum *R*-value of R-2. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] INSULATED VINYL SIDING.** A vinyl cladding product, with manufacturer-installed foam plastic insulating material as an integral part of the cladding product, having a thermal resistance of not less than R-2.

**[RB] INSULATING CONCRETE FORM (ICF).** A concrete forming system using stay-in-place forms of rigid foam plastic insulation, a hybrid of cement and foam insulation, a hybrid of cement and wood chips, or other insulating material for constructing cast-in-place concrete walls.

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**[RB] INSULATING SHEATHING.** A rigid panel or board insulation material having a thermal resistance of not less than R-2 of the core material with properties suitable for use on walls, floors, roofs or foundations.

For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] INTERMODAL SHIPPING CONTAINER.** A six-sided steel unit originally constructed as a general cargo container used for the transport of goods and materials.

**[RB] JURISDICTION.** The governmental unit that has adopted this code.

**[RB] KITCHEN.** An area used, or designated to be used, for the preparation of food.

**[RB] LABEL.** An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an *approved agency* and that indicates that the representative sample of the product or material has been tested and evaluated by an *approved agency*. (See also “*Manufacturer’s designation*” and “*Mark*.”)

**[RB] LABELED.** Equipment, materials or products to which have been affixed a *label*, seal, symbol or other identifying *mark* of a nationally recognized testing laboratory, *approved agency* or other organization concerned with product evaluation that maintains periodic inspection of the production of such *labeled* items and whose labeling indicates either that the *equipment*, material or product meets identified standards or has been tested and found suitable for a specified purpose. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] LIGHT-FRAME CONSTRUCTION.** Construction whose vertical and horizontal structural elements are primarily formed by a system of repetitive wood or cold-formed steel framing members.

**[RB] LISTED.** Equipment, materials, products or services included in a list published by an organization acceptable to the code official and concerned with evaluation of products or services that maintains periodic inspection of production of *listed equipment* or materials or periodic evaluation of services and whose listing states either that the *equipment*, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] LIVE LOADS.** Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

**[RB] LIVE/WORK UNIT.** A *dwelling unit* or sleeping unit in which a significant portion of the space includes a non-residential use that is operated by the tenant.

**[MP] LIVING SPACE.** Space within a *dwelling unit* utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes.

**[MP] LOCAL EXHAUST.** An exhaust system that uses one or more fans to exhaust air from a specific room or rooms within a dwelling.

**[MP] LOCKING-TYPE TAMPER-RESISTANT CAP.** A cap designed to be unlocked by a specially designed tool or key to prevent removal of the cap by means of hand-loosening or by commonly available tools.

**[RB] LODGING HOUSE.** A one-family dwelling where one or more occupants are primarily permanent in nature, and rent is paid for guestrooms.

**[RB] LOT.** A measured portion or parcel of land considered as a unit having fixed boundaries.

**[RB] LOT LINE.** The line that bounds a plot of ground described as a lot in the title to the property.

**[RE] LOW-VOLTAGE LIGHTING.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] MACERATING TOILET SYSTEMS.** A system comprised of a sump with macerating pump and with connections for a water closet and other plumbing fixtures, that is designed to accept, grind and pump wastes to an *approved* point of discharge.

**[MP] MAIN.** The principal pipe artery to which branches may be connected.

**[MP] MAIN SEWER.** See “*Public sewer*.”

**[MP] MANIFOLD WATER DISTRIBUTION SYSTEMS.** A fabricated piping arrangement in which a large supply main is fitted with multiple branches in close proximity in which water is distributed separately to fixtures from each branch.

**[RE] MANUAL.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] MANUFACTURED HOME.** A structure, transportable in one or more sections, that in the traveling mode is 8 body feet (2438 body mm) or more in width or 40 body feet (12 192 body mm) or more in length, or, where erected on site, is 320 square feet (30 m<sup>2</sup>) or more, and that is built on a permanent chassis and designed to be used as a *dwelling* with or without a permanent foundation where connected to the required utilities, and includes the plumbing, heating, air-conditioning and electrical systems contained therein; except that such term shall include any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the secretary (HUD) and complies with the standards established under this title. For mobile homes built prior to June 15, 1976, a *label* certifying compliance to the Standard for Mobile Homes, NFPA 501, in effect at the time of manufacture is required. For the purpose of these provisions, a mobile home shall be considered to be a *manufactured home*.

**[RB] MANUFACTURER’S DESIGNATION.** An identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules. (See also “*Mark*” and “*Label*.”)

## DEFINITIONS

**[RB] MANUFACTURER'S INSTALLATION INSTRUCTIONS.** Printed instructions included with equipment as part of the conditions of their *listing* and *labeling*.

**[RB] MARK.** An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material. (See also “*Manufacturer's designation*” and “*Label*.”)

**[RB] MASONRY, SOLID.** Masonry consisting of *solid masonry* units laid contiguously with the joints between the units filled with mortar.

**[RB] MASONRY CHIMNEY.** A field-constructed chimney composed of *solid masonry* units, bricks, stones or concrete.

**[RB] MASONRY HEATER.** A masonry heater is a solid fuel burning heating *appliance* constructed predominantly of concrete or *solid masonry* having a mass of not less than 1,100 pounds (500 kg), excluding the chimney and foundation. It is designed to absorb and store a substantial portion of heat from a fire built in the firebox by routing exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes not less than one 180-degree (3.14-rad) change in flow direction before entering the chimney and that deliver heat by radiation through the masonry surface of the heater.

**[RB] MASONRY UNIT.** Brick, tile, stone, architectural cast stone, glass block or concrete block conforming to the requirements specified in Section 2103 of the *International Building Code*.

**Clay.** A building unit larger in size than a brick, composed of burned clay, shale, fire clay or mixtures thereof.

**Concrete.** A building unit or block larger in size than 12 inches by 4 inches by 4 inches (305 mm by 102 mm by 102 mm) made of cement and suitable aggregates.

**Glass.** Nonload-bearing masonry composed of glass units bonded by mortar.

**Hollow.** A *masonry unit* with a net cross-sectional area in any plane parallel to the loadbearing surface that is less than 75 percent of its gross cross-sectional area measured in the same plane.

**Solid.** A *masonry unit* with a net cross-sectional area in every plane parallel to the loadbearing surface that is 75 percent or more of its cross-sectional area measured in the same plane.

**[RB] MEAN ROOF HEIGHT.** The average of the roof eave height and the height to the highest point on the roof surface, except that eave height shall be used for roof angle of less than or equal to 10 degrees (0.18 rad).

**[MP] MECHANICAL DRAFT SYSTEM.** A venting system designed to remove flue or vent gases by mechanical means, that consists of an induced draft portion under nonpositive static pressure or a forced draft portion under positive static pressure.

**Forced draft venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static pressure.

**Induced draft venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under nonpositive static vent pressure.

**Power venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static vent pressure.

**[MP] MECHANICAL EXHAUST SYSTEM.** A system for removing air from a room or space by mechanical means.

**[MP] MECHANICAL JOINT.**

1. A connection between pipes, fittings or pipes and fittings that is not welded, brazed, caulked, soldered, solvent cemented or heat fused.
2. A general form of gastight or liquid-tight connections obtained by the joining of parts through a positive holding mechanical construction such as, but not limited to, flanged, screwed, clamped or flared connections.

**[MP] MECHANICAL SYSTEM.** A system specifically addressed and regulated in this code and composed of components, devices, *appliances* and *equipment*.

**[RB] METAL ROOF PANEL.** An interlocking metal sheet having an installed weather exposure of not less than 3 square feet (0.28 m<sup>2</sup>) per sheet.

**[RB] METAL ROOF SHINGLE.** An interlocking metal sheet having an installed weather exposure less than 3 square feet (0.28 m<sup>2</sup>) per sheet.

**[RB] MEZZANINE.** An intermediate level or levels between the floor and ceiling of any *story*.

**[RB] MODIFIED BITUMEN ROOF COVERING.** One or more layers of polymer modified asphalt sheets. The sheet materials shall be fully adhered or mechanically attached to the substrate or held in place with an *approved* ballast layer.

**[RB] MULTIPLE-STATION SMOKE ALARM.** Two or more single-station alarm devices that are capable of inter-connection such that actuation of one causes all integral or separate audible alarms to operate.

**[RB] NAILABLE SUBSTRATE.** A product or material such as framing, sheathing or furring, composed of wood or wood-based materials, or other materials and fasteners providing equivalent fastener withdrawal resistance.

**[MP] NATURAL DRAFT SYSTEM.** A venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.

**[RB] NATURALLY DURABLE WOOD.** The heartwood of the following species with the exception that an occasional piece with corner sapwood is permitted if 90 percent or more of the width of each side on which it occurs is heartwood.

**Decay resistant.** Redwood, cedar, black locust and black walnut.

**Termite resistant.** Alaska yellow cedar, redwood, Eastern red cedar and Western red cedar including all sapwood of Western red cedar.



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**[RB] NONCOMBUSTIBLE MATERIAL.** A material that passes ASTM E136.

**[RB] NOSING.** The leading edge of treads of stairs and of landings at the top of *stairway* flights.

**[RB] OCCUPIED SPACE.** The total area of all buildings or structures on any *lot* or parcel of ground projected on a horizontal plane, excluding permitted projections as allowed by this code.

**[MP] OFFSET.** A combination of fittings that makes two changes in direction, bringing one section of the pipe out of line and into a line parallel with the other section.

**[MP] ON-SITE NONPOTABLE WATER REUSE SYSTEMS.** Water systems for the collection, treatment, storage, distribution, and reuse of nonpotable water generated on site, including but not limited to graywater systems. This definition does not include rainwater harvesting systems.

**[RE] OPAQUE DOOR.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] OWNER.** Any person, agent, firm or corporation having a legal or equitable interest in the property.

**[RB] PAN FLASHING.** Corrosion-resistant flashing at the base of an opening that is integrated into the building exterior wall to direct water to the exterior and is premanufactured, fabricated, formed or applied at the job site.

**[RB] PANEL THICKNESS.** Thickness of core plus two layers of structural wood panel facings.

**[MP] PELLET FUEL-BURNING APPLIANCE.** A closed combustion, vented *appliance* equipped with a fuel feed mechanism for burning processed pellets of solid fuel of a specified size and composition.

**[MP] PELLET VENT.** A vent *listed* and *labeled* for use with a *listed* pellet fuel-burning *appliance*.

**[RB] PERFORMANCE CATEGORY.** A designation of wood structural panels as related to the panel performance used in Chapters 4, 5, 6 and 8.

**[RB] PERMIT.** An official document or certificate issued by the *building official* that authorizes performance of a specified activity.

**[RB] PERSON.** An individual, heirs, executors, administrators or assigns, and a firm, partnership or corporation, its or their successors or assigns, or the agent of any of the aforesaid.

**[RB] PHOTOVOLTAIC MODULE.** A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of a tracker, designed to generate DC power where exposed to sunlight.

**[RB] PHOTOVOLTAIC PANEL.** A collection of *photovoltaic modules* mechanically fastened together, wired, and designed to provide a field-installable unit.

**[RB] PHOTOVOLTAIC PANEL SYSTEM.** A system that incorporates discrete photovoltaic panels that convert solar radiation into electricity, including rack support systems.

**[RB] PHOTOVOLTAIC SHINGLES.** A *roof covering* that resembles shingles and that incorporates *photovoltaic modules*.

**[MP] PITCH.** See “*Slope*.”

**[RB] PLASTIC COMPOSITE.** A generic designation that refers to wood-plastic composites and plastic lumber.

**[RB] PLATFORM CONSTRUCTION.** A method of construction by which floor framing bears on load bearing walls that are not continuous through the *story* levels or floor framing.

**[MP] PLENUM.** A chamber that forms part of an air-circulation system other than the *occupied space* being conditioned.

**[MP] PLUMBING.** For the purpose of this code, plumbing refers to those installations, repairs, maintenance and *alterations* regulated by Chapters 25 through 33.

**[MP] PLUMBING APPLIANCE.** An energized household *appliance* with plumbing connections, such as a dishwasher, food waste disposer, clothes washer or water heater.

**[MP] PLUMBING APPURTENANCE.** A device or assembly that is an adjunct to the basic plumbing system and does not demand additional water supply or add any discharge load to the system. It is presumed that it performs some useful function in the operation, maintenance, servicing, economy or safety of the plumbing system. Examples include filters, relief valves and aerators.

**[MP] PLUMBING FIXTURE.** A receptacle or device that is connected to a water supply system or discharges to a drainage system or both. Such receptacles or devices require a supply of water; or discharge liquid waste or liquidborne solid waste; or require a supply of water and discharge waste to a drainage system.

**[MP] PLUMBING SYSTEMS.** Includes the water distribution pipes; plumbing fixtures and traps; water-treating or water-using equipment; soil, waste and vent pipes; and building drains; in addition to their respective connections, devices and appurtenances within a structure or premises; and the water service, building sewer and building storm sewer serving such structure or premises.

**[MP] POLLUTION.** A low-hazard or nonhealth-hazard impairment of the quality of the potable water to a degree that does not create a hazard to the public health and that does adversely and unreasonably affect the aesthetic qualities of such potable water for domestic use.

**[RB] POLYPROPYLENE SIDING.** A shaped material, made principally from polypropylene homopolymer, or copolymer, that in some cases contains fillers or reinforcements, that is used to clad exterior walls or buildings.

**[MP] PORTABLE-FUEL-CELL APPLIANCE.** A fuel cell generator of electricity that is not fixed in place. A portable-fuel-cell *appliance* utilizes a cord and plug connection to a grid-isolated load and has an integral fuel supply.

**[RB] POSITIVE ROOF DRAINAGE.** The drainage condition in which consideration has been made for the loading deflections of the *roof deck*, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.

**[MP] POTABLE WATER.** Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming in bacteriological and chemical quality to the requirements of the public health authority having *jurisdiction*.

**[RB] PRECAST CONCRETE.** A structural concrete element cast elsewhere than its final position in the structure.

**[RB] PRECAST CONCRETE FOUNDATION WALLS.** Preengineered, *precast concrete* wall panels that are designed to withstand specified stresses and used to build below-grade foundations.

**[MP] PRESS-CONNECT JOINT.** A permanent mechanical joint incorporating an elastomeric seal or an elastomeric seal and corrosion-resistant grip or bite ring. The joint is made with a pressing tool and jaw or ring approved by the fitting manufacturer.

**[MP] PRESSURE-RELIEF VALVE.** A pressure-actuated valve held closed by a spring or other means and designed to automatically relieve pressure at the pressure at which it is set.

**[RE] PROPOSED DESIGN.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] PUBLIC SEWER.** A common sewer directly controlled by public authority.

**[MP] PUBLIC WATER MAIN.** A water-supply pipe for public use controlled by public authority.

**[RB] PUBLIC WAY.** Any street, alley or other parcel of land open to the outside air leading to a public street, that has been deeded, dedicated or otherwise permanently appropriated to the public for public use and that has a clear width and height of not less than 10 feet (3048 mm).

**[MP] PURGE.** To clear of air, gas or other foreign substances.

**[MP] PUSH-FIT FITTING.** A mechanical fitting that joins pipes or tubes and achieves a seal by mating the pipe or tube into the fitting.

**[MP] QUICK-CLOSING VALVE.** A valve or faucet that closes automatically where released manually or controlled by mechanical means for fast-action closing.

**[RB] RAMP.** A walking surface that has a running slope steeper than 1 unit vertical in 20 units horizontal (5-percent slope).

**[RE] RATED DESIGN.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] READY ACCESS (TO).** That which enables a device, *appliance* or equipment to be directly reached, without requiring the removal or movement of any panel, door or similar obstruction.

**[MP] RECEPTOR.** A fixture or device that receives the discharge from indirect waste pipes.

**[MP] RECLAIMED WATER.** Nonpotable water that has been derived from the treatment of wastewater by a facility or system licensed or permitted to produce water meeting the *jurisdiction's* water requirements for its intended uses. Also known as "recycled water."

**[MP] REFRIGERANT.** A substance used to produce refrigeration by its expansion or evaporation.

**[MP] REFRIGERANT COMPRESSOR.** A specific machine, with or without accessories, for compressing a given refrigerant vapor.

**[MP] REFRIGERATING SYSTEM.** A combination of interconnected parts forming a closed circuit in which refrigerant is circulated for the purpose of extracting, then rejecting, heat. A direct refrigerating system is one in which the evaporator or condenser of the refrigerating system is in direct contact with the air or other substances to be cooled or heated. An indirect refrigerating system is one in which a secondary coolant cooled or heated by the refrigerating system is circulated to the air or other substance to be cooled or heated.

**[RB] REGISTERED DESIGN PROFESSIONAL.** An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or *jurisdiction* in which the project is to be constructed.

**[MP] RELIEF VALVE, VACUUM.** A device to prevent excessive buildup of vacuum in a pressure vessel.

**[RB] REPAIR.** The reconstruction, replacement or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] REROOFING.** The process of recovering or replacing an existing *roof covering*. See "*Roof recover*."

For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] RESIDENTIAL BUILDING.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] RETURN AIR.** Air removed from an *approved conditioned space* or location and recirculated or exhausted.

**[RB] RIDGE.** With respect to topographic wind effects, an elongated crest of a *hill* characterized by strong relief in two directions.

**[MP] RISER (PLUMBING).** A water pipe that extends vertically one full *story* or more to convey water to branches or to a group of fixtures.

**[RB] RISER (STAIR).** The vertical component of a step or *stair*.

**[RB] ROOF ASSEMBLY.** A system designed to provide weather protection and resistance to design loads. The system consists of a *roof covering* and *roof deck* or a single component serving as both the *roof covering* and the *roof deck*. A

## DEFINITIONS

**roof assembly** can include an underlayment, thermal barrier, ignition barrier, insulation or a vapor retarder. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] ROOF COATING.** A fluid-applied, adhered coating used for roof maintenance or *roof repair*, or as a component of a *roof covering system* or *roof assembly*.

**[RB] ROOF COVERING.** The covering applied to the *roof deck* for weather resistance, fire classification or appearance.

**[RB] ROOF COVERING SYSTEM.** See “*Roof assembly*.”

**[RB] ROOF DECK.** The flat or sloped surface not including its supporting members or vertical supports.

**[RB] ROOF RECOVER.** The process of installing an additional *roof covering* over an existing roof covering without removing the existing roof covering. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] ROOF REPAIR.** Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] ROOF REPLACEMENT.** The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*. For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] ROOM HEATER.** A free-standing heating *appliance* installed in the space being heated and not connected to ducts.

**[MP] ROUGH-IN.** The installation of the parts of the plumbing system that must be completed prior to the installation of fixtures. This includes DWV, water supply and built-in fixture supports.

**[RB] RUNNING BOND.** The placement of *masonry units* such that head joints in successive courses are horizontally offset not less than one-quarter the unit length.

**[RE] R-VALUE (THERMAL RESISTANCE).** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] SANITARY SEWER.** A sewer that carries sewage and excludes storm, surface and groundwater.

**[RB] SCUPPER.** An opening in a wall or parapet that allows water to drain from a roof.

**[RB] SEISMIC DESIGN CATEGORY (SDC).** A classification assigned to a structure based on its occupancy category and the severity of the design earthquake ground motion at the site.

**[MP] SEPTIC TANK.** A watertight receptor that receives the discharge of a building sanitary drainage system and is constructed so as to separate solids from the liquid, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a system of open joint or perforated piping or a seepage pit.

**[RE] SERVICE WATER HEATING.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] SEWAGE.** Any liquid waste containing animal matter, vegetable matter or other impurity in suspension or solution.

**[MP] SEWAGE PUMP.** A permanently installed mechanical device for removing sewage or liquid waste from a sump.

**[RB] SHALL.** The term, where used in the code, is construed as mandatory.

**[RB] SHEAR WALL.** A general term for walls that are designed and constructed to resist racking from seismic and wind by use of masonry, concrete, cold-formed steel or wood framing in accordance with Chapter 6 of this code and the associated limitations in Section R301.2 of this code.

**[RB] SHINGLE FASHION.** A method of installing roof or wall coverings, *water-resistive barriers*, flashing or other building components such that upper layers of material are placed overlapping lower layers of material to provide drainage and protect against water intrusion at unsealed penetrations and joints or in combination with sealed joints.

**[RB] SINGLE-PLY MEMBRANE.** A roofing membrane that is field applied using one layer of membrane material (either homogeneous or composite) rather than multiple layers.

**[RB] SINGLE-STATION SMOKE ALARM.** An assembly incorporating the detector, control equipment and alarm sounding device in one unit that is operated from a power supply either in the unit or obtained at the point of installation.

**[RE] SKYLIGHT.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] SKYLIGHT, UNIT.** A factory assembled, glazed fenestration unit, containing one panel of glazing material, that allows for natural daylighting through an opening in the *roof assembly* while preserving the weather-resistant barrier of the roof.

**[RB] SKYLIGHTS AND SLOPED GLAZING.** Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. *Unit skylights*, *tubular daylighting devices* and glazing materials in solariums, *sunrooms*, roofs and sloped walls are included in this definition. For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] SLEEPING UNIT.** A single unit that provides rooms or spaces for one or more persons, includes permanent provisions for sleeping and can include provisions for living, eating and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a *dwelling unit* are not sleeping units.

**[MP] SLIP JOINT.** A mechanical-type joint used primarily on fixture traps. The joint tightness is obtained by compressing a friction-type washer such as rubber, nylon, neoprene, lead or special packing material against the pipe by the tightening of a (slip) nut.

**[MP] SLOPE.** The fall (pitch) of a line of pipe in reference to a horizontal plane. In drainage, the slope is expressed as the fall in units vertical per units horizontal (percent) for a length of pipe.



**[RB] SMOKE-DEVELOPED INDEX.** A comparative measure, expressed as a dimensionless number, derived from measurements of smoke obscuration versus time for a material tested in accordance with ASTM E84 or UL 723.

**[MP] SOIL STACK OR PIPE.** A pipe that conveys sewage containing fecal material.

**[RB] SOLAR ENERGY SYSTEM.** A system that converts solar radiation to usable energy, including *photovoltaic panel systems* and *solar thermal systems*.

**[RE] SOLAR HEAT GAIN COEFFICIENT (SHGC).** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] SOLAR THERMAL COLLECTOR.** Components in a *solar thermal system* that collect and convert solar radiation to thermal energy.

**[MP] SOLAR THERMAL SYSTEM.** A system that converts solar radiation to thermal energy for use in heating or cooling.

**[RB] SOLID MASONRY.** Load-bearing or nonload-bearing construction using *masonry units* where the net cross-sectional area of each unit in any plane parallel to the bearing surface is not less than 75 percent of its gross cross-sectional area. *Solid masonry* units shall conform to ASTM C55, C62, C73, C145 or C216.

**[RB] SPLINE.** A strip of wood structural panel cut from the same material used for the panel facings, used to connect two structural insulated panels. The strip (spline) fits into a groove cut into the vertical edges of the two structural insulated panels to be joined. Splines are used behind each facing of the structural insulated panels being connected as shown in Figure R610.8.

**[MP] STACK.** Any main vertical DWV line, including offsets, that extends one or more stories as directly as possible to its vent terminal.

**[RB] STACK BOND.** The placement of *masonry units* in a bond pattern is such that head joints in successive courses are vertically aligned. For the purpose of this code, requirements for stack bond shall apply to all masonry laid in other than *running bond*.

**[MP] STACK VENT.** The extension of soil or waste stack above the highest horizontal drain connected.

**[RB] STAIR.** A change in elevation, consisting of one or more *risers*.

**[RB] STAIRWAY.** One or more flights of stairs, either interior or exterior, with the necessary landings and connecting platforms to form a continuous and uninterrupted passage from one level to another.

**[RB] STAIRWAY, SPIRAL.** A stairway with a plan view of closed circular form and uniform section-shaped treads radiating from a minimum-diameter circle.

**[RE] STANDARD REFERENCE DESIGN.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] STANDARD TRUSS.** Any construction that does not permit the roof-ceiling insulation to achieve the required *R*-value over the exterior walls.

**[MP] STATIONARY FUEL CELL POWER PLANT.** A self-contained package or factory-matched packages that constitute an automatically operated assembly of integrated systems for generating useful electrical energy and recoverable thermal energy that is permanently connected and fixed in place.

**[MP] STORM SEWER, DRAIN.** A pipe used for conveying rainwater, surface water, subsurface water and similar liquid waste.

**[RB] STORM SHELTER.** A building, structure or portion thereof, constructed in accordance with ICC 500 and designated for use during a severe wind storm event, such as a hurricane or tornado.

**[RB] STORY.** That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.

**[RB] STORY ABOVE GRADE PLANE.** Any *story* having its finished floor surface entirely above *grade plane*, or in which the finished surface of the floor next above is either of the following:

1. More than 6 feet (1829 mm) above *grade plane*.
2. More than 12 feet (3658 mm) above the finished ground level at any point.

**[RB] STRUCTURAL COMPOSITE LUMBER.** Structural members manufactured using wood elements bonded together with exterior adhesives.

Examples of structural composite lumber are:

**Laminated strand lumber (LSL).** A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths are not less than 150 times the least dimension of the wood strand elements.

**Laminated veneer lumber (LVL).** A composite of wood veneer elements with wood fibers primarily oriented along the length of the member, where the veneer element thicknesses are 0.25 inch (6.4 mm) or less.

**Oriented strand lumber (OSL).** A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.10 inch (2.54 mm) or less and their average lengths are not less than 75 times and less than 150 times the least dimension of the wood strand elements.

**Parallel strand lumber (PSL).** A composite of wood strand elements with wood fibers primarily oriented along the length of the member, where the least dimension of the wood strand elements is 0.25 inch (6.4 mm) or less and their average lengths are not less than 300 times the least dimension of the wood strand elements.

**[RB] STRUCTURAL INSULATED PANEL (SIP).** A structural sandwich panel that consists of a lightweight foam plastic core securely laminated between two thin, rigid wood structural panel facings.

**[RB] STRUCTURE.** That which is built or constructed.

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**[RB] SUBSOIL DRAIN.** A drain that collects subsurface water or seepage water and conveys such water to a place of disposal.

**[MP] SUMP.** A tank or pit that receives sewage or waste, located below the normal *grade* of the gravity system and that must be emptied by mechanical means.

**[MP] SUMP PUMP.** A pump installed to empty a sump. These pumps are used for removing storm water only. The pump is selected for the specific head and volume of the load and is usually operated by level controllers.

**[RB] SUNROOM.** A one-story structure attached to a *dwelling* with a *glazing area* in excess of 40 percent of the gross area of the structure's exterior walls and roof.

For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] SUPPLY AIR.** Air delivered to a *conditioned space* through ducts or plenums from the heat exchanger of a heating, cooling or ventilating system.

**[MP] SUPPORTS.** Devices for supporting, hanging and securing pipes, fixtures and equipment.

**[MP] SWEEP.** A drainage fitting designed to provide a change in direction of a drain pipe of less than the angle specified by the amount necessary to establish the desired slope of the line. Sweeps provide a longer turning radius than bends and a less turbulent flow pattern (see "*Bend*" and "*Elbow*").

**[MP] TEMPERATURE- AND PRESSURE-RELIEF (T AND P) VALVE.** A combination relief valve designed to function as both a temperature-relief and pressure-relief valve.

**[MP] TEMPERATURE-RELIEF VALVE.** A temperature-actuated valve designed to discharge automatically at the temperature at which it is set.

**[RB] TERMITE-RESISTANT MATERIAL.** Pressure-preservative-treated wood in accordance with the AWPA standards in Section R317.1, naturally durable termite-resistant wood, steel, concrete, masonry or other *approved* material.

**[RE] THERMAL ISOLATION.** For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] THERMAL RESISTANCE, R-VALUE.** See "*R-value*."

**[RE] THERMAL TRANSMITTANCE, U-FACTOR.** See "*U-factor*."

**[RE] THERMOSTAT.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] THIRD-PARTY CERTIFICATION AGENCY.** An *approved* agency operating a product or material certification system that incorporates initial product testing, assessment and surveillance of a manufacturer's quality control system.

**[MP] THIRD-PARTY CERTIFIED.** Certification obtained by the manufacturer indicating that the function and performance characteristics of a product or material have been determined by testing and ongoing surveillance by an

*approved* third-party certification agency. Assertion of certification is in the form of identification in accordance with the requirements of the third-party certification agency.

**[RB] TOWNHOUSE.** A *building* that contains three or more attached *townhouse units*.

**[RB] TOWNHOUSE UNIT.** A single-family *dwelling unit* in a *townhouse* that extends from foundation to roof and that has a *yard* or *public way* on not less than two sides.

**[MP] TRAP.** A fitting, either separate or built into a fixture, that provides a liquid seal to prevent the emission of sewer gases without materially affecting the flow of sewage or wastewater through it.

**[MP] TRAP ARM.** That portion of a *fixture drain* between a trap weir and the vent fitting.

**[MP] TRAP PRIMER.** A device or system of piping to maintain a water seal in a trap, typically installed where infrequent use of the trap would result in evaporation of the trap seal, such as floor drains.

**[MP] TRAP SEAL.** The trap seal is the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.

**[RB] TRIM.** Picture molds, chair rails, baseboards, *hand-rails*, door and window frames, and similar decorative or protective materials used in fixed applications.

**[RB] TRUSS DESIGN DRAWING.** The graphic depiction of an individual truss, that describes the design and physical characteristics of the truss.

**[RB] TUBULAR DAYLIGHTING DEVICE (TDD).** A nonoperable fenestration unit primarily designed to transmit daylight from a roof surface to an interior ceiling via a tubular conduit. The basic unit consists of an exterior glazed weathering surface, a light-transmitting tube with a reflective interior surface, and an interior-sealing device such as a translucent ceiling panel. The unit may be factory assembled, or field assembled from a manufactured kit.

**[MP] TYPE L VENT.** A *listed* and *labeled* vent conforming to UL 641 for venting oil-burning *appliances listed* for use with Type L vents or with gas *appliances listed* for use with Type B vents.

**[RE] U-FACTOR (THERMAL TRANSMITTANCE).** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] UNDERLAYMENT.** One or more layers of felt, sheathing paper, nonbituminous saturated felt, or other *approved* material over which a roof covering, with a slope of 2 units vertical in 12 units horizontal (17-percent slope) or greater, is applied.

**[MP] VACUUM BREAKER.** A device that prevents back-siphonage of water by admitting atmospheric pressure through ports to the discharge side of the device.

**[RB] VAPOR DIFFUSION PORT.** An assembly constructed or installed within a *roof assembly* at an opening in the *roof deck* to convey water vapor from an unvented attic to the outside atmosphere.

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**[RB] VAPOR PERMEABLE.** The property of having a moisture vapor permeance rating of 5 perms ( $2.9 \times 10^{-10}$  kg/Pa  $\times$  s  $\times$  m<sup>2</sup>) or greater, where tested in accordance with Procedure A or Procedure B of ASTM E96. A vapor permeable material permits the passage of moisture vapor.

**[RB] VAPOR RETARDER CLASS.** A measure of the ability of a material or assembly to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method with Procedure A of ASTM E96 as follows:

Class I:  $\leq 0.1$  perm rating

Class II:  $> 0.1$  to  $\leq 1.0$  perm rating

Class III:  $> 1.0$  to  $\leq 10$  perm rating

**[MP] VENT.** A passageway for conveying flue gases from fuel-fired *appliances*, or their vent connectors, to the outside atmosphere.

**[MP] VENT COLLAR.** See “*Flue collar*.”

**[MP] VENT CONNECTOR.** That portion of a venting system that connects the flue collar or draft hood of an *appliance* to a vent.

**[MP] VENT DAMPER DEVICE, AUTOMATIC.** A device intended for installation in the venting system, in the outlet of an individual, automatically operated fuel-burning *appliance* and that is designed to open the venting system automatically where the *appliance* is in operation and to close off the venting system automatically where the *appliance* is in a standby or shutdown condition.

**[MP] VENT GASES.** Products of combustion from fuel-burning *appliances*, plus excess air and dilution air, in the venting system above the draft hood or draft regulator.

**[MP] VENT STACK.** A vertical vent pipe installed to provide circulation of air to and from the drainage system and that extends through one or more stories.

**[MP] VENT SYSTEM.** Piping installed to equalize pneumatic pressure in a drainage system to prevent trap seal loss or blowback due to siphonage or back pressure.

**[RB] VENTILATION.** The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

For the definition applicable in Chapter 11, see Section N1101.6.

**[RE] VENTILATION AIR.** For the definition applicable in Chapter 11, see Section N1101.6.

**[MP] VENTING.** Removal of combustion products to the outdoors.

**[MP] VENTING SYSTEM.** A continuous open passageway from the flue collar of an *appliance* to the outside atmosphere for the purpose of removing flue or vent gases. A venting system is usually composed of a vent or a chimney and vent connector, if used, assembled to form the open passageway.

**[MP] VERTICAL PIPE.** Any pipe or fitting that makes an angle of 45 degrees (0.79 rad) or more with the horizontal.

**[RB] VINYL SIDING.** A shaped material, made principally from rigid polyvinyl chloride (PVC), that is used to cover exterior walls of buildings.

**[RE] VISIBLE TRANSMITTANCE (VT).** For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] WALL, RETAINING.** A wall not laterally supported at the top, that resists lateral soil load and other imposed loads.

**[RB] WALLS.** Walls shall be defined as follows:

**Load-bearing wall.** A wall supporting any vertical load in addition to its own weight.

**Nonbearing wall.** A wall which does not support vertical loads other than its own weight.

**[MP] WASTE.** Liquidborne waste that is free of fecal matter.

**[MP] WASTE PIPE OR STACK.** Piping that conveys only liquid sewage not containing fecal material.

**[MP] WASTE RECEPTOR.** A floor sink, standpipe, hub drain or a floor drain that receives the discharge of one or more indirect waste pipes.

**[MP] WATER DISTRIBUTION SYSTEM.** Piping that conveys water from the service to the plumbing fixtures, *appliances*, appurtenances, equipment, devices or other systems served, including fittings and control valves.

**[MP] WATER HEATER.** Any heating *appliance* or equipment that heats potable water and supplies such water to the potable hot water distribution system.

**[MP] WATER MAIN.** A water supply pipe for public use.

**[MP] WATER OUTLET.** A valved discharge opening, including a hose bibb, through which water is removed from the potable water system supplying water to a plumbing fixture or plumbing *appliance* that requires either an *air gap* or backflow prevention device for protection of the supply system.

**[MP] WATER SERVICE PIPE.** The outside pipe from the water main or other source of potable water supply to the water distribution system inside the building, terminating at the service valve.

**[MP] WATER SUPPLY SYSTEM.** The water service pipe, the water-distributing pipes and the necessary connecting pipes, fittings, control valves and appurtenances in or adjacent to the building or premises.

**[RB] WATER-RESISTIVE BARRIER.** A material behind an exterior wall covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly.

**[MP] WET VENT.** A vent that receives the discharge of wastes from other fixtures.



## DEFINITIONS

**[MP] WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM.** An exhaust system, supply system, or combination thereof that is designed to mechanically exchange indoor air for outdoor air where operating continuously or through a programmed intermittent schedule to satisfy the whole-house ventilation rate.

For the definition applicable in Chapter 11, see Section N1101.6.

**[RB] WINDBORNE DEBRIS REGION.** Areas within *hurricane-prone regions* located in accordance with one of the following:

1. Within 1 mile (1.61 km) of the coastal mean high-water line where the ultimate design wind speed,  $V_{ult}$ , is 130 mph (58 m/s) or greater.
2. In areas where an Exposure D condition exists upwind at the waterline and the ultimate design wind speed,  $V_{ult}$ , is 140 mph (63 m/s) or greater; or Hawaii.

**[RB] WINDER.** A tread with nonparallel edges.

**[RB] WOOD STRUCTURAL PANEL.** A panel manufactured from veneers; or wood strands or wafers; bonded together with waterproof synthetic resins or other suitable bonding systems. Examples of wood structural panels are plywood, orientated strand board (OSB) or composite panels.

**[RB] YARD.** An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the *lot* on which a building is situated.

**[RE] ZONE.** For the definition applicable in Chapter 11, see Section N1101.6.

# Part III—Building Planning and Construction

## CHAPTER 3 BUILDING PLANNING

### User note:

**About this chapter:** Chapter 3 contains a wide array of building planning requirements that are critical to designing a safe and usable building. This includes, but is not limited to, requirements related to general structural design, fire-resistant construction, light, ventilation, sanitation, plumbing fixture clearances, minimum room area and ceiling height, safety glazing, means of egress, automatic fire sprinkler systems, smoke and carbon monoxide alarm systems, accessibility, solar energy systems, swimming pools, spas and hot tubs.

### SECTION R301 DESIGN CRITERIA

**R301.1 Application.** Buildings and structures, and parts thereof, shall be constructed to safely support all loads, including dead loads, *live loads*, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets the requirements for the transfer of loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.

**R301.1.1 Alternative provisions.** As an alternative to the requirements in Section R301.1, the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards, the design shall comply with the *International Building Code*.

1. AWC *Wood Frame Construction Manual* (WFCM).
2. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings* (AIS S230).
3. ICC *Standard on the Design and Construction of Log Structures* (ICC 400).

**R301.1.2 Construction systems.** The requirements of this code are based on platform and balloon-frame construction for light-frame buildings. The requirements for concrete and masonry buildings are based on a balloon framing system. Other framing systems must have equivalent detailing to ensure force transfer, continuity and compatible deformations.

**R301.1.3 Engineered design.** Where a building of otherwise conventional construction contains structural elements exceeding the limits of Section R301 or otherwise not conforming to this code, these elements shall be designed in accordance with accepted engineering practice. The extent of such design need only demonstrate

compliance of nonconventional elements with other applicable provisions and shall be compatible with the performance of the conventional framed system. Engineered design in accordance with the *International Building Code* is permitted for buildings and structures, and parts thereof, included in the scope of this code.

**R301.1.4 Intermodal shipping containers.** Intermodal shipping containers that are repurposed for use as buildings or structures shall be designed in accordance with the structural provisions in Section 3115 of the *International Building Code*.

**R301.2 Climatic and geographic design criteria.** Buildings shall be constructed in accordance with the provisions of this code as limited by the provisions of this section. Additional criteria shall be established by the local *jurisdiction* and set forth in Table R301.2.

**R301.2.1 Wind design criteria.** Buildings and portions thereof shall be constructed in accordance with the wind provisions of this code using the ultimate design wind speed in Table R301.2 as determined from Figure R301.2(2). The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section R301.2.1.1. Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where not otherwise specified, the wind loads listed in Table R301.2.1(1) adjusted for height and exposure using Table R301.2.1(2) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.4. *Metal roof shingles* shall be designed for wind speeds in accordance with Section R905.4.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section R802.11 from the *roof assembly* to the foundation. Where ultimate design wind speeds in Figure R301.2(2) are less than the lowest wind speed indicated in the prescriptive provisions of this code, the lowest wind speed indicated in the prescriptive provisions of this code shall be used.

**R301.2.1.1 Wind limitations and wind design required.** The wind provisions of this code shall not apply to the design of buildings where wind design is required in accordance with Figure R301.2.1.1, or where the ultimate design wind speed,  $V_{ult}$ , in Figure R301.2(2) equals or exceeds 140 miles per hour (225 kph) in a special wind region.

**Exceptions:**

1. For concrete construction, the wind provisions of this code shall apply in accordance with the limitations of Sections R404 and R608.
2. For structural insulated panels, the wind provisions of this code shall apply in accordance with the limitations of Section R610.
3. For cold-formed steel *light-frame construction*, the wind provisions of this code shall apply in accordance with the limitations of Sections R505, R603 and R804.

In regions where wind design is required in accordance with Figure R301.2.1.1 or where the ultimate design wind speed,  $V_{ult}$ , in Figure R301.2(2) equals or exceeds 140 miles per hour (225 kph) in a special wind region, the design of buildings for wind loads shall be in accordance with one or more of the following methods:

1. AWC *Wood Frame Construction Manual* (WFCM).
2. ICC *Standard for Residential Construction in High-Wind Regions* (ICC 600).
3. ASCE *Minimum Design Loads for Buildings and Other Structures* (ASCE 7).
4. AISI *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings* (AISI S230).
5. *International Building Code*.

The elements of design not addressed by the methods in Items 1 through 5 shall be in accordance with the provisions of this code.

Where ASCE 7 or the *International Building Code* is used for the design of the building, the wind speed map and exposure category requirements as specified in ASCE 7 and the *International Building Code* shall be used.

**R301.2.1.1.1 Sunrooms.** *Sunrooms* shall comply with AAMA/NPEA/NSA 2100. For the purpose of applying the criteria of AAMA/NPEA/NSA 2100 based on the intended use, *sunrooms* shall be identified as one of the following categories by the permit applicant, *design professional* or the property owner or owner's agent in the *construction documents*. Component and cladding pressures shall be used for the design of elements that do not qualify as main windforce-resisting systems. Main windforce-resisting system pressures shall be used for the design of elements assigned to provide support and stability for the overall *sunroom*.

**Category I:** A thermally isolated *sunroom* with walls that are open or enclosed with insect

screening or 0.5 mm (20 mil) maximum thickness plastic film. The space is nonhabitable and unconditioned.

**Category II:** A thermally isolated *sunroom* with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The space is nonhabitable and unconditioned.

**Category III:** A thermally isolated *sunroom* with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The *sunroom* fenestration complies with additional requirements for air infiltration resistance and water penetration resistance. The space is nonhabitable and unconditioned.

**Category IV:** A thermally isolated *sunroom* with enclosed walls. The *sunroom* is designed to be heated or cooled by a separate temperature control or system and is thermally isolated from the primary structure. The *sunroom* fenestration complies with additional requirements for water penetration resistance, air infiltration resistance and thermal performance. The space is nonhabitable and conditioned.

**Category V:** A *sunroom* with enclosed walls. The *sunroom* is designed to be heated or cooled and is open to the main structure. The *sunroom* fenestration complies with additional requirements for water penetration resistance, air infiltration resistance and thermal performance. The space is habitable and conditioned.

**R301.2.1.2 Protection of openings.** Exterior glazing in buildings located in *windborne debris regions* shall be protected from windborne debris. Glazed opening protection for windborne debris shall meet the requirements of the Large Missile Test of ASTM E1886 and ASTM E1996 as modified in Section 301.2.1.2.1. Garage door glazed opening protection for windborne debris shall meet the requirements of an *approved* impact-resisting standard or ANSI/DASMA 115.

**Exception:** *Wood structural panels* with a thickness of not less than  $\frac{7}{16}$  inch (11 mm) and a span of not more than 8 feet (2438 mm) shall be permitted for opening protection. Panels shall be precut and attached to the framing surrounding the opening containing the product with the glazed opening. Panels shall be predrilled as required for the anchorage method and shall be secured with the attachment hardware provided. Attachments shall be designed to resist the component and cladding loads determined in accordance with either Table R301.2.1(1) or ASCE 7, with the permanent corrosion-resistant attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table R301.2.1.2 is permitted for buildings with a mean roof height of 45 feet (13 728 mm) or less where the ultimate design wind speed,  $V_{ult}$ , is 180 mph (290 kph) or less.



## BUILDING PLANNING

**R301.2.1.4 Exposure category.** For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features. For a site where multiple detached one- and two-family *dwelling*s, townhouses or other structures are to be constructed as part of a subdivision or master-planned community, or are otherwise designated as a developed area by the authority having *jurisdiction*, the exposure category for an individual structure shall be based on the site conditions that will exist at the time when all adjacent structures on the site have been constructed, provided that their construction is expected to begin within 1 year of the start of construction for the structure for which the exposure category is determined. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. Exposure B. Urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family *dwelling*s or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
2. Exposure C. Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat, open country and grasslands.
3. Exposure D. Flat, unobstructed areas exposed to wind flowing over open water, smooth mud flats, salt flats and unbroken ice for a distance of not less than 5,000 feet (1524 m). This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the unobstructed area. Exposure D extends downwind from the edge of the unobstructed area a distance of 600 feet (183 m) or 20 times the height of the building or structure, whichever is greater.

**R301.2.1.5 Topographic wind effects.** In areas designated in Table R301.2 as having local historical data documenting structural damage to buildings caused by wind speed-up at isolated *hills*, ridges and escarpments that are abrupt changes from the general topography of the area, topographic wind effects shall be considered in the design of the building in accordance with Section R301.2.1.5.1 or in accordance with the provisions of ASCE 7. See Figure R301.2.1.5.1(1) for topographic features for wind speed-up effect.

In these designated areas, topographic wind effects shall apply only to buildings sited on the top half of an isolated *hill*, *ridge* or escarpment where all of the following conditions exist:

1. The average slope of the top half of the *hill*, *ridge* or escarpment is 10 percent or greater.
2. The *hill*, *ridge* or escarpment is 60 feet (18 288 mm) or greater in height for Exposure B, 30 feet (9144 mm) or greater in height for Exposure C, and 15 feet (4572 mm) or greater in height for Exposure D.
3. The *hill*, *ridge* or escarpment is isolated or unobstructed by other topographic features of similar height in the upwind direction for a distance measured from its high point of 100 times its height or 2 miles (3.2 km), whichever is less. See Figure R301.2.1.5.1(3) for upwind obstruction.
4. The *hill*, *ridge* or escarpment protrudes by a factor of two or more above the height of other upwind topographic features located in any quadrant within a radius of 2 miles (3.2 km) measured from its high point.

**R301.2.1.5.1 Simplified topographic wind speed-up method.** As an alternative to the ASCE 7 topographic wind provisions, the provisions of Section R301.2.1.5.1 shall be permitted to be used to design for wind speed-up effects, where required by Section R301.2.1.5.

Structures located on the top half of isolated *hills*, ridges or escarpments meeting the conditions of Section R301.2.1.5 shall be designed for an increased basic wind speed as determined by Table R301.2.1.5.1. On the high side of an escarpment, the increased basic wind speed shall extend horizontally downwind from the edge of the escarpment 1.5 times the horizontal length of the upwind slope (1.5L) or 6 times the height of the escarpment (6H), whichever is greater. See Figure R301.2.1.5.1(2) for where wind speed increase is applied.

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4. For wood-frame construction, a continuous rim joist is connected to ends of cantilever joists. Where spliced, the rim joists shall be spliced using a galvanized metal tie not less than 0.058 inch (1.5 mm) (16 gage) and 1½ inches (38 mm) wide fastened with six 16d nails on each side of the splice; or a block of the same size as the rim joist and of sufficient length to fit securely between the joist space at which the splice occurs, fastened with eight 16d nails on each side of the splice.
  5. Gravity loads carried at the end of cantilevered joists are limited to uniform wall and roof loads and the reactions from headers having a span of 8 feet (2438 mm) or less.
2. **Lateral support of roofs and floors.** Conditions where a section of floor or roof is not laterally supported by *shear walls* or *braced wall lines* on all edges.

**Exception:** Portions of floors that do not support *shear walls*, *braced wall panels* above, or roofs shall be permitted to extend not more than 6 feet (1829 mm) beyond a *shear wall* or *braced wall line*.

3. **Shear wall or braced wall offsets in plane.** Conditions where the end of a *braced wall panel* occurs over an opening in the wall below and extends more than 1 foot (305 mm) horizontally past the edge of the opening. This provision is applicable to *shear walls* and *braced wall panels* offset in plane and to *braced wall panels* offset out of plane in accordance with the exception to Item 1.

**Exception:** For wood light-frame wall construction, one end of a *braced wall panel* shall be permitted to extend more than 1 foot (305 mm) over an opening not more than 8 feet (2438 mm) in width in the wall below provided that the opening includes a header in accordance with all of the following:

1. The building width, loading condition and framing member species limitations of Table R602.7(1) shall apply.
2. The header is composed of:
  - 2.1. Not less than one 2 × 12 or two 2 × 10 for an opening not more than 4 feet (1219 mm) wide.
  - 2.2. Not less than two 2 × 12 or three 2 × 10 for an opening not more than 6 feet (1829 mm) in width.

- 2.3. Not less than three 2 × 12 or four 2 × 10 for an opening not more than 8 feet (2438 mm) in width.

3. The entire length of the *braced wall panel* does not occur over an opening in the wall below.

4. **Floor and roof opening.** Conditions where an opening in a floor or roof exceeds the lesser of 12 feet (3658 mm) or 50 percent of the least floor or roof dimension.
5. **Floor level offset.** Conditions where portions of a floor level are vertically offset.

**Exceptions:**

1. Framing supported directly by continuous foundations at the perimeter of the building.
2. For wood *light-frame construction*, floors shall be permitted to be vertically offset where the floor framing is lapped or tied together as required by Section R502.6.1.
6. **Perpendicular shear wall and wall bracing.** Conditions where *shear walls* and *braced wall lines* do not occur in two perpendicular directions.
7. **Wall bracing in stories containing masonry or concrete construction.** Conditions where stories above *grade plane* are partially or completely braced by wood wall framing in accordance with Section R602 or cold-formed steel wall framing in accordance with Section R603 include masonry or concrete construction. Where this irregularity applies, the entire story shall be designed in accordance with accepted engineering practice.

**Exceptions:** Fireplaces, chimneys and masonry veneer in accordance with this code.

8. **Hillside light-frame construction.** Conditions in which all of the following apply:
  - 8.1. The grade slope exceeds 1 unit vertical in 5 units horizontal where averaged across the full length of any side of the dwelling.
  - 8.2. The tallest cripple wall clear height exceeds 7 feet (2134 mm), or where a post and beam system occurs at the dwelling perimeter, the post and beam system tallest post clear height exceeds 7 feet (2134 mm).
  - 8.3. Of the total plan area below the lowest framed floor, whether open or enclosed, less than 50 percent is living space having interior wall finishes conforming to Section R702.

Where Item 8 is applicable, design in accordance with accepted engineering practice shall be provided for the floor immediately above the cripple walls or post and beam system and all structural elements and connections from this diaphragm down to and including connections to the foundation and design of the foundation to transfer lateral loads from the framing above.

**Exception:** *Light-frame construction* in which the lowest framed floor is supported directly on concrete or masonry walls over the full length of all sides except the downhill side of the dwelling need not be considered an irregular dwelling under Item 8.

**R301.2.2.7 Height limitations.** Wood-framed buildings shall be limited to three *stories* above *grade plane* or the limits given in Table R602.10.3(3). Wood-framed buildings in Seismic Design Category  $D_2$  exceeding two *stories* shall be designed for wind and seismic loads in accordance with accepted engineering practice. Cold-formed steel-framed buildings shall be limited to less than or equal to three *stories* above *grade plane* in accordance with AISI S230. *Mezzanines* as defined in Section R202 that comply with Section R325 shall not be considered as *stories*. *Structural insulated panel* buildings shall be limited to two *stories* above *grade plane*.

**R301.2.2.8 Cold-formed steel framing in Seismic Design Categories  $D_0$ ,  $D_1$  and  $D_2$ .** In *Seismic Design Categories*  $D_0$ ,  $D_1$  and  $D_2$  in addition to the requirements of this code, cold-formed steel framing shall comply with the requirements of AISI S230.

**R301.2.2.9 Masonry chimneys.** In *Seismic Design Categories*  $D_0$ ,  $D_1$  and  $D_2$ , masonry chimneys shall be reinforced and anchored to the building in accordance with Sections R1003.3 and R1003.4.

**R301.2.2.10 Anchorage of water heaters.** In *Seismic Design Categories*  $D_0$ ,  $D_1$  and  $D_2$ , and in *townhouses* in Seismic Design Category C, water heaters and thermal storage units shall be anchored against movement and overturning in accordance with Section M1307.2 or P2801.8.

**R301.2.3 Snow loads.** Wood-framed construction, cold-formed, steel-framed construction and masonry and concrete construction, and *structural insulated panel* construction in regions with ground snow loads 70 pounds per square foot (3.35 kPa) or less, shall be in accordance with Chapters 5, 6 and 8. Buildings in regions with ground snow loads greater than 70 pounds per square foot (3.35 kPa) shall be designed in accordance with accepted engineering practice.

**R301.2.4 Floodplain construction.** Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table R301.2, and substantial improvement and *repair* of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with Section R322. Buildings and structures that are located in more than one flood hazard area shall comply with the

provisions associated with the most restrictive flood hazard area. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

**R301.2.4.1 Alternative provisions.** As an alternative to the requirements in Section R322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

**R301.3 Story height.** The wind and seismic provisions of this code shall apply to buildings with *story heights* not exceeding the following:

1. For wood wall framing, the *story height* shall not exceed 11 feet 7 inches (3531 mm) and the laterally unsupported bearing wall stud height permitted by Table R602.3(5).

**Exception:** A *story height* not exceeding 13 feet 7 inches (4140 mm) is permitted provided that the maximum wall stud clear height does not exceed 12 feet (3658 mm), the wall studs are in accordance with Exception 2 or 3 of Section R602.3.1 or an engineered design is provided for the wall framing members, and wall bracing for the building is in accordance with Section R602.10. Studs shall be laterally supported at the top and bottom plate in accordance with Section R602.3.

2. For cold-formed steel wall framing, the *story height* shall be not more than 11 feet 7 inches (3531 mm) and the unsupported bearing wall stud height shall be not more than 10 feet (3048 mm).
3. For masonry walls, the *story height* shall be not more than 13 feet 7 inches (4140 mm) and the bearing wall clear height shall be not more than 12 feet (3658 mm).

**Exception:** An additional 8 feet (2438 mm) of bearing wall clear height is permitted for gable end walls.

4. For insulating concrete form walls, the maximum *story height* shall not exceed 11 feet 7 inches (3531 mm) and the maximum unsupported wall height per *story* as permitted by Section R608 tables shall not exceed 10 feet (3048 mm).
5. For structural insulated panel (SIP) walls, the *story height* shall be not more than 11 feet 7 inches (3531 mm) and the bearing wall height per *story* as permitted by Section R610 tables shall not exceed 10 feet (3048 mm).

For walls other than wood-framed walls, individual walls or wall studs shall be permitted to exceed these limits as permitted by Chapter 6, provided that the *story heights* of this section are not exceeded. An engineered design shall be provided for the wall or wall framing members where the limits of Chapter 6 are exceeded. Where the *story height* limits of this section are exceeded, the design of the building, or the noncompliant portions thereof, to resist wind and seismic loads shall be in accordance with the *International Building Code*.



exterior sheathing is filled with a minimum of two 2-inch nominal thickness wood studs.

**R302.2.3 Continuity.** The fire-resistance-rated wall or assembly separating *townhouse units* shall be continuous from the foundation to the underside of the roof sheathing, deck or slab. The fire-resistance rating shall extend the full length of the wall or assembly, including wall extensions through and separating attached enclosed *accessory structures*.

**R302.2.4 Parapets for townhouses.** Parapets constructed in accordance with Section R302.2.5 shall be constructed for *townhouses* as an extension of exterior walls or common walls separating *townhouse units* in accordance with the following:

1. Where roof surfaces adjacent to the wall or walls are at the same elevation, the parapet shall extend not less than 30 inches (762 mm) above the roof surfaces.
2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.

**Exception:** A parapet is not required in the preceding two cases where the roof covering complies with a minimum Class C rating as tested in accordance with ASTM E108 or UL 790 and the roof decking or sheathing is of *noncombustible materials* or fire-retardant-treated wood for a distance of 4 feet (1219 mm) on each side of the wall or walls, or one layer of  $\frac{5}{8}$ -inch (15.9 mm) Type X gypsum board is installed directly beneath the roof decking or sheathing, supported by not less than nominal 2-inch (51 mm) ledgers attached to the sides of the roof framing members, for a distance of not less than 4 feet (1219 mm) on each side of the wall or walls and any openings or penetrations in the roof are not within 4 feet (1219 mm) of the common walls. Fire-retardant-treated wood shall meet the requirements of Sections R802.1.5 and R803.2.1.2.

3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches (762 mm) above the lower roof. The common wall construction from the lower roof to the underside of the higher *roof deck* shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.

**R302.2.5 Parapet construction.** Parapets shall have the same fire-resistance rating as that required for the supporting wall or walls. On any side adjacent to a roof surface, the parapet shall have noncombustible faces for the uppermost 18 inches (457 mm), to include counter-flashing and coping materials. Where the roof slopes

toward a parapet at slopes greater than 2 units vertical in 12 units horizontal (16.7-percent slope), the parapet shall extend to the same height as any portion of the roof within a distance of 3 feet (914 mm), and the height shall be not less than 30 inches (762 mm).

**R302.2.6 Structural independence.** Each *townhouse unit* shall be structurally independent.

#### Exceptions:

1. Foundations supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit fastened to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. *Townhouse units* separated by a common wall as provided in Section R302.2.2, Item 1 or 2.
6. *Townhouse units* protected by a fire sprinkler system complying with Section P2904 or NFPA 13D.

**R302.3 Two-family dwellings.** *Dwelling units* in two-family dwellings shall be separated from each other by wall and floor assemblies having not less than a 1-hour fire-resistance rating where tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the *International Building Code*. Such separation shall be provided regardless of whether a *lot line* exists between the two *dwelling units* or not. Fire-resistance-rated floor/ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend from the foundation to the underside of the roof sheathing.

#### Exceptions:

1. A fire-resistance rating of  $\frac{1}{2}$  hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904.
2. Wall assemblies need not extend through attic spaces where the ceiling is protected by not less than  $\frac{5}{8}$ -inch (15.9 mm) Type X gypsum board, an attic draft stop constructed as specified in Section R302.12.1 is provided above and along the wall assembly separating the *dwellings* and the structural framing supporting the ceiling is protected by not less than  $\frac{1}{2}$ -inch (12.7 mm) gypsum board or equivalent.

**R302.3.1 Supporting construction.** Where floor assemblies are required to be fire-resistance rated by Section R302.3, the supporting construction of such assemblies shall have an equal or greater fire-resistance rating.

**R302.4 Dwelling unit rated penetrations.** Penetrations of wall or floor-ceiling assemblies required to be fire-resistance rated in accordance with Section R302.2 or R302.3 shall be protected in accordance with this section.

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**R302.4.1 Through penetrations.** Through penetrations of fire-resistance-rated wall or floor assemblies shall comply with Section R302.4.1.1 or R302.4.1.2.

**Exceptions:**

1. Where the penetrating items are steel, ferrous or copper pipes, tubes or conduits, the annular space shall be protected as follows:
  - 1.1. In concrete or masonry wall or floor assemblies, concrete, grout or mortar shall be permitted where installed to the full thickness of the wall or floor assembly or the thickness required to maintain the fire-resistance rating, provided that both of the following are complied with:
    - 1.1.1. The nominal diameter of the penetrating item is not more than 6 inches (152 mm).
    - 1.1.2. The area of the opening through the wall does not exceed 144 square inches (92 900 mm<sup>2</sup>).
  - 1.2. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 or UL 263 time temperature fire conditions under a positive pressure differential of not less than 0.01 inch of water (3 Pa) at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.
2. The annular space created by the penetration of water-filled fire sprinkler piping, provided that the annular space is filled using a material complying with Item 1.2 of Exception 1.

**R302.4.1.1 Fire-resistance-rated assembly.** Penetrations shall be installed as tested in the *approved* fire-resistance-rated assembly.

**R302.4.1.2 Penetration firestop system.** Penetrations shall be protected by an *approved* penetration firestop system installed as tested in accordance with ASTM E814 or UL 1479, with a positive pressure differential of not less than 0.01 inch of water (3 Pa) and shall have an F rating of not less than the required fire-resistance rating of the wall or floor-ceiling assembly penetrated.

**R302.4.2 Membrane penetrations.** Membrane penetrations shall comply with Section R302.4.1. Where walls are required to have a fire-resistance rating, recessed fixtures shall be installed so that the required fire-resistance rating will not be reduced.

**Exceptions:**

1. Membrane penetrations of not more than 2-hour fire-resistance-rated walls and partitions

by steel electrical boxes that do not exceed 16 square inches (0.0103 m<sup>2</sup>) in area provided that the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m<sup>2</sup>) in any 100 square feet (9.29 m<sup>2</sup>) of wall area. The annular space between the wall membrane and the box shall not exceed  $\frac{1}{8}$  inch (3.1 mm). Such boxes on opposite sides of the wall shall be separated by one of the following:

- 1.1. By a horizontal distance of not less than 24 inches (610 mm) where the wall or partition is constructed with individual noncommunicating stud cavities.
- 1.2. By a horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation.
- 1.3. By solid fireblocking in accordance with Section R302.11.
- 1.4. By protecting both boxes with *listed* putty pads.
- 1.5. By other *listed* materials and methods.
2. Membrane penetrations by *listed* electrical boxes of any materials provided that the boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the *listing*. The annular space between the wall membrane and the box shall not exceed  $\frac{1}{8}$  inch (3.1 mm) unless *listed* otherwise. Such boxes on opposite sides of the wall shall be separated by one of the following:
  - 2.1. By the horizontal distance specified in the *listing* of the electrical boxes.
  - 2.2. By solid fireblocking in accordance with Section R302.11.
  - 2.3. By protecting both boxes with *listed* putty pads.
  - 2.4. By other *listed* materials and methods.
3. The annular space created by the penetration of a fire sprinkler or water-filled fire sprinkler piping, provided that the annular space is covered by a metal escutcheon plate.
4. Ceiling membrane penetrations by *listed* luminaires or by luminaires protected with *listed* materials that have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the *listing*.

**R302.5 Dwelling-garage opening and penetration protection.** Openings and penetrations through the walls or ceilings separating the *dwelling* from the garage shall be in accordance with Sections R302.5.1 through R302.5.3.

**R302.5.1 Opening protection.** Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than  $1\frac{3}{8}$  inches (35 mm) in thickness, solid or honeycomb-core steel doors not less than  $1\frac{3}{8}$  inches (35 mm) thick, or 20-minute fire-rated doors. Doors shall be self-latching and equipped with a self-closing or automatic-closing device.

**R302.5.2 Duct penetration.** Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage (0.48 mm) sheet steel or other approved material and shall not have openings into the garage.

**R302.5.3 Other penetrations.** Penetrations through the separation required in Section R302.6 shall be protected as required by Section R302.11, Item 4.

**R302.6 Dwelling-garage fire separation.** The garage shall be separated as required by Table R302.6. Openings in garage walls shall comply with Section R302.5. Attachment of gypsum board shall comply with Table R702.3.5. The wall separation provisions of Table R302.6 shall not apply to garage walls that are perpendicular to the adjacent dwelling unit wall.

**R302.7 Under-stair protection.** Enclosed space under stairs that is accessed by a door or access panel shall have walls, under-stair surface and any soffits protected on the enclosed side with  $\frac{1}{2}$ -inch (12.7 mm) gypsum board.

**R302.8 Foam plastics.** For requirements for foam plastics, see Section R316.

**R302.8.1 Interior finish.** Foam plastics used as interior finishes shall comply with Section R316.5.10.

**R302.9 Flame spread index and smoke-developed index for wall and ceiling finishes.** Flame spread and smoke-developed indices for wall and ceiling finishes shall be in accordance with Sections R302.9.1 through R302.9.4.

**R302.9.1 Flame spread index.** Wall and ceiling finishes shall have a flame spread index of not greater than 200.

**Exception:** Flame spread index requirements for finishes shall not apply to trim defined as picture molds, chair rails, baseboards and handrails; to doors and windows or their frames; or to materials that are less than  $\frac{1}{28}$  inch (0.91 mm) in thickness cemented to

the surface of walls or ceilings if these materials exhibit flame spread index values not greater than those of paper of this thickness cemented to a noncombustible backing.

**R302.9.2 Smoke-developed index.** Wall and ceiling finishes shall have a *smoke-developed index* of not greater than 450.

**R302.9.3 Testing.** Tests shall be made in accordance with ASTM E84 or UL 723.

**R302.9.4 Alternative test method.** As an alternative to having a flame spread index of not greater than 200 and a *smoke-developed index* of not greater than 450 where tested in accordance with ASTM E84 or UL 723, wall and ceiling finishes shall be permitted to be tested in accordance with NFPA 286. Materials tested in accordance with NFPA 286 shall meet the following criteria:

The interior finish shall comply with the following:

1. During the 40 kW exposure, flames shall not spread to the ceiling.
2. The flame shall not spread to the outer extremity of the sample on any wall or ceiling.
3. Flashover, as defined in NFPA 286, shall not occur.
4. The peak heat release rate throughout the test shall not exceed 800 kW.
5. The total smoke released throughout the test shall not exceed 1,000 m<sup>2</sup>.

**R302.9.5 High-density polyethylene (HDPE) and polypropylene (PP).** Where high-density polyethylene or polypropylene is used as an interior finish material, it shall be tested in accordance with NFPA 286 and comply with the criteria in Section R302.9.4.

**R302.10 Flame spread index and smoke-developed index for insulation.** Flame spread and *smoke-developed index* for insulation shall be in accordance with Sections R302.10.1 through R302.10.5.

**R302.10.1 Insulation.** Insulating materials installed within floor-ceiling assemblies, roof-ceiling assemblies, wall assemblies, crawl spaces and attics shall comply with the requirements of this section. They shall exhibit a flame spread index not to exceed 25 and a *smoke-developed index* not to exceed 450 where tested in accordance with ASTM E84 or UL 723. Insulating materials, where

TABLE R302.6  
DWELLING-GARAGE SEPARATION

SEPARATION	MATERIAL
From the residence and attics	Not less than $\frac{1}{2}$ -inch gypsum board or equivalent applied to the garage side
From habitable rooms above the garage	Not less than $\frac{5}{8}$ -inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than $\frac{1}{2}$ -inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than $\frac{1}{2}$ -inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.



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tested in accordance with the requirements of this section, shall include facings, where used, such as vapor retarders, *vapor permeable* membranes and similar coverings.

**Exceptions:**

1. Where such materials are installed in concealed spaces, the flame spread index and *smoke-developed index* limitations do not apply to the facings, provided that the facing is installed in substantial contact with the unexposed surface of the ceiling, floor or wall finish.
2. Cellulose fiber loose-fill insulation that is not spray applied and that complies with the requirements of Section R302.10.3 shall not be required to meet the flame spread index requirements but shall be required to meet a *smoke-developed index* of not more than 450 where tested in accordance with CAN/ULC S102.2.
3. Foam plastic insulation shall comply with Section R316.

**R302.10.2 Loose-fill insulation.** Loose-fill insulation materials that cannot be mounted in the ASTM E84 or UL 723 apparatus without a screen or artificial supports shall comply with the flame spread and smoke-developed limits of Section R302.10.1 where tested in accordance with CAN/ULC S102.2.

**Exception:** Cellulosic fiber loose-fill insulation shall not be required to be tested in accordance with CAN/ULC S102.2, provided that such insulation complies with the requirements of Sections R302.10.1 and R302.10.3.

**R302.10.3 Cellulosic fiber loose-fill insulation.** Cellulosic fiber loose-fill insulation shall comply with CPSC 16 CFR, Parts 1209 and 1404. Each package of such insulating material shall be clearly *labeled* in accordance with CPSC 16 CFR, Parts 1209 and 1404.

**R302.10.4 Exposed attic insulation.** Exposed insulation materials installed on attic floors shall have a critical radiant flux of not less than 0.12 watt per square centimeter.

**R302.10.5 Testing.** Tests for critical radiant flux shall be made in accordance with ASTM E970.

**R302.11 Fireblocking.** In combustible construction, fireblocking shall be provided to cut off both vertical and horizontal concealed draft openings and to form an effective fire barrier between stories, and between a top story and the roof space.

Fireblocking shall be provided in wood-framed construction in the following locations:

1. In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs, as follows:
  - 1.1. Vertically at the ceiling and floor levels.
  - 1.2. Horizontally at intervals not exceeding 10 feet (3048 mm).

2. At interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
3. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed spaces under stairs shall comply with Section R302.7.
4. At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an *approved* material to resist the free passage of flame and products of combustion. The material filling this annular space shall not be required to meet the ASTM E136 requirements.
5. For the fireblocking of chimneys and fireplaces, see Section R1003.19.
6. Fireblocking of cornices of a two-family *dwelling* is required at the line of *dwelling unit* separation.

**R302.11.1 Fireblocking materials.** Except as provided in Section R302.11, Item 4, fireblocking shall consist of the following materials.

1. Two-inch (51 mm) nominal lumber.
2. Two thicknesses of 1-inch (25.4 mm) nominal lumber with broken lap joints.
3. One thickness of  $\frac{23}{32}$ -inch (18.3 mm) *wood structural panels* with joints backed by  $\frac{23}{32}$ -inch (18.3 mm) *wood structural panels*.
4. One thickness of  $\frac{3}{4}$ -inch (19.1 mm) particleboard with joints backed by  $\frac{3}{4}$ -inch (19.1 mm) particleboard.
5. One-half-inch (12.7 mm) gypsum board.
6. One-quarter-inch (6.4 mm) cement-based millboard.
7. Batts or blankets of mineral wool or glass fiber or other *approved* materials installed in such a manner as to be securely retained in place.
8. Cellulose insulation installed as tested in accordance with ASTM E119 or UL 263, for the specific application.

**R302.11.1.1 Batts or blankets of mineral or glass fiber.** Batts or blankets of mineral or glass fiber or other *approved* nonrigid materials shall be permitted for compliance with the 10-foot (3048 mm) horizontal fireblocking in walls constructed using parallel rows of studs or staggered studs.

**R302.11.1.2 Unfaced fiberglass.** Unfaced fiberglass batt insulation used as fireblocking shall fill the entire cross section of the wall cavity to a height of not less than 16 inches (406 mm) measured vertically. Where piping, conduit or similar obstructions are encountered, the insulation shall be packed tightly around the obstruction.

**R302.11.1.3 Loose-fill insulation material.** Loose-fill insulation material shall not be used as a fireblock unless specifically tested in the form and manner

intended for use to demonstrate its ability to remain in place and to retard the spread of fire and hot gases.

**R302.11.2 Fireblocking integrity.** The integrity of fireblocks shall be maintained.

**R302.12 Draftstopping.** In combustible construction where there is usable space both above and below the concealed space of a floor-ceiling assembly, draftstops shall be installed so that the area of the concealed space does not exceed 1,000 square feet (92.9 m<sup>2</sup>). Draftstopping shall divide the concealed space into approximately equal areas. Where the assembly is enclosed by a floor membrane above and a ceiling membrane below, draftstopping shall be provided in floor-ceiling assemblies under the following circumstances:

1. Ceiling is suspended under the floor framing.
2. Floor framing is constructed of truss-type open-web or perforated members.

**R302.12.1 Materials.** Draftstopping materials shall be not less than 1/2-inch (12.7 mm) gypsum board, 3/8-inch (9.5 mm) *wood structural panels* or other *approved* materials adequately supported. Draftstopping shall be installed parallel to the floor framing members unless otherwise *approved* by the *building official*. The integrity of the draftstops shall be maintained.

**R302.13 Fire protection of floors.** Floor assemblies that are not required elsewhere in this code to be fire-resistance rated, shall be provided with a 1/2-inch (12.7 mm) gypsum wallboard membrane, 5/8-inch (16 mm) *wood structural panel* membrane, or equivalent on the underside of the floor framing member. Penetrations or openings for ducts, vents, electrical outlets, lighting, devices, luminaires, wires, speakers, drainage, piping and similar openings or penetrations shall be permitted.

**Exceptions:**

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA 13D, or other *approved* equivalent sprinkler system.
2. Floor assemblies located directly over a *crawl space* not intended for storage or for the installation of fuel-fired or electric-powered heating *appliances*.
3. Portions of floor assemblies shall be permitted to be unprotected where complying with the following:
  - 3.1. The aggregate area of the unprotected portions does not exceed 80 square feet (7.4 m<sup>2</sup>) per story.
  - 3.2. Fireblocking in accordance with Section R302.11.1 is installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
4. Wood floor assemblies using dimension lumber or *structural composite lumber* equal to or greater

than 2-inch by 10-inch (50.8 mm by 254 mm) nominal dimension, or other *approved* floor assemblies demonstrating equivalent fire performance.

**R302.14 Combustible insulation clearance.** Combustible insulation shall be separated not less than 3 inches (76 mm) from recessed luminaires, fan motors and other heat-producing devices.

**Exception:** Where heat-producing devices are *listed* for lesser clearances, combustible insulation complying with the listing requirements shall be separated in accordance with the conditions stipulated in the listing.

Recessed luminaires installed in the *building thermal envelope* shall meet the requirements of Section N1102.4.5 of this code.

## SECTION R303 LIGHT, VENTILATION AND HEATING

**R303.1 Habitable rooms.** Habitable rooms shall have an aggregate glazing area of not less than 8 percent of the floor area of such rooms. Natural *ventilation* shall be through windows, skylights, doors, louvers or other *approved* openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The openable area to the outdoors shall be not less than 4 percent of the floor area being ventilated.

**Exceptions:**

1. For habitable rooms other than kitchens, the glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical *ventilation* system or a mechanical ventilation system capable of producing 0.35 air changes per hour in the habitable rooms is installed in accordance with Section M1505.
2. For kitchens, the glazed areas need not be openable where the opening is not required by Section R310 and a local exhaust system is installed in accordance with Section M1505.
3. The glazed areas need not be installed in rooms where Exception 1 is satisfied and artificial light is provided that is capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.
4. Use of *sunroom* and patio covers, as defined in Section R202, shall be permitted for natural *ventilation* if in excess of 40 percent of the exterior *sunroom* walls are open, or are enclosed only by insect screening.

**R303.2 Adjoining rooms.** For the purpose of determining light and *ventilation* requirements, rooms shall be considered to be a portion of an adjoining room where not less than one-half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the

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floor area of the interior room and not less than 25 square feet (2.3 m<sup>2</sup>).

**Exception:** Openings required for light or *ventilation* shall be permitted to open into a *sunroom* with thermal isolation or a patio cover, provided that there is an openable area between the adjoining room and the *sunroom* or patio cover of not less than one-tenth of the floor area of the interior room and not less than 20 square feet (2 m<sup>2</sup>). The minimum openable area to the outdoors shall be based on the total floor area being ventilated.

**R303.3 Bathrooms.** Bathrooms, water closet compartments and other similar rooms shall be provided with aggregate glazing area in windows of not less than 3 square feet (0.3 m<sup>2</sup>), one-half of which shall be openable.

**Exception:** The glazed areas shall not be required where artificial light and a local exhaust system are provided. The minimum local exhaust rates shall be determined in accordance with Section M1505. Exhaust air from the space shall be exhausted directly to the outdoors.

**R303.4 Mechanical ventilation.** Buildings and *dwelling units* complying with Section N1102.4.1 shall be provided with mechanical ventilation in accordance with Section M1505, or with other *approved* means of ventilation.

**R303.5 Opening location.** Outdoor intake and exhaust openings shall be located in accordance with Sections R303.5.1 and R303.5.2.

**R303.5.1 Intake openings.** Mechanical and gravity outdoor air intake openings shall be located not less than 10 feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks.

For the purpose of this section, the exhaust from *dwelling unit* toilet rooms, bathrooms and *kitchens* shall not be considered as hazardous or noxious.

### Exceptions:

1. The 10-foot (3048 mm) separation is not required where the intake opening is located 3 feet (914 mm) or greater below the contaminant source.
2. Vents and chimneys serving fuel-burning *appliances* shall be terminated in accordance with the applicable provisions of Chapters 18 and 24.
3. Clothes dryer exhaust ducts shall be terminated in accordance with Section M1502.3.

**R303.5.2 Exhaust openings.** Exhaust air shall not be directed onto walkways.

**R303.6 Outside opening protection.** Air exhaust and intake openings that terminate outdoors shall be protected with corrosion-resistant screens, louvers or grilles having an opening size of not less than 1/4 inch (6 mm) and a maximum opening size of 1/2 inch (13 mm), in any dimension. Openings shall be protected against local weather conditions. Outdoor air exhaust and intake openings shall meet the provisions for exterior wall opening protectives in accordance with this code.

**R303.7 Interior stairway illumination.** Interior *stairways* shall be provided with an artificial light source to illuminate the landings and treads. The light source shall be capable of illuminating treads and landings to levels of not less than 1 footcandle (11 lux) as measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the *stairway* has six or more *risers*.

**Exception:** A switch is not required where remote, central or automatic control of lighting is provided.

**R303.8 Exterior stairway illumination.** Exterior *stairways* shall be provided with an artificial light source located at the top landing of the *stairway*. Exterior *stairways* providing access to a *basement* from the outdoor *grade* level shall be provided with an artificial light source located at the bottom landing of the *stairway*.

**R303.9 Required glazed openings.** Required glazed openings shall open directly onto a street or public alley, or a *yard* or court located on the same *lot* as the building.

### Exceptions:

1. Required glazed openings that face into a roofed porch where the porch abuts a street, *yard* or court and the longer side of the porch is not less than 65 percent unobstructed and the ceiling height is not less than 7 feet (2134 mm).
2. Eave projections shall not be considered as obstructing the clear open space of a *yard* or court.
3. Required glazed openings that face into the area under a deck, balcony, bay or floor cantilever where a clear vertical space not less than 36 inches (914 mm) in height is provided.

**R303.9.1 Sunroom additions.** Required glazed openings shall be permitted to open into *sunroom additions* or patio covers that abut a street, *yard* or court if in excess of 40 percent of the exterior *sunroom* walls are open, or are enclosed only by insect screening, and the ceiling height of the *sunroom* is not less than 7 feet (2134 mm).

**R303.10 Required heating.** Where the winter design temperature in Table R301.2 is below 60°F (16°C), every *dwelling unit* shall be provided with heating facilities capable of maintaining a room temperature of not less than 68°F (20°C) at a point 3 feet (914 mm) above the floor and 2 feet (610 mm) from exterior walls in habitable rooms at the design temperature. The installation of one or more portable space heaters shall not be used to achieve compliance with this section.

## SECTION R304 MINIMUM ROOM AREAS

**R304.1 Minimum area.** Habitable rooms shall have a floor area of not less than 70 square feet (6.5 m<sup>2</sup>).

**Exception:** Kitchens.

**R304.2 Minimum dimensions.** Habitable rooms shall be not less than 7 feet (2134 mm) in any horizontal dimension.

**Exception:** Kitchens.



**R304.3 Height effect on room area.** Portions of a room with a sloping ceiling measuring less than 5 feet (1524 mm) or a furred ceiling measuring less than 7 feet (2134 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required habitable area for that room.

### SECTION R305 CEILING HEIGHT

**R305.1 Minimum height.** *Habitable space*, hallways and portions of *basements* containing these spaces shall have a ceiling height of not less than 7 feet (2134 mm). Bathrooms, toilet rooms and laundry rooms shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

#### Exceptions:

1. For rooms with sloped ceilings, the required floor area of the room shall have a ceiling height of not less than 5 feet (1524 mm) and not less than 50 percent of the required floor area shall have a ceiling height of not less than 7 feet (2134 mm).
2. The ceiling height above bathroom and toilet room fixtures shall be such that the fixture is capable of being used for its intended purpose. A shower or tub equipped with a showerhead shall have a ceiling height of not less than 6 feet 8 inches (2032 mm) above an area of not less than 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.
3. Beams, girders, ducts or other obstructions in *basements* containing *habitable space* shall be permitted to project to within 6 feet 4 inches (1931 mm) of the finished floor.
4. Beams and girders spaced apart not less than 36 inches (914 mm) in clear finished width shall project not more than 78 inches (1981 mm) from the finished floor.

**R305.1.1 Basements.** Portions of *basements* that do not contain *habitable space* or hallways shall have a ceiling height of not less than 6 feet 8 inches (2032 mm).

**Exception:** At beams, girders, ducts or other obstructions, the ceiling height shall be not less than 6 feet 4 inches (1931 mm) from the finished floor.

### SECTION R306 SANITATION

**R306.1 Toilet facilities.** Every *dwelling unit* shall be provided with a water closet, lavatory, and a bathtub or shower.

**R306.2 Kitchen.** Each *dwelling unit* shall be provided with a kitchen area and every kitchen area shall be provided with a sink.

**R306.3 Sewage disposal.** Plumbing fixtures shall be connected to a sanitary sewer or to an *approved* private sewage disposal system.

**R306.4 Water supply to fixtures.** Plumbing fixtures shall be connected to an *approved* water supply. Kitchen sinks, lavatories, bathtubs, showers, bidets, laundry tubs and washing machine outlets shall be provided with hot and cold water.

### SECTION R307 TOILET, BATH AND SHOWER SPACES

**R307.1 Space required.** Fixtures shall be spaced in accordance with Figure R307.1, and in accordance with the requirements of Section P2705.1.

**R307.2 Bathtub and shower spaces.** Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than 6 feet (1829 mm) above the floor.

### SECTION R308 GLAZING

**R308.1 Identification.** Except as indicated in Section R308.1.1 each pane of glazing installed in hazardous locations as defined in Section R308.4 shall be provided with a manufacturer's designation specifying who applied the designation, the type of glass and the safety glazing standard with which it complies, and that is visible in the final installation. The designation shall be acid etched, sandblasted, ceramic-fired, laser etched, embossed, or be of a type that once applied cannot be removed without being destroyed. A *label* shall be permitted in lieu of the manufacturer's designation.

#### Exceptions:

1. For other than tempered glass, manufacturer's designations are not required provided that the *building official* approves the use of a certificate, affidavit or other evidence confirming compliance with this code.
2. Tempered spandrel glass is permitted to be identified by the manufacturer with a removable paper designation.

**R308.1.1 Identification of multiple assemblies.** Multi-pane assemblies having individual panes not exceeding 1 square foot (0.09 m<sup>2</sup>) in exposed area shall have not less than one pane in the assembly identified in accordance with Section R308.1. Other panes in the assembly shall be labeled "CPSC 16 CFR 1201" or "ANSI Z97.1" as appropriate.

**R308.2 Louvered windows or жалюзи.** Regular, float, wired or patterned glass in жалюзи and louvered windows shall be not less than nominal  $\frac{3}{16}$  inch (5 mm) thick and not more than 48 inches (1219 mm) in length. Exposed glass edges shall be smooth.

**R308.2.1 Wired glass prohibited.** Wired glass with wire exposed on longitudinal edges shall not be used in жалюзи or louvered windows.

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4. One or more walking surfaces are within 36 inches (914 mm), measured horizontally and in a straight line, of the glazing.

**Exceptions:**

1. Decorative glazing.
2. Where glazing is adjacent to a walking surface and a horizontal rail is installed 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and have a cross-sectional height of not less than 1½ inches (38 mm).
3. Outboard panes in insulating glass units and other multiple glazed panels where the bottom edge of the glass is 25 feet (7620 mm) or more above *grade*, a roof, walking surfaces or other horizontal [within 45 degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.

**R308.4.4 Glazing in guards and railings.** Glazing in *guards* and railings, including structural baluster panels and nonstructural in-fill panels, regardless of area or height above a walking surface shall be considered to be a hazardous location.

**R308.4.4.1 Structural glass baluster panels.** *Guards* with structural glass baluster panels shall be installed with an attached top rail or *handrail*. The top rail or *handrail* shall be supported by not less than three glass baluster panels, or shall be otherwise supported to remain in place should one glass baluster panel fail.

**Exception:** An attached top rail or *handrail* is not required where the glass baluster panels are laminated glass with two or more glass plies of equal thickness and of the same glass type.

**R308.4.5 Glazing and wet surfaces.** Glazing in walls, enclosures or fences containing or adjacent to hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface shall be considered to be a hazardous location. This shall apply to single glazing and each pane in multiple glazing.

**Exception:** Glazing that is more than 60 inches (1524 mm), measured horizontally, from the water's edge of a bathtub, hot tub, spa, whirlpool or swimming pool or from the edge of a shower, sauna or steam room.

**R308.4.6 Glazing adjacent to stairs and ramps.** Glazing where the bottom exposed edge of the glazing is less than 36 inches (914 mm) above the plane of the adjacent walking surface of *stairways*, landings between flights of stairs and *ramps* shall be considered to be a hazardous location.

**Exceptions:**

1. Where glazing is adjacent to a walking surface and a horizontal rail is installed at 34 to 38

inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and have a cross-sectional height of not less than 1½ inches (38 mm).

2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.

**R308.4.7 Glazing adjacent to the bottom stair landing.**

Glazing adjacent to the landing at the bottom of a *stairway* where the glazing is less than 36 inches (914 mm) above the landing and within a 60-inch (1524 mm) horizontal arc less than 180 degrees (3.14 rad) from the bottom tread *nosing* shall be considered to be a hazardous location. (See Figure R308.4.7.)

**Exception:** Where the glazing is protected by a *guard* complying with Section R312 and the plane of the glass is more than 18 inches (457 mm) from the *guard*.

**R308.5 Site-built windows.** Site-built windows shall comply with Section 2404 of the *International Building Code*.

**R308.6 Skylights and sloped glazing.** *Skylights* and *sloped glazing* shall comply with the following sections.

**R308.6.1 Definitions.** The following terms are defined in Chapter 2:

**SKYLIGHT, UNIT.**

**SKYLIGHTS AND SLOPED GLAZING.**

**TUBULAR DAYLIGHTING DEVICE (TDD).**

**R308.6.2 Materials.** Glazing materials shall be limited to the following:

1. Laminated glass with not less than a 0.015-inch (0.38 mm) polyvinyl butyral interlayer for glass panes 16 square feet (1.5 m<sup>2</sup>) or less in area located such that the highest point of the glass is not more than 12 feet (3658 mm) above a walking surface; for higher or larger sizes, the interlayer thickness shall be not less than 0.030 inch (0.76 mm).
2. Fully tempered glass.
3. Heat-strengthened glass.
4. Wired glass.
5. *Approved* rigid plastics.

**R308.6.3 Screens, general.** For fully tempered or heat-strengthened glass, a broken glass retention screen meeting the requirements of Section R308.6.7 shall be installed below the full area of the glass, except for fully tempered glass that meets Condition 1 or 2 listed in Section R308.6.5.

**R308.6.4 Screens with multiple glazing.** Where the inboard pane is fully tempered, heat-strengthened or wired glass, a broken glass retention screen meeting the requirements of Section R308.6.7 shall be installed below the full area of the glass, except for Condition 1 or 2 listed in Section R308.6.5. Other panes in the multiple glazing shall be of any type listed in Section R308.6.2.

## SECTION R309 GARAGES AND CARPORTS

**R309.1 Floor surface.** Garage floor surfaces shall be of *approved noncombustible material*.

The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

**R309.2 Carports.** Carports shall be open on not less than two sides. Carport floor surfaces shall be of *approved noncombustible material*. Carports not open on two or more sides shall be considered to be a garage and shall comply with the provisions of this section for garages.

The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

**Exception:** Asphalt surfaces shall be permitted at ground level in carports.

**R309.3 Flood hazard areas.** Garages and carports located in flood hazard areas as established by Table R301.2 shall be constructed in accordance with Section R322.

**R309.4 Automatic garage door openers.** Automatic garage door openers, if provided, shall be *listed* and *labeled* in accordance with UL 325.

**R309.5 Fire sprinklers.** Private garages shall be protected by fire sprinklers where the garage wall has been designed based on Table R302.1(2), Note a. Sprinklers in garages shall be connected to an automatic sprinkler system that complies with Section P2904. Garage sprinklers shall be residential sprinklers or quick-response sprinklers, designed to provide a density of 0.05 gpm/ft<sup>2</sup>. Garage doors shall not be considered obstructions with respect to sprinkler placement.

## SECTION R310 EMERGENCY ESCAPE AND RESCUE OPENINGS

**R310.1 Emergency escape and rescue opening required.** *Basements, habitable attics* and every sleeping room shall have not less than one operable *emergency escape and rescue opening*. Where *basements* contain one or more sleeping rooms, an *emergency escape and rescue opening* shall be required in each sleeping room. *Emergency escape and rescue openings* shall open directly into a *public way*, or to a *yard* or court having a minimum width of 36 inches (914 mm) that opens to a *public way*.

### Exceptions:

1. *Storm shelters* and *basements* used only to house mechanical *equipment* not exceeding a total floor area of 200 square feet (18.58 m<sup>2</sup>).
2. Where the *dwelling unit* or *townhouse unit* is equipped with an automatic sprinkler system installed in accordance with Section P2904, sleeping rooms in *basements* shall not be required to have *emergency escape and rescue openings*

provided that the *basement* has one of the following:

- 2.1. One means of egress complying with Section R311 and one *emergency escape and rescue opening*.
- 2.2. Two means of egress complying with Section R311.
3. A *yard* shall not be required to open directly into a *public way* where the *yard* opens to an unobstructed path from the *yard* to the *public way*. Such path shall have a width of not less than 36 inches (914 mm).

**R310.1.1 Operational constraints and opening control devices.** *Emergency escape and rescue openings* shall be operational from the inside of the room without the use of keys, tools or special knowledge. Window opening control devices and fall prevention devices complying with ASTM F2090 shall be permitted for use on windows serving as a required *emergency escape and rescue opening* and shall be not more than 70 inches (178 cm) above the finished floor.

**R310.2 Emergency escape and rescue openings.** *Emergency escape and rescue openings* shall have minimum dimensions in accordance with Sections R310.2.1 through R310.2.4.

**R310.2.1 Minimum size.** *Emergency escape and rescue openings* shall have a net clear opening of not less than 5.7 square feet (0.530 m<sup>2</sup>).

**Exception:** The minimum net clear opening for *grade-floor emergency escape and rescue openings* shall be 5 square feet (0.465 m<sup>2</sup>).

**R310.2.2 Minimum dimensions.** The minimum net clear opening height dimension shall be 24 inches (610 mm). The minimum net clear opening width dimension shall be 20 inches (508 mm). The net clear opening dimensions shall be the result of normal operation of the opening.

**R310.2.3 Maximum height from floor.** *Emergency escape and rescue openings* shall have the bottom of the clear opening not greater than 44 inches (1118 mm) above the floor.

**R310.2.4 Emergency escape and rescue openings under decks, porches and cantilevers.** *Emergency escape and rescue openings* installed under decks, porches and cantilevers shall be fully openable and provide a path not less than 36 inches (914 mm) in height and 36 inches (914 mm) in width to a *yard* or court.

**R310.3 Emergency escape and rescue doors.** Where a door is provided as the required *emergency escape and rescue opening*, it shall be a side-hinged door or a sliding door.

**R310.4 Area wells.** An *emergency escape and rescue opening* where the bottom of the clear opening is below the adjacent grade shall be provided with an area well in accordance with Sections R310.4.1 through R310.4.4.

**R310.4.1 Minimum size.** The horizontal area of the area well shall be not less than 9 square feet (0.9 m<sup>2</sup>), with a



horizontal projection and width of not less than 36 inches (914 mm). The size of the area well shall allow the *emergency escape and rescue opening* to be fully opened.

**Exception:** The ladder or steps required by Section R310.4.2 shall be permitted to encroach not more than 6 inches (152 mm) into the required dimensions of the area well.

**R310.4.2 Ladder and steps.** Area wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with an *approved*, permanently affixed ladder or steps. The ladder or steps shall not be obstructed by the *emergency escape and rescue opening* where the window or door is in the open position. Ladders or steps required by this section shall not be required to comply with Section R311.7.

**R310.4.2.1 Ladders.** Ladders and rungs shall have an inside width of not less than 12 inches (305 mm), shall project not less than 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center vertically for the full height of the area well.

**R310.4.2.2 Steps.** Steps shall have an inside width of not less than 12 inches (305 mm), a minimum tread depth of 5 inches (127 mm) and a maximum *riser* height of 18 inches (457 mm) for the full height of the area well.

**R310.4.3 Drainage.** Area wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section R405.1.

**Exception:** A drainage system for area wells is not required where the foundation is on well-drained soil or sand-gravel mixture soils in accordance with the United Soil Classification System, Group I Soils, as detailed in Table R405.1.

**R310.4.4 Bars, grilles, covers and screens.** Where bars, grilles, covers, screens or similar devices are placed over *emergency escape and rescue openings*, bulkhead enclosures or area wells that serve such openings, the minimum net clear opening size shall comply with Sections R310.2 through R310.2.2 and R310.4.1. Such devices shall be releasable or removable from the inside without the use of a key or tool or force greater than that required for the normal operation of the escape and rescue opening.

**R310.5 Replacement windows for emergency escape and rescue openings.** Replacement windows installed in buildings meeting the scope of this code shall be exempt from Sections R310.2 and R310.4.4, provided that the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window is of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.
2. The replacement window is not part of a change of occupancy.

**R310.6 Dwelling additions.** Where *dwelling additions* contain sleeping rooms, an *emergency escape and rescue opening* shall be provided in each new sleeping room. Where *dwelling additions* have *basements*, an *emergency escape and rescue opening* shall be provided in the new *basement*.

#### Exceptions:

1. An *emergency escape and rescue opening* is not required in a new *basement* that contains a sleeping room with an *emergency escape and rescue opening*.
2. An *emergency escape and rescue opening* is not required in a new *basement* where there is an *emergency escape and rescue opening* in an existing *basement* that is *accessed* from the new *basement*.
3. An operable window complying with Section 310.7.1 shall be acceptable as an *emergency escape and rescue opening*.

**R310.7 Alterations or repairs of existing basements.** New sleeping rooms created in an existing *basement* shall be provided with *emergency escape and rescue openings* in accordance with Section R310.1. Other than new sleeping rooms, where existing basements undergo alterations or repairs, an *emergency escape and rescue opening* is not required.

**Exception:** An operable window complying with Section 310.7.1 shall be acceptable as an *emergency escape and rescue opening*.

**R310.7.1 Existing emergency escape and rescue openings.** Where a *change of occupancy* would require an *emergency escape and rescue opening* in accordance with Section 310.1, operable windows serving as the *emergency escape and rescue opening* shall comply with the following:

1. An existing operable window shall provide a minimum net clear opening of 4 square feet (0.38 m<sup>2</sup>) with a minimum net clear opening height of 22 inches (559 mm) and a minimum net clear opening width of 20 inches (508 mm).
2. A replacement window where such window complies with both of the following:
  - 2.1. The replacement window meets the size requirements in Item 1.
  - 2.2. The replacement window is the manufacturer's largest standard-size window that will fit within the existing frame or existing rough opening. The replacement window shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.

## SECTION R311 MEANS OF EGRESS

**R311.1 Means of egress.** *Dwellings* shall be provided with a means of egress in accordance with this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the *dwelling* to the required egress door without requiring travel through a garage. The required egress door shall open directly into a *public way* or to a *yard* or court that opens to a *public way*.

**R311.2 Egress door.** Not less than one egress door shall be provided for each *dwelling unit*. The egress door shall be side-hinged, and shall provide a clear width of not less than 32 inches (813 mm) where measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). The clear height of the door opening shall be not less than 78 inches (1981 mm) in height measured from the top of the threshold to the bottom of the stop. Other doors shall not be required to comply with these minimum dimensions. Egress doors shall be readily openable from inside the *dwelling* without the use of a key or special knowledge or effort.

**R311.3 Floors and landings at exterior doors.** There shall be a landing or floor on each side of each exterior door. The width of each landing shall be not less than the door served. Landings shall have a dimension of not less than 36 inches (914 mm) measured in the direction of travel. The slope at exterior landings shall not exceed  $\frac{1}{4}$  unit vertical in 12 units horizontal (2 percent).

**Exception:** Exterior balconies less than 60 square feet (5.6 m<sup>2</sup>) and only *accessed* from a door are permitted to have a landing that is less than 36 inches (914 mm) measured in the direction of travel.

**R311.3.1 Floor elevations at the required egress doors.** Landings or finished floors at the required egress door shall be not more than  $1\frac{1}{2}$  inches (38 mm) lower than the top of the threshold.

**Exception:** The landing or floor on the exterior side shall be not more than  $7\frac{3}{4}$  inches (196 mm) below the top of the threshold provided that the door does not swing over the landing or floor.

Where exterior landings or floors serving the required egress door are not at *grade*, they shall be provided with access to *grade* by means of a *ramp* in accordance with Section R311.8 or a *stairway* in accordance with Section R311.7.

**R311.3.2 Floor elevations at other exterior doors.** Doors other than the required egress door shall be provided with landings or floors not more than  $7\frac{3}{4}$  inches (196 mm) below the top of the threshold.

**Exception:** A top landing is not required where a *stairway* of not more than two *risers* is located on the exterior side of the door, provided that the door does not swing over the *stairway*.

**R311.3.3 Storm and screen doors.** Storm and screen doors shall be permitted to swing over exterior stairs and landings.

**R311.4 Vertical egress.** Egress from habitable levels including habitable attics and *basements* that are not provided with an egress door in accordance with Section R311.2 shall be by a *ramp* in accordance with Section R311.8 or a *stairway* in accordance with Section R311.7.

**R311.5 Landing, deck, balcony and stair construction and attachment.** Exterior landings, decks, balconies, stairs and similar facilities shall be positively anchored to the primary structure to resist both vertical and lateral forces or shall be designed to be self-supporting. Attachment shall not be accomplished by use of toenails or nails subject to withdrawal.

**R311.6 Hallways.** The width of a hallway shall be not less than 3 feet (914 mm).

**R311.7 Stairways.** Where required by this code or provided, *stairways* shall comply with this section.

### Exceptions:

1. Stairways not within or serving a building, porch or deck.
2. Stairways leading to nonhabitable attics.
3. Stairways leading to *crawl spaces*.

**R311.7.1 Width.** *Stairways* shall be not less than 36 inches (914 mm) in clear width at all points above the permitted *handrail* height and below the required headroom height. The clear width of *stairways* at and below the *handrail* height, including treads and landings, shall be not less than  $31\frac{1}{2}$  inches (787 mm) where a *handrail* is installed on one side and 27 inches (698 mm) where *handrails* are installed on both sides.

**Exception:** The width of *spiral stairways* shall be in accordance with Section R311.7.10.1.

**R311.7.2 Headroom.** The headroom in *stairways* shall be not less than 6 feet 8 inches (2032 mm) measured vertically from the sloped line adjoining the tread *nosing* or from the floor surface of the landing or platform on that portion of the *stairway*.

### Exceptions:

1. Where the *nosings* of treads at the side of a flight extend under the edge of a floor opening through which the *stair* passes, the floor opening shall not project horizontally into the required headroom more than  $4\frac{3}{4}$  inches (121 mm).
2. The headroom for *spiral stairways* shall be in accordance with Section R311.7.10.1.

**R311.7.3 Vertical rise.** A flight of stairs shall not have a vertical rise greater than 12 feet 7 inches (3835 mm) between floor levels or landings.

**R311.7.4 Walkline.** The walkline across *winder* treads and landings shall be concentric to the turn and parallel to the direction of travel entering and exiting the turn. The walkline shall be located 12 inches (305 mm) from the inside of the turn. The 12-inch (305 mm) dimension shall be measured from the widest point of the clear stair width

at the walking surface. Where *winders* are adjacent within a flight, the point of the widest clear stair width of the adjacent *winders* shall be used.

**R311.7.5 Stair treads and risers.** *Stair* treads and *risers* shall meet the requirements of this section. For the purposes of this section, dimensions and dimensioned surfaces shall be exclusive of carpets, rugs or runners.

**R311.7.5.1 Risers.** The *riser* height shall be not more than  $7\frac{3}{4}$  inches (196 mm). The *riser* height shall be measured vertically between leading edges of the adjacent treads. The greatest *riser* height within any flight of stairs shall not exceed the smallest by more than  $\frac{3}{8}$  inch (9.5 mm). *Risers* shall be vertical or sloped from the underside of the *nosing* of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical. At open *risers*, openings located more than 30 inches (762 mm), as measured vertically, to the floor or *grade* below shall not permit the passage of a 4-inch-diameter (102 mm) sphere.

**Exceptions:**

1. The opening between adjacent treads is not limited on *spiral stairways*.
2. The *riser* height of *spiral stairways* shall be in accordance with Section R311.7.10.1.

**R311.7.5.2 Treads.** The tread depth shall be not less than 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than  $\frac{3}{8}$  inch (9.5 mm).

**R311.7.5.2.1 Winder treads.** *Winder* treads shall have a tread depth of not less than 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. *Winder* treads shall have a tread depth of not less than 6 inches (152 mm) at any point within the clear width of the *stair*. Within any flight of stairs, the largest *winder* tread depth at the walkline shall not exceed the smallest *winder* tread by more than  $\frac{3}{8}$  inch (9.5 mm). Consistently shaped *winders* at the walkline shall be allowed within the same flight of stairs as rectangular treads and shall not be required to be within  $\frac{3}{8}$  inch (9.5 mm) of the rectangular tread depth.

**Exception:** The tread depth at *spiral stairways* shall be in accordance with Section R311.7.10.1.

**R311.7.5.3 Nosings.** *Nosings* at treads, landings and floors of *stairways* shall have a radius of curvature at the *nosing* not greater than  $\frac{9}{16}$  inch (14 mm) or a bevel not greater than  $\frac{1}{2}$  inch (12.7 mm). A *nosing* projection not less than  $\frac{3}{4}$  inch (19 mm) and not more

than  $1\frac{1}{4}$  inches (32 mm) shall be provided on *stairways*. The greatest *nosing* projection shall not exceed the smallest *nosing* projection by more than  $\frac{3}{8}$  inch (9.5 mm) within a *stairway*.

**Exception:** A *nosing* projection is not required where the tread depth is not less than 11 inches (279 mm).

**R311.7.5.4 Exterior plastic composite stair treads.** *Plastic composite* exterior stair treads shall comply with the provisions of this section and Section R507.2.2.

**R311.7.6 Landings for stairways.** There shall be a floor or landing at the top and bottom of each *stairway*. The width perpendicular to the direction of travel shall be not less than the width of the flight served. For landings of shapes other than square or rectangular, the depth at the walk line and the total area shall be not less than that of a quarter circle with a radius equal to the required landing width. Where the *stairway* has a straight run, the depth in the direction of travel shall be not less than 36 inches (914 mm).

**Exception:** A floor or landing is not required at the top of an interior flight of stairs, including stairs in an enclosed garage, provided that a door does not swing over the stairs.

**R311.7.7 Stairway walking surface.** The walking surface of treads and landings of *stairways* shall be sloped not steeper than 1 unit vertical in 48 units horizontal (2-percent slope).

**Exception:** Where the surface of a landing is required elsewhere in the code to drain surface water, the walking surface of the landing shall be sloped not steeper than 1 unit vertical in 20 units horizontal (5-percent slope) in the direction of travel.

**R311.7.8 Handrails.** *Handrails* shall be provided on not less than one side of each flight of stairs with four or more *risers*.

**R311.7.8.1 Height.** *Handrail* height, measured vertically from the sloped plane adjoining the tread *nosing*, or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

**Exceptions:**

1. The use of a volute, turnout or starting easing shall be allowed over the lowest tread.
2. Where *handrail* fittings or bendings are used to provide continuous transition between flights, transitions at *winder* treads, the transition from *handrail* to *guard*, or used at the start of a flight, the *handrail* height at the fittings or bendings shall be permitted to exceed 38 inches (965 mm).



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**R311.7.8.2 Handrail projection.** *Handrails* shall not project more than  $4\frac{1}{2}$  inches (114 mm) on either side of the *stairway*.

**Exception:** Where *nosings* of landings, floors or passing flights project into the *stairway* reducing the clearance at passing *handrails*, *handrails* shall project not more than  $6\frac{1}{2}$  inches (165 mm) into the *stairway*, provided that the stair width and *handrail* clearance are not reduced to less than that required.

**R311.7.8.3 Handrail clearance.** *Handrails* adjacent to a wall shall have a space of not less than  $1\frac{1}{2}$  inches (38 mm) between the wall and the *handrails*.

**R311.7.8.4 Continuity.** *Handrails* shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above the lowest riser of the flight. *Handrail* ends shall be returned toward a wall, guard walking surface continuous to itself, or terminate to a post.

**Exceptions:**

1. *Handrail* continuity shall be permitted to be interrupted by a newel post at a turn in a flight with winders, at a landing, or over the lowest tread.
2. A volute, turnout or starting easing shall be allowed to terminate over the lowest tread and over the top landing.

**R311.7.8.5 Grip size.** Required *handrails* shall be of one of the following types or provide equivalent graspability.

1. Type I. *Handrails* with a circular cross section shall have an outside diameter of not less than  $1\frac{1}{4}$  inches (32 mm) and not greater than 2 inches (51 mm). If the *handrail* is not circular, it shall have a perimeter of not less than 4 inches (102 mm) and not greater than  $6\frac{1}{4}$  inches (160 mm) and a cross section of not more than  $2\frac{1}{4}$  inches (57 mm). Edges shall have a radius of not less than 0.01 inch (0.25 mm).
2. Type II. *Handrails* with a perimeter greater than  $6\frac{1}{4}$  inches (160 mm) shall have a graspable finger recess area on both sides of the profile. The finger recess shall begin within  $\frac{3}{4}$  inch (19 mm) measured vertically from the tallest portion of the profile and have a depth of not less than  $\frac{5}{16}$  inch (8 mm) within  $\frac{7}{8}$  inch (22 mm) below the widest portion of the profile. This required depth shall continue for not less than  $\frac{3}{8}$  inch (10 mm) to a level that is not less than  $1\frac{3}{4}$  inches (45 mm) below the tallest portion of the profile. The width of the *handrail* above the recess shall be not less than  $1\frac{1}{4}$  inches (32 mm) and not more than  $2\frac{3}{4}$  inches (70 mm). Edges shall have a radius of not less than 0.01 inch (0.25 mm).

**R311.7.8.6 Exterior plastic composite handrails.** *Plastic composite* exterior *handrails* shall comply with the requirements of Section R507.2.2.

**R311.7.9 Illumination.** *Stairways* shall be provided with illumination in accordance with Sections R303.7 and R303.8.

**R311.7.10 Special stairways.** *Spiral stairways* and bulkhead enclosure *stairways* shall comply with the requirements of Section R311.7 except as specified in Sections R311.7.10.1 and R311.7.10.2.

**R311.7.10.1 Spiral stairways.** The clear width at and below the *handrails* at *spiral stairways* shall be not less than 26 inches (660 mm) and the walkline radius shall be not greater than  $24\frac{1}{2}$  inches (622 mm). Each tread shall have a depth of not less than  $6\frac{3}{4}$  inches (171 mm) at the walkline. Treads shall be identical, and the rise shall be not more than  $9\frac{1}{2}$  inches (241 mm). Headroom shall be not less than 6 feet 6 inches (1982 mm).

**R311.7.10.2 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 R311.3 and R311.7 where the height from the *basement* finished floor level to *grade* adjacent to the *stairway* is not more than 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.

**R311.7.11 Alternating tread devices.** Alternating tread devices shall not be used as an element of a means of egress. Alternating tread devices shall be permitted provided that a required means of egress *stairway* or *ramp* serves the same space at each adjoining level or where a means of egress is not required. The clear width at and below the *handrails* shall be not less than 20 inches (508 mm).

**Exception:** Alternating tread devices are allowed to be used as an element of a means of egress for lofts, *mezzanines* and similar areas of 200 gross square feet (18.6 m<sup>2</sup>) or less where such devices do not provide exclusive access to a kitchen or bathroom.

**R311.7.11.1 Treads of alternating tread devices.** Alternating tread devices shall have a tread depth of not less than 5 inches (127 mm), a projected tread depth of not less than  $8\frac{1}{2}$  inches (216 mm), a tread width of not less than 7 inches (178 mm) and a *riser* height of not more than  $9\frac{1}{2}$  inches (241 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projections of adjacent treads. The *riser* height shall be measured vertically between the leading edges of adjacent treads. The *riser* height and tread depth provided shall result in an angle of ascent from the horizontal of between 50 and 70 degrees (0.87 and 1.22 rad). The initial tread of the device shall begin at the same elevation as the platform, landing or floor surface.

**R311.7.11.2 Handrails of alternating tread devices.**

*Handrails* shall be provided on both sides of alternating tread devices and shall comply with Sections R311.7.8.2 through R311.7.8.6. *Handrail* height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

**R311.7.12 Ship's ladders.** Ship's ladders shall not be used as an element of a means of egress. Ship's ladders shall be permitted provided that a required means of egress *stairway* or *ramp* serves the same space at each adjoining level or where a means of egress is not required. The clear width at and below the *handrails* shall be not less than 20 inches (508 mm).

**Exception:** Ship's ladders are allowed to be used as an element of a means of egress for lofts, *mezzanines* and similar areas of 200 gross square feet (18.6 m<sup>2</sup>) or less that do not provide exclusive access to a kitchen or bathroom.

**R311.7.12.1 Treads of ship's ladders.** Treads shall have a depth of not less than 5 inches (127 mm). The tread shall be projected such that the total of the tread depth plus the *nosings* projection is not less than 8½ inches (216 mm). The *riser* height shall be not more than 9½ inches (241 mm).

**R311.7.12.2 Handrails of ship's ladders.** *Handrails* shall be provided on both sides of ship's ladders and shall comply with Sections R311.7.8.2 through R311.7.8.6. *Handrail* height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

**R311.8 Ramps.** Where required by this code or provided, *ramps* shall comply with this section.

**Exception:** Ramps not within or serving a building, porch or deck.

**R311.8.1 Maximum slope.** *Ramps* serving the egress door required by Section R311.2 shall have a slope of not more than 1 unit vertical in 12 units horizontal (8.3-percent slope).

Other *ramps* shall have a maximum slope of 1 unit vertical in 8 units horizontal (12.5 percent).

**Exception:** Where it is technically infeasible to comply because of site constraints, *ramps* shall have a slope of not more than 1 unit vertical in 8 units horizontal (12.5 percent).

**R311.8.2 Landings required.** There shall be a floor or landing at the top and bottom of each *ramp*, where doors open onto *ramps*, and where *ramps* change directions. The width of the landing perpendicular to the *ramp* slope shall be not less than the width of the *ramp*. The depth of the landing in the direction of the *ramp* slope shall be not less than 36 inches (914 mm).

**R311.8.3 Handrails required.** *Handrails* shall be provided on not less than one side of *ramps* exceeding a slope of 1 unit vertical in 12 units horizontal (8.33-percent slope).

**R311.8.3.1 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).

**R311.8.3.2 Grip size.** *Handrails* on *ramps* shall comply with Section R311.7.8.5.

**R311.8.3.3 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 1½ inches (38 mm) between the wall and the *handrails*.

## 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.

**R312.1.1 Where required.** *Guards* shall be provided for those portions of open-sided walking surfaces, including floors, 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*.

**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 *nosings*.

### Exceptions:

1. *Guards* on the open sides of stairs shall have a height of not less than 34 inches (864 mm) measured vertically from a line connecting the *nosings*.
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 *nosings*.

**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 4¾ inches (111 mm) in diameter.

**R312.1.4 Exterior plastic composite guards.** *Plastic composite* exterior *guards* shall comply with the requirements of Section R317.4.

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**R312.2 Window fall protection.** Window fall protection shall be provided in accordance with Sections R312.2.1 and R312.2.2.

**R312.2.1 Window opening height.** In *dwelling units*, where the bottom of the clear opening 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 window openings will not allow a 4-inch-diameter (102 mm) sphere to pass through where the openings are in their largest opened position.
2. Operable windows are provided with window opening control devices or fall prevention devices that comply with ASTM F2090.

**R312.2.2 Emergency escape and rescue openings.** Where an operable window serves as an *emergency escape and rescue opening*, a window opening control device or fall prevention device, after operation to release the control device or fall prevention 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 Sections R310.2.1 and R310.2.2.

## SECTION R313 AUTOMATIC FIRE SPRINKLER SYSTEMS

**R313.1 Townhouse automatic fire sprinkler systems.** An automatic sprinkler system shall be installed in *townhouses*.

**Exception:** An automatic sprinkler system shall not be required where *additions* or *alterations* are made to existing *townhouses* that do not have an automatic sprinkler system installed.

**R313.1.1 Design and installation.** Automatic sprinkler systems for *townhouses* shall be designed and installed in accordance with Section P2904 or NFPA 13D.

**R313.2 One- and two-family dwellings automatic sprinkler systems.** An automatic sprinkler system shall be installed in one- and two-family *dwellings*.

**Exception:** An automatic sprinkler system shall not be required for *additions* or *alterations* to existing buildings that are not already provided with a sprinkler system.

**R313.2.1 Design and installation.** Automatic sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA 13D.

## SECTION R314 SMOKE ALARMS

**R314.1 General.** Smoke alarms shall comply with NFPA 72 and Section R314.

**R314.1.1 Listings.** Smoke alarms shall be *listed* in accordance with UL 217. Combination smoke and carbon

monoxide alarms shall be *listed* in accordance with UL 217 and UL 2034.

**R314.2 Where required.** Smoke alarms shall be provided in accordance with this section.

**R314.2.1 New construction.** Smoke alarms shall be provided in *dwelling units*.

**R314.2.2 Alterations, repairs and additions.** Where *alterations, repairs* or *additions* requiring a *permit* occur, the individual *dwelling unit* shall be equipped with smoke alarms located as required for new *dwellings*.

### Exceptions:

1. Work involving the exterior surfaces of *dwellings*, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of a porch or deck.
2. Installation, *alteration* or repairs of plumbing or mechanical systems.

**R314.3 Location.** 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* and *habitable attics* and 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.
4. Not less than 3 feet (914 mm) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by this section.
5. In the hallway and in the room open to the hallway in *dwelling units* where the ceiling height of a room open to a hallway serving bedrooms exceeds that of the hallway by 24 inches (610 mm) or more.

**R314.3.1 Installation near cooking appliances.** Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Section R314.3.

1. Ionization smoke alarms shall not be installed less than 20 feet (6096 mm) horizontally from a permanently installed cooking *appliance*.
2. Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet (3048 mm) horizontally from a permanently installed cooking *appliance*.
3. Photoelectric smoke alarms shall not be installed less than 6 feet (1828 mm) horizontally from a permanently installed cooking *appliance*.
4. Smoke alarms *listed* and marked "helps reduce cooking nuisance alarms" shall not be installed



less than 6 feet (1828 mm) horizontally from a permanently installed cooking *appliance*.

**R314.4 Interconnection.** Where more than one smoke alarm is required to be installed within an individual *dwelling unit* in accordance with Section R314.3, 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 *dwelling unit*. Physical interconnection of smoke alarms shall not be required where *listed* wireless alarms are installed and all alarms sound upon activation of one alarm.

**R314.5 Combination alarms.** Combination smoke and carbon monoxide alarms shall be permitted to be used in lieu of smoke alarms.

**R314.6 Power source.** Smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and, where 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.

**Exceptions:**

1. Smoke alarms shall be permitted to be battery operated where installed in buildings without commercial power.
2. Smoke alarms installed in accordance with Section R314.2.2 shall be permitted to be battery powered.

**R314.7 Fire alarm systems.** Fire alarm systems shall be permitted to be used in lieu of smoke alarms and shall comply with Sections R314.7.1 through R314.7.4.

**R314.7.1 General.** Fire alarm systems shall comply with the provisions of this code and the household fire warning equipment provisions of NFPA 72. Smoke detectors shall be *listed* in accordance with UL 268.

**R314.7.2 Location.** Smoke detectors shall be installed in the locations specified in Section R314.3.

**R314.7.3 Permanent fixture.** Where a household fire alarm system is installed, it shall become a permanent fixture of the occupancy, owned by the homeowner.

**R314.7.4 Combination detectors.** Combination smoke and carbon monoxide detectors shall be permitted to be installed in fire alarm systems in lieu of smoke detectors, provided that they are *listed* in accordance with UL 268 and UL 2075.

## SECTION R315 CARBON MONOXIDE ALARMS

**R315.1 General.** Carbon monoxide alarms shall comply with Section R315.

**R315.1.1 Listings.** Carbon monoxide alarms shall be *listed* in accordance with UL 2034. Combination carbon monoxide and smoke alarms shall be *listed* in accordance with UL 217 and UL 2034.

**R315.2 Where required.** Carbon monoxide alarms shall be provided in accordance with Sections R315.2.1 and R315.2.2.

**R315.2.1 New construction.** For new construction, carbon monoxide alarms shall be provided in *dwelling units* where either or both of the following conditions exist.

1. The *dwelling unit* contains a fuel-fired *appliance*.
2. The *dwelling unit* has an attached garage with an opening that communicates with the *dwelling unit*.

**R315.2.2 Alterations, repairs and additions.** Where *alterations, repairs* or *additions* requiring a *permit* occur, the individual *dwelling unit* shall be equipped with carbon monoxide alarms located as required for new *dwelling units*.

**Exceptions:**

1. Work involving the exterior surfaces of *dwelling units*, such as the replacement of roofing or siding, or the addition or replacement of windows or doors, or the addition of a porch or deck.
2. Installation, *alteration* or repairs of plumbing systems.
3. Installation, alteration or repairs of mechanical systems that are not fuel fired.

**R315.3 Location.** Carbon monoxide alarms in *dwelling units* shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning *appliance* is located within a bedroom or its attached bathroom, a carbon monoxide alarm shall be installed within the bedroom.

**R315.4 Combination alarms.** Combination carbon monoxide and smoke alarms shall be permitted to be used in lieu of carbon monoxide alarms.

**R315.5 Interconnectivity.** Where more than one carbon monoxide alarm is required to be installed within an individual *dwelling unit* in accordance with Section R315.3, 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 *dwelling unit*. Physical interconnection of carbon monoxide alarms shall not be required where *listed* wireless alarms are installed and all alarms sound upon activation of one alarm.

**Exception:** Interconnection of carbon monoxide alarms in existing areas shall not be required where *alterations* or *repairs* do not result in removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, *crawl space* or *basement* available that could provide access for interconnection without the removal of interior finishes.

**R315.6 Power source.** Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and, where primary power is interrupted, shall receive power from a



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battery. Wiring shall be permanent and without a disconnecting switch other than those required for overcurrent protection.

**Exceptions:**

1. Carbon monoxide alarms shall be permitted to be battery operated where installed in buildings without commercial power.
2. Carbon monoxide alarms installed in accordance with Section R315.2.2 shall be permitted to be battery powered.

**R315.7 Carbon monoxide detection systems.** Carbon monoxide detection systems shall be permitted to be used in lieu of carbon monoxide alarms and shall comply with Sections R315.7.1 through R315.7.4.

**R315.7.1 General.** Household carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be *listed* in accordance with UL 2075.

**R315.7.2 Location.** Carbon monoxide detectors shall be installed in the locations specified in Section R315.3. These locations supersede the locations specified in NFPA 720.

**R315.7.3 Permanent fixture.** Where a household carbon monoxide detection system is installed, it shall become a permanent fixture of the occupancy and owned by the homeowner.

**R315.7.4 Combination detectors.** Combination carbon monoxide and smoke detectors installed in carbon monoxide detection systems in lieu of carbon monoxide detectors shall be *listed* in accordance with UL 268 and UL 2075.

## SECTION R316 FOAM PLASTIC

**R316.1 General.** The provisions of this section shall govern the materials, design, application, construction and installation of foam plastic materials.

**R316.2 Labeling and identification.** Packages and containers of foam plastic insulation and foam plastic insulation components delivered to the job site shall bear the *label* of an *approved agency* showing the manufacturer's name, the product listing, product identification and information sufficient to determine that the end use will comply with the requirements.

**R316.3 Surface burning characteristics.** Unless otherwise allowed in Section R316.5, foam plastic, or foam plastic cores used as a component in manufactured assemblies, used in building construction shall comply with Section R316.3.1 or R316.3.2. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and *smoke-developed index*.

**Exception:** Spray foam plastic insulation more than 4 inches (102 mm) in thickness shall have a flame spread index of not more than 25 and a *smoke-developed index* of not more than 450 where tested at a thickness of 4

inches (102 mm) and at the density intended for use. Such spray foam plastic shall be separated from the interior of a building by  $\frac{1}{2}$ -inch (12.7 mm) gypsum wallboard or by a material that has been tested in accordance with NFPA 275, and shall meet the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test.

**R316.3.1 Foam plastic insulation 4 inches thick or less.** Foam plastic insulation installed at 4 inches (102 mm) in thickness or less shall have a flame spread index of not more than 75 and a *smoke-developed index* of not more than 450 where tested in the maximum thickness and density intended for use in accordance with ASTM E84 or UL 723.

**R316.3.2 Foam plastic insulation more than 4 inches thick.** Foam plastic insulation installed at more than 4 inches (102 mm) in thickness shall have a flame spread index of not more than 75 and a *smoke-developed index* of not more than 450 where tested at a thickness of 4 inches (102 mm) in accordance with ASTM E84 or UL 723, provided that the end use is *approved* in accordance with Section R316.6 using the thickness and density intended for use.

**R316.4 Thermal barrier.** Unless otherwise allowed in Section R316.5, foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of not less than  $\frac{1}{2}$ -inch (12.7 mm) gypsum wallboard,  $\frac{23}{32}$ -inch (18.2 mm) *wood structural panel* or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275.

**R316.5 Specific requirements.** The following requirements shall apply to these uses of foam plastic unless specifically *approved* in accordance with Section R316.6 or by other sections of the code or the requirements of Sections R316.2 through R316.4 have been met.

**R316.5.1 Masonry or concrete construction.** The thermal barrier specified in Section R316.4 is not required in a masonry or concrete wall, floor or roof where the foam plastic insulation is separated from the interior of the building by not less than a 1-inch (25 mm) thickness of masonry or concrete.

**R316.5.2 Roofing.** The thermal barrier specified in Section R316.4 is not required where the foam plastic in a *roof assembly* or under a roof covering is installed in accordance with the code and the manufacturer's instructions and is separated from the interior of the building by tongue-and-groove wood planks or *wood structural panel* sheathing, in accordance with Section R803, that is not less than  $\frac{15}{32}$  inch (11.9 mm) thick bonded with exterior glue, identified as Exposure 1 and with edges supported by blocking or tongue-and-groove joints or an equivalent material. The *smoke-developed index* for roof applications shall not be limited.

**R316.5.3 Attics.** The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. *Attic* access is required by Section R807.1.

2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation has been tested in accordance with Section R316.6 or the foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
  - 3.1. 1½-inch-thick (38 mm) mineral fiber insulation.
  - 3.2. ¼-inch-thick (6.4 mm) *wood structural panels*.
  - 3.3. ⅜-inch (9.5 mm) particleboard.
  - 3.4. ¼-inch (6.4 mm) hardboard.
  - 3.5. ⅜-inch (9.5 mm) gypsum board.
  - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm).
  - 3.7. 1½-inch-thick (38 mm) cellulose insulation.
  - 3.8. ¼-inch (6.4 mm) fiber-cement panel, soffit or backer board.

The ignition barrier is not required where the foam plastic insulation has been tested in accordance with Section R316.6.

**R316.5.4 Crawl spaces.** The thermal barrier specified in Section R316.4 is not required where all of the following apply:

1. *Crawl space* access is required by Section R408.4.
2. Entry is made only for purposes of repairs or maintenance.
3. The foam plastic insulation has been tested in accordance with Section R316.6 or the foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
  - 3.1. 1½-inch-thick (38 mm) mineral fiber insulation.
  - 3.2. ¼-inch-thick (6.4 mm) *wood structural panels*.
  - 3.3. ⅜-inch (9.5 mm) particleboard.
  - 3.4. ¼-inch (6.4 mm) hardboard.
  - 3.5. ⅜-inch (9.5 mm) gypsum board.
  - 3.6. Corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm).
  - 3.7. ¼-inch (6.4 mm) fiber-cement panel, soffit or backer board.

**R316.5.5 Foam-filled exterior doors.** Foam-filled exterior doors are exempt from the requirements of Sections R316.3 and R316.4.

**R316.5.6 Foam-filled garage doors.** Foam-filled garage doors in attached or detached garages are exempt from the requirements of Sections R316.3 and R316.4.

**R316.5.7 Foam backer board.** The thermal barrier specified in Section R316.4 is not required where siding backer board foam plastic insulation has a thickness of not more than 0.5 inch (12.7 mm) and a potential heat of

not more than 2000 Btu per square foot (22 720 kJ/m<sup>2</sup>) when tested in accordance with NFPA 259 and it complies with one or more of the following:

1. The foam plastic insulation is separated from the interior of the building by not less than 2 inches (51 mm) of mineral fiber insulation.
2. The foam plastic insulation is installed over existing exterior wall finish in conjunction with re-siding.
3. The foam plastic insulation has been tested in accordance with Section R316.6.

**R316.5.8 Re-siding.** The thermal barrier specified in Section R316.4 is not required where the foam plastic insulation is installed over existing exterior wall finish in conjunction with re-siding provided that the foam plastic has a thickness of not more than 0.5 inch (12.7 mm) and a potential heat of not more than 2000 Btu per square foot (22 720 kJ/m<sup>2</sup>) when tested in accordance with NFPA 259.

**R316.5.9 Interior trim.** The thermal barrier specified in Section R316.4 is not required for exposed foam plastic interior *trim*, provided that all of the following are met:

1. The density is not less than 20 pounds per cubic foot (320 kg/m<sup>3</sup>).
2. The thickness of the *trim* is not more than 0.5 inch (12.7 mm) and the width is not more than 8 inches (204 mm).
3. The interior *trim* shall not constitute more than 10 percent of the aggregate wall and ceiling area of any room or space.
4. The flame spread index does not exceed 75 when tested in accordance with ASTM E84 or UL 723. The *smoke-developed index* is not limited.

**R316.5.10 Interior finish.** Foam plastics used as interior finishes shall comply with Section R316.6 and shall meet the flame spread index and *smoke-developed index* requirements of Sections R302.9.1 and R302.9.2.

**R316.5.11 Sill plates and headers.** Foam plastic spray applied to sill plates and headers or installed in the perimeter joist space without the thermal barrier specified in Section R316.4 shall comply with all of the following:

1. The thickness of the foam plastic shall be not more than ¾ inches (83 mm).
2. The density of the foam plastic shall be in the range of 0.5 to 2.0 pounds per cubic foot (8 to 32 kg/m<sup>3</sup>).
3. The foam plastic shall have a flame spread index of 25 or less and an accompanying *smoke-developed index* of 450 or less when tested in accordance with ASTM E84 or UL 723.

**R316.5.12 Sheathing.** Foam plastic insulation used as sheathing shall comply with Section R316.3 and Section R316.4. Where the foam plastic sheathing is exposed to the *attic* space at a gable or kneewall, the provisions of Section R316.5.3 shall apply. Where foam plastic insula-

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tion is used as exterior wall sheathing on framed wall assemblies, it shall comply with Section R316.8.

**R316.5.13 Floors.** The thermal barrier specified in Section R316.4 is not required to be installed on the walking surface of a structural floor system that contains foam plastic insulation where the foam plastic is covered by not less than a nominal  $\frac{1}{2}$ -inch-thick (12.7 mm) *wood structural panel* or equivalent. The thermal barrier specified in Section R316.4 is required on the underside of the structural floor system that contains foam plastic insulation where the underside of the structural floor system is exposed to the interior of the building.

**R316.6 Specific approval.** Foam plastic not meeting the requirements of Sections R316.3 through R316.5 shall be specifically *approved* on the basis of one of the following *approved* tests: NFPA 286 with the acceptance criteria of Section R302.9.4, FM 4880, UL 1040 or UL 1715, or fire tests related to actual end-use configurations. Approval shall be based on the actual end-use configuration and shall be performed on the finished foam plastic assembly in the maximum thickness intended for use. Assemblies tested shall include seams, joints and other typical details used in the installation of the assembly and shall be tested in the manner intended for use.

**R316.7 Termite damage.** The use of foam plastics in areas of “very heavy” termite infestation probability shall be in accordance with Section R318.4.

**R316.8 Wind resistance.** Foam plastic insulation complying with ASTM C578 and ASTM C1289 and used as exterior wall sheathing on framed wall assemblies shall comply with SBCA FS 100 for wind pressure resistance unless installed directly over a sheathing material that is separately capable of resisting the wind load or otherwise exempted from the scope of SBCA FS 100.

## SECTION R317 PROTECTION OF WOOD AND WOOD-BASED PRODUCTS AGAINST DECAY

**R317.1 Location required.** Protection of wood and wood-based products from decay shall be provided in the following locations by the use of *naturally durable wood* or wood that is preservative-treated in accordance with AWPA U1.

1. In crawl spaces or unexcavated areas located within the periphery of the building foundation, wood joists or the bottom of a wood structural floor where closer than 18 inches (457 mm) to exposed ground, wood girders where closer than 12 inches (305 mm) to exposed ground, and wood columns where closer than 8 inches (204 mm) to exposed ground.
2. Wood framing members, including columns, that rest directly on concrete or masonry exterior foundation walls and are less than 8 inches (203 mm) from the exposed ground.
3. Sills and sleepers on a concrete or masonry slab that is in direct contact with the ground unless separated from such slab by an impervious moisture barrier.

4. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than  $\frac{1}{2}$  inch (12.7 mm) on tops, sides and ends.
  5. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than 6 inches (152 mm) from the ground or less than 2 inches (51 mm) measured vertically from concrete steps, porch slabs, patio slabs and similar horizontal surfaces exposed to the weather.
  6. Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.
  7. Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below *grade* except where an *approved* vapor retarder is applied between the wall and the furring strips or framing members.
  8. Portions of wood structural members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances where those members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering that would prevent moisture or water accumulation on the surface or at joints between members.
- Exception:** Sawn lumber used in buildings located in a geographical region where experience has demonstrated that climatic conditions preclude the need to use naturally durable or preservative-treated wood where the structure is exposed to the weather.
9. Wood columns in contact with *basement* floor slabs unless supported by concrete piers or metal pedestals projecting not less than 1 inch (25 mm) above the concrete floor and separated from the concrete pier by an impervious moisture barrier.

**R317.1.1 Field treatment.** Field-cut ends, notches and drilled holes of preservative-treated wood shall be treated in the field in accordance with AWPA M4.

**R317.1.2 Ground contact.** All wood in contact with the ground, embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather that supports permanent structures intended for human occupancy shall be *approved* pressure-preservative-treated wood suitable for ground contact use, except that untreated wood used entirely below groundwater level or continuously submerged in fresh water shall not be required to be pressure-preservative treated.

**R317.2 Quality mark.** Lumber and plywood required to be pressure-preservative treated in accordance with Section R318.1 shall bear the quality *mark* of an *approved* inspection agency that maintains continuing supervision, testing and inspection over the quality of the product and that has been *approved* by an accreditation body that complies with the



requirements of the American Lumber Standard Committee treated wood program.

**R317.2.1 Required information.** The required quality *mark* on each piece of pressure-preservative-treated lumber or plywood shall contain the following information:

1. Identification of the treating plant.
2. Type of preservative.
3. The minimum preservative retention.
4. End use for which the product was treated.
5. Standard to which the product was treated.
6. Identity of the *approved* inspection agency.
7. The designation “Dry,” if applicable.

**Exception:** Quality *marks* on lumber less than 1 inch (25 mm) nominal thickness, or lumber less than nominal 1 inch by 5 inches (25 mm by 127 mm) or 2 inches by 4 inches (51 mm by 102 mm) or lumber 36 inches (914 mm) or less in length shall be applied by stamping the faces of exterior pieces or by end labeling not less than 25 percent of the pieces of a bundled unit.

**R317.3 Fasteners and connectors in contact with preservative-treated and fire-retardant-treated wood.**

Fasteners, including nuts and washers, and connectors in contact with preservative-treated wood and fire-retardant-treated wood shall be in accordance with this section. The coating weights for zinc-coated fasteners shall be in accordance with ASTM A153. Stainless steel driven fasteners shall be in accordance with the material requirements of ASTM F1667.

**R317.3.1 Fasteners for preservative-treated wood.**

Fasteners, including nuts and washers, for preservative-treated wood shall be of hot-dipped, zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Staples shall be of stainless steel. Coating types and weights for connectors in contact with preservative-treated wood shall be in accordance with the connector manufacturer’s recommendations. In the absence of manufacturer’s recommendations, not less than ASTM A653 type G185 zinc-coated galvanized steel, or equivalent, shall be used.

**Exceptions:**

1. 1/2-inch-diameter (12.7 mm) or greater steel bolts.
2. Fasteners other than nails, staples and timber rivets shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B695, Class 55 minimum.
3. Plain carbon steel fasteners in SBX/DOT and zinc borate preservative-treated wood in an interior, dry environment shall be permitted.

**R317.3.2 Fastenings for wood foundations.** Fastenings, including nuts and washers, for wood foundations shall be as required in AWC PWF.

**R317.3.3 Fasteners for fire-retardant-treated wood used in exterior applications or wet or damp locations.**

Fasteners, including nuts and washers, for fire-retardant-treated wood used in exterior applications or wet or damp locations shall be of hot-dipped, zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Fasteners other than nails, staples and timber rivets shall be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B695, Class 55 minimum.

**R317.3.4 Fasteners for fire-retardant-treated wood used in interior applications.**

Fasteners, including nuts and washers, for fire-retardant-treated wood used in interior locations shall be in accordance with the manufacturer’s recommendations. In the absence of the manufacturer’s recommendations, Section R317.3.3 shall apply.

**R317.4 Plastic composites.** *Plastic composite* exterior deck boards, stair treads, *guards* and *handrails* containing wood, cellulosic or other biodegradable materials shall comply with the requirements of Section R507.2.2.

## SECTION R318 PROTECTION AGAINST SUBTERRANEAN TERMITES

**R318.1 Subterranean termite control methods.** In areas subject to damage from termites as indicated by Table R301.2, protection shall be by one, or a combination, of the following methods:

1. Chemical termiticide treatment in accordance with Section R318.2.
2. Termite-baiting system installed and maintained in accordance with the *label*.
3. Pressure-preservative-treated wood in accordance with the provisions of Section R317.1.
4. Naturally durable termite-resistant wood.
5. Physical barriers in accordance with Section R318.3 and used in locations as specified in Section R317.1.
6. Cold-formed steel framing in accordance with Sections R505.2.1 and R603.2.1.

**R318.1.1 Quality mark.** Lumber and plywood required to be pressure-preservative treated in accordance with Section R318.1 shall bear the quality *mark* of an *approved* inspection agency that maintains continuing supervision, testing and inspection over the quality of the product and that has been *approved* by an accreditation body that complies with the requirements of the American Lumber Standard Committee treated wood program.

**R318.1.2 Field treatment.** Field-cut ends, notches and drilled holes of pressure-preservative-treated wood shall be retreated in the field in accordance with AWWA M4.

**R318.2 Chemical termiticide treatment.** Chemical termiticide treatment shall include soil treatment or field-applied wood treatment. The concentration, rate of application and method of treatment of the chemical termiticide shall be in strict accordance with the termiticide *label*.

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**R318.3 Barriers.** *Approved* physical barriers, such as metal or plastic sheeting or collars specifically designed for termite prevention, shall be installed in a manner to prevent termites from entering the structure. Shields placed on top of an exterior foundation wall shall be used only if in combination with another method of protection.

**R318.4 Foam plastic protection.** In areas where the probability of termite infestation is “very heavy” as indicated in Figure R318.4, extruded and expanded polystyrene, polyisocyanurate and other foam plastics shall not be installed on the exterior face or under interior or exterior foundation walls or slab foundations located below *grade*. The clearance between foam plastics installed above *grade* and exposed earth shall be not less than 6 inches (152 mm).

**Exceptions:**

1. Buildings where the structural members of walls, floors, ceilings and roofs are entirely of *noncombustible materials* or pressure-preservative-treated wood.
2. Where in addition to the requirements of Section R318.1, an *approved* method of protecting the foam plastic and structure from subterranean termite damage is used.
3. On the interior side of basement *walls*.

### SECTION R319 SITE ADDRESS

**R319.1 Address identification.** Buildings shall be provided with *approved* address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Each character shall be not less than 4 inches (102 mm) in height with a stroke width of not less than 0.5 inch (12.7 mm). Where required by the fire code official, address identification shall be provided in additional *approved* locations to facilitate emergency response. Where access is by means of a private road and the building address cannot be viewed from the *public way*, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained.

### SECTION R320 ACCESSIBILITY

**R320.1 Scope.** Where there are four or more *dwelling units* or *sleeping units* in a single structure, the provisions of Chapter 11 of the *International Building Code* for Group R-3 shall apply.

**Exception:** Owner-occupied *lodging houses* with five or fewer guestrooms are not required to be accessible.

**R320.2 Live/work units.** In *live/work units*, the nonresidential portion shall be accessible in accordance with Sections 508.5.9 and 508.5.11 of the *International Building Code*. In

a structure where there are four or more *live/work units*, the dwelling portion of the *live/work unit* shall comply with Section 1108.6.2.1 of the *International Building Code*.

### SECTION R321 ELEVATORS AND PLATFORM LIFTS

**R321.1 Elevators.** Where provided, passenger elevators, limited-use and limited-application elevators or private residence elevators shall comply with ASME A17.1/CSA B44.

**R321.2 Platform lifts.** Where provided, platform lifts shall comply with ASME A18.1.

**R321.3 Accessibility.** Elevators or platform lifts that are part of an accessible route required by Chapter 11 of the *International Building Code*, shall comply with ICC A117.1.

### SECTION R322 FLOOD-RESISTANT CONSTRUCTION

**R322.1 General.** Buildings and structures constructed in whole or in part in flood hazard areas, including A or V Zones and Coastal A Zones, as established in Table R301.2, and substantial improvement and *repair* of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. Buildings and structures that are located in more than one flood hazard area shall comply with the provisions associated with the most restrictive flood hazard area. Buildings and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

**R322.1.1 Alternative provisions.** As an alternative to the requirements in Section R322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

**R322.1.2 Structural systems.** Structural systems of 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.

**R322.1.3 Flood-resistant construction.** Buildings and structures erected in areas prone to flooding shall be constructed by methods and practices that minimize flood damage.

**R322.1.4 Establishing the design flood elevation.** The design flood elevation shall be used to define flood hazard areas. At a minimum, the design flood elevation shall be the higher of the following:

1. The base flood elevation at the depth of peak elevation of flooding, including wave height, that has a 1-percent (100-year flood) or greater chance of being equaled or exceeded in any given year.
2. The elevation of the design flood associated with the area designated on a flood hazard map adopted by the community, or otherwise legally designated.

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**R322.1.4.1 Determination of design flood elevations.** If design flood elevations are not specified, the *building official* is authorized to require the applicant to comply with either of the following:

1. Obtain and reasonably use data available from a federal, state or other source.
2. Determine the design flood elevation in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a *registered design professional* who shall document that the technical methods used reflect currently accepted engineering practice. Studies, analyses and computations shall be submitted in sufficient detail to allow thorough review and *approval*.

**R322.1.4.2 Determination of impacts.** In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall demonstrate that the effect of the proposed buildings and structures on design flood elevations, including fill, when combined with other existing and anticipated flood hazard area encroachments, will not increase the design flood elevation more than 1 foot (305 mm) at any point within the *jurisdiction*.

**R322.1.5 Lowest floor.** The lowest floor shall be the lowest floor of the lowest enclosed area, including *basement*, and 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.

**R322.1.6 Protection of mechanical, plumbing and electrical systems.** Electrical systems, *equipment* and components; heating, ventilating, air-conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* shall be located at or above the elevation required in Section R322.2 or R322.3. If replaced as part of a substantial improvement, electrical systems, *equipment* and components; heating, ventilating, air-conditioning and plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* shall meet the requirements of this section. Systems, fixtures, and *equipment* and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

**Exception:** Locating electrical systems, *equipment* and components; heating, ventilating, air-conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* is permitted below the elevation required in Section R322.2 or R322.3 provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the required elevation in accordance with ASCE 24. Elec-

trical wiring systems are permitted to be located below the required elevation provided that they conform to the provisions of the electrical part of this code for wet locations.

**R322.1.7 Protection of water supply and sanitary sewage systems.** New and replacement water supply systems shall be designed to minimize or eliminate 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 or eliminate 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*.

**R322.1.8 Flood-resistant materials.** Building materials and installation methods used for flooring and interior and exterior walls and wall coverings below the elevation required in Section R322.2 or R322.3 shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2.

**R322.1.9 Manufactured homes.** The bottom of the frame of new and replacement *manufactured homes* on foundations that conform to the requirements of Section R322.2 or R322.3, as applicable, shall be elevated to or above the elevations specified in Section R322.2 (flood hazard areas including A Zones) or R322.3 in coastal high-hazard areas (V Zones and Coastal A Zones). The anchor and tie-down requirements of the applicable state or federal requirements shall apply. The foundation and anchorage of *manufactured homes* to be located in identified floodways shall be designed and constructed in accordance with ASCE 24.

**R322.1.10 As-built elevation documentation.** A *registered design professional* shall prepare and seal documentation of the elevations specified in Section R322.2 or R322.3.

**R322.2 Flood hazard areas (including A Zones).** Areas that have been determined to be prone to flooding and that are not subject to high-velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1½ feet (457 mm) and 3 feet (914 mm) or otherwise designated by the *jurisdiction* shall be designated as Coastal A Zones and are subject to the requirements of Section R322.3. Buildings and structures constructed in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections R322.2.1 through R322.2.4.

#### R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, not including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor



(including *basement*) elevated to a height above the highest adjacent *grade* of not less than the depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or not less than 3 feet (915 mm) if a depth number is not specified.

3. *Basement* floors that are below *grade* on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
4. Garage and carport floors shall comply with one of the following:
  - 4.1. They shall be elevated to or above the elevations required in Item 1 or Item 2, as applicable.
  - 4.2. They shall be at or above *grade* on not less than one side. Where a garage or carport is enclosed by walls, the garage or carport shall be used solely for parking, building access or storage.

**Exception:** Enclosed areas below the elevation required in this section, including *basements* with floors that are not below *grade* on all sides, shall meet the requirements of Section R322.2.2.

**R322.2.2 Enclosed area below required elevation.** Enclosed areas, including *crawl spaces*, that are below the elevation required in Section R322.2.1 shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria and are installed in accordance with Section R322.2.2.1:
  - 2.1. The total net area of nonengineered openings shall be not less than 1 square inch (645 mm<sup>2</sup>) for each square foot (0.093 m<sup>2</sup>) of enclosed area where the enclosed area is measured on the exterior of the enclosure walls, or the openings shall be designed as engineered openings and the *construction documents* shall include a statement by a *registered design professional* that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.7.2.2 of ASCE 24.
  - 2.2. Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the wall.
  - 2.3. The presence of louvers, blades, screens and faceplates or other covers and devices shall allow the automatic flow of floodwater into and out of the enclosed areas and shall be accounted for in the determination of the net open area.

**R322.2.2.1 Installation of openings.** The walls of enclosed areas shall have openings installed such that:

1. There shall be not less than two openings on different sides of each enclosed area; if a building has more than one enclosed area, each area shall have openings.
2. The bottom of each opening shall be not more than 1 foot (305 mm) above the higher of the final interior grade or floor and the finished exterior grade immediately under each opening.
3. Openings shall be permitted to be installed in doors and windows; doors and windows without installed openings do not meet the requirements of this section.

**R322.2.3 Foundation design and construction.** Foundation walls for buildings and structures erected in flood hazard areas shall meet the requirements of Chapter 4.

**Exception:** Unless designed in accordance with Section R404:

1. The unsupported height of 6-inch (152 mm) plain masonry walls shall be not more than 3 feet (914 mm).
2. The unsupported height of 8-inch (203 mm) plain masonry walls shall be not more than 4 feet (1219 mm).
3. The unsupported height of 8-inch (203 mm) reinforced masonry walls shall be not more 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 to the top of the wall.

**R322.2.4 Tanks.** Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood.

**R322.3 Coastal high-hazard areas (including V Zones and Coastal A Zones, where designated).** 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. Flood hazard areas that have been designated as subject to wave heights between 1½ feet (457 mm) and 3 feet (914 mm) or otherwise designated by the *jurisdiction* shall be designated as Coastal A Zones. Buildings and structures constructed in whole or in part in coastal high-hazard areas and Coastal A Zones, where designated, shall be designed and constructed in accordance with Sections R322.3.1 through R322.3.10.

**R322.3.1 Location and site preparation.**

1. New buildings and buildings that are determined to be substantially improved pursuant to Section

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R105.3.1.1 shall be located landward of the reach of mean high tide.

- For any alteration of sand dunes and mangrove stands, the *building official* shall require submission of an engineering analysis that demonstrates that the proposed alteration will not increase the potential for flood damage.

**R322.3.2 Elevation requirements.**

- Buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.
- Basement* floors that are below *grade* on all sides are prohibited.
- Garages used solely for parking, building access or storage, and carports shall comply with Item 1 or shall be at or above *grade* on not less than one side and, if enclosed with walls, such walls shall comply with Item 6.
- The use of fill for structural support is prohibited.
- Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.
- Walls and partitions enclosing areas below the elevation required in this section shall meet the requirements of Sections R322.3.5 and R322.3.6.

**R322.3.3 Foundations.** Buildings and structures erected in coastal high-hazard areas and Coastal A Zones shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns and shall comply with the following:

- The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R322.3.5.
- Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift) and pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling.
- Columns and their supporting foundations shall be designed to resist combined wave and wind loads, lateral and uplift, and shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the columns. Spread footing, 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 spread footing, mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24.

- Flood and wave loads shall be those associated with the design flood. Wind loads shall be those required by this code.
- Foundation designs and *construction documents* shall be prepared and sealed in accordance with Section R322.3.9.

**Exception:** In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided that the foundations are designed to account for wave action, debris impact, erosion and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

**R322.3.4 Concrete slabs.** Concrete slabs used for parking, floors of enclosures, landings, decks, walkways, patios and similar uses that are located beneath structures, or slabs that are located such that if undermined or displaced during base flood conditions could cause structural damage to the building foundation, shall be designed and constructed in accordance with one of the following:

- To be structurally independent of the foundation system of the structure, to not transfer flood loads to the main structure, and to be frangible and break away under flood conditions prior to base flood conditions. Slabs shall be a maximum of 4 inches (102 mm) thick, shall not have turned-down edges, shall not contain reinforcing, shall have isolation joints at pilings and columns, and shall have control or construction joints in both directions spaced not more than 4 feet (1219 mm) apart.
- To be self-supporting, structural slabs capable of remaining intact and functional under base flood conditions, including erosion and local scour, and the main structure shall be capable of resisting any added flood loads and effects of local scour caused by the presence of the slabs.

**R322.3.5 Walls below required elevation.** Walls and partitions are permitted below the elevation required in Section R322.3.2, provided that such walls and partitions are not part of the structural support of the building or structure and:

- Electrical, mechanical and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
- Are constructed with insect screening or open lattice; or
- Are 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 resistance of not less than 10 (479 Pa) and not more than 20 pounds per square foot (958 Pa) as determined using allowable stress design; or

4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), as determined using allowable stress design, the *construction documents* shall include documentation prepared and sealed by a *registered design professional* that:
  - 4.1. The walls and partitions below the required elevation have been designed to collapse from a water load less than that which would occur during the base flood.
  - 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on structural and nonstructural building components. Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code.
5. Walls intended to break away under flood loads as specified in Item 3 or 4 have flood openings that meet the criteria in Section R322.2.2, Item 2.

**R322.3.6 Enclosed areas below required elevation.** Enclosed areas below the elevation required in Section R322.3.2 shall be used solely for parking of vehicles, building access or storage.

**R322.3.6.1 Protection of building envelope.** An exterior door that meets the requirements of Section R609 shall be installed at the top of stairs that provide access to the building and that are enclosed with walls designed to break away in accordance with Section R322.3.5.

**R322.3.7 Stairways and ramps.** *Stairways* and *ramps* that are located below the lowest floor elevations specified in Section R322.3.2 shall comply with one or more of the following:

1. Be designed and constructed with open or partially open *risers* and *guards*.
2. *Stairways* and *ramps* not part of the required means of egress shall be designed and constructed to break away during design flood conditions without causing damage to the building or structure, including foundation.
3. Be retractable, or able to be raised to or above the lowest floor elevation, provided that the ability to be retracted or raised prior to the onset of flooding is not contrary to the means of egress requirements of the code.
4. Be designed and constructed to resist flood loads and minimize transfer of flood loads to the building or structure, including foundation.

Areas below *stairways* and *ramps* shall not be enclosed with walls below the required in Section R322.3.2 elevation unless such walls are constructed in accordance with Section R322.3.5.

**R322.3.8 Decks and porches.** Attached decks and porches shall meet the elevation requirements of Section R322.3.2 and shall either meet the foundation requirements of this section or shall be cantilevered from or knee braced to the building or structure. Self-supporting decks and porches that are below the elevation required in Section R322.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Self-supporting decks and porches shall be designed and constructed to remain in place during base flood conditions or shall be frangible and break away under base flood conditions.

**R322.3.9 Construction documents.** The *construction documents* shall include documentation that is prepared and sealed by a *registered design professional* that the design and methods of construction to be used meet the applicable criteria of this section.

**R322.3.10 Tanks.** Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R322.3.2. Where elevated on platforms, the platforms shall be cantilevered from or knee braced to the building or shall be supported on foundations that conform to the requirements of Section R322.3.

## SECTION R323 STORM SHELTERS

**R323.1 General.** This section applies to *storm shelters* where constructed as separate detached buildings or where constructed as safe rooms within buildings for the purpose of providing refuge from storms that produce high winds, such as tornados and hurricanes. In addition to other applicable requirements in this code, storm shelters shall be constructed in accordance with ICC 500.

**R323.1.1 Sealed documentation.** The *construction documents* for all structural components and *impact protective systems* of the *storm shelter* shall be prepared and sealed by a *registered design professional* indicating that the design meets the criteria of ICC 500.

**Exception:** *Storm shelters*, structural components and impact-protective systems that are *listed* and *labeled* to indicate compliance with ICC 500.

## SECTION R324 SOLAR ENERGY SYSTEMS

**R324.1 General.** Solar energy systems shall comply with the provisions of this section.

**R324.2 Solar thermal systems.** Solar thermal systems shall be designed and installed in accordance with Chapter 23.



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**R324.3 Photovoltaic systems.** Photovoltaic (PV) systems shall be designed and installed in accordance with Sections R324.3.1 through R324.7.1 and the manufacturer's installation instructions. The electrical portion of solar PV systems shall be designed and installed in accordance with NFPA 70.

**R324.3.1 Equipment listings.** *Photovoltaic panels* and modules shall be *listed* and *labeled* in accordance with UL 1703 or with both UL 61730-1 and UL 61730-2. Inverters shall be *listed* and *labeled* in accordance with UL 1741. Systems connected to the utility grid shall use inverters *listed* for utility interaction. Mounting systems *listed* and *labeled* in accordance with UL 2703 shall be installed in accordance with the manufacturer's installation instructions and their listings.

**R324.4 Rooftop-mounted photovoltaic systems.** Rooftop-mounted *photovoltaic panel systems* installed on or above the roof covering shall be designed and installed in accordance with this section.

**R324.4.1 Structural requirements.** Rooftop-mounted *photovoltaic panel systems* shall be designed to structurally support the system and withstand applicable gravity loads in accordance with Chapter 3. The roof on which these systems are installed shall be designed and constructed to support the loads imposed by such systems in accordance with Chapter 8.

**R324.4.1.1 Roof load.** Portions of roof structures not covered with *photovoltaic panel systems* shall be designed for dead loads and roof loads in accordance with Sections R301.4 and R301.6. Portions of roof structures covered with *photovoltaic panel systems* shall be designed for the following load cases:

1. Dead load (including *photovoltaic panel* weight) plus snow load in accordance with Table R301.2.
2. Dead load (excluding *photovoltaic panel* weight) plus roof *live load* or snow load, whichever is greater, in accordance with Section R301.6.

**R324.4.1.2 Wind load.** Rooftop-mounted *photovoltaic panel* or *module* systems and their supports shall be designed and installed to resist the component and cladding loads specified in Table R301.2.1(1), adjusted for height and exposure in accordance with Table R301.2.1(2).

**R324.4.2 Fire classification.** Rooftop-mounted *photovoltaic panel systems* shall have the same fire classification as the *roof assembly* required in Section R902.

**R324.4.3 Roof penetrations.** Roof penetrations shall be flashed and sealed in accordance with Chapter 9.

**R324.5 Building-integrated photovoltaic systems.** Building-integrated photovoltaic (BIPV) systems that serve as roof coverings shall be designed and installed in accordance with Section R905.

**R324.5.1 Photovoltaic shingles.** Photovoltaic shingles shall comply with Section R905.16.

**R324.5.2 Fire classification.** *Building-integrated photovoltaic systems* shall have a fire classification in accordance with Section R902.3.

**R324.5.3 BIPV roof panels.** BIPV roof panels shall comply with Section R905.17.

**R324.6 Roof access and pathways.** Roof access, pathways and setback requirements shall be provided in accordance with Sections R324.6.1 through R324.6.2.1. Access and minimum spacing shall be required to provide emergency access to the roof, to provide pathways to specific areas of the roof, provide for smoke ventilation opportunity areas, and to provide emergency egress from the roof.

#### Exceptions:

1. Detached, nonhabitable structures, including but not limited to detached garages, parking shade structures, carports, solar trellises and similar structures, shall not be required to provide roof access.
2. Roof access, pathways and setbacks need not be provided where the code official has determined that rooftop operations will not be employed.
3. These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (17-percent slope) or less.
4. BIPV systems *listed* in accordance with Section 690.12(B)(2) of NFPA 70, where the removal or cutting away of portions of the BIPV system during fire-fighting operations has been determined to not expose a fire fighter to electrical shock hazards.

**R324.6.1 Pathways.** Not fewer than two pathways, on separate roof planes from lowest roof edge to ridge and not less than 36 inches (914 mm) wide, shall be provided on all buildings. Not fewer than one pathway shall be provided on the street or driveway side of the roof. For each roof plane with a photovoltaic array, a pathway not less than 36 inches wide (914 mm) shall be provided from the lowest roof edge to ridge on the same roof plane as the photovoltaic array, on an adjacent roof plane, or straddling the same and adjacent roof planes. Pathways shall be over areas capable of supporting fire fighters accessing the roof. Pathways shall be located in areas with minimal obstructions such as vent pipes, conduit, or mechanical equipment.

**R324.6.2 Setback at ridge.** For photovoltaic arrays occupying not more than 33 percent of the plan view total roof area, not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge. For photovoltaic arrays occupying more than 33 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.

**R324.6.2.1 Alternative setback at ridge.** Where an automatic sprinkler system is installed within the dwelling in accordance with NFPA 13D or Section P2904, setbacks at ridges shall comply with one of the following:

1. For photovoltaic arrays occupying not more than 66 percent of the plan view total roof area, not less than an 18-inch (457 mm) clear setback is required on both sides of a horizontal ridge.
2. For photovoltaic arrays occupying more than 66 percent of the plan view total roof area, not less than a 36-inch (914 mm) clear setback is required on both sides of a horizontal ridge.

**R324.6.3 Emergency escape and rescue openings.** Panels and modules installed on dwellings shall not be placed on the portion of a roof that is below an *emergency escape and rescue opening*. A pathway not less than 36 inches (914 mm) wide shall be provided to the emergency escape and rescue opening.

**Exception:** BIPV systems *listed* in accordance with Section 690.12(B)(2) of NFPA 70, where the removal or cutting away of portions of the BIPV system during fire-fighting operations has been determined to not expose a fire fighter to electrical shock hazards.

**R324.7 Ground-mounted photovoltaic systems.** Ground-mounted photovoltaic systems shall be designed and installed in accordance with Section R301.

**R324.7.1 Fire separation distances.** Ground-mounted photovoltaic systems shall be subject to the *fire separation distance* requirements determined by the local jurisdiction.

## SECTION R325 MEZZANINES

**R325.1 General.** *Mezzanines* shall comply with Sections R325 through R325.5.

**R325.2 Mezzanines.** The clear height above and below *mezzanine* floor construction shall be not less than 7 feet (2134 mm).

**R325.3 Area limitation.** The aggregate area of a *mezzanine* or *mezzanines* shall be not greater than one-third of the floor area of the room or space in which they are located. The enclosed portion of a room shall not be included in a determination of the floor area of the room in which the *mezzanine* is located.

**Exception:** The aggregate area of a *mezzanine* located within a *dwelling unit* equipped with an automatic sprinkler system in accordance with Section P2904 shall not be greater than one-half of the floor area of the room, provided that the *mezzanine* meets all of the following requirements:

1. Except for enclosed closets and bathrooms, the *mezzanine* is open to the room in which such *mezzanine* is located.

2. The opening to the room is unobstructed except for walls not more than 42 inches (1067 mm) in height, columns and posts.
3. The exceptions to Section R325.5 are not applied.

**R325.4 Means of egress.** The means of egress for *mezzanines* shall comply with the applicable provisions of Section R311.

**R325.5 Openness.** *Mezzanines* shall be open and unobstructed to the room in which they are located except for walls not more than 36 inches (914 mm) in height, columns and posts.

### Exceptions:

1. *Mezzanines* or portions thereof are not required to be open to the room in which they are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the *mezzanine* area.
2. In buildings that are not more than two stories above *grade plane* and equipped throughout with an automatic sprinkler system in accordance with Section R313, a *mezzanine* shall not be required to be open to the room in which the *mezzanine* is located.

## SECTION R326 HABITABLE ATTICS

**R326.1 General.** Habitable attics shall comply with Sections R326.2 and R326.3.

**R326.2 Minimum dimensions.** A habitable attic shall have a floor area in accordance with Section R304 and a ceiling height in accordance with Section R305.

**R326.3 Story above grade plane.** A habitable attic shall be considered a story above *grade plane*.

**Exceptions:** A habitable attic shall not be considered to be a story above *grade plane* provided that the habitable attic meets all the following:

1. The aggregate area of the habitable attic is either of the following:
  - 1.1. Not greater than one-third of the floor area of the story below.
  - 1.2. Not greater than one-half of the floor area of the story below where the habitable attic is located within a dwelling unit equipped with a fire sprinkler system in accordance with Section P2904.
2. The occupiable space is enclosed by the roof assembly above, knee walls, if applicable, on the sides and the floor-ceiling assembly below.
3. The floor of the habitable attic does not extend beyond the exterior walls of the story below.
4. Where a habitable attic is located above a third story, the dwelling unit or townhouse unit shall be equipped with a fire sprinkler system in accordance with Section P2904.

**R326.4 Means of egress.** The means of egress for habitable attics shall comply with the applicable provisions of Section R311.

## SECTION R327 SWIMMING POOLS, SPAS AND HOT TUBS

**R327.1 General.** The design and construction of pools and spas shall comply with the *International Swimming Pool and Spa Code*.

## SECTION R328 ENERGY STORAGE SYSTEMS

**R328.1 General.** *Energy storage systems (ESS)* shall comply with the provisions of this section.

### Exceptions:

1. *ESS listed and labeled* in accordance with UL 9540 and marked "For use in residential dwelling units" where installed in accordance with the manufacturer's instructions and NFPA 70.
2. ESS less than 1 kWh (3.6 megajoules).

**R328.2 Equipment listings.** *Energy storage systems (ESS)* shall be *listed and labeled* in accordance with UL 9540.

**Exception:** Where *approved*, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached sheds located not less than 5 feet (1524 mm) from exterior walls, property lines and public ways.

**R328.3 Installation.** *ESS* shall be installed in accordance with the manufacturer's instructions and their *listing*.

**R328.3.1 Spacing.** Individual units shall be separated from each other by not less than 3 feet (914 mm) except where smaller separation distances are documented to be adequate based on large-scale fire testing complying with Section 1207.1.5 of the *International Fire Code*.

**R328.4 Locations.** *ESS* shall be installed only in the following locations:

1. Detached garages and detached accessory structures.
2. Attached garages separated from the *dwelling unit* living space in accordance with Section R302.6.
3. Outdoors or on the exterior side of exterior walls located not less than 3 feet (914 mm) from doors and windows directly entering the *dwelling unit*.
4. Enclosed utility closets, basements, storage or utility spaces within *dwelling units* with finished or noncombustible walls and ceilings. Walls and ceilings of unfinished wood-framed construction shall be provided with not less than  $\frac{5}{8}$ -inch (15.9 mm) Type X gypsum wallboard.

*ESS* shall not be installed in sleeping rooms, or closets or spaces opening directly into sleeping rooms.

**R328.5 Energy ratings.** Individual *ESS* units shall have a maximum rating of 20 kWh. The aggregate rating of the *ESS* shall not exceed:

1. 40 kWh within utility closets, basements and storage or utility spaces.
2. 80 kWh in attached or detached garages and detached accessory structures.
3. 80 kWh on exterior walls.
4. 80 kWh outdoors on the ground.

*ESS* installations exceeding the permitted individual or aggregate ratings shall be installed in accordance with Section 1207 of the *International Fire Code*.

**R328.6 Electrical installation.** *ESS* shall be installed in accordance with NFPA 70. Inverters shall be *listed and labeled* in accordance with UL 1741 or provided as part of the UL 9540 listing. Systems connected to the utility grid shall use inverters *listed* for utility interaction.

**R328.7 Fire detection.** Rooms and areas within *dwelling units*, basements and attached garages in which *ESS* are installed shall be protected by smoke alarms in accordance with Section R314. A heat detector, *listed* and interconnected to the smoke alarms, shall be installed in locations within *dwelling units* and attached garages where smoke alarms cannot be installed based on their listing.

**R328.8 Protection from impact.** *ESS* installed in a location subject to vehicle damage shall be protected by *approved* barriers.

**R328.9 Ventilation.** Indoor installations of *ESS* that produce hydrogen or other flammable gases during charging shall be provided with mechanical *ventilation* in accordance with Section M1307.4.

**R328.10 Electric vehicle use.** The temporary use of an owner or occupant's electric-powered vehicle to power a *dwelling unit* while parked in an attached or detached garage or outdoors shall comply with the vehicle manufacturer's instructions and NFPA 70.

**R328.11 Documentation and labeling.** The following information shall be provided:

1. A copy of the manufacturer's installation, operation, maintenance and commissioning instructions shall be provided to the owner or placed in a conspicuous location near the *ESS* equipment.
2. A label on the installed system containing the contact information for the qualified maintenance and service providers.

## SECTION R329 STATIONARY ENGINE GENERATORS

**R329.1 General.** Stationary engine generators shall be *listed and labeled* in accordance with UL 2200 and shall comply with this section. The connection of stationary engine generators to the premise wiring system shall be by means of a *listed* transfer switch.



**R329.2 Installation.** The installation of stationary engine generators shall be in an *approved* location and in accordance with the listing, the manufacturer's installation instructions and Chapters 34 through 43.

### **SECTION R330 STATIONARY FUEL CELL POWER SYSTEMS**

**R330.1 General.** *Stationary fuel cell power systems* in new and existing buildings and structures shall comply with Section 1206 of the *International Fire Code*.