



AMENDMENTS GROUP 107 - PROPOSED RCO AMENDMENTS
July 2026 – Initial Stakeholder Input

Rule Number	Section	Description of Needed Change
4101:8-1-01 (Rescind & Adopt New)	Ch 1	Update to reflect R.C. changes and other rule changes
	101.1	Scope includes plumbing and electrical chapters of the 2018 IRC
	101.2	Change reference to artificial bodies of water – Code Change from Pete Bauldorf
		Exempt certain tents (#15)
		Exempt time-limited occupancies (#18)
	101.6	Add "no submission" criteria where the residential department is not certified for repairs and alterations
	102.10	Exempt temp structures <120 sf
		Item #7 Change reference to artificial bodies of water – Code change from Pete Bauldorf
	103	Clean up title
	104	Point to new location of rules 4101:7 and delete text
	105	Edit Section to reflect similar OBC Ch 1 changes
	105.1.1	Delete "nonconformance approval" and renumber sections
	105.2	Delete duplicate language
	105.9	Clarify applicable rules - determined by plan approval application date
	106.1	Delete inaccurate portion regarding approval of an IU
	106.1.2	Delete section that required certified designer for residential sprinklers and renumbered subsequent sections.
	106.1.2, Item 2.2	Delete redundant first sentence
	106.1.3	Delete redundant language
	106.5	Change title of "Alternative Engineered Design" to a less restrictive term.
	106.5.4	Add option to utilize future model codes and referenced standards
	107.2	Simplify application language
	107.2.1	Delete redundant language
	107.3	Match option in OBC Ch 1 - alternative queues
	108	Modify regulatory restrictions throughout the section
	108.2.10	Delete the unlikely scenario
	108.6.4	Delete language inconsistent with IU rules
	112	Simplify Section to petition Board for changes
	115	Delete section - match OBC Ch 1

Rule Number	Section	Description of Needed Change
4101:8-2-01 (Amend)	202	Add several definitions:
		- Accessory Dwelling Unit
		- Boathouse
		- Boat Well
		- Egress Roof Access Window
		- Flood or Flooding
		- Landing Platform
		- Loft
		- Patio Cover
		- Technically Infeasible (approved petition #17-02)
		- Tiny House
4101:8-3-01 (Amend)	301.2.4.2	Add supplemental drainage - related to areas with documented flooding issues
	302.1	Adjust Table 302.1 reference per petition
	302.6.1	Separation assembly - Boat house from dwelling unit
	311.8.1	Ramp slope and technically infeasible language (approved petition #17-02)
	314.1.1 and 1.2	Smoke Alarm technology and standard update
	314.8 and 314.8.1	Boathouse – fire alarm and notification per Sandusky
	320.1	Add approved Petition #17-04 language
	322.2.5	Local supplemental drainage language
	329	Add tiny houses provisions from Appendix BB of 2024 IRC
	330	Add ADU provisions from Appendix BC of 2024 IRC
	331	Add Patio cover language from Appendix BF of 2024 IRC)
4101:8-4-01 (Amend)	403.1.4.1	Frost protection - Exemption redo
	405.3	Local supplemental drainage
4101:8-5-01	Ch 5	No change
4101:8-6-01	Ch 6	No change
4101:8-7-01	Ch 7	No change
4101:8-8-01	Ch 8	No change
4101:8-9-01	Ch 9	No change
4101:8-10-01	Ch 10	No change
4101:8-11-01	Ch 11	No change
4101:8-12-01	Ch 12	No change
4101:8-13-01	Ch 13	No change
4101:8-14-01 (Amend)	Ch 14	Add referenced standard update per petition in several locations
4101:8-15-01	Ch 15	No change
4101:8-16-01	Ch 16	No change
4101:8-17-01	Ch 17	No change
4101:8-18-01	Ch 18	No change
4101:8-19-01	Ch 19	No change
4101:8-20-01	Ch 20	No change

Rule Number	Section	Description of Needed Change
4101:8-21-01	Ch 21	No change
4101:8-22-01	Ch 22	No change
4101:8-23-01	Ch 23	No change
4101:8-24-01	Ch 24	No change
4101:8-25 (Rescind & Adopt New)	Ch 25	Add 2018 IRC plumbing provisions as optional path w/Ohio amendments (2501.1)
4101:8-26 to 4101:8-33 (New)	Ch 26 to 33	Add 2018 IRC plumbing provisions as optional path w/Ohio amendments (2501.1)
4101:8-26	2601.1, 2602.1	Apply Ohio amendment regarding recycled water systems
	2609.3, 2609.4	Apply Ohio amendments regarding testing agencies
4101:8-27	2709.3	Apply Ohio amendment to shower liner testing requirement
4101:8-28	2800	Apply Ohio amendment that places high volume water heaters into the Boiler and Pressure Vessel rules
4101:8-29 (Rescind & Adopt New)	2901	Apply Ohio amendment that makes Ohio Department of Health the regulatory authority for Private Water Systems
	2902.5.1	Apply Ohio amendment regarding temperature rating of backflow preventers for boilers
4101:8-30	3001.1	Apply Ohio amendment regarding supervision and regulation of sewerage and drainage systems.
	3011	Apply Ohio amendment regarding relining building drains
4101:8-31	3103.1	Apply Ohio amendment regarding vent terminations through building roof
	3109.2	Apply Ohio amendment regarding clinical/flushing rim sinks
	3114.8	Apply Ohio amendment regarding air admittance valves
4101:8-32	3201	Apply Ohio amendments regarding trap seals
4101:8-33	3301.1	Apply Ohio amendments regarding sump pumps
4101:8-34 (Rescind & Adopt New)	Ch 34	Add 2018 IRC electrical provisions as optional path w/Ohio amendments
4101:8-34	3401.1	Clarify GFCI requirements to coordinate with 2023 NEC
4101:8-35 to 4101:43 (New)	Ch 35 to 43	Add 2018 IRC electrical provisions as optional path w/Ohio amendments
4101:8-35	Dwelling	Add definition of Three-family dwelling
4101:8-36	3601.8	Add requirement for emergency disconnects
	3606.5	Add requirement for Surge-Protection Devices
4101:8-39	3902	Apply Ohio amendments to GFCI receptacle requirements
4101:8-40	4001.15	Apply Ohio amendment to remove start date
4101:8-43	4302.2.4	Apply Ohio amendments replacing the Exception
4101:8-44-01 (Amend)	Ch 44	Update reference standards per petition and BBS adoption

4101:8-1-01 Administration.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

SECTION 101 **GENERAL**

101.1 Title. *Chapters 4101:8-1 to 4101:8-44 of the Administrative Code are designated as the “Residential Code of Ohio for One-, Two-, and Three-Family Dwellings” for which the designation “RCO” may be substituted. The 2018 edition of the “International Residential Code”, first printing, Chapters 2 through 44 as published by the “International Code Council, Inc.” is used as the basis of this document as is incorporated fully except as modified in italic herein. References in these chapters to “this code”, to the “residential code”, or to the “Residential Code of Ohio” in other sections of the Administrative Code shall mean the “Residential Code of Ohio for One-, Two-, and Three-Family Dwellings”.*

101.2 Scope. *The provisions of the “Residential Code of Ohio for One-, Two-, and Three-Family Dwellings” apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every one-, two-, or three-family dwelling, any appurtenances connected or attached to such buildings or structures, or any accessory structure incidental to that dwelling house including electrical equipment and wiring associated with bodies of water as defined in article 100, associated with article 680, of NFPA 70 as referenced in chapter 44. This code also applies to a one-family, two-family, or three-family dwelling house that is used as a model to promote the sale of a similar dwelling house. No building or its equipment or accessories, to which the rules of the board apply shall be erected, constructed, or installed, except in conformity with the rules of the board.*

This code also applies to such other residential occupancies as referenced and to the extent indicated in section 310 of the “Ohio Building Code” or OBC.

Exceptions:

- 1. Manufactured homes constructed under “24 CFR Part 3280,” “Manufactured Home Construction and Safety Standards” and used as*

- a dwelling or by a park operator to promote the sale/rental of manufactured homes.
2. Multiple single-family dwelling structures more than three stories in height and with more than three dwelling units.
 - a. The structure of one-, two-, and three-family dwellings which are more than three stories in height shall comply with the structural requirements of the OBC or section 106.5 of this code.
 3. Residential buildings attached to occupancies that are within the scope of the OBC shall comply with the requirements of the "OBC".
 4. Buildings or structures containing two or three dwelling units with a shared exit shall comply with the requirements of the "OBC."
 5. Buildings or structures which are incident to the use for agricultural purposes of the land on which said buildings or structures are located, provided such buildings or structures are not used in the business of retail trade; for the purposes of this section, a building or structure is not considered used in the business of retail trade if fifty per cent or more of the gross income received from sales of products in the building or structure by the owner or operator is from sales of products produced or raised in a normal crop year on farms owned or operated by the seller (see sections 3781.06 and 3781.061 of the Revised Code);
 6. Agricultural labor camps;
 7. Type A or Type B family day-care homes, except for the inspection required for licensure by the "Ohio Department of Children and Youth (ODCAY)". This required inspection shall be conducted by the certified building department having jurisdiction in accordance with the inspection checklist found on the board of building standard's website.
 8. Buildings or structures which are designed, constructed, and maintained in accordance with federal standards and regulations and are used primarily for federal and state military purposes where the U.S. secretary of defense, pursuant to 10 U.S.C. Sections 18233(A)(1) and 18237, has acquired by purchase, lease, or transfer, and constructs, expands, rehabilitates, or corrects and equips, such buildings or structures as he determines to be necessary to carry out the purposes of Chapter 1803 of the U.S.C.
 9. Sewerage systems, treatment works, and disposal systems (including the tanks, piping, and process equipment associated with these systems) regulated by the legislative authority of a municipal corporation or the governing board of a county or special district owning or operating a publicly owned treatment works or sewerage system as stated in division (A) of section 6111.032 of the Revised Code.
 10. Building sewer piping.

11. Private water systems (including tanks, foundations, piping, and process equipment associated with these systems) regulated by the Ohio Department of Health in accordance with section 3701.344 of the Revised Code.
12. Wind turbines, pumps, site lighting, and flagpoles not connected to building services equipment.
13. Fixed or floating docks (including the electrical wiring and lighting systems serving the docks not connected to building services equipment).
14. Retaining walls, bridges, walkways or site stairs unless associated with or necessary for the building or the building egress to comply with the rules of the board.
15. Tents erected as temporary accessory structures.
16. The applicable provisions of the OBC shall apply when installing components, equipment, and systems for which there are no provisions in this code.
17. When buildings regulated by the OBC are permitted to use the construction requirements of this code, such buildings remain within the scope of the OBC.
18. Time-limited occupancies are within the scope of the OBC shall comply with the requirements of the "OBC".

101.3 Intent. The purpose of this code is to establish uniform minimum requirements for the erection, construction, repair, alteration, and maintenance of residential buildings, including construction of industrialized units. Such requirements also relate to the conservation of energy, safety, and sanitation of buildings for their intended use and occupancy with consideration for the following:

1. **Performance.** Establish such requirements, in terms of performance objectives for the use intended. Further, the rules shall consider the following:
 - 1.1. The impact that the state residential building code may have upon the health, safety, and welfare of the public;
 - 1.2. The economic reasonableness of the residential building code;
 - 1.3. The technical feasibility of the residential building code;
 - 1.4. The financial impact that the residential building code may have on the public's ability to purchase affordable housing.
2. **Extent of use.** Permit to the fullest extent feasible, the use of materials and technical methods, devices, and improvements which tend to reduce the cost of construction without affecting minimum requirements for the health,

safety, and security of the occupants of buildings without preferential treatment of types or classes of materials or products or methods of construction.

- 3. Standardization.** To encourage, so far as may be practicable, the standardization of construction practices, methods, equipment, material and techniques, including methods employed to produce industrialized units.

This code does not prevent a local governing authority from adopting additional regulations governing residential structures if the regulations comply with this section.

- 3.1. A local governing authority shall, and any person may, notify the board of building standards of any regulation the local governing authority adopts related to content within the scope of this code and request that the board of building standards determine whether that regulation conflicts with the state residential building code.**

3.1.1. Not later than sixty days after receiving a notice to review local regulations for conflict, the board shall determine, based upon a recommendation from the advisory committee, whether the regulation conflicts with the state residential building code and shall notify any person who submitted the notice and the local governing authority that adopted the regulation of the board's determination.

3.1.2. If the board determines that a conflict does not exist, the board shall take no further action with regard to the regulation. If the board determines a conflict exists and the regulation is not necessary to protect the health or safety of the persons within the local governing authority's jurisdiction, the regulation is not valid and the local governing authority may not enforce the regulation.

3.1.3. If the board determines that a conflict exists and that the regulation is necessary to protect the health or safety of the persons within the local governing authority's jurisdiction, the board shall adopt a rule to incorporate the regulation into the state residential building code. Until the rule becomes a part of the state residential building code, the board shall grant a temporary variance to the local governing authority and any similarly situated local governing authority to which the board determines the temporary variance should apply.

101.4 Reasonable application. The rules of the board and proceedings shall be liberally construed in order to promote its purpose. When the residential building

official finds that the proposed design is a reasonable interpretation of the provisions of this code, it shall be approved. Materials, equipment and devices approved by the residential building officials pursuant to section 114 shall be constructed and installed in accordance with such approval.

101.5 Jurisdiction without a certified residential building department. If no municipal, township, or county building department is certified by the Board of Building Standards for residential buildings in accordance with section 3781.10(E) of the Revised Code has jurisdiction, the owner is not required to make submission of construction documents, seek approvals, request inspections, or obtain certificates of occupancy required in this Chapter.

101.6 Jurisdiction without a residential building department certified to enforce this code for repairs and alterations. If the municipal, township, or county building department is only certified by the Board of Building Standards for new construction in accordance with 3781.10(E) of the Revised Code, the owner is not required to make submission of construction documents, seek approvals, request inspections, or obtain certificates of occupancy required in this Chapter for alterations or repairs. Any limitation in scope of enforcement authority of a certified residential department pursuant to this paragraph does not affect the authority of the local health district to enforce the rules of the board related to plumbing pursuant to section 3701.01 of the Revised Code.

SECTION 102

APPLICABILITY AND JURISDICTIONAL AUTHORITY

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

102.2 Other laws. The provisions of this code shall not be deemed to nullify any provisions of state or federal law. Municipal corporations may make further and additional regulations, not in conflict with Chapters 3781. and 3791. of the Revised Code or with the rules of the board of building standards. However, approval by the board of building standards of any fixture, device, material, system, assembly or product of a manufacturing process, or method or manner of construction or installation constitute approval for their use anywhere in Ohio.

102.3 Other rules. As provided in division (B) of section 3781.11 of the Revised Code, the rules of the board of building standards shall supersede and govern any

order, standard, or rule of the divisions of state fire marshal or industrial compliance in the department of commerce, and the department of health and of counties and townships, in all cases where such orders, standards or rules are in conflict with the rules of the board of building standards, except that rules adopted and orders issued by the fire marshal pursuant to Chapter 3743. of the Revised Code prevail in the event of a conflict.

There may be other requirements owners may be required to meet as set forth by other regulatory agencies such as the Ohio Department of Health, Ohio Department of Children and Youth (ODCAY), Ohio Department of Mental Health and Addiction Services, Ohio Department of Developmental Disabilities, federal agencies, or other regulatory authorities. Owners and designers should investigate these additional regulatory requirements to ensure they are incorporated into the building design before submitting to the certified residential building department for plan approval.

The rules of the board of building standards adopted pursuant to section 3781.10 of the Revised Code govern any rule or standard adopted by the board pursuant to sections 4104.02 and 4105.011 of the Revised Code.

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

102.5 Referenced codes and standards. When a reference is made within the code to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in Chapter 44.

Unless specified otherwise in this code, reference to the term “International Residential Code” shall be changed to “residential code”; and reference in design and construction provisions to “one-and two-family dwellings” shall be changed to “one-, two-, and three-family dwellings.”

Because the “International Code Council” has placed design and construction information throughout its model code documents, including into the fire prevention code, any referenced code requirements relating to the design, construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal, and demolition of every building or structure within the scope of this code, shall be enforced by the residential building official.

The codes and standards referenced in this code shall be considered part of the requirements of this code as though the text were printed in this code, to the prescribed extent of each such reference. Where differences occur between

provisions of this code and referenced standards listed in Chapter 44, the provisions of this code shall apply.

102.6 Partial invalidity. In the event any part or provision of this code is held to be illegal or void, this does not have the effect of making void or illegal any of the other parts or provisions thereof, and it is to be presumed that this code would have been adopted without such illegal or invalid parts or provisions.

102.7 Existing structures. The provisions of section 113 shall control the alteration, repair, addition, maintenance, and change of occupancy of any existing structure.

The occupancy of any structure currently existing on the date of adoption of this code shall be permitted to continue without change provided there are no orders of the residential building official pending, no evidence of fraud, or no serious safety or sanitation hazard.

102.8 Temporary structures. The residential building official is authorized to issue approvals for temporary structures other than tents. Such approvals shall be in the form of a "Certificate of Occupancy for a Temporary Building" in accordance with section 111.1.5.

102.8.1 Conformance. Temporary structures shall conform to the structural strength, fire safety, means of egress, accessibility, light, ventilation and sanitary requirements of this code only to the extent necessary to ensure the public health, safety and general welfare.

102.8.2 Termination of approval. The residential building official is authorized to terminate approval for a temporary structure and to order the temporary structure to be discontinued if conditions of the approval have been violated or the structure or use poses an immediate hazard to the public or occupants of the structure.

102.9 Non-required work. Any component, building element, equipment, system or portion thereof not required by this code shall be permitted to be installed provided that it is constructed or installed in accordance with this code to the extent of the installation.

102.8.1 Fire protection systems. Non-required fire protection systems shall be installed in accordance with Chapter 29 to the extent of the intended installation.

102.8.2 Elevators and lifts. *Non-required elevators and platform lifts shall be installed in accordance with Section 321.*

102.10 Work exempt from approval. *Approval is not required for the following work; however, this work shall comply with all applicable provisions of the rules of the board:*

Building:

- 1. One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed two hundred square feet (18.58 m²) and playground structures.*
- 2. Fences not over six feet (1829 mm) high.*
- 3. Retaining walls which are not over four feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.*
- 4. Water tanks supported directly upon grade if the capacity does not exceed five thousand gallons (18 927 L) and the ratio of height to diameter or width does not exceed two to one.*
- 5. Sidewalks and driveways not more than thirty inches (762 mm) above grade and not over any basement or story below and which are not part of an accessible route.*
- 6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.*
- 7. Swings and other playground equipment accessory to a one, two, or three-family dwelling.*
- 8. Temporary structures that are one hundred twenty square feet (11.15 m²) or less in area, temporary structures with an occupant load of 10 or fewer.*
- 9. Window awnings supported by an exterior wall which do not project more than fifty-four inches (1372 mm) from the exterior wall and do not require additional support.*
- 10. Decks not exceeding 200 square feet (18.58 m²) in area, that are not more than 30 inches (762mm) above grade at any point, are not attached to a dwelling, and do not serve the exit door required by section 311.2.*
- 11. Above-ground storage tanks as defined in rule 4101:8-2-01 of the Administrative Code and the associated tank foundations.*
- 12. Battery operated smoke or carbon monoxide alarms installed in existing buildings where no construction is taking place.*

Electrical:

1. Listed cord-and-plug connected temporary decorative lighting.
2. Reinstallation of attachment plug receptacles but not the outlets thereof.
3. Replacement of branch circuit overcurrent devices of the required capacity and type 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. Repairs and Maintenance: Approval shall not be required for minor repair work, including the replacement of lamps or the connection of approved portable electrical equipment to approved permanently installed receptacles.
6. Process equipment and the associated wiring on the load side of the power disconnect to the equipment.
7. Electrical wiring equipment not connected to building services equipment in and adjacent to natural or artificially made bodies of water as defined in Article 100, associated with article 682, of NFPA 70 as referenced in Chapter 44.

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.
4. Gas distribution piping owned and maintained by public or municipal utilities and located upstream of the point of delivery.
5. Process equipment, including the associated tanks, foundations, and process piping. For combination building services/process or power piping systems, the power or process piping located downstream of the control valve which separates the process from the building services piping is exempt from approval.

Mechanical:

1. Portable heating appliances; .
2. Portable ventilation equipment; .
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 part that does not alter approval of equipment or make such equipment unsafe.

6. Portable evaporative cooler.
7. Self-contained refrigeration systems containing ten pounds (4.54 kg) or less of refrigerant or that are actuated by motors of one 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.
9. Heating and cooling distribution piping owned and maintained by public or municipal utilities.
10. Process equipment including the associated tanks, foundations, and process piping. For combination building services/process or power piping systems, the power or process piping located downstream of the control valve which separates the process from the building services piping is exempt from approval.

Plumbing:

1. The repair of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drain-pipe, 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 an approval shall be obtained and inspection made as provided in this code.
2. The clearance of stoppages or the repair 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 of more than one fixture or rearrangement of valves, pipes or fixtures.
3. Process equipment including the associated tanks, foundations, and process piping. For combination building services/process or power piping systems, the power or process piping located downstream of the control valve which separates the process from the building services piping is exempt from approval.

102.10.1 Emergency repairs. Where equipment replacements and repairs must be performed in an emergency situation, an application for approval shall be submitted within the next working business day to the residential building official.

102.10.2 Minor repairs. Minor repairs to structures may be to residential structures made without application or notice to the residential building official. Such repairs are not to 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 do minor repairs include addition to, alteration of, replacement or relocation of any standpipe, 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.

102.10.3 Alterations. Approval for alterations or repairs to a one-, two-, and three-family dwelling within the scope of this code is not required in jurisdictions with a certified residential building department only authorized to require approvals for new construction and additions; however, this work shall comply with all applicable provisions of the rules of the board and shall not cause the structure to become unsafe or adversely affect the performance of the building.

102.11 Building department jurisdictional limitations. A municipal, township, or county residential building department that has been certified by the board of building standards, pursuant to section 103.2, shall enforce provisions of the rules of the board and of Chapters 3781. and 3791. of the Revised Code, relating to construction, arrangement, and the erection of residential buildings or parts thereof as defined in the rules of the board in accordance with the certification except as follows:

- 1. Fire.** The fire chief of municipal corporations or townships, having fire departments, shall enforce all provisions of the rules of the board relating to fire prevention.
- 2. Health.** The department of health, the boards of health of city or general health districts, or the residential departments of building inspection of municipal corporations, townships, or counties shall enforce such provisions relating to sanitary construction.
- 3. Sewerage and drainage system.** In accordance with Section 3781.03 of the Revised Code, the department of the city engineer, in cities having such departments, the boards of health of health districts, or the sewer purveyor, as appropriate, have complete supervision and regulation of the entire sewerage and drainage system of the jurisdiction, including the building sewer and all laterals draining into the street sewers. Such department or agency have control and supervision of the installation and construction of all drains and sewers that become a part of the sewerage system of the jurisdiction and issue all the necessary permits and licenses for the construction and installation of all building sewers and of all other lateral drains that empty into the main sewers. Such department or agency is to keep a permanent record of the installation and location of every drain and sewerage system of the city.

4. **Enforcement.** *This section does not exempt any officer or department from the obligation of enforcing any provision of the rules of the board.*
5. **State Projects.** *Certification does not confer any jurisdiction to a certified building department to regulate:*
 - 5.1 *The construction of buildings by the state of Ohio or on land owned by the state of Ohio including, but is not limited to, its agencies, authorities, boards, commissions, administrative departments, instrumentalities, community or technical college districts, but does not include other political subdivisions.*
 - 5.2 **Park Districts.** *Park districts created pursuant to Chapter 1545. of the Revised Code. A certified municipal, township, or county building department may exercise enforcement authority, accept and approve plans and specifications, and make inspections for a park district created pursuant to Chapter 1545. of the Revised Code upon the approval, by resolution, of the board of park commissioners of the park district requesting the department to exercise that authority and conduct those activities.*

SECTION 103
CERTIFIED RESIDENTIAL BUILDING DEPARTMENTS AND
PERSONNEL

Refer to division 4101:7 of the Administrative Code for building department and building department personnel certification requirements.

SECTION 104
DUTIES AND RESPONSIBILITIES

Refer to division 4101:7 of the Administrative Code for the duties and responsibilities of certified building departments and building department personnel.

SECTION 105
APPROVALS

105.1 Approvals required. *Except as provided by section 114, any owner or owner's representative who intends to construct, enlarge, alter, repair, move, or change the occupancy of a residential building or structure, or portion thereof, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical, plumbing system, other residential building service equipment, or piping system the installation of which is regulated by this code, or to cause any*

such work to be done, is to first make application to the residential building official of a certified residential building department and obtain the required approval.

105.2 Previous approvals. This code shall not require changes in the residential construction documents, construction or designated occupancy of a structure for which a lawful approval has previously been issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within one year of the approval of residential construction documents.

105.3 Conditional approval. When residential construction documents are submitted which cannot be approved under the other provisions of this rule, the residential building official, may at the request of the owner or owner's representative, issue a conditional plan approval when an objection to any portion of the residential construction documents results from conflicting interpretations of the code, or compliance requires only minor modifications to the building design or construction. No conditional approval is to be issued where the objection is to the application of specific technical requirements of the code or correction of the objection would cause extensive changes in the building design or construction. A conditional approval is a conditional license to proceed with construction or materials up to the point where construction or materials objected to by the agency are to be incorporated into the building. The conditions objected to are to be in writing from the residential building official which shall be an adjudication order denying the issuance of a license and may be appealed in accordance with section 3781.19 of the Revised Code.

In the absence of fraud or a serious safety or sanitation hazard, all items previously examined shall be conclusively presumed to comply with Chapters 3781. and 3791. of the Revised Code and the rules of the board. Reexamination of the residential construction documents shall be limited to those items in the adjudication order. A conditional plan approval is not a phased plan approval.

105.4 Phased approval. The residential building official may issue an approval for the residential construction of foundations, floors, walls, roofs or any other part of a building, structure, or building service equipment before the residential construction documents for the whole building, structure or building service equipment have been submitted, provided that adequate information and detailed statements have been filed complying with applicable requirements of this code. The holder of such approval for the foundations, floors, walls, roofs or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that an approval for the entire structure will be granted. Such approvals shall be issued for various stages in the sequence of construction provided that all information and data required by the code for that

portion of the building or structure has been submitted. The holder of a phased plan approval may proceed only to the point for which approval has been given.

105.5 Validity of approval. The construction, erection, and alteration of a building, and any addition thereto, and the equipment and maintenance thereof, are to conform to required plans which have been approved by the residential building official, except for minor deviations which do not involve a violation of the rules of the board. In the absence of fraud or a serious safety or sanitation hazard, any residential structure built in accordance with approved plans are conclusively presumed to comply with Chapters 3781. and 3791. of the Revised Code and the rules of the board.

105.6 Expiration. The approval of plans or drawings and specifications or data in accordance with this rule is invalid if construction, erection, alteration, or other work upon the building has not commenced within twelve months of the approval of the residential construction documents.

One extension shall be granted for an additional twelve-month period if requested by the owner at least ten days in advance of the expiration of the approval and upon payment of a fee not to exceed one hundred dollars.

105.7 Extension. If, in the course of construction, work is delayed or suspended for more than six months, the approval of residential construction documents is invalid. Two extensions shall be granted for six months each if requested by the owner at least ten days in advance of the expiration of the approval and upon payment of a fee for each extension of not more than one hundred dollars.

105. 8 Certificate of plan approval. The residential building official issues to the owner/applicant a certificate of plan approval after plans have been approved in accordance with section. 107.

105.8.1 Content. The certificate of plan approval is to list the serial number of the certificate, the address at which the building or equipment under consideration is or is to be located, the name and address of the owner, the signature of the residential building official who issued the certificate, the date of issuance and such other information as is necessary to facilitate and ensure proper enforcement of the rules of the board, including but not limited to whether alternative design was part of the approved installation.

105.9 Applicable rules to be enforced. The department with jurisdiction exercises enforcement authority to accept and approve plans and specifications and make inspections using the rules of the board that were in effect on the date of the first

application for plan approval for that project. Such approvals are subject to the limitations this section.

SECTION 106

CONSTRUCTION DOCUMENTS

106.1 Submittal documents. *Residential construction documents and other data are to be submitted with each application for an approval. Before beginning the construction of any building for which construction documents are required under section 105, the owner or the owner's representative are to submit construction documents to the residential building official of a certified residential building department for approval. When construction documents have been found to be in compliance with the rules of the board of building standards in accordance with section 107 by a certified residential building department, that determination of compliance shall be deemed sufficient to obtain approval for construction pursuant to section 105.2 and the residential building official shall issue the certificate of plan approval.*

106.1.1 Professionally prepared construction documents. *Construction documents which have been prepared by a registered design professional who prepared the same as conforming to the requirements of the rules of the board pertaining to design loads, stresses, strength, and stability, or other requirements involving technical analysis, need be examined only to the extent necessary to determine conformity of such residential construction documents with other requirements of this code.*

106.1.2 Information on construction documents. *Residential construction documents are to be dimensioned and drawn upon suitable material. Electronic media documents are permitted to be submitted when approved by the residential building official. Construction documents are to be coordinated and 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. Construction documents, adequate for the scope of the project, are to include information necessary to determine compliance with this code.*

- 1. Index.** *An index of drawings located on the first sheet;*
- 2. Site plan.** *A site plan showing a north orientation arrow, the size and location of new residential construction and all existing structures on the site, all property and interior lot line locations with setback and side yard dimensions and distances from buildings to lot lines, the locations of the nearest streets, the established street grades, the locations, types and sizes of all utility lines, the location of any fences, and the elevations*

of all proposed finished grades; and it shall be drawn in accordance with an accurate boundary line survey. In the case of demolition, the site plan is to 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 residential building official is authorized to waive or modify the requirement for a site plan when the application for approval is for alteration or repair or when otherwise warranted.

2.1. Residential buildings or structures located in flood hazard areas.

Construction documents submitted for residential buildings or structures located in communities with identified flood hazard areas, pursuant to section 1612, are to include the current FEMA "Flood Hazard Boundary Map" (FHBM), "Flood Insurance Rate Map" (FIRM) or "Flood Boundary Floodway Map" (FBFM) for the project location. The required site plan is to include building elevations using the same datum as the related flood hazard map. The owner is responsible for the compliance with local flood damage prevention regulations for additional critical elevation information for the project site. The elevation certification and dry flood proofing certification, when required for buildings or structures located in communities with identified flood hazard areas, is to be submitted to the residential building official.

2.2. Site accessibility plan. When applicable, the plans shall include: the exterior accessible route between all facilities required to be connected; ramp locations and elevations along the exterior accessible route; number of and details for the required accessible van and car parking spaces and passenger loading areas; location and detail of required accessibility signage; grade/topographic elevations before and after proposed grading when site impracticality is intended to be applied.

3. Floor plans. Complete floor plans, including plans of full or partial basements and full or partial attics. Floor plans are to show all relevant information such as door swings, stairs and ramps, windows, shafts, all portions of the means of egress, etc., and be sufficiently dimensioned to describe all relevant space sizes. Wall materials are to be described by cross-hatching (with explanatory key), by notation, or by other clearly understandable method. Spaces are to be identified by how each space is intended to be used.

4. Exterior wall envelope. The exterior envelope described in sufficient detail to determine compliance with this code and the referenced standards. Details or elevations are to be provided which describe floor to floor dimensions, flashing, intersections with dissimilar materials,

corners, end details, control joints, intersections at roof, eaves, or parapets, means of drainage, water-resistive membrane, details around openings, location and type of vapor retarders, window and door “U”-values, and insulation location and “R”-values. The supporting documentation is to fully describe the exterior wall system, which was tested, where applicable, as well as the test procedure used.

5. **Sections.** Cross sections, wall sections, details including typical connections as required to fully describe the residential building construction showing wall, ceiling, floor and roof materials. Residential construction documents are to describe the exterior wall envelope in sufficient detail to determine compliance with this code.
6. **Structure.** Complete structural description of the residential building including size and location of all structural elements used in the design of the residential building and other data as required to fully describe the structural system.
7. **Ratings.** The fire-resistance ratings of all structural elements as required by this code, data substantiating all required fire-resistance ratings including details showing how penetrations will be made for electrical, mechanical, plumbing, and communication conduits, pipes, and systems, and the materials and methods for maintaining the required structural integrity, fire-resistance rating, and firestopping.
8. **System descriptions.** Description of the mechanical, plumbing and electrical systems, including: materials; location and type of fixtures and equipment; materials, and sizes of all ductwork; location and type of heating, ventilation, air conditioning and other mechanical equipment; and all lighting and power equipment.
9. **Accessibility provisions.** When non-required accessibility components are intended to be installed, indicate whether the project will comply with Type A, Type B, Type C (Visitable), or Accessible units in ICC/ANSI A117.1 listed in Chapter 44 as pursuant to Section 320.1.
10. **Additional information.** Additional graphic or text information as may be reasonably required by the residential building official to allow the review of special or extraordinary construction methods or equipment.

106.1.2.1 Fire protection system drawings. Construction documents for the fire protection system(s) shall be submitted to indicate conformance with this code and be approved prior to the start of system installation.

106.1.2.2 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.

106.1.3 Industrialized units. *When construction includes the use of industrialized units or alternative materials, designs and methods of construction or equipment approved by the board, documentation is to be provided to the residential building official describing how they are to be used, including:*

- 1. A copy of the construction documents approved by the board; and*
- 2. Details pertaining to on-site interconnection of modules or assemblies.*

106.2 Evidence of responsibility. *Required residential construction documents, when submitted for review as required under section 107, are to bear the identification of the person primarily responsible for their preparation.*

106.3 Amended construction documents. *If substantive changes to the residential building are contemplated after first document submission, or during construction, those changes are to be submitted to the residential building official for review and approval prior to those changes being executed. The residential building official may waive this requirement in the instance of an emergency repair, or similar instance.*

106.4 Alternative materials and methods of construction and equipment. *For approval of a device, material or assembly that does not conform to the performance requirements in this code, section 114 applies.*

106.5 Compliance by alternative design. *The design, documentation, inspection, testing and approval of an alternative system is to comply with sections 106.5.1 to 106.5.4.*

106.5.1 Design criteria. *An alternative design shall conform to the intent of the provisions of this code and shall provide an equivalent level of quality, strength, effectiveness, fire resistance, durability and safety. Materials, equipment or components shall be designed and installed in accordance with the manufacturer's installation instructions.*

106.5.2 Submittal. *A registered design professional is to indicate on the application that the system is an alternative design. The approval and permanent approval records shall indicate that an alternative design was part of the approved installation. Where special conditions exist, the residential building official is authorized to require additional construction documents to be prepared by a registered design professional.*

106.5.3 Technical data. *The registered design professional shall submit sufficient technical data to substantiate the proposed alternative design and to prove that the performance meets the intent of this code.*

Exception: *Approval of alternative materials, products, assemblies and methods of construction in accordance with Section 114.3.2.*

106.5.4 Newer model codes and referenced standards. *Future editions and amendments to model codes and referenced standards are not automatically included in this code, however, the residential building official should give them due consideration in deciding whether the newer codes or standards meet the intent of this code.*

SECTION 107 **PLAN APPROVAL PROCESS**

107.1 Plan review required. *Where the rules of the board are applicable under section 101.2, before a residential building or addition to a residential building is constructed or erected, and before a residential building is altered or relocated, or residential building equipment is installed, or a resubmission of construction documents is required or received, residential construction documents relating to the work and equipment under consideration are to be prepared in conformity with section 106 and be submitted to the residential building department for examination and approval.*

107.2 Application for plan approval. *To obtain a plan approval, the owner or the owner's representative is to first file an application for that purpose and include:*

- 1. Identify and describe the work to be covered for which application is made for approval.*
- 2. Describe the land on which the proposed work is to be done, street address or similar description that will readily identify and locate the proposed building or work.*
- 3. Be accompanied by residential construction documents and other information as required in section 106.1.*
- 4. Be signed by the owner, or the owner's authorized agent.*
- 5. Give such other data and information as required by the residential building official.*
- 6. Identify and clearly indicate whether the project or portion of a project intends to utilize an industrialized unit.*
- 7. Identify and clearly indicate whether the project or portion of a project intends to utilize an assembly of individually listed or labeled products.*

107.2.1 Time limitation of application. *The approval of construction documents under this section is a “license” and the failure to approve such construction documents as submitted within thirty days after filing or the disapproval of such construction documents is an “adjudication order denying the issuance of a license” requiring the opportunity for an “adjudication hearing” as provided by sections 119.07 to 119.13 of the Revised Code and as modified by sections 3781.031 and 3781.19 of the Revised Code.*

If residential construction documents have been reviewed for compliance with the rules of the board, an adjudication order has been issued to the owner and the owner’s representative, and the owner has neither exercised the right to appeal pursuant to section 110 nor resubmitted corrected documents, the application is invalid six months from the date of the issuance of the adjudication order.

107.3 Order of plan review. *Residential construction documents submitted for approval are to be examined for compliance with the rules of the board in the order received, unless otherwise consented to by the building owners affected by deferred examination or pursuant to a written policy adopted by the department providing alternative schedules for plan review based on project size or other rational basis. Such policy is to be posted on the department’s website and may not give preferential treatment to any one individual, organization or industry.*

107.4 Review of plans. *When residential construction documents have been submitted to the residential building department for review and approval, the residential building official shall review or cause the residential construction documents to be examined for compliance with the rules of the board by assigning the examination duty to an appropriately certified individual. The residential building official or plans examiner shall first determine whether the construction documents are adequate as required in section 106.*

107.4.1 Inadequate construction documents. *If residential construction documents are determined to be incomplete or inadequate for examination, the residential plans examiner shall report the findings to the residential building official. The residential plans examiner is to examine the construction documents to the extent possible and identify what information from section 106 is missing and needed to complete the required examination. Upon receipt and review of the report, the residential building official proceeds as required in section 107.6.*

107.4.2 Resubmitted documents. *If residential construction documents are resubmitted in response to an adjudication order, the review for compliance is*

limited to determining that the item of non-compliance, and any work affected, has been corrected but does not permit another review of unmodified construction documents previously determined to comply.

107.4.3 Sealed construction documents. Residential construction documents, if prepared by an Ohio registered design professional to conform to the requirements of the rules of the board pertaining to design loads, stresses, strength, and stability, or other requirements involving technical analysis, need be examined only to the extent necessary to determine conformity of such construction documents with other requirements of the rules of the board.

107.5 Plan review, compliance with rules of the board. If the residential construction documents are determined to comply with the rules of the board, the residential plans examiner communicates the findings and recommends the conditions and type of approval to the residential building official.

107.5.1 Residential building official approval. The residential building official evaluates the residential plans examiner's recommendations. When the residential construction documents have been determined to conform to the applicable provisions of the rules of the board, the residential building official shall endorse or stamp such plans as approved and issue the certificate of plan approval in accordance with section 105.5.

107.5.2 Posting. The certificate of plan approval shall be posted in a conspicuous location on the site. The owner and the contractor is to preserve and keep the certificate posted until the final inspections have been completed.

107.6 Plan review, items of noncompliance. When the residential construction documents are examined and items of noncompliance with the rules of the board are found, the residential building official proceeds as required in either section 107.6.1 or section 107.6.2.

107.6.1 Communication process for items of non-compliance.

1. Item(s) of non-compliance are to be communicated to the owner or the owner's representative and offer the following options:
 - 1.1 The owner will revise the construction documents and resubmit to the department.
 - 1.2 The items of noncompliance will not be brought into compliance and will be referred to the residential building official as indicated in item 4 below.

2. The owner or the owner's representative indicates which option (item 1 above) will be exercised.
3. Notations of the communication shall be made on a plan review record. The notations are to include the residential plans examiner's name, the date of the communication with the owner or the owner's representative, the observed items of noncompliance, the code citation related to the item(s) of noncompliance, the action necessary to correct the item(s) of noncompliance, the option chosen by the owner or the owner's representative, the name of the person communicated with, and the estimated dates of compliance and resubmission, if applicable.
4. If the owner or the owner's representative indicates that the work will not be brought into compliance with the rules of the board or requests an adjudication order, the residential plans examiner reports to the residential building official in accordance with section 107.6.2.

107.6.2 Residential building official determination of noncompliance. The residential building official evaluates the results of the plans examination and render a final determination as to whether the items of non-compliance are to be communicated to the owner in the form of an adjudication order complying with section 109. The residential building official also determines whether any approvals are possible, and issue the appropriate approval as described in section 105.

107.7 Approved residential construction document sets. One set of approved residential construction documents is to be kept by the residential building official. The other set(s) is returned to the applicant, kept at the work site, along with manufacturers' installation instructions and product information, and be made available for use by the residential inspectors.

SECTION 108

INSPECTION PROCESS

108.1 General. After residential construction documents have been approved, construction or work may proceed in accordance with the approved documents. Construction or work for which an approval is required is to be subject to inspection. It is the duty of the owner or the owner's representative to notify the residential building department when work is ready for inspection. Access to and means for inspection of such work is to be provided for any inspections that are required by this code.

It is the duty of the owner or the owner's representative to cause the work to remain accessible and exposed for inspection purposes. Such construction or work

shall remain accessible and exposed for inspection purposes until the work has been inspected to verify compliance with the approved construction documents, but failure of the inspectors to inspect the work within four days, exclusive of Saturdays, Sundays, and legal holidays, after the work is ready for inspection, allows the work to proceed.

Subsequent work is allowed to proceed only to the point of the next required inspection.

108.2 Required inspections. At the time that the certificate of plan approval is issued, the residential building official will also provide to the owner, or the owner's representative, a list of all required inspections for each project. The required inspection list is created from the applicable inspections set forth in sections 108.2.1 to 108.2.12. The residential building official, upon notification from the owner or the owner's representative that the work is ready for inspection, will cause the inspections set forth in the required inspection list to be made by an appropriately certified residential inspector in accordance with the approved residential construction documents.

108.2.1 Lot line markers required. Before any work is started in the construction of a residential building or an addition to a residential building to which the rules of the board are applicable under section 101.2, all boundary lines are to be clearly marked at their intersections with permanent markers or with markers which are offset at a distance which is of record with the owner.

108.2.2 Footing or foundation inspection. Footing and foundation inspections are to be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms are to be in place prior to inspection. Materials for the foundation are to be on the job, except where concrete is ready mixed in accordance with "ASTM C 94", the concrete need not be on the job.

108.2.3 Concrete slab and under-floor inspection. Concrete slab and under-floor inspections are to be made after in-slab and under-floor reinforcing steel and building service equipment, conduit, insulation, vapor retarder, piping accessories and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the subfloor.

108.2.4 Lowest floor elevation. The elevation certification required in section 322 shall be submitted to the residential building official.

108.2.5 Frame inspection. *Framing inspections are to be made after the roof deck or sheathing, all framing, fire blocking and bracing are in place and pipes, chimneys and vents to be concealed are complete and the rough electrical, plumbing, heating wires, pipes and ducts are approved.*

108.2.6 Lath or gypsum board inspection. *Lath and gypsum board inspections are to be made after lathing and gypsum board, interior and exterior, is in place, but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.*

Exception: *Gypsum board that is not part of a fire-resistive assembly or a shear assembly.*

108.2.7 Fire-resistant penetrations. *Protection of joints and penetrations in fire-resistance-rated assemblies are not to be concealed from view until inspected and approved.*

108.2.8 Energy efficiency inspections. *Inspections are to be made to determine compliance with Chapter 11 and include, but not be limited to, inspections for: envelope insulation “R” and “U” values, fenestration “U” value, duct system “R” value, infiltration air barriers, caulking/sealing of openings in envelope and ductwork, and “HVAC” and water heating equipment efficiency.*

108.2.9 Testing of residential building service equipment. *Inspections are to be made of all residential building services equipment to ensure that it has been installed in accordance with the approved construction documents, the equipment listings, and the manufacturer’s installation instructions. Inspections include, but not be limited to, inspections for the following systems and their associated components: mechanical heating and ventilating systems, mechanical exhaust systems, plumbing systems, fire protection systems, and electrical systems.*

108.2.10 Other inspections. *In addition to the inspections specified above, other inspections may be required by the residential building official to ascertain compliance with the provisions of this code.*

108.2.11 Industrialized unit inspections. *Inspection of on-site construction of complete installation of approved industrialized units is the responsibility of the building department with jurisdiction. Such inspections include:*

- 1. Connection to on-site construction, interconnection of modules, connection to utilities. The inspections and conducting of required tests*

are not to require the destruction or disassembly of any factory-constructed component authorized by the board.

2. Inspection of the unit for damage resulting from transportation, improper protection of exposed parts from inclement weather or other causes. Damage is to be repaired as required by the residential building official to comply with the applicable provisions of the rules of the board;
3. Inspection of the unit to determine if it is marked by an insignia furnished by the board; and
4. Inspect the unit to determine if the floor plan, exterior elevations, and exposed details are in conformance with the construction documents approved by the board.

108.3 Inspection agencies. The residential building official is authorized to accept reports of approved inspection agencies, provided such agencies are approved in accordance with the rules of the board of building standards.

108.4 Right of entry. The residential building official, or the residential building official's 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 credentials are presented to the occupant and that entry is requested and obtained. Where permission to enter has not been obtained, is denied, or the residential building official has probable cause to believe that there exists in a structure or upon a premises a condition which is a serious hazard, the residential building official is to proceed as required in section 109 and shall also have recourse to the remedies provided by law to secure entry, including those adopted by the jurisdiction.

108.5 Inspections, compliance with residential construction documents. When an individual certified to make inspections from the residential department having jurisdiction finds that completed work is in accordance with the approved residential construction documents, the certified individual will communicate the findings to the owner or owner's representative, make a note of the inspection in the written or electronic inspection record of the project available on-site and in the department's project record, and communicate the findings to the residential building official. The residential building official, after review of the findings, shall issue the certificate of occupancy or certificate of completion in accordance with section 111.

108.6 Inspections, observation of violations, unsafe conditions, or serious hazards. When an individual certified to make inspections from the residential

department having jurisdiction finds that any work in connection with the location, erection, construction, repair, alteration, moving, or equipment of a residential building is contrary to the approved residential construction documents for the same, the residential building inspector proceeds as required in either section 108.6.1 or 108.7.

108.6.1 Communication process for work contrary to approved construction documents.

1. Communicate the nature of the differences to the owner or the owner's on-site representative and offer the following options:
 - 1.1 The owner will bring the item of noncompliance into compliance.
 - 1.2 The owner will revise the construction documents and resubmit to the residential department.
 - 1.3 The items of noncompliance will not be brought into compliance and will be referred to the residential building official as indicated in item 4 below.
2. The owner or the owner's on-site representative shall indicate which option (item 1 above) will be exercised.
3. Notations of the inspection in the written or electronic inspection record of the project available on-site and in the department's project record are to be made. The notations are to include the name of the certified individual authorized to make the inspections, the date of the inspection, the type of inspection, the observed items of noncompliance, the option chosen by the owner or the owner's on-site representative, the name of the person communicated with, and the estimated dates of compliance and follow-up inspections, if applicable.
4. If the owner or the owner's on-site representative indicates that the work will not be brought into compliance with the approved residential construction documents, the individual certified to make inspections is to submit a report to the residential building official for the final determination of noncompliance in accordance with section 108.7.

108.6.2 Observation of violations not shown on plans. If an individual certified to make inspections, in the course of performing the assigned or requested inspections, observes a code violation that was either shown incorrectly or not adequately addressed or detailed in the approved residential construction documents, the certified individual is to communicate the finding to the residential building official so that the residential building official can make a determination of whether to issue a notice of recommended change.

108.6.3 Observation of unsafe conditions or serious hazards. *If an individual certified to make inspections, in the course of performing the assigned or requested inspections, observes an unsafe condition or a serious hazard, the certified individual shall communicate that condition to the owner or the owner's on-site representative and report the findings immediately to the residential building official so that the residential building official can make a final determination of whether the violation constitutes a serious hazard which requires the issuance of an adjudication order as required in section 109.*

108.6.4 Industrialized units, observations of noncompliance. *If a unit of closed construction does not bear an insignia issued by the board, the unit has not been approved by the board therefore is within the jurisdiction of the building department. Units not approved by the board and placed on-site are work without approval and the residential building official is to proceed in accordance with section 109 of this code.*

The residential building official is to notify the board of any variance of floor plan, exterior elevations, and exposed details with the plans approved by the board or placement of a unit without an insignia.

108.7 Residential building official determination of noncompliance. *The residential building official shall evaluate any report of items of noncompliance and render a final determination as to whether the items of non-compliance are to be communicated to the owner in the form of an adjudication order complying with section 109. The residential building official shall make the determination within four days of the inspector reporting as required in sections 108.6.2 and 108.6.3, exclusive of Saturdays, Sundays, and legal holidays. The residential building official shall also determine whether any approvals are possible.*

108.8 Acceptance, performance, and operational testing. *Acceptance, performance, and operational testing is to be conducted as required in the applicable code or referenced standard. Advanced notice of the test schedule is to be given to the residential building official. The residential building official may require that the tests be conducted in the presence of the residential building official or certified residential inspector. Testing and inspection records shall be made available to the residential building official or inspector, upon request, at all times during the fabrication of the systems and the erection of the building.*

108.8.1 New, altered, extended or repaired systems. *New systems and parts of existing systems, which have been altered, extended, renovated or repaired, are to be tested as prescribed herein to disclose leaks and defects.*

108.8.2 Apparatus, material and labor for tests. *Apparatus, material and labor required for testing a system or part thereof are to be furnished by the owner or the owner's representative. Required tests are to be conducted by and at the expense of the owner or the owner's representative.*

108.8.3 Reinspection and testing. *Where any work or installation does not pass an initial test or inspection, the inspector is to proceed as outlined in section 108.6.*

SECTION 109

ORDERS, VIOLATIONS, AND UNSAFE BUILDINGS

109.1 Adjudication orders required. *When the residential building official denies any approval or takes action in response to findings of non-compliance with the rules of the board, such action is to be initiated by issuing an adjudication order, prior to seeking any remedy, civil or criminal. Every adjudication order shall:*

- 1. Clearly identify the section of law or rules violated;*
- 2. Specifically indicate which detail, installation, site preparation, material, appliance, device, addition, alteration to structures, residential construction documents, assemblages or procedures are necessary to change to comply with the order;*
 - 2.1 When issued to stop work, the order shall also clearly indicate the specific work that is required to cease, when the work must cease and the conditions under which the cited work will be permitted to resume.*
- 3. Include notice of the procedure for appeal and right to a hearing if requested within thirty days of the mailing of the order. The order shall also indicate that, at the hearing, the owner may be represented by counsel, present arguments or contentions orally or in writing, and present evidence and examine witnesses appearing for or against the owner;*
- 4. Specify a reasonable period of time in which to bring the item(s) on the order into compliance;*
- 5. Include the signature of the residential building official;*
- 6. Be sent to the owner and owner's representatives, and any individual designated as a representative or agent by the owner in such matters.*
 - 6.1 When issued to stop work, the order shall also be given to the person doing the work.*

109.2 Response to orders. *The person receiving an order may exercise their right to appeal within 30 days of the mailing of the order, comply with the order, or otherwise be released from the order by the residential building official.*

109.3 Prosecution and penalties. *When an owner fails to comply with section 109.2, the owner may be prosecuted pursuant to this code or other law or ordinance adopted by the jurisdiction, and is subject to fine as provided for in section 3791.04 of the Revised Code.*

109.3.1 Unlawful continuance. *Failure to cease work after receipt of an order to stop work is hereby declared a public nuisance.*

109.4 Unsafe buildings. *Structures or existing equipment that are unsafe or unsanitary due to inadequate means of egress facilities, inadequate light and ventilation, or which constitute a fire hazard, or are otherwise dangerous to human life, shall be deemed a serious hazard. Where a residential building is found to be a serious hazard, such hazard shall be eliminated or the residential building shall be vacated.*

109.4.1 Orders, injunction proceedings. *Where the residential building official finds that a residential building is a serious hazard and the owner of such building fails, in the time specified in an order from the residential building official, to eliminate such hazard, or to vacate the residential building, the residential building official shall proceed under section 3781.15 of the Revised Code or other law or ordinance adopted by the jurisdiction.*

109.4.2 Restoration. *Where the residential structure or equipment is determined to be unsafe by the residential building official, it is permitted to be restored to a safe condition. To the extent that repairs, alterations or additions are intended to be made or a change of occupancy occurs during the restoration of the structure, such repairs, alterations, or additions or change of occupancy shall comply with this chapter.*

SECTION 110

APPEALS

110.1 Hearing and right of appeal, local board of building appeals. *In order to hear and decide appeals of orders, decisions, or determinations made by the residential building official relative to the application of this code, there shall be a local appeals process established within the certified jurisdiction.*

SECTION 111
CERTIFICATE OF OCCUPANCY AND CERTIFICATE OF COMPLETION

111.1 Approval required to occupy. *No residential building or structure, in whole or in part, shall be used or occupied until the residential building official has issued an approval in the form of a certificate of occupancy or certificate of completion in compliance with this section.*

111.1.1 Certificate of occupancy and certificate of completion. *The certificate of occupancy indicates the conditions under which the residential building shall be used. The building owner may only use the building in compliance with the certificate of occupancy and any stated conditions. The residential building and all approved building service equipment are to be maintained in accordance with the approval. Where appropriate, the residential building official may issue a certificate of completion for alterations and repairs in lieu of a certificate of occupancy.*

When a residential building or structure is entitled thereto, the residential building official shall issue a certificate of occupancy or completion provided there are no violations of the rules of the board or orders of the residential building official pending or as permitted in this section. The certificate shall be issued in a timely manner.

111.1.1.1 Occupancy. *A residential building or structure erected is not permitted to be used or occupied, in whole or in part, until the certificate of occupancy has been issued by the residential building official. Occupancy of spaces within a residential building which are unaffected by the work of work may be permitted to continue if the residential building official determines the existing spaces can be occupied safely until the completion of the work.*

111.1.1.2 Partial occupancy. *Upon the request of the owner or owner's representative, a residential building official may issue a certificate of occupancy before the completion of the entire work, provided that the residential building official determines that the space can be safely occupied prior to full completion of the residential building, structure, or portion without endangering life or public welfare. The certificate is to indicate the extent of the areas approved for occupancy and any time limits for completion of the work.*

111.1.1.3 Temporary structures occupancy. *A residential building intended to be erected, placed and used for a period of time not to exceed*

one hundred eighty days that has been determined by the residential building official to be in compliance with section 102.9 may be issued a "Certificate of Occupancy for Temporary Structures." The residential building official is authorized to grant extensions for demonstrated cause.

111.2 Certificate issued. The certificate shall certify compliance with the provisions of this code, Chapters 3781. and 3791. of the Revised Code, and the purpose for which the residential building or structure may be used in its several parts. The certificate of occupancy or certificate of completion shall contain the following:

1. The plan approval application number.
2. The name and address of the owner.
3. A description of that portion of the structure for which the certificate is issued.
4. The signature of all residential building officials having jurisdiction. When more than one residential building official has jurisdiction for a building (when the certification of the residential building department is limited for such systems as plumbing or piping systems) each signs the certificate with an indication of the scope of their individual approvals.
5. The edition of the residential code under which the plan approval was issued.
6. When an automatic sprinkler system is provided, the type and description of the system shall be indicated.
7. Any special stipulations and conditions of the plan approval including any variances granted to the requirements of this code.

111.3 Validity of a certificate of occupancy or certificate of completion. The certificate represents an approval that is valid only when the residential building or structure is used as approved and certifies conformance with applicable provisions of the "Residential Code of Ohio for One-, Two-, and Three-family Dwellings" and Chapters 3781. and 3791. of the Revised Code. The approval is conditioned upon the building systems and equipment being maintained and tested in accordance with the approval, the "RCO", and applicable equipment and systems schedules.

111.4 Existing residential buildings. Upon written request from the owner of an existing residential building or structure, the residential building official shall issue a certificate of occupancy, provided there are not violations of law or orders of the residential building official pending, and it is established after inspection and investigation that the alleged occupancy of the residential building or structure has previously existed. This code shall not require the removal, alteration or

abandonment of, or prevent the continuance of, the occupancy of a lawfully existing residential building or structure, unless such use is deemed to endanger public safety and welfare.

111.5 Connection of service utilities. No connections shall be made from a utility, source of energy, fuel or power to any residential building or system that is regulated by this code for which a plan approval and inspections are required, until approved by the residential building official.

111.6 Temporary connection. The residential building official shall approve the temporary connection of the residential building or system to the utility source of energy, fuel or power.

SECTION 112 **CHANGES TO THE CODE**

112.1 Code change process. The board may, on its own motion or upon receipt of a petition, adopt, amend, or rescind the rules adopted pursuant to Chapters 3781 and 3791 of the Revised Code through the administrative rule process. Any person may petition the board to adopt, amend, or rescind rules of the board on an application prescribed by the board. Upon receipt of petition for the adoption, amendment, or annulment of a provision of the rules of the board, the board will proceed under sections 3781.101 and 3781.12 of the Revised Code.

SECTION 113 **EXISTING BUILDINGS AND STRUCTURES**

113.1 General. Provisions within this section shall control the alteration, repair, addition and change of occupancy if existing residential buildings.

113.2 Maintenance. Residential buildings, structures and the building equipment shall be maintained in a safe and sanitary condition and in accordance with the condition(s) established in current and any previous plan approvals and certificates of occupancy. Devices or safeguards which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance.

The requirements of this chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures without approval of the residential building official.

113.3 Additions and alterations. *Additions or alterations to residential buildings shall conform with the requirements of the code for new construction and shall be approved by the residential building official. Additions or alterations shall not be made to an existing residential building or structure which will cause the existing residential building or structure to be in violation of any provisions of this code. Portions of the structure not altered and not affected by the alteration are not required to comply with the code requirements for a new structure.*

Exception: *For residential buildings and structures in flood hazard areas, any additions, alterations or repairs that constitute substantial improvement of the existing structure, shall comply with the flood design requirements for new construction and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.*

113.3.1 Replacement of systems, components and materials. *Replacements of an existing system (egress, fire protection, mechanical, plumbing, etc.) and materials or building components not otherwise provided for in this section, shall conform to that required for new construction to the extent of the alteration. The existing systems, materials, or components shall not be required to comply with all of the requirements of this code for new construction except to the extent that they are affected by the alteration. Replacement of existing systems, materials, or components shall not cause them to become unsafe, hazardous, overloaded, or become less effective than when originally installed, constructed, and/or approved.*

113.4.2 Door and window dimensions. *Minor reductions in the clear opening dimensions of replacement doors and windows that result from the use of different materials shall be allowed, whether or not they are permitted by this code.*

113.4 Repairs to systems, components and materials. *Repair of residential building components, systems and materials or building components not otherwise provided for in this section, shall not be required to meet the provisions for new construction, provided such work is done in accordance with the conditions of the existing approval in the same manner and arrangement as was in the existing system, is not less safe than when originally installed and is approved.*

113.5 Changes in occupancy. *A residential building, accessory structure, or space within a residential building shall not change in its use or purpose unless it is made to comply with the requirements of this code for such use and approved by the residential building official. An approval is not required when the code requirements are the same for both uses.*

113.5.1 Use of a residential building for other purposes. *No change of occupancy to uses within the scope of the OBC shall be made to any existing residential building, space within, or accessory structure unless such building is made to comply with the requirements of the OBC for such occupancy and approved by the building official with OBC enforcement authority.*

113.5.2 Type A family child care homes. *A residential building that is intended to be used in whole or in part as a licensed type A family child-care home shall be inspected in accordance with the type A family child-care home checklist (available from the board of building standards). The building official shall issue a report of the findings to the Ohio department of children and youth.*

113.5.3 Type B family child care homes. *When a residential building that is intended to be used in whole or in part as a type B family child-care home and is required to be licensed, the residential building shall be inspected in accordance with the type B family child-care home checklist (available from the board of building standards). The building official shall issue a report of the findings to the Ohio department of children and youth.*

113.6 Moved structures. *Residential structures moved shall be safe and sanitary and any repair, alteration, or change in occupancy shall comply with the provisions of this code for new structures. Field work, building location, foundations and foundation connections, wind loads, seismic loads, snow loads, and flood loads, shall comply with the requirements of this code.*

The residential building official shall be authorized to inspect, or require inspection at the expense of the owner, the various components of a relocated building to verify that they have not sustained damage. Building service equipment, mechanical, plumbing, and fire protection systems shall be tested to assure that they are in operating condition. Any repairs or alterations required as a result of such inspections shall be approved and completed prior to issuance of the certificate of occupancy.

Buildings previously approved as industrialized units, when moved after first occupancy are to be evaluated for conformance in accordance with this section by the residential building official in the jurisdiction where the building is intended to be relocated.

113.7 Historic buildings. *The provisions of this code relating to the construction, repair, alteration, addition, restoration and movement of residential structures, and change of occupancy shall not be mandatory for historic buildings where such*

residential buildings are judged by the residential building official not to constitute a distinct life safety hazard.

113.8 Used materials and equipment. The use of used materials which meet the requirements of this code for new materials is permitted. Used equipment, appliances, and devices shall not be reused unless approved by the residential building official.

113.9 Flood hazard areas. Within flood hazard areas established, the residential building shall be brought into conformance with section 322.

Exception: Historic buildings.

SECTION 114

PRODUCTS AND MATERIALS

114.1 General. Any material, product, assembly or method of construction used in a building or structure shall be approved by the residential building official. The provisions of this section describe the product approval process intended by the board of building standards in accordance with Section 3781.10 (C) of the Revised Code.

114.2 Definitions. The following words and terms shall, for the purposes of this section, have the meanings shown herein:

Accreditation. The formal recognition of a conformity assessment body's adherence and operation under a documented quality system whereby a third party (Accreditation Body) attests to technical competence and the specific scope of accreditation of the conformity assessment body.

Accreditation body. An authoritative body that is an established, independent, internationally recognized, third-party organization that performs accreditation to ascribe initial recognition and monitors, on a cyclical basis, the competency, integrity, and performance of conformity assessment bodies in accordance with established standards.

Assembly. A preassembled grouping of materials, products and/or components designed to act as a whole. This does not include industrialized units regulated by section 113.

Calibration laboratory. An established, independent, nationally recognized and accredited, third-party organization that regularly provides calibration

services such as, but not limited to, tolerance testing to ensure the accuracy of measuring equipment used in construction.

Conformity assessment body. A body that performs conformity assessment services and can be an object of accreditation, such as a testing laboratory, inspection body, product certification body.

Evaluation service. An established, independent, nationally recognized and accredited, third-party conformity assessment body that is accredited as a product certification body and performs technical evaluations of building materials, products, and methods of construction where code requirements are not clear or the innovative products do not have national consensus standards. The evaluation of the product results in the issuance of a research report establishing the code compliance and conditions of its use based upon multiple sources of information including test reports, test data, performance data, or acceptance criteria, and can be approved for installation by the residential building official in accordance with the rules of the board.

Fabricator inspection agency. An established, independent, nationally recognized and accredited, third-party conformity assessment body regularly engaged in fabrication of construction materials and methods of construction.

Field evaluation body. An established, independent, nationally recognized and accredited, third-party conformity assessment body regularly engaged in furnishing field inspection, observation, testing, or reporting services for construction materials, products, and methods of construction.

Industry trade association certification program. A certification program operated by an established and nationally recognized organization, founded and funded by businesses that operate in a specific industry, where the main focus is to monitor quality assurance among associated members.

Insignia. A mark or label prescribed in accordance with board procedures.

Inspection body. An established, independent, nationally recognized and accredited, third-party conformity assessment body regularly engaged in furnishing inspection, observation, testing, or reporting services for construction materials, products, and methods of construction. Such services include, but are not limited to geotechnical inspections, environmental inspections, mechanical and metallurgical analysis, non-destructive testing and evaluation, chemical analysis, and structural and product testing.

Listing agency. *An established, independent, nationally recognized and accredited, third-party conformity assessment body that is accredited as a product certification body and conducts tests on materials, products, or methods of construction to certify products that meet the criteria for compliance with nationally recognized codes and standards. The product certification body allows its insignia of conformity to be placed on a material or product by the manufacturer, identifying that the material or product has been certified by the product certification body. The product certification body maintains a list or directory of all of the materials and products that they have certified and the conditions of their use.*

Material. *A manufactured form or substance designed to act as a whole.*

Method of construction. *A procedure or system intended to result in a finished building, structure or portion thereof.*

Product. *A material or device designed and manufactured to perform a predetermined function. Appliances, assemblies and equipment are also considered products.*

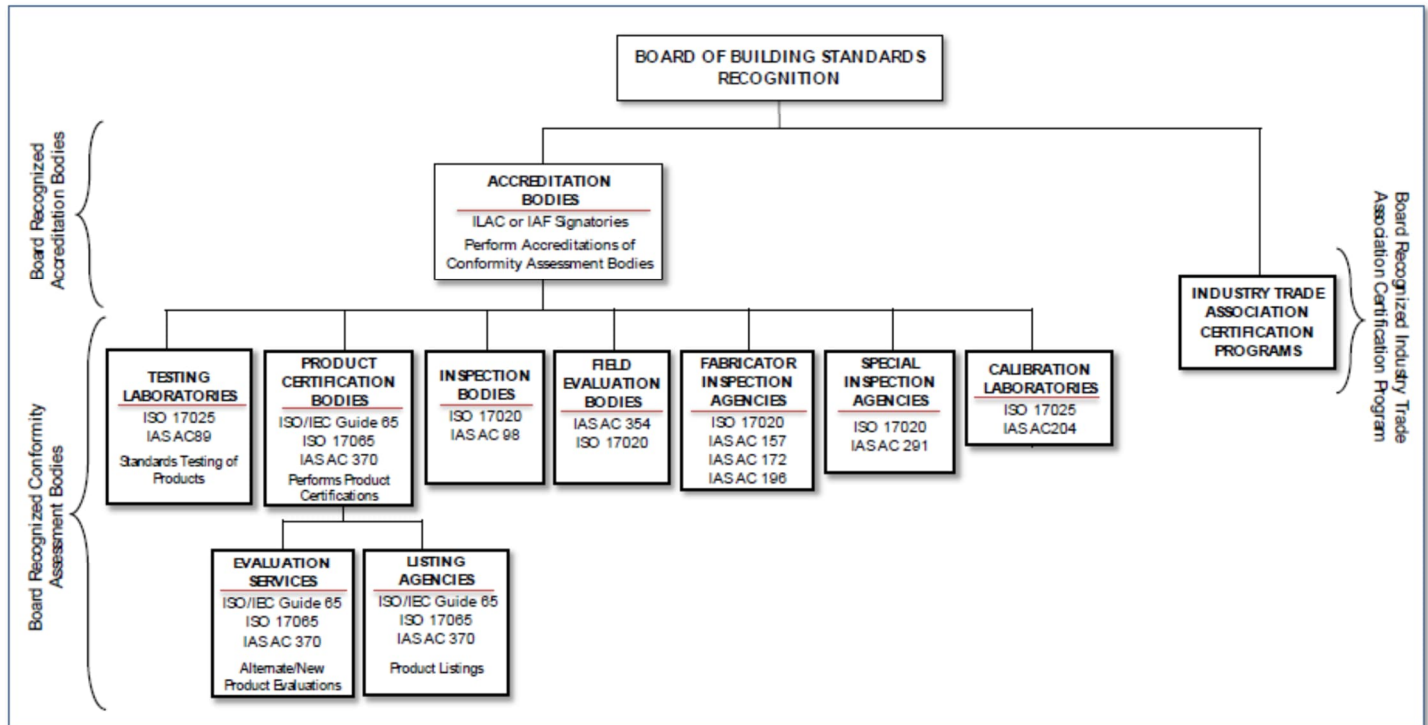
Product certification body. *An established, independent, nationally recognized and accredited, third-party conformity assessment body regularly engaged in conducting evaluation services, inspections and tests on materials and products to certify compliance with nationally recognized codes and standards. Product Certification Bodies are sub-classified as either Evaluation Services or Listing Agencies.*

Recognition. *An acceptance by the board of building standards of an accreditation body, a conformity assessment body, or an industry trade association certification program in accordance with the rules of the board of building standards.*

Special inspection agency. *An established, independent, nationally recognized and accredited, third-party conformity assessment body regularly engaged in performing special inspections as required by Chapter 17.*

Testing laboratory. *An established, independent, nationally recognized and accredited, third-party conformity assessment body regularly engaged in conducting tests of materials, products, or methods of construction to determine*

compliance with a specification or testing standard. The testing laboratory issues a report documenting the test results.



ILAC – International Laboratory Accreditation Cooperation
 IAF – International Accreditation Forum
 ISO – International Organization for Standardization
 IAS – International Accreditation Service
 IEC – International Electrotechnical Commission

Figure 114.2
ORGANIZATION OF BOARD RECOGNIZED BODIES AND
CERTIFICATION PROGRAMS

114.3 Residential building official approval process. *The residential building official shall approve the use of products in accordance with Sections 114.3.1 through 114.3.3.*

114.3.1 Materials, products, assemblies and methods of construction prescribed in the code.

114.3.1.1 Testing laboratories. *When test reports are required to be submitted or when the rules of the Board require materials, products, assemblies and methods of construction to conform to specific referenced standards, the residential building official shall verify that the proposed*

material, product, assembly, and method of construction has been tested by a testing laboratory recognized by the board and published on the list titled “Recognized Conformity Assessment Bodies” found on the board’s website at <https://com.ohio.gov/divisions-and-programs/industrial-compliance/boards/board-of-building-standards>.

The residential building official shall verify that the testing laboratory is accredited to perform the specific tests prescribed in the code by verifying the testing laboratory’s “scope of accreditation” found on the testing laboratory’s website.

Exception: Acceptance, performance, and operational testing reports submitted in accordance with Section 108.8 are permitted to be prepared and submitted by the individual performing the acceptance, performance, and operational tests. Board recognition is not required for persons conducting acceptance, performance, or operational tests.

114.3.1.2 Listing agencies. When the rules of the Board require materials, products, assemblies and methods of construction to be marked or listed and labeled in accordance with a specific referenced standard, the residential building official shall verify that the proposed material, product, assembly, and method of construction has been listed and labeled by a listing agency recognized by the board and published on the list titled “Recognized Conformity Assessment Bodies” found on the board’s website at <https://com.ohio.gov/divisions-and-programs/industrial-compliance/boards/board-of-building-standards>.

Residential building officials are authorized to approve listed and labeled materials, products, assemblies and methods of construction after verifying all of the following additional information:

1. The product is listed on the product certification body’s website directory.
2. The listing is current.
3. The product is proposed to be installed/used in accordance with the listing.
4. When used as an assembly, the assembly is proposed to be installed/used in compliance with this code.
5. The extent of the listing does not include in its scope, elements of design, construction or installation otherwise in conflict with the provisions of this code such as fire-resistance and structural design.

114.3.2 Alternative materials, products, assemblies and methods of construction not prescribed in the code. The provisions of this code are not intended to prevent the installation of any material or to prohibit any material,

product, assembly or method of construction not specifically prescribed by this code, provided that any such alternative shall have a valid research report or listing from an evaluation service recognized by the board and published on a list titled "Recognized Conformity Assessment Bodies" found on the board's website at <https://com.ohio.gov/divisions-and-programs/industrial-compliance/boards/board-of-building-standards>.

The alternative material, product, assembly, or method of construction shall be deemed to be approved provided it complies with the conditions listed in the research report or listing found on the evaluation service's website.

Exceptions:

1. Alternative materials, products, assemblies, or methods of construction submitted pursuant to section 106.5.
2. Industrialized units shall be approved and constructed in accordance with section 113.1 of this chapter.

114.3.2.1 Evaluation Service Reports. Residential building officials are authorized to accept evaluation service reports for materials, products, assemblies, and methods of construction from recognized evaluation service agencies after reviewing and verifying all of the following minimum information in the evaluation service report:

1. Identification and description of the product specifically addressed in the report and a description of how the product can be identified;
2. Identification of the specific code provisions to which the product was evaluated as a suitable alternative to the requirements of the code;
3. The product installation requirements;
4. The statement of the conditions and limitations of use of the product; and
5. List the test reports used in the evaluation.

114.3.3 Used materials and products. The use of used materials and products which meet the requirements of this code for new materials and products is permitted. Used products and materials shall not be reused unless approved by the residential building official.

114.4 Process for board-recognition of "Accreditation Bodies," "Conformity Assessment Bodies," and "Industry Trade Association Certification Programs." All accreditation bodies, conformity assessment bodies, and industry trade association certification programs shall be recognized by the board in accordance with division 4101:7 of the Administrative Code.

4101:8-2-01 Definitions.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

SECTION 201 GENERAL

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

201.2 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.

201.3 Terms defined in other codes. Where terms are not defined in this code such terms shall have the meanings ascribed *to them as* in other codes adopted and referenced by the Board of Building Standards (the Board).

201.4 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 202 DEFINITIONS

ABOVE-GRADE WALL. *A wall more than 50 percent above grade and enclosing conditioned space. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.*

ABOVE-GROUND STORAGE TANK. *A vessel, intended for fixed installation above grade, at grade, or below grade without backfill, used for the purpose of bulk-storage, dispensing, handling or processing of hazardous, flammable or combustible liquids or gases and not connected to and utilized for the operation of building service equipment.*

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.

ACCESSIBLE. *Admitting close approach as a result of not being guarded by locked doors, elevation or other effective means (see “Readily accessible”).*

ACCESSORY DWELLING UNIT (ADU). *An addition or alteration that is an additional, subordinate dwelling unit on the same lot, and is entirely within a dwelling unit, attached to a dwelling unit or in a detached structure.*

ACCESSORY STRUCTURE. A building, the use of which is incidental to that of the dwelling(s) and that is located on the same lot.

ADDITION. An extension or increase in floor area, number of stories or height of a building or structure.

Addition (Chapter 11 Energy Conservation). *An extension or increase in the conditioned space floor area, number of stories or height of a building or structure.*

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.

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.

AIR BARRIER. *One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.*

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.

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

AIR CONDITIONER, GAS-FIRED. *A gas-burning, automatically operated appliance for supplying cooled air, dehumidified air, or both, or chilled liquid.*

AIR CONDITIONING. *The treatment of air so as to control simultaneously the temperature, humidity, cleanness and distribution of the air to meet the requirements of a conditioned space.*

AIR, EXHAUST. *Air being removed from any space or piece of equipment or appliance and conveyed directly to the atmosphere by means of openings or ducts.*

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.*

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.*

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.*

AIR-HANDLING UNIT. *A blower or fan used for the purpose of distributing supply air to a room, space or area.*

AIR-IMPERMEABLE INSULATION. *An insulation having an air permeance equal to or less than 0.02 L/s-m^2 at 75 Pa pressure differential as tested in accordance with ASTM E2178 or E283 and that can function as an air barrier material as required in Chapter 11.*

AIR, MAKEUP. *Any combination of outdoor and transfer air intended to replace exhaust air and exfiltration.*

ALTERATION. *The 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 an approval.*

Alteration (Chapter 24 Fuel gas) *The construction or renovation to an existing structure other than repair or addition.*

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.

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

ANCHORS. See “Supports.”

ANODELESS RISER. *A transition assembly in which plastic piping is installed and terminated above ground outside of a building.*

ANTISIPHON. A term applied to valves or mechanical devices that eliminate siphonage.

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

***Appliance (Chapter 24 Fuel gas).** Any apparatus or device that utilizes a fuel or a raw material as a fuel to produce light, heat, power, refrigeration or air conditioning. Also, an apparatus that compresses fuel gases.*

APPLIANCE, AUTOMATICALLY CONTROLLED. *Appliances equipped with an automatic burner ignition and safety shutoff device and other automatic devices that accomplish complete turn-on and shutoff of the gas to the main burner or burners, and graduate the gas supply to the burner or burners, but do not affect complete shutoff of the gas.*

APPLIANCE, FAN-ASSISTED COMBUSTION. *An appliance equipped with an integral mechanical means to either draw or force products of combustion through the combustion chamber or heat exchanger.*

APPLIANCE, UNVENTED. *An appliance designed or installed in such a manner that the products of combustion are not conveyed by a vent or chimney directly to the outside atmosphere.*

APPLIANCE, VENTED. *An appliance designed and installed in such a manner that all of the products of combustion are conveyed directly from the appliance to the outside atmosphere through an approved chimney or vent system.*

APPROVED. *Determined to be in compliance by the authority having jurisdiction in accordance with the rules of the board.*

Approved (Chapter 24 Fuel gas). *Refers to approval by the building official as the result of review, investigation, inspection and testing in accordance with the provisions of this code.*

APPROVED AGENCY. *An established and accredited testing laboratory, listing agency, inspection body, or field evaluation body recognized by the board of building standards providing services consistent with their accreditation and the code section requiring the approved agency service.*

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.*

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

ATMOSPHERIC PRESSURE. *The pressure of the weight of air and water vapor on the surface of the earth, approximately 14.7 pounds per square inch (psi) (101 kPa absolute) at sea level.*

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

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

AUTOMATIC. *Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see "Manual").*

Automatic ignition. *Ignition of gas at the burner(s) when the gas controlling device is turned on, including re ignition if the flames on the burner(s) have been extinguished by means other than by the closing of the gas controlling device.*

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

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

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.

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

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 backflow condition.

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.

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.

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

BAROMETRIC DRAFT REGULATOR. *A balanced damper device attached to a chimney, vent connector, breeching or flue gas manifold to protect combustion appliances by controlling chimney draft. A double-acting barometric draft regulator is one whose balancing damper is free to move in either direction to protect combustion appliances from both excessive draft and backdraft.*

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

BASEMENT WALL. *A wall 50 percent or more below grade and enclosing conditioned space.*

BASIC WIND SPEED. Three-second gust speed at 33 feet (10 058 mm) above the ground in Exposure C (see Section 301.2.1) as given in Figure 301.2(5)A.

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.

BATTERY SYSTEM, STATIONARY STORAGE. A rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls and associated electrical equipment designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.

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”).

BOATHOUSE. *A structure that may or may not include a dwelling unit where the structure overhangs a body of water for the purpose of sheltering or storing watercraft where the watercraft have access to the structure via the body of water.*

BOAT WELL. *The portion of a boathouse that is used to keep or store watercraft on or out of the body of water used for access.*

BOILER. *A closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum for use externally to itself by the direct application of heat from the combustion of fuels, or from electricity or nuclear energy. The term boiler includes fired units for heating or vaporizing liquids other than water where these units are separate from processing systems and are complete within themselves. Low-pressure boilers operate at pressures less than or equal to 15 pounds per square inch (psi) (103 kPa) for steam and 160 psi (1103 kPa) or temperatures not exceeding 250 °F for water. High-pressure boilers operate at pressures exceeding those pressures and temperatures.*

Boiler, low pressure. *A steam boiler operating at pressures not exceeding fifteen psig, or a hot water heating boiler operating at pressures not exceeding one hundred sixty psig or temperatures not exceeding two hundred fifty degrees.*

Hot water heating boiler. *A boiler in which no steam is generated, 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 gauge (psig) (1100 kPa gauge) and at water temperatures not exceeding 250°F (121°C) at or near the boiler outlet.

Hot water supply boiler. *A boiler, completely filled with water, which furnishes hot water to be used externally to itself, and that operates at water pressures not exceeding 160 psig (1100 kPa gauge) and at water temperatures not exceeding 250°F (121°C) at or near the boiler outlet.*

Steam heating boiler. *A boiler in which steam is generated and that operates at a steam pressure not exceeding 15 psig (100 kPa gauge).*

BOND BEAM. A horizontal grouted element within masonry in which reinforcement is embedded.

BONDING JUMPER. *A conductor installed to electrically connect metallic gas piping to the grounding electrode system.*

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

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

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 602.10.1.

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

BRANCH, FIXTURE. See "Fixture branch, drainage."

BRANCH, HORIZONTAL. See "Horizontal branch, drainage."

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.

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

BRANCH, VENT. A vent connecting two or more individual vents with a vent stack or stack vent.

BRAZING. *A metal-joining process wherein coalescence is produced by the use of a nonferrous filler metal having a melting point above 1,000°F (538°C), but lower than that of the base metal being joined. The filler material is distributed between the closely fitted surfaces of the joint by capillary action.*

BTU. *Abbreviation for British thermal unit, which is the quantity of heat required to raise the temperature of 1 pound (454 g) of water 1°F (0.56°C) (1 Btu = 1055 J).*

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

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.

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

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

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

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

BUILDING OFFICIAL. *An individual who has received and maintains a certification of “Residential Building Official” in accordance with rules of the board of building standards. The designated authority charged with the administration and enforcement of this code, approved by the board in accordance with section 103 of this code, in a municipal corporation, township or county having a building department, certified by the board pursuant to section 3781.10*

of the Revised Code, or the health commissioner or his authorized representative in health districts, whichever one has jurisdiction.

BUILDING SERVICE EQUIPMENT. *Equipment, appliances, materials, devices, and systems integrated into a building which provide space heating, air conditioning, ventilation, fire protection, lighting, electricity, sanitation, water, heating, cooking, medical gas, medical vacuum, and clothes drying. Building service equipment begins from the connected stored source of liquid or gas fuel or electrical power supplying the equipment or the utility service point/point of delivery and extends through the point of use but does not include process equipment that may also be connected to the same source.*

BUILDING SERVICES PIPING. *All piping systems and their component parts that are part of a building system and that promote the safe, sanitary, and energy efficient occupancy of a building. Building services piping includes, but is not limited to, cold and hot potable water distribution for plumbing fixtures; sanitary lines from plumbing fixtures; nonflammable medical gas systems; medical oxygen systems; medical vacuum systems; fire protection piping systems and compressed air in dry systems; refrigeration, chilled water, condenser and cooling tower water, brine, and water/antifreeze systems; steam, steam condensate, and hot water piping systems; and fuel oil piping and fuel gas piping for heating, cooling, and cooking applications.*

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.*

BUILDING SITE. *A contiguous area of land that is under the ownership or control of one entity.*

BUILDING THERMAL ENVELOPE. *The basement walls, exterior walls, floors, ceilings, roofs and any other building element assemblies that enclose conditioned space or provide a boundary between conditioned space and exempt or unconditioned space.*

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.*

BURNER. *A device for the final conveyance of the gas, or a mixture of gas and air, to the combustion zone.*

Induced-draft. *A burner that depends on draft induced by a fan that is an integral part of the appliance and is located downstream from the burner.*

Power. *A burner in which gas, air or both are supplied at pressures exceeding, for gas, the line pressure, and for air, atmospheric pressure, with this added pressure being applied at the burner.*

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.

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.

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.

CEILING HEIGHT. The clear vertical distance from the finished floor to the finished ceiling.

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.

CHANGE OF OCCUPANCY. *A change in the purpose or level of activity within a building that involves a change in application of the requirements of the code. Such a change could be to an entire building or a portion of a building. A change of occupancy shall include any change that causes an increase in risk.*

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.

Factory-built chimney. *A listed and labeled chimney composed of factory-made components, assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.*

Masonry chimney. *A field-constructed chimney composed of solid masonry units, bricks, stones or concrete.*

CHIMNEY CONNECTOR. A pipe that connects a fuel-burning appliance to a chimney.

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.

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.

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.

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

CLEANOUT. An opening in the drainage system used for the removal of possible obstruction and located to allow for access.

CLEARANCE (Chapter 24 Fuel Gas). *The minimum distance through air measured between the heat-producing surface of the mechanical appliance, device or equipment and the surface of the combustible material or assembly.*

CLIMATE ZONE. A geographical region based on climatic criteria as specified in this code.

CLOSED CONSTRUCTION. *An assembly of materials or products manufactured in such a manner that its structural, plumbing, electrical, environmental control, or fire protection elements or components are concealed and are not readily accessible for inspection at the site of its erection, without disassembly, damage, or destruction. Closed construction includes assemblies where only one of the components is not accessible for inspection. (For example, an equipment enclosure where all the electrical conductors and components are exposed for inspection and its roof and wall panels have exposed structural members but the floor panel structural members are not exposed, would be required to comply with this section.)*

CLOSET. A small room or chamber used for storage.

CLOTHES DRYER. *An appliance used to dry wet laundry by means of heated air.*

Type 1. *Factory-built package, multiple production. Primarily used in the family living environment. Usually the smallest unit physically and in function output.*

CODE, BUILDING, MECHANICAL, AND PLUMBING. *When reference is made within this code to building code, mechanical code, or plumbing code, those references shall have the following meanings:*

Building code or this code. *The Residential Code of Ohio, current edition.*

Mechanical Code. *The current edition of the Ohio Mechanical Code.*

Plumbing Code. *The edition of the Ohio Plumbing Code referenced in Chapter 44 of this code, Section 4401.2.*

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

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

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.*

COMBUSTIBLE ASSEMBLY. *Wall, floor, ceiling or other assembly constructed of one or more component materials that are not defined as noncombustible.*

COMBUSTIBLE MATERIAL. *Any material not defined as noncombustible.*

COMBUSTION (Chapter 24 Fuel gas). *In the context of this code, refers to the rapid oxidation of fuel accompanied by the production of heat or heat and light.*

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

Combustion Air (Chapter 24 - Fuel gas). *Air necessary for complete combustion of a fuel, including theoretical air and excess air.*

COMBUSTION CHAMBER (Chapter 24 – Fuel gas). *The portion of an appliance within which combustion occurs.*

COMBUSTION PRODUCTS (Chapter 24 – Fuel gas). *Constituents resulting from the combustion of a fuel with the oxygen of the air, including the inert gases, but excluding excess air.*

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

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

CONCEALED LOCATION. *A location that cannot be accessed without damaging permanent parts of the building structure or finish surface. Spaces above, below or behind readily removable panels or doors shall not be considered as concealed.*

CONCEALED PIPING. *Piping that is located in a concealed location (see “Concealed location”).*

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.

Condensate (Chapter 24 – Fuel gas). *The liquid that condenses from a gas (including flue gas) caused by a reduction in temperature or increase in pressure*

CONDENSING APPLIANCE. An appliance that condenses water generated by the burning of fuels.

CONDITIONED AIR. Air treated to control its temperature, relative humidity or quality.

CONDITIONED FLOOR AREA. *The horizontal projection of the floors associated with the conditioned space.*

CONDITIONED SPACE. An area, room or space that is enclosed by, *but not* within, the building thermal envelope assembly and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are

separated from conditioned spaces by uninsulated walls, floors, or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling.

CONNECTOR, APPLIANCE (Chapter 24 – Fuel gas). *Rigid metallic pipe and fittings, semi rigid metallic tubing and fittings or a listed and labeled device that connects an appliance to the gas piping system.*

CONNECTOR, CHIMNEY OR VENT. *The pipe that connects an appliance to a chimney or vent.*

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 *plan approval in accordance with Section 106.*

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.

CONTINUOUS AIR BARRIER. *A combination of materials and assemblies that restrict or prevent the passage of air through the building thermal envelope.*

CONTINUOUS INSULATION (ci). *Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior, or is integral to any opaque surface, of the building envelope.*

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

CONTROL (Chapter 24 – Fuel gas). *A manual or automatic device designed to regulate the gas, air, water or electrical supply to, or operation of, a mechanical system.*

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

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.

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.

CONVERSION BURNER. *A unit consisting of a burner and its controls for installation in an appliance originally utilizing another fuel.*

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

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

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.

CRAWL SPACE. An underfloor space that is not a basement.

CRAWL SPACE WALL. *The opaque portion of a wall that encloses a crawl space and is partially or totally below grade.*

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.

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

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.

CUBIC FOOT (Chapter 24 – Fuel gas). *The amount of gas that occupies 1 cubic foot (0.02832 m³) when at a temperature of 60°F (16°C), saturated with water vapor and under a pressure equivalent to that of 30 inches of mercury (101 kPa).*

CURTAIN WALL. *Fenestration products used to create an external nonload-bearing wall that is designed to separate the exterior and interior environments.*

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

DAMPER. *A manually or automatically controlled device to regulate draft or the rate of flow of air or combustion gases.*

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.

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.

DECORATIVE APPLIANCE, VENTED (Chapter 24 – Fuel gas). *A vented appliance wherein the primary function lies in the aesthetic effect of the flames.*

DECORATIVE APPLIANCES FOR INSTALLATION IN VENTED FIREPLACES (Chapter 24 – Fuel gas). *A vented appliance designed for installation within the fire chamber of a vented fireplace, wherein the primary function lies in the aesthetic effect of the flames.*

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.

DEMAND (Chapter 24 – Fuel gas). *The maximum amount of gas input required per unit of time, usually expressed in cubic feet per hour, or Btu/h (1 Btu/h = 0.2931 W).*

DEMAND RECIRCULATION WATER SYSTEM. *A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold-water supply pipe.*

DESIGN FLOOD ELEVATION. *The elevation of the “design flood,” including wave height, relative to the datum specified on the community’s legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building’s perimeter plus the*

depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

DESIGN PROFESSIONAL. See “Registered design professional.”

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

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

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.

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

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

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.

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.

Mechanical or 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.

DRAFT HOOD. A device built into an appliance, or *made as* 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.

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

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.

DRAIN. Any pipe that carries soil and waterborne wastes in a building drainage system.

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.

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.

DRIP (Chapter 24 – Fuel gas). *The container placed at a low point in a system of piping to collect condensate and from which the condensate is removable.*

DUCT. *A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.*

DUCT FURNACE. *A warm-air furnace normally installed in an air distribution duct to supply warm air for heating. This definition shall apply only to a warm-air heating appliance that depends for air circulation on a blower not furnished as part of the furnace.*

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.

DWELLING. Any building that *exclusively* contains one, two, or three dwelling units *each of which may be occupied by a family and no more than five lodgers or boarders*, intended, or designed to be built, used, rented, leased, let or hired out to

be occupied, or that *is* occupied for living purposes, *physically separated from adjacent structures and with an independent exit from each dwelling unit.*

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. *The dwelling unit may include any accessory space intended for the exclusive use of the occupants of an individual dwelling unit such as a private garage, greenhouse, etc.*

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

EGRESS ROOF ACCESS WINDOW. *A skylight or roof window designed and installed to satisfy the emergency escape and rescue opening requirements of Section 310.2.*

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.)

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”).

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

ENERGY ANALYSIS. *A method for estimating the annual energy use of the proposed design and standard reference design based on estimates of energy use.*

ENERGY COST. *The total estimated annual cost for purchased energy for the building functions regulated by this code, including applicable demand charges.*

ENERGY SIMULATION TOOL. *An approved software program or calculation-based methodology that projects the annual energy use of a building.*

ENGINE-MOUNTED TANK. *A fuel tank furnished by the engine manufacturer or the emergency power system supplier and mounted on the engine, the engine-frame, or under as a subbase.*

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.

EQUIPMENT (OR FIXTURE). *Any plumbing, heating, electrical, ventilating, air conditioning, refrigerating and fire protection devices and components of systems other than appliances, and elevators, dumb-waiters, and other mechanical facilities or installations that are related to building services.*

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.

ERI REFERENCE DESIGN. *A version of the rated design that meets the minimum requirements of the 2006 International Energy Conservation Code.*

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

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.

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

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

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

EXCESS FLOW VALVE (EFV). *A valve designed to activate when the fuel gas passing through it exceeds a prescribed flow rate.*

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

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.

EXIT. *That portion of a means of egress system between the exit access and the exit discharge or public way. Exit components include exterior exit doors at the level of exit discharge, interior exit stairways, interior exit ramps, exit passageways, exterior exit stairways and exterior exit ramps and horizontal exits.*

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

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.

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

EXTERIOR MASONRY CHIMNEYS. *Masonry chimneys exposed to the outdoors on one or more sides below the roof line.*

EXTERIOR WALL. *Walls including both above-grade walls and basement walls.*

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.

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

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.

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.

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.

Site-built fenestration product. *A fenestration designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built fenestration include storefront systems, curtain walls, and atrium roof systems.*

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.*

Skylights (Chapter 11 Energy Conservation). *Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.*

Unit Skylight. 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.

Vertical fenestration. *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 from vertical.*

Vertical fenestration (Chapter 11 Energy Conservation). *Windows that are fixed or operable, opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of not less than 60 degrees (1.05 rad) from horizontal.*

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

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.

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.

FIREPLACE. *A fire chamber and hearth constructed of non-combustible material for use with solid fuels and provided with a chimney.*

Factory-built fireplace. A listed and labeled fireplace and chimney system composed of factory-made components, and assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.

Masonry fireplace. A field-constructed *hearth and fire chamber composed of solid masonry units such as bricks, stones, listed masonry units or reinforced concrete and provided with a suitable chimney.*

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.

FIREPLACE THROAT. The opening between the top of the firebox and the smoke chamber.

FIRE-RETARDANT-TREATED WOOD. Pressure-treated lumber and plywood that 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.

FIXTURE. See "Plumbing fixture."

FIXTURE (OR EQUIPMENT). *Any plumbing, heating, electrical, ventilating, air conditioning, refrigerating and fire protection devices and components of systems other than appliances, and elevators, dumb-waiters, and other mechanical facilities or installations that are related to building services.*

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

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

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

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.

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.

FIXTURE SUPPLY. The water-supply pipe connecting a fixture or fixture fitting to a fixture branch.

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.

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.

FLAME SAFEGUARD. *A device that will automatically shut off the fuel supply to a main burner or group of burners when the means of ignition of such burners becomes inoperative, and when flame failure occurs on the burner or group of burners.*

FLAME SPREAD. The propagation of flame over a surface.

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.

FLASHBACK ARRESTOR CHECK VALVE. *A device that will prevent the backflow of one gas into the supply system of another gas and prevent the passage of flame into the gas supply system.*

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.

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

FLOOD or FLOODING. *A general and temporary condition of partial or complete inundation of normally dry land from:*

- 1. The overflow of inland or tidal waters.*
- 2. The unusual and rapid accumulation or runoff of surface waters from any source.*

FLOOD HAZARD AREA. *The greater of the following two areas:*

- 1. The area within a floodplain subject to a 1 percent or greater chance of flooding in any given year.*
- 2. This area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.*

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

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.

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

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.

FLUE. See “Vent.”

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

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

FLUE GASES. Products of combustion plus excess air in appliance flues or heat exchangers.

FLUE LINER (LINING). *A system or material used to form the inside surface of a flue in a chimney or vent, for the purpose of protecting the surrounding structure from the effects of combustion products and for conveying combustion products without leakage to the atmosphere.*

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

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.

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.

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

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^3) unless it is used as interior trim.

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.

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

FUEL GAS. *A natural gas, manufactured gas, liquefied petroleum gas or mixtures of these gases.*

FUEL TANK. *A tank containing fuel for an engine(s) or appliance.*

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.

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.

FURNACE. *A completely self-contained heating unit that is designed to supply heated air to spaces remote from or adjacent to the appliance location.*

Furnace, central. *A self-contained appliance for heating air by transfer of heat of combustion through metal to the air, and designed to supply heated air through ducts to spaces remote from or adjacent to the appliance location.*

Furnace plenum. *An air compartment or chamber to which one or more ducts are connected and that forms part of an air distribution system.*

GAS CONVENIENCE OUTLET. *A permanently mounted, manually operated device that provides the means for connecting an appliance to, and disconnecting an appliance from, the supply piping. The device includes an integral, manually operated valve with a non-displaceable valve member and is designed so that disconnection of an appliance only occurs when the manually operated valve is in the closed position.*

GAS PIPING. *An installation of pipe, valves or fittings installed on a premises or in a building and utilized to convey fuel gas.*

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.

GRADE. The finished ground level adjoining the building at all exterior walls.

GRADE, PIPING. See “Slope.”

GRADE FLOOR OPENING. A window or other opening located such that the sill height of the 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.”)

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.

GRAY WATER. Waste discharged from lavatories, bathtubs, showers, clothes washers and laundry trays. *Private water supplies and recycled water systems are regulated by the Ohio Department of Health rules found in Chapter 3701-28 of the Administrative Code.*

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.

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

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.

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.

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

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 702.3 and Part IX of this code are types of gypsum board.

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

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.

HANDRAIL. A horizontal or sloping rail intended for grasping by the hand for guidance or support.

HANGERS. See “Supports.”

HAZARDOUS LOCATION. Any location considered to be a fire hazard for flammable vapors, dust, combustible fibers or other highly combustible substances. *The location is not necessarily categorized in the Ohio Building Code as a high-hazard use group classification.*

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

HEATED SLAB. *Slab-on-grade construction in which the heating elements, hydronic tubing, or hot air distribution system is in contact with, or placed within or under, the slab.*

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

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.

HIGH-EFFICACY LAMPS. *Compact fluorescent lamps, light-emitting diode (LED) lamps, T-8 or smaller diameter linear fluorescent lamps, or other lamps with an efficacy of not less than the following:*

1. *60 lumens per watt for lamps over 40 watts.*
2. *50 lumens per watt for lamps over 15 watts to 40 watts.*
3. *40 lumens per watt for lamps 15 watts or less.*

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.

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

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 Preservation *Office at the Ohio History Connection* 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.

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.

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

HOUSE PIPING. *See "Piping system."*

HOT WATER. Water at a temperature greater than or equal to 110°F (43°C).

HURRICANE-PRONE REGIONS. Areas vulnerable to hurricanes, defined as the U.S. 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.

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.

IGNITION PILOT. *A pilot that operates during the lighting cycle and discontinues during main burner operation.*

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.

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.

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.

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

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.

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

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

INDUSTRIALIZED UNITS. *Industrialized units are prefabricated components comprised of closed construction manufactured at a location remote from the site of intended use and transported to a building site for its subsequent use. Industrialized units are not restricted to housing for one-, two-, and three-family*

dwelling, but includes all prefabricated forms of building elements and assembled construction units, intended for both structural and service equipment purposes in all buildings of all groups. Prefabricated shop assemblies may be shipped in structurally complete units ready for installation in the building structure or in knock-down and packaged form for assembly at the site.

INFILTRATION. *The uncontrolled inward air leakage into a building caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.*

INFRARED RADIANT HEATER. *A heater that directs a substantial amount of its energy output in the form of infrared radiant energy into the area to be heated. Such heaters are of either the vented or unvented type.*

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.*

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.*

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.*

INSULATING SHEATHING. *An insulating board having a thermal resistance of not less than R-2 of the core material.*

JOINT, FLARED. *A metal-to-metal compression joint in which a conical spread is made on the end of a tube that is compressed by a flare nut against a mating flare.*

JOINT, MECHANICAL. *A general form of gas-tight joints obtained by the joining of metal parts through a positive-holding mechanical construction, such as a press-connect joint, flanged joint, threaded joint, flared joint or compression joint.*

JOINT, PLASTIC ADHESIVE. *A joint made in thermoset plastic piping by the use of an adhesive substance that forms a continuous bond between the mating*

surfaces without dis- solving either one of them.

JURISDICTION. *The municipality, township or county governmental unit with a residential building department certified by the board of building standards.*

KITCHEN. Kitchen shall mean an area used, or designated to be used, for the preparation of food.

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.”)

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.

LANDING PLATFORM. *A landing provided as the top step of a stairway accessing a loft.*

LEAK CHECK. *An operation performed on a gas piping system to verify that the system does not leak.*

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.

LIQUEFIED PETROLEUM GAS or LPG (LP-GAS). *Liquefied petroleum gas composed predominately of pro- pane, propylene, butanes or butylenes, or mixtures thereof that is gaseous under normal atmospheric conditions, but is capable of being liquefied under moderate pressure at normal temperatures.*

LISTED. Equipment, materials, products or services included in a list published by an organization *recognized by the Board* 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 *when installed in accordance with the manufacturer's installation instructions.*

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.

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

LOAD-BEARING ELEMENT. *Any column, girder, beam, joist, truss, rafter, wall, floor or roof sheathing that supports any vertical load in addition to its own weight, and/or any lateral load.*

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

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.

LOFT. *A floor level located more than 30 inches (762 mm) above the main floor, open to the main floor on one or more sides with a ceiling height of less than 6 feet 8 inches (2032 mm) and used as a living or sleeping space.*

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

LOG LIGHTER. *A manually operated solid-fuel ignition appliance for installation in a vented solid fuel-burning fire-place.*

LOT. A portion or parcel of land considered as a unit.

LOT LINE. A line dividing one lot from another, or from a street or any public place.

LOW-VOLTAGE LIGHTING. *Lighting equipment powered through a transformer such as a cable conductor, a rail conductor and track lighting.*

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.

MAIN. The principal pipe artery to which branches may be connected.

MAIN BURNER. *A device or group of devices essentially forming an integral unit for the final conveyance of gas or a mixture of gas and air to the combustion zone, and on which combustion takes place to accomplish the function for which the appliance is designed.*

MAIN SEWER. See "Public sewer."

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.

MANUAL. *Capable of being operated by personal intervention (see "Automatic").*

MANUFACTURED HOME. *A building unit or assembly of closed construction that is fabricated in an off-site facility and constructed in conformance with the federal construction and safety standards established by the secretary of housing and urban development pursuant to the "Manufactured Housing Construction and Safety Standards Act of 1974," 88 Stat. 700, 42 U.S.C.A. 5401, 5403, and that has a permanent label or tag affixed to it, as specified in 42 U.S.C.A. 5415, certifying compliance with all applicable federal construction and safety standards.*

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.")

MANUFACTURER'S INSTALLATION INSTRUCTIONS. *Instructions published for appliances, materials, components, products, equipment, assemblies or systems as part of the conditions of their listing and labeling.*

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.")

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

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.

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

MASONRY UNIT. Brick, tile, stone, architectural cast stone, glass block or concrete block conforming to the requirements specified in Section 2103 of the *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.

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).

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.

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

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 gas- 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.

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

METAL ROOF PANEL. An interlocking metal sheet having an installed weather exposure of not less than 3 square feet (0.28 m²) per sheet.

METAL ROOF SHINGLE. An interlocking metal sheet having an installed weather exposure less than 3 square feet (0.28 m²) per sheet.

METER. *The instrument installed to measure the volume of gas delivered through it.*

MEZZANINE. An intermediate level or levels between the floor and ceiling of any story.

MINOR REPAIR. *See “Repair, Minor”.*

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.

MODULATING (Chapter 24 – Fuel gas). *Modulating or throttling is the action of a control from its maximum to minimum position in either pre-determined steps or increments of movement as caused by its actuating medium.*

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

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.

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

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.

NONCOMBUSTIBLE MATERIAL. Materials that pass the test procedure for defining noncombustibility of elementary materials set forth in ASTM E136.

Noncombustible materials (Chapter 24 – Fuel gas). Materials that, where tested in accordance with ASTM E136, have not fewer than three of four specimens tested meeting all of the following criteria:

- 1. The recorded temperature of the surface and interior thermocouples shall not at any time during the test rise more than 54°F (30°C) above the furnace temperature at the beginning of the test.*
- 2. There shall not be flaming from the specimen after the first 30 seconds.*
- 3. If the weight loss of the specimen during testing exceeds 50 percent, the recorded temperature of the surface and interior thermocouples shall not at any time during the test rise above the furnace air temperature at the beginning of the test, and there shall not be flaming of the specimen.*

NOSING. The leading edge of treads of stairs and of landings at the top of stairway flights.

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.

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.

Offset (vent). *A combination of approved bends that make two changes in direction bringing one section of the vent out of line, but into a line parallel with the other section.*

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.

OPAQUE DOOR. *A door that is not less than 50-percent opaque in surface area.*

OUTLET (Chapter 24 – Fuel gas). *The point at which a gas-fired appliance connects to the gas piping system.*

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

OXYGEN DEPLETION SAFETY SHUTOFF SYSTEM (ODS). *A system designed to act to shut off the gas supply to the main and pilot burners if the oxygen in the surrounding atmosphere is reduced below a predetermined level.*

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.

PANEL THICKNESS. Thickness of core plus two layers of structural wood panel facings.

PATIO COVER. *A structure with open or glazed walls that is used for recreational, outdoor living purposes associated with a dwelling unit.*

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.

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

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

PERMIT. *An approval indicated in an official document or certificate issued by the residential building official that authorizes performance of a specified activity. Also see “APPROVED”.*

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.

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.

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

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

PHOTOVOLTAIC SHINGLES. A roof covering that resembles shingles and that incorporates photovoltaic modules.

PILOT. *A small flame that is utilized to ignite the gas at the main burner or burners.*

PIPING (Chapter 24 – Fuel gas). *Where used in this code, “piping” refers to either pipe or tubing, or both.*

Pipe. *A rigid conduit of iron, steel, copper, copper-alloy or plastic.*

Tubing. *Semi-rigid conduit of copper, copper-alloy, aluminum, plastic or steel.*

PIPING SYSTEM (Chapter 24 – Fuel gas). *The fuel piping, valves and fittings from the outlet of the point of delivery to the outlets of the appliance shutoff valves.*

PITCH. See “Slope.”

PLASTIC COMPOSITE. A generic designation that refers to wood-plastic composites and plastic lumber.

PLASTIC, THERMOPLASTIC. *A plastic that is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.*

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.

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

PLUMBING. *The practice, materials and fixtures utilized in the installation, maintenance, extension and alteration of all piping, fixtures, appliances and appurtenances within or adjacent to any structure, in connection with sanitary drainage or storm drainage facilities; venting systems; and public or private water supply systems.*

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

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.

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.

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.

POINT OF DELIVERY (Chapter 24 – Fuel gas). *For natural gas systems, the point of delivery is the outlet of the service meter assembly or the outlet of the service regulator or service shutoff valve where a meter is not provided. Where a valve is provided at the outlet of the service meter assembly, such valve shall be*

considered to be downstream of the point of delivery. For undiluted liquefied petroleum gas systems, the point of delivery shall be considered to be the outlet of the service pressure regulator, exclusive of line gas regulators, in the system.

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.

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.

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.

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.

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.

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

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

PRESSURE DROP (Chapter 24 – Fuel gas). *The loss in pressure due to friction or obstruction in pipes, valves, fittings, regulators and burners.*

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.

PRESSURE TEST (Chapter 24 – Fuel gas). *An operation performed to verify the*

gas-tight integrity of gas piping following its installation or modification.

PROCESS EQUIPMENT. *Equipment, machinery and devices specifically intended and used exclusively for purposes other than building service equipment.*

PROPOSED DESIGN. *A description of the proposed building used to estimate annual energy use for determining compliance based on total building performance.*

PUBLIC SEWER. A common sewer directly controlled by public authority.

PUBLIC WATER MAIN. A water-supply pipe for public use controlled by public authority.

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).

PURGE. To clear of air, gas or other foreign substances.

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

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

RATED DESIGN. *A description of the proposed building used to determine the energy rating index.*

READILY ACCESSIBLE. *Capable of being reached quickly for operation, renewal or inspection without requiring those to whom ready access is requisite to climb over or remove obstacles or to resort to portable ladders or access equipment (see "Accessible").*

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.

RECEPTOR. A fixture or device that receives the discharge from indirect waste pipes.

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."

REFRIGERANT. A substance used to produce refrigeration by its expansion or evaporation.

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

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.

REGISTERED DESIGN PROFESSIONAL. *Any architect holding a certificate issued under sections 4703.10 and 4703.36 of the Revised Code or any engineer holding a certificate issued under section 4733.14 of the Revised Code.*

REGULATOR. *A device for controlling and maintaining a uniform gas supply pressure, either pounds-to-inches water column (MP regulator) or inches-to-inches water column (appliance regulator).*

REGULATOR, GAS APPLIANCE. *A pressure regulator for controlling pressure to the manifold of the gas appliance.*

REGULATOR, LINE GAS PRESSURE. *A device placed in a gas line between the service pressure regulator and the appliance for controlling, maintaining or reducing the pressure in that portion of the piping system downstream of the device.*

REGULATOR, MEDIUM-PRESSURE (MP Regulator). *A line pressure regulator that reduces gas pressure from the range of greater than 0.5 psig (3.4 kPa) and less than or equal to 5 psig (34.5 kPa) to a lower pressure.*

REGULATOR, PRESSURE. *A device placed in a gas line for reducing, controlling and maintaining the pressure in that portion of the piping system*

downstream of the device.

REGULATOR, SERVICE PRESSURE. *For natural gas systems, a device installed by the serving gas supplier to reduce and limit the service line pressure to delivery pressure. For undiluted liquefied petroleum gas systems, the regulator located upstream from all line gas pressure regulators, where installed, and downstream from any first stage or a high pressure regulator in the system.*

RELIEF OPENING. *The opening provided in a draft hood to permit the ready escape to the atmosphere of the flue products from the draft hood in the event of no draft, backdraft or stoppage beyond the draft hood, and to permit air into the draft hood in the event of a strong chimney updraft.*

RELIEF VALVE (DEVICE). *A safety valve designed to forestall the development of a dangerous condition by relieving either pressure, temperature or vacuum in the hot water supply system.*

RELIEF VALVE, PRESSURE. *An automatic valve that opens and closes a relief vent, depending on whether the pressure is above or below a predetermined value.*

RELIEF VALVE, TEMPERATURE.

Manual reset type. *A valve that automatically opens a relief vent at a predetermined temperature and that must be manually returned to the closed position.*

Reseating or self-closing type. *An automatic valve that opens and closes a relief vent, depending on whether the temperature is above or below a predetermined value.*

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

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

REPAIR, MINOR. *The reconstruction or renewal of any part of an existing building for the purpose of its maintenance when the work has limited impact on access, safety or health. Minor repairs do not include the cutting away of any wall, partition or portions of walls, the removal or cutting of any structural beam or load bearing support, or the removal or change of any required element of accessibility, means of egress, or rearrangement of parts of a structure affecting the egress requirements. Minor repairs do not include addition to, alteration of, replacement*

or relocation of any standpipe, 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.

REROOFING. The process of recovering or replacing an existing roof covering. See “Roof recover.”

RESIDENTIAL BUILDING. *A one-family, two-family, or three-family dwelling house, and any accessory structure incidental to that dwelling house. “Residential building” includes a one-family, two-family, or three-family dwelling house that is used as a model to promote the sale of a similar dwelling house. “Residential building” does not include an industrialized unit as defined by division (C)(3) of Section 3781.06 of the Revised Code, a manufactured home as defined by division (C)(4) of Section 3781.06 of the Revised Code, or a mobile home as defined by division (O) of Section 4501.01 of the Revised Code.*

RESIDENTIAL BUILDING OFFICIAL. *An individual who has received and maintains a certification of “Residential Building Official” in accordance with rules of the board of building standards.*

RETURN AIR. Air removed from an approved conditioned space or location and recirculated or exhausted.

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

RISER, GAS. *A vertical pipe supplying fuel gas.*

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

RISER (STAIR). The vertical component of a step or stair.

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 roof assembly includes the roof deck, underlayment and roof covering, and can also include a thermal barrier, ignition barrier, insulation or a vapor retarder.

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.

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

ROOF COVERING SYSTEM. See “Roof assembly.”

ROOF DECK. The flat or sloped surface not including its supporting members or vertical supports.

ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

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

ROOM HEATER, UNVENTED. See “Unvented room heater.”

ROOM HEATER, VENTED. See “Vented room heater.”

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.

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.

R-VALUE (THERMAL RESISTANCE). *The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \cdot ft^2 \cdot ^\circ F/Btu$) [$(m^2 \cdot K)/W$].*

SAFE. *As applied to a building, means free from danger or hazard to the life, safety, health or welfare of persons occupying or frequenting it, or of the public, and from danger of settlement, movement, disintegration, or collapse, whether such danger arises from the method or materials of its construction or from equipment*

installed therein, for the purpose of lighting, heating, the transmission or utilization of electric current, or from its location or otherwise.

SAFETY SHUTOFF DEVICE. *See “Flame safeguard.”*

SANITARY. *As applied to a building, means free from danger or hazard to the health of persons occupying or frequenting it or to that of the public, if such danger arises from the method or materials of its construction or from any equipment installed therein for the purpose of lighting, heating, ventilating, or plumbing.*

SANITARY SEWER. A sewer that carries sewage and excludes storm, surface and groundwater.

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

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.

SEPTIC TANK. A water-tight 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.

SERIOUS HAZARD. *A hazard of considerable consequence to safety or health through the design, location, construction, or equipment of a building, or the condition thereof, which hazard has been established through experience to be of certain or probable consequence, or which can be determined to be, or which is obviously such a hazard.*

SERVICE WATER HEATING. *Supply of hot water for purposes other than comfort heating.*

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

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

SHAFT. *An enclosed space extending through one or more stories of a building,*

connecting vertical openings in successive floors, or floors and the roof.

SHALL. The term, where used in the code, is construed as mandatory.

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 *applicable* limitations in Section 301.2 of this code.

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.

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

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.

SITE-BUILT FENESTRATION PRODUCT. *See FENESTRATION, Site-Built Fenestration Product.*

SKYLIGHT. *See FENESTRATION, Skylights.*

SKYLIGHT, UNIT. *See FENESTRATION, Unit Skylight.*

SKYLIGHTS AND SLOPED GLAZING. *See FENESTRATION, Skylights and Sloped Glazing.*

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.

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.

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.

SPECIFIC GRAVITY (Chapter 24 – Fuel gas). *As applied to gas, specific gravity is the ratio of the weight of a given volume to that of the same volume of air, both measured under the same condition.*

SOIL STACK OR PIPE. A pipe that conveys sewage containing fecal material.

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

SOLAR HEAT GAIN COEFFICIENT (SHGC). *The ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation that is then reradiated, conducted or convected into the space.*

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

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

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.

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 610.8.

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

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.

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

STAIR. A change in elevation, consisting of one or more risers.

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 within or attached to a building, porch or deck.

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

STANDARD REFERENCE DESIGN. *A version of the proposed design that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.*

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

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.

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

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.

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.

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.

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.

STRUCTURE. That which is built or constructed.

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

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.

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.

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.

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

SUPPORTS. Devices for supporting, hanging and securing pipes, fixtures and equipment.

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”).

TECHNICALLY INFEASIBLE. *An alteration of a building or a facility that has little likelihood of being accomplished because the existing structural conditions necessitate the removal or alteration of a load-bearing member that is an essential part of the structural frame, or because other existing physical or site constraints do not allow for modification or addition of elements, spaces or features which are in full and strict compliance with the minimum requirements for new construction and are necessary to provide accessibility. This definition is only applicable to Sections 311.8 and 320.1.*

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

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

TERMITE-RESISTANT MATERIAL. Pressure-preservative-treated wood in accordance with the AWPA standards in Section 317.1, naturally durable termite-resistant wood, steel, concrete, masonry or other approved material.

THERMAL ISOLATION. *Physical and space conditioning separation from conditioned spaces. The conditioned spaces shall be controlled as separate zones for heating and cooling or conditioned by separate equipment.*

THERMAL RESISTANCE, R-VALUE. See “R-value.”

THERMAL TRANSMITTANCE, U-FACTOR. See “U-factor.”

THERMOSTAT. *An automatic control device used to maintain temperature at a fixed or adjustable set point.*

Electric switch type. *A device that senses changes in temperature and controls electrically, by means of separate components, the flow of gas to the burner(s) to maintain selected temperatures.*

THIRD-PARTY CERTIFICATION AGENCY. *Deleted.*

THIRD-PARTY CERTIFIED. *Deleted.*

TINY HOUSE. *A dwelling that is 400 square feet (37 m²) or less in floor area excluding lofts.*

TOILET, GAS-FIRED. *A packaged and completely assembled appliance containing a toilet that incinerates refuse instead of flushing it away with water.*

TOWNHOUSE. *Deleted.*

TRANSITION FITTINGS, PLASTIC TO STEEL. *An adapter for joining plastic pipe to steel pipe. The purpose of this fitting is to provide a permanent, pressure-tight connection between two materials that cannot be joined directly one to another.*

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.

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

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.

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.

TRIM. Picture molds, chair rails, baseboards, handrails, door and window frames, and similar decorative or protective materials used in fixed applications.

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

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.

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.

U-FACTOR (THERMAL TRANSMITTANCE). *The coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h • ft² • °F) [W/(m² • K)].*

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 to 12 (17-percent slope) or greater, is applied.

UNIT HEATER. *A self-contained, automatically controlled, vented, fuel-gas-burning, space-heating appliance, intended for installation in the space to be heated without the use of ducts, and having integral means for circulation of air.*

UNVENTED ROOM HEATER. *An unvented heating appliance designed for stationary installation and utilized to provide comfort heating. Such appliances provide radiant heat or convection heat by gravity or fan circulation directly from the heater and do not utilize ducts.*

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

VALVE (Chapter 24 – Fuel gas). *A device used in piping to control the gas supply to any section of a system of piping or to an appliance.*

Appliance shutoff. *A valve located in the piping system, used to isolate individual appliances for purposes such as service or replacement.*

Automatic. *An automatic or semiautomatic device consisting essentially of a valve and an operator that control the gas supply to the burner(s) during*

operation of an appliance. The operator shall be actuated by application of gas pressure on a flexible diaphragm, by electrical means, by mechanical means or by other approved means.

Automatic gas shutoff. *A valve used in conjunction with an automatic gas shutoff device to shut off the gas supply to a water-heating system. It shall be constructed integrally with the gas shutoff device or shall be a separate assembly.*

Individual main burner. *A valve that controls the gas supply to an individual main burner.*

Main burner control. *A valve that controls the gas supply to the main burner manifold.*

Manual main gas-control. *A manually operated valve in the gas line for the purpose of completely turning on or shutting off the gas supply to the appliance, except to pilot or pilots that are provided with independent shutoff.*

Manual reset. *An automatic shutoff valve installed in the gas supply piping and set to shut off when unsafe conditions occur. The device remains closed until manually reopened.*

Service shutoff. *A valve, installed by the serving gas supplier between the service meter or source of supply and the customer piping system, to shut off the entire piping system.*

VAPOR DIFFUSION PORT. *A passageway for conveying water vapor from an unvented attic to the outside atmosphere.*

VAPOR PERMEABLE. *The property of having a moisture vapor permeance rating of 5 perms (2.9×10^{-10} kg/Pa $\times$ s $\times$ m²) or greater, where tested in accordance with the desiccant method using Procedure A of ASTM E96. A vapor permeable material permits the passage of moisture vapor.*

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: ≤ 0.1 perm rating

Class II: > 0.1 to ≤ 1.0 perm rating

Class III: > 1.0 to ≤ 10 perm rating

VENT. *A pipe or other conduit composed of factory-made components, containing a passageway for conveying combustion products and air to the atmosphere, listed and labeled for use with a specific type or class of appliance.*

Special gas vent. *A vent listed and labeled for use with listed Category II, III*

and IV gas appliances.

Type B vent. *A vent listed and labeled for use with appliances with draft hoods and other Category I appliances that are listed for use with Type B vents.*

Type BW vent. *A vent listed and labeled for use with wall furnaces.*

Type L vent. *A vent listed and labeled for use with appliances that are listed for use with Type L or Type B vents.*

VENT COLLAR. See “Flue collar.”

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

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.

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.

VENT PIPING (Chapter 24 – Fuel gas).

Breather. *Piping run from a pressure-regulating device to the outdoors, designed to provide a reference to atmospheric pressure. If the device incorporates an integral pressure relief mechanism, a breather vent can also serve as a relief vent.*

Relief. *Piping run from a pressure-regulating or pressure-limiting device to the outdoors, designed to provide for the safe venting of gas in the event of excessive pressure in the gas piping system.*

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.

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.

VENTED APPLIANCE CATEGORIES. *Appliances that are categorized for the purpose of vent selection are classified into the following four categories:*

Category I. *An appliance that operates with a non-positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.*

Category II. *An appliance that operates with a non-positive vent static pressure and with a vent gas temperature that is capable of causing excessive condensate production in the vent.*

Category III. *An appliance that operates with a positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.*

Category IV. *An appliance that operates with a positive vent static pressure and with a vent gas temperature that is capable of causing excessive condensate production in the vent.*

VENTED ROOM HEATER. *A vented self-contained, free-standing, non-recessed appliance for furnishing warm air to the space in which it is installed, directly from the heater without duct connections.*

VENTED WALL FURNACE. *A self-contained vented appliance complete with grilles or equivalent, designed for incorporation in or permanent attachment to the structure of a building, mobile home or travel trailer, and furnishing heated air circulated by gravity or by a fan directly into the space to be heated through openings in the casing. This definition shall exclude floor furnaces, unit heaters and central furnaces as herein defined.*

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

VENTILATION AIR. *That portion of supply air that comes from outside (outdoors) plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.*

VENTING. Removal of combustion products to the outdoors.

VENTING SYSTEM. A continuous open passageway from the flue collar or draft hood 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.

VERTICAL FENESTRATION. *See FENESTRATION, vertical.*

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

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

VISIBLE TRANSMITTANCE (VT). *The ratio of visible light entering the space through the fenestration product assembly to the incident visible light, Visible Transmittance, includes the effects of glazing material and frame and is expressed as a number between 0 and 1.*

WALL HEATER, UNVENTED TYPE. *A room heater of the type designed for insertion in or attachment to a wall or partition. Such heater does not incorporate concealed venting arrangements in its construction and discharges all products of combustion through the front into the room being heated.*

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

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.

WASTE. Liquidborne waste that is free of fecal matter.

WASTE PIPE OR STACK. Piping that conveys only liquid sewage not containing fecal material.

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

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.

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

WATER MAIN. A water supply pipe for public use.

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.

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.

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.

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.

WET VENT. A vent that receives the discharge of wastes from other fixtures.

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.

WINDBORNE DEBRIS REGION. *Deleted.*

WINDER. A tread with nonparallel edges.

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.

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.

ZONE. *A space or group of spaces within a building with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained throughout using a single controlling device.*

4101:8-3-01 Building planning.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

SECTION 301 DESIGN CRITERIA

301.1 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.

301.1.1 Alternative provisions. As an alternative to the requirements in Section 301.1, 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 *Ohio 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 (AISI S230).
3. ICC Standard on the Design and Construction of Log Structures (ICC 400).

301.1.2 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.

301.1.3 Engineered design. Where a building of otherwise conventional

construction contains structural elements exceeding the limits of Section 301 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 *Ohio building code* is permitted for buildings and structures, and parts thereof, included in the scope of this code.

301.2 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 301.2(1).

301.2.1 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 301.2(1) as determined from Figure 301.2(5)A. The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section 301.2.1.1. 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 301.2(2) adjusted for height and exposure using Table 301.2(3) 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 905.2.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section 802.11.1 from the roof assembly to the foundation.

301.2.1.1 Wind limitations and wind design required. *Deleted*

301.2.1.1.1 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.

1. **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 non-habitable and unconditioned.
2. **Category II:** A thermally isolated sunroom with enclosed walls. The openings are enclosed with translucent or transparent plastic or glass. The space is non-habitable and unconditioned.
3. **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 non-habitable and unconditioned.
4. **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 non-habitable and conditioned.
5. **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.

301.2.1.2 Protection of openings. Deleted

301.2.1.2.1 Application of ASTM E1996. Deleted

**TABLE 301.2.1.2
WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR
WOOD STRUCTURAL PANELS**

Deleted

301.2.1.3 Wind speed conversion. Where referenced documents are based on nominal design wind speeds and do not provide the means for conversion between ultimate design wind speeds and nominal design wind

speeds, the ultimate design wind speeds, V_{ult} , of Figure 301.2(5)A shall be converted to nominal design wind speeds, V_{asd} , using Table 301.2.1.3.

TABLE 301.2.1.3
WIND SPEED CONVERSIONS^a

V_{ult}	110	115	120	130	140	150	160	170	180	190	200
V_{asd}	85	89	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.447 m/s.

a. Linear interpolation is permitted.

301.2.1.4 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-, two- and three family dwellings, *Ohio building code group R occupancies permitted to use this code* 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 dwellings 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.

TABLE 301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD ^a	WIND DESIGN Speed ^d (mph)	SEISMIC DESIGN CATEGORY	SUBJECT TO DAMAGE FROM			WINTER DESIGN TEMP. ^e	ICE BARRIER UNDERLAYMENT REQUIRED ^h	FLOOD HAZARDS ^g	AIR FREEZING INDEX ⁱ	MEAN ANNUAL TEMP ^j
			Weathering ^a	Frost line depth ^b	Termite ^c					
	115		severe		Moderate to heavy		Yes			
MANUAL J DESIGN CRITERIAⁿ										
<i>Deleted portion of table – owners shall use manual J when required by this code</i>										

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

- Where weathering requires a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code, the frost line depth strength required for weathering shall govern. The grade of masonry units shall be determined from ASTM C34, C55, C62, C73, C90, C129, C145, C216 or C652.
- Where the frost line depth requires deeper footings than indicated in Figure R403.1(1), the frost line depth strength required for weathering shall govern. The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.
- Indicates the need for protection depending on whether there has been a history of local subterranean termite damage.
- Wind exposure category shall be determined on a site-specific basis in accordance with Section 301.2.1.4.
- The outdoor design dry-bulb temperature shall be determined from the following table:

STATION	HEATING DEGREE DAYS (Yearly Total)	DESIGN TEMPERATURES	DEGREES NORTH LATITUDE
Akron-Canton	6,037	6°	41°00' – 40°50'
Cincinnati	4,410	6°	39°10'
Cleveland	6,351	5°	41°30'
Columbus	5,660	5°	40°00'
Dayton	5,622	4°	39°50'
Mansfield	6,403	5°	40°50'
Sandusky	5,796	6°	41°30'
Toledo	6,494	1°	41°40'
Youngstown	6,417	4°	41°10'

Deviations from the tabulated temperatures shall be permitted to reflect local climates or local weather experience as documented by the building official.

- The jurisdiction shall fill in this part of the table with the seismic design category determined from Section 301.2.2.1.
- The jurisdiction shall fill in this part of the table with (a) the date of the jurisdiction's entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), (b) the date(s) of the Flood Insurance Study and (c) the panel numbers and dates of the currently effective FIRMs and FBFMs or other flood hazard map adopted by the authority having jurisdiction, as amended.
- In accordance with Sections 905.1.2, 905.4.3.1, 905.5.3.1, 905.6.3.1, 905.7.3.1 and 905.8.3.1, all jurisdictions in Ohio have a history of local damage from the effects of ice damming.
- The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure 403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)."
- The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table "Air Freezing Index-USA Method (Base 32°F)."
- Topographic wind speed-up effects -Deleted
- Unusual wind conditions -Deleted
- Wind-borne debris wind zone(s) -Deleted
- The jurisdiction shall fill in these sections of the table to establish the design criteria using Table 1a or 1b from ACCA

- Manual J or established criteria determined by the jurisdiction.
- o. The jurisdiction shall fill in this section of the table using the Ground Snow Loads in Figure 301.2(6).

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TABLE 301.2(2)
COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN ROOF HEIGHT OF
30 FEET LOCATED IN EXPOSURE B (ASD) (psf)^{a, b, c, d, e}

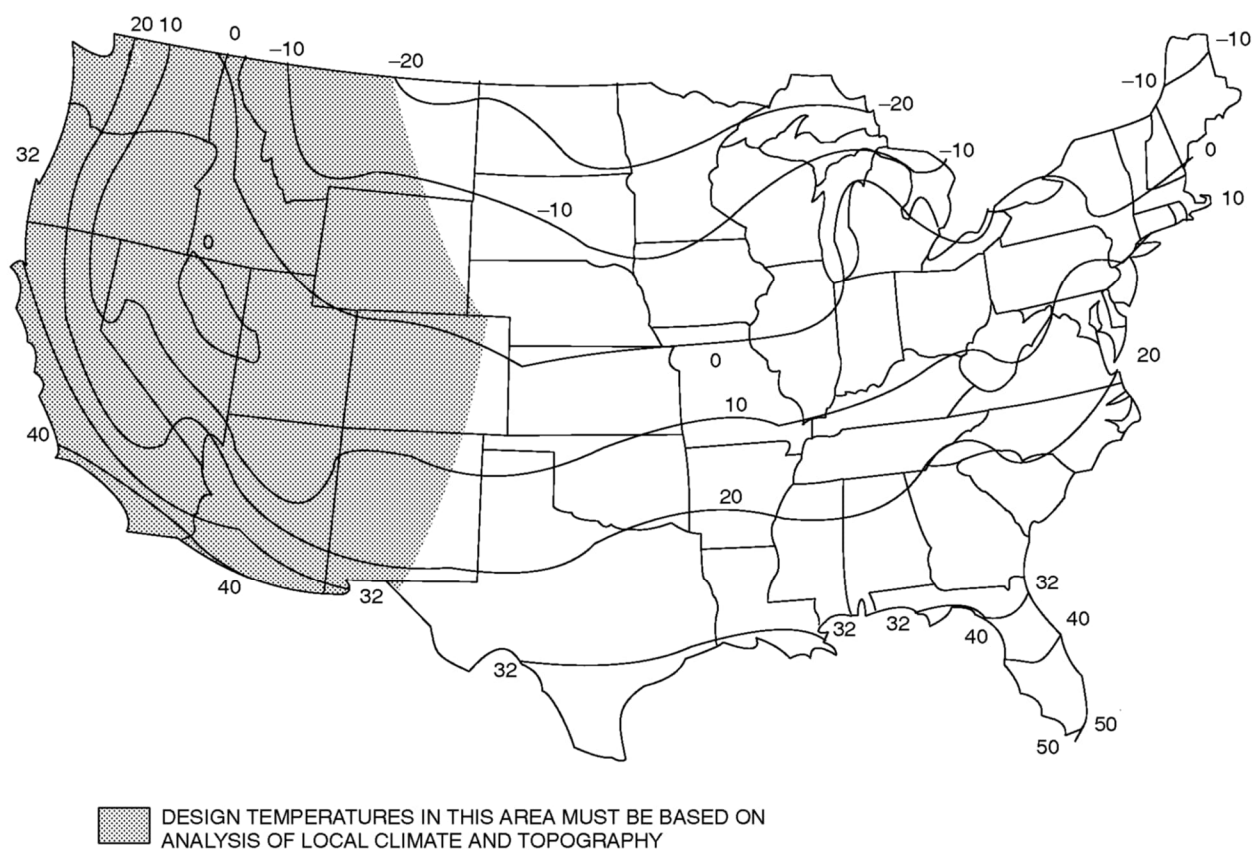
	ZONE	EFFECTIVE WIND AREA (feet ²)	ULTIMATE DESIGN WIND SPEED, V_{ULT} (mph)																	
			110		115		120		130		140		150		160		170		180	
Roof 0 to 7 degrees	1	10	10.0	-13.0	10.0	-14.0	10.0	-15.0	10.0	-18.0	10.0	-21.0	9.9	-24.0	11.2	-27.0	12.6	-31.0	14.2	-35.0
	1	20	10.0	-12.0	10.0	-13.0	10.0	-15.0	10.0	-17.0	10.0	-20.0	9.2	-23.0	10.6	-26.0	11.9	-30.0	13.3	-34.1
	1	50	10.0	-12.0	10.0	-13.0	10.0	-14.0	10.0	-17.0	10.0	-19.0	8.5	-22.0	10.0	-26.0	10.8	-29.0	12.2	-32.9
	1	100	10.0	-11.0	10.0	-13.0	10.0	-14.0	10.0	-16.0	10.0	-19.0	7.8	-22.0	10.0	-25.0	10.0	-28.0	11.3	-32.0
	2	10	10.0	-21.0	10.0	-23.0	10.0	-26.0	10.0	-30.0	10.0	-35.0	9.9	-40.0	11.2	-46.0	12.6	-52.0	14.2	-58.7
	2	20	10.0	-19.0	10.0	-21.0	10.0	-23.0	10.0	-27.0	10.0	-31.0	9.2	-36.0	10.6	-41.0	11.9	-46.0	13.3	-52.4
	2	50	10.0	-16.0	10.0	-18.0	10.0	-19.0	10.0	-23.0	10.0	-26.0	8.5	-30.0	10.0	-34.0	10.8	-39.0	12.2	-44.1
	2	100	10.0	-14.0	10.0	-15.0	10.0	-16.0	10.0	-19.0	10.0	-22.0	7.8	-26.0	10.0	-30.0	10.0	-33.0	11.3	-37.9
	3	10	10.0	-33.0	10.0	-36.0	10.0	-39.0	10.0	-46.0	10.0	-53.0	9.9	-61.0	11.2	-69.0	12.6	-78.0	14.2	-88.3
	3	20	10.0	-27.0	10.0	-29.0	10.0	-32.0	10.0	-38.0	10.0	-44.0	9.2	-50.0	10.6	-57.0	11.9	-65.0	13.3	-73.1
	3	50	10.0	-19.0	10.0	-21.0	10.0	-23.0	10.0	-27.0	10.0	-32.0	8.5	-36.0	10.0	-41.0	10.8	-47.0	12.2	-53.1
	3	100	10.0	-14.0	10.0	-15.0	10.0	-16.0	10.0	-19.0	10.0	-22.0	7.8	-26.0	10.0	-30.0	10.0	-33.0	11.3	-37.9
Roof > 7 to 27 degrees	1	10	10.0	-11.0	10.0	-13.0	10.0	-14.0	10.5	-16.0	12.2	-19.0	14.0	-22.0	15.9	-25.0	17.9	-28.0	20.2	-32.0
	1	20	10.0	-11.0	10.0	-12.0	10.0	-13.0	10.0	-16.0	11.1	-18.0	12.8	-21.0	14.5	-24.0	16.4	-27.0	18.4	-31.1
	1	50	10.0	-11.0	10.0	-12.0	10.0	-13.0	10.0	-15.0	10.0	-18.0	11.1	-20.0	12.7	-23.0	14.3	-26.0	16.0	-29.9
	1	100	10.0	-10.0	10.0	-11.0	10.0	-12.0	10.0	-15.0	10.0	-17.0	9.9	-20.0	11.2	-22.0	12.6	-25.0	14.2	-29.0
	2	10	10.0	-20.0	10.0	-22.0	10.0	-24.0	10.5	-29.0	12.2	-33.0	14.0	-38.0	15.9	-44.0	17.9	-49.0	20.2	-55.8
	2	20	10.0	-19.0	10.0	-20.0	10.0	-22.0	10.0	-26.0	11.1	-31.0	12.8	-35.0	14.5	-40.0	16.4	-45.0	18.4	-51.2
	2	50	10.0	-16.0	10.0	-18.0	10.0	-20.0	10.0	-23.0	10.0	-27.0	11.1	-31.0	12.7	-35.0	14.3	-40.0	16.0	-45.4
	2	100	10.0	-15.0	10.0	-16.0	10.0	-18.0	10.0	-21.0	10.0	-24.0	9.9	-28.0	11.2	-32.0	12.6	-36.0	14.2	-40.9
	3	10	10.0	-30.0	10.0	-33.0	10.0	-36.0	10.5	-43.0	12.2	-49.0	14.0	-57.0	15.9	-65.0	17.9	-73.0	20.2	-82.4
	3	20	10.0	-28.0	10.0	-31.0	10.0	-34.0	10.0	-40.0	11.1	-46.0	12.8	-53.0	14.5	-60.0	16.4	-68.0	18.4	-77.0
	3	50	10.0	-26.0	10.0	-28.0	10.0	-31.0	10.0	-36.0	10.0	-42.0	11.1	-48.0	12.7	-55.0	14.3	-62.0	16.0	-69.9
	3	100	10.0	-24.0	10.0	-26.0	10.0	-28.0	10.0	-33.0	10.0	-39.0	9.9	-44.0	11.2	-51.0	12.6	-57.0	14.2	-64.6
Roof > 27 to 45 degrees	1	10	11.9	-13.0	13.1	-14.0	14.2	-15.0	16.7	-18.0	19.4	-21.0	22.2	-24.0	25.3	-27.0	28.5	-31.0	32.0	-35.0
	1	20	11.6	-12.0	12.7	-13.0	13.8	-14.0	16.2	-17.0	18.8	-20.0	21.6	-23.0	24.6	-26.0	27.7	-29.0	31.1	-33.2
	1	50	11.2	-11.0	12.2	-12.0	13.3	-13.0	15.6	-16.0	18.1	-18.0	20.8	-21.0	23.6	-24.0	26.7	-27.0	29.9	-30.8
	1	100	10.9	-10.0	11.9	-11.0	12.9	-12.0	15.1	-15.0	17.6	-17.0	20.2	-20.0	22.9	-22.0	25.9	-25.0	29.0	-29.0
	2	10	11.9	-15.0	13.1	-16.0	14.2	-18.0	16.7	-21.0	19.4	-24.0	22.2	-28.0	25.3	-32.0	28.5	-36.0	32.0	-40.9
	2	20	11.6	-14.0	12.7	-16.0	13.8	-17.0	16.2	-20.0	18.8	-23.0	21.6	-27.0	24.6	-30.0	27.7	-34.0	31.1	-39.1
	2	50	11.2	-13.0	12.2	-15.0	13.3	-16.0	15.6	-19.0	18.1	-22.0	20.8	-25.0	23.6	-29.0	26.7	-32.0	29.9	-36.8
	2	100	10.9	-13.0	11.9	-14.0	12.9	-15.0	15.1	-18.0	17.6	-21.0	20.2	-24.0	22.9	-27.0	25.9	-31.0	29.0	-35.0
	3	10	11.9	-15.0	13.1	-16.0	14.2	-18.0	16.7	-21.0	19.4	-24.0	22.2	-28.0	25.3	-32.0	28.5	-36.0	32.0	-40.9
	3	20	11.6	-14.0	12.7	-16.0	13.8	-17.0	16.2	-20.0	18.8	-23.0	21.6	-27.0	24.6	-30.0	27.7	-34.0	31.1	-39.1
	3	50	11.2	-13.0	12.2	-15.0	13.3	-16.0	15.6	-19.0	18.1	-22.0	20.8	-25.0	23.6	-29.0	26.7	-32.0	29.9	-36.8
	3	100	10.9	-13.0	11.9	-14.0	12.9	-15.0	15.1	-18.0	17.6	-21.0	20.2	-24.0	22.9	-27.0	25.9	-31.0	29.0	-35.0
Wall	4	10	13.1	-14.0	14.3	-15.0	15.5	-16.0	18.2	-19.0	21.2	-22.0	24.3	-26.0	27.7	-30.0	31.2	-33.0	35.0	-37.9
	4	20	12.5	-13.0	13.6	-14.0	14.8	-16.0	17.4	-19.0	20.2	-22.0	23.2	-25.0	26.4	-28.0	29.7	-32.0	33.4	-36.4
	4	50	11.7	-12.0	12.8	-14.0	13.9	-15.0	16.3	-17.0	19.0	-20.0	21.7	-23.0	24.7	-27.0	27.9	-30.0	31.3	-34.3
	4	100	11.1	-12.0	12.1	-13.0	13.2	-14.0	15.5	-17.0	18.0	-19.0	20.6	-22.0	23.5	-25.0	26.5	-29.0	29.8	-32.7
	4	500	10.0	-10.0	10.6	-11.0	11.6	-12.0	13.6	-15.0	15.8	-17.0	18.1	-20.0	20.6	-22.0	23.2	-25.0	26.1	-29.0
	5	10	13.1	-17.0	14.3	-19.0	15.5	-20.0	18.2	-24.0	21.2	-28.0	24.3	-32.0	27.7	-37.0	31.2	-41.0	35.0	-46.8
	5	20	12.5	-16.0	13.6	-17.0	14.8	-19.0	17.4	-22.0	20.2	-26.0	23.2	-30.0	26.4	-34.0	29.7	-39.0	33.4	-43.7
	5	50	11.7	-14.0	12.8	-16.0	13.9	-17.0	16.3	-20.0	19.0	-23.0	21.7	-27.0	24.7	-31.0	27.9	-35.0	31.3	-39.5
	5	100	11.1	-13.0	12.1	-14.0	13.2	-16.0	15.5	-19.0	18.0	-22.0	20.6	-25.0	23.5	-28.0	26.5	-32.0	29.8	-36.4
	5	500	10.0	-10.0	10.6	-11.0	11.6	-12.0	13.6	-15.0	15.8	-17.0	18.1	-20.0	20.6	-22.0	23.2	-25.0	26.1	-29.0

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

- The effective wind area shall be equal to the span length multiplied by an effective width. This width shall be permitted to be not less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.
- For effective areas between those given, the load shall be interpolated or the load associated with the lower effective area shall be used.
- Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table 301.2(3).
- See Figure 301.2(8) for location of zones.
- Plus and minus signs signify pressures acting toward and away from the building surfaces.

TABLE 301.2(3)
HEIGHT AND EXPOSURE ADJUSTMENT COEFFICIENTS FOR TABLE 301.2(2)

MEAN ROOF HEIGHT	EXPOSURE		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87



For SI: $^{\circ}\text{C} = [(^{\circ}\text{F}) - 32] / 1.8$.

FIGURE 301.2(1)
ISOLINES OF THE 97^{1/2} -PERCENT WINTER (DECEMBER, JANUARY AND FEBRUARY)
DESIGN TEMPERATURES (°F)

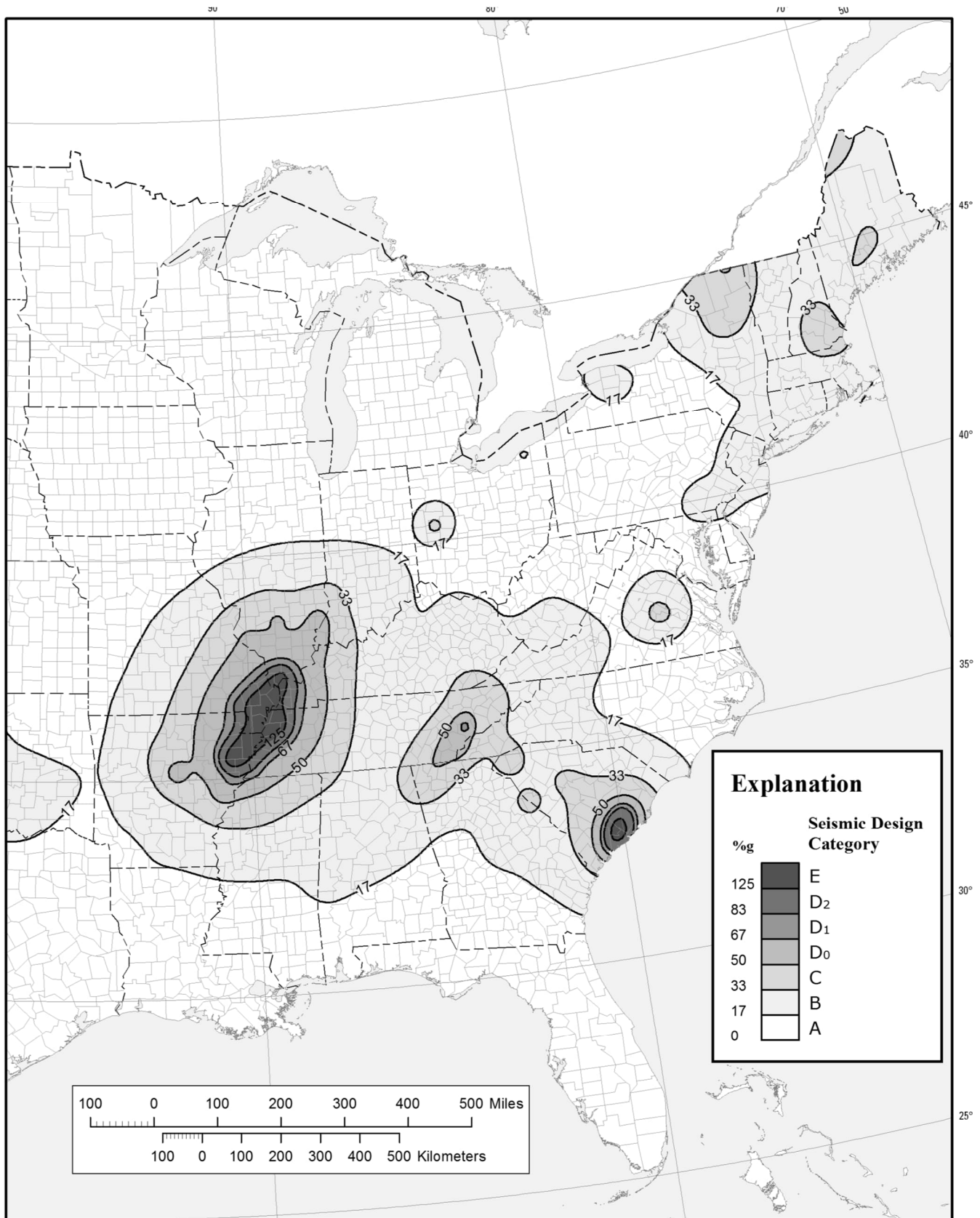


FIGURE 301.2(2)
SEISMIC DESIGN CATEGORIES

***DELETED** portion of Figure 301.2(2) for Alaska, Hawaii, Puerto Rico and western U.S*

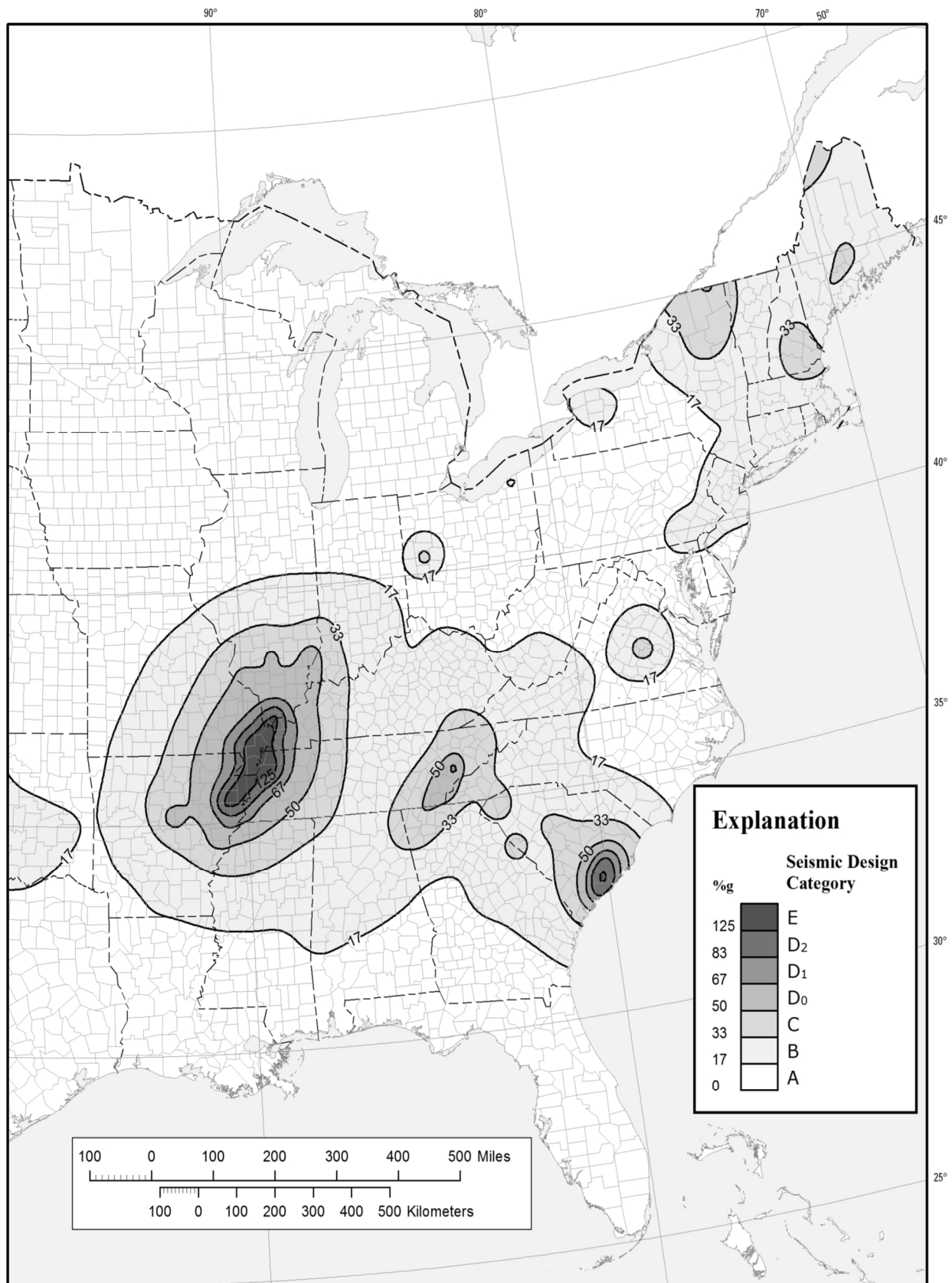
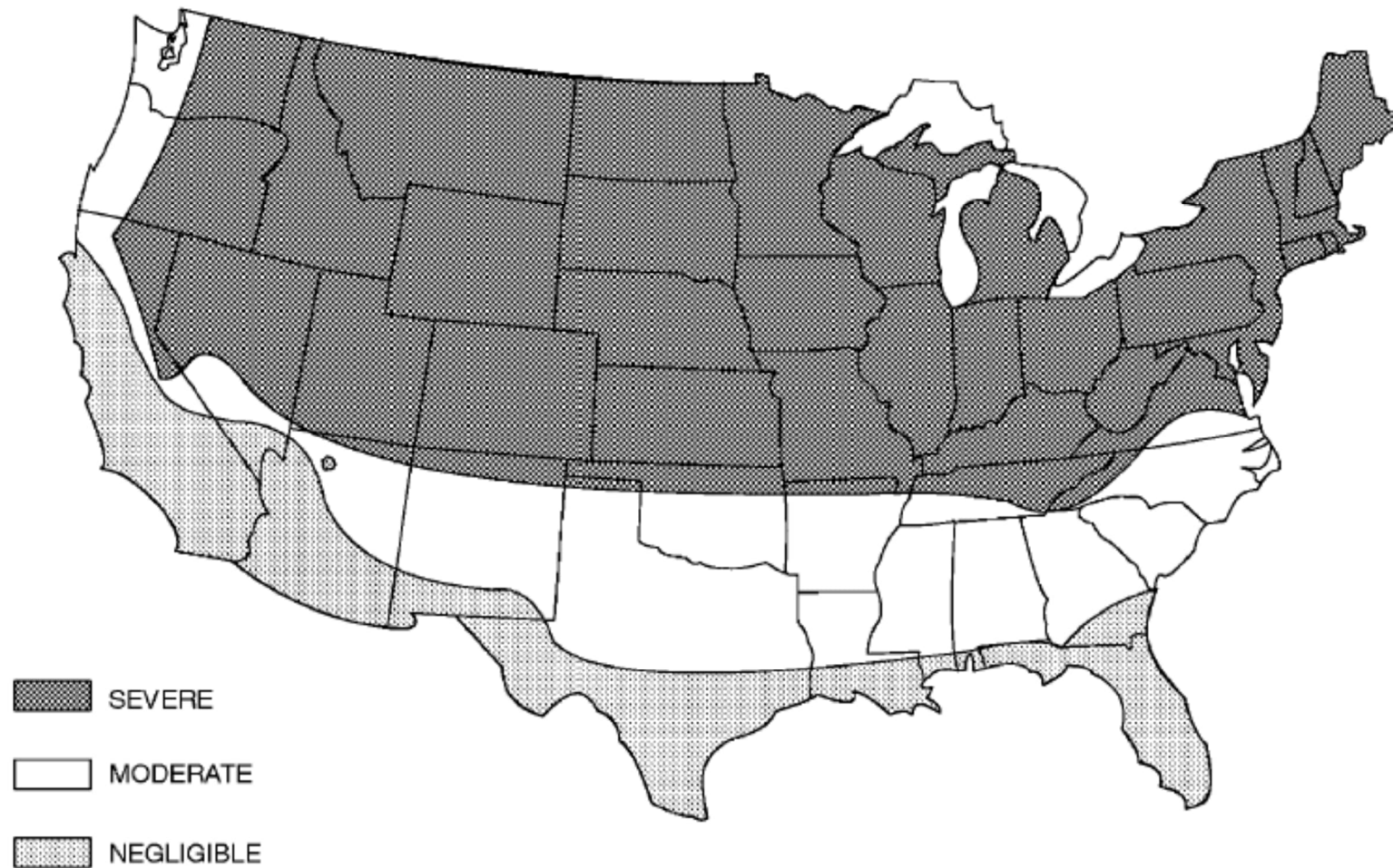


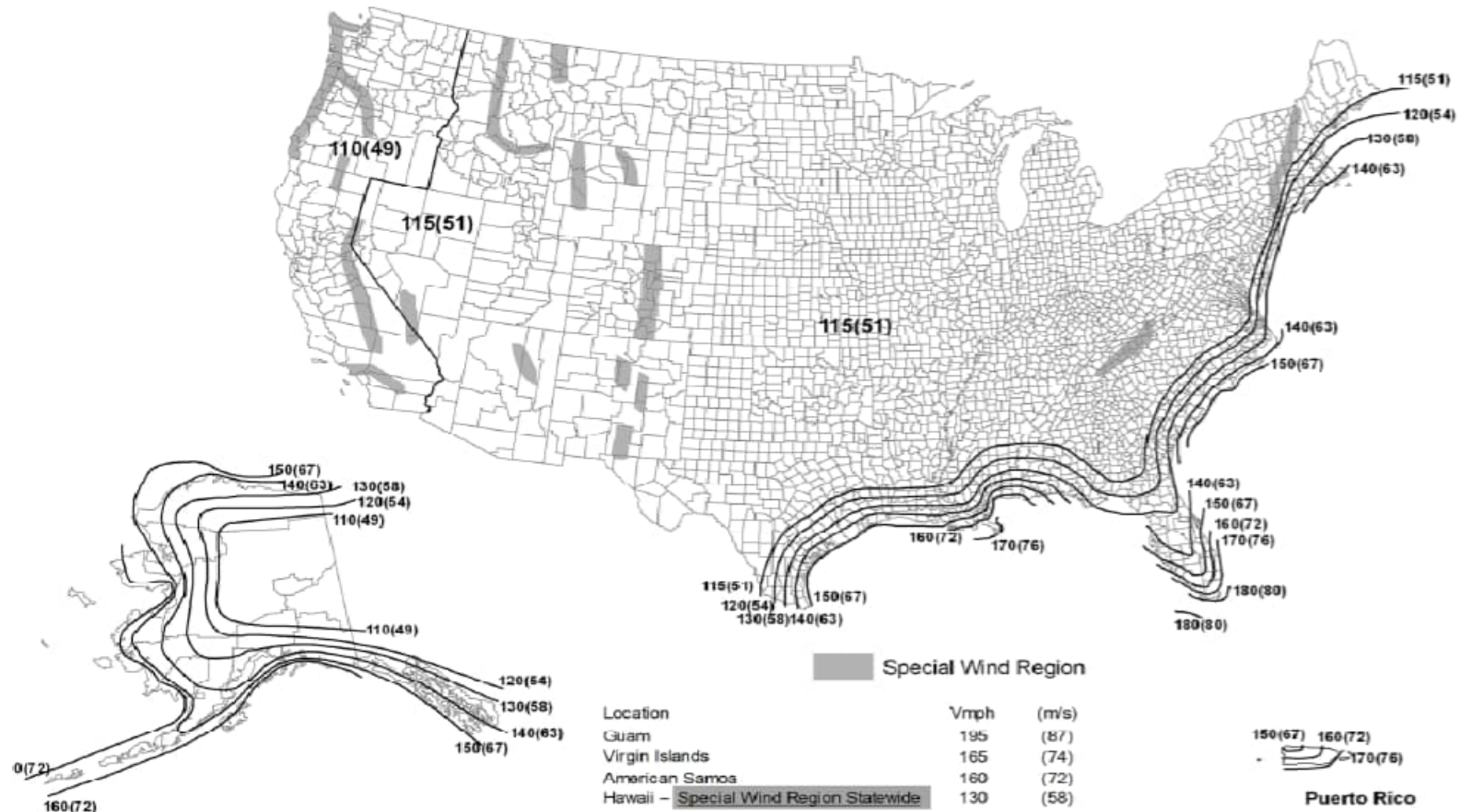
FIGURE 301.2(3)
ALTERNATE SEISMIC DESIGN CATEGORIES

***DELETED** portion of Figure 301.2(3) for Alaska, Hawaii, Puerto Rico and western U.S*



- a. Alaska and Hawaii are classified as severe and negligible, respectively.
- b. Lines defining areas are approximate only. Local conditions may be more or less severe than indicated by region classification. A severe classification is where weather conditions result in significant snowfall combined with extended periods during which there is little or no natural thawing causing deicing salts to be used extensively.

FIGURE 301.2(4)
WEATHERING PROBABILITY MAP FOR CONCRETE ^{a, b}



Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

**FIGURE 301.2(5) A
ULTIMATE DESIGN WIND SPEEDS**

***DELETE** Figure 301.2(5)B Regions where wind design is required*

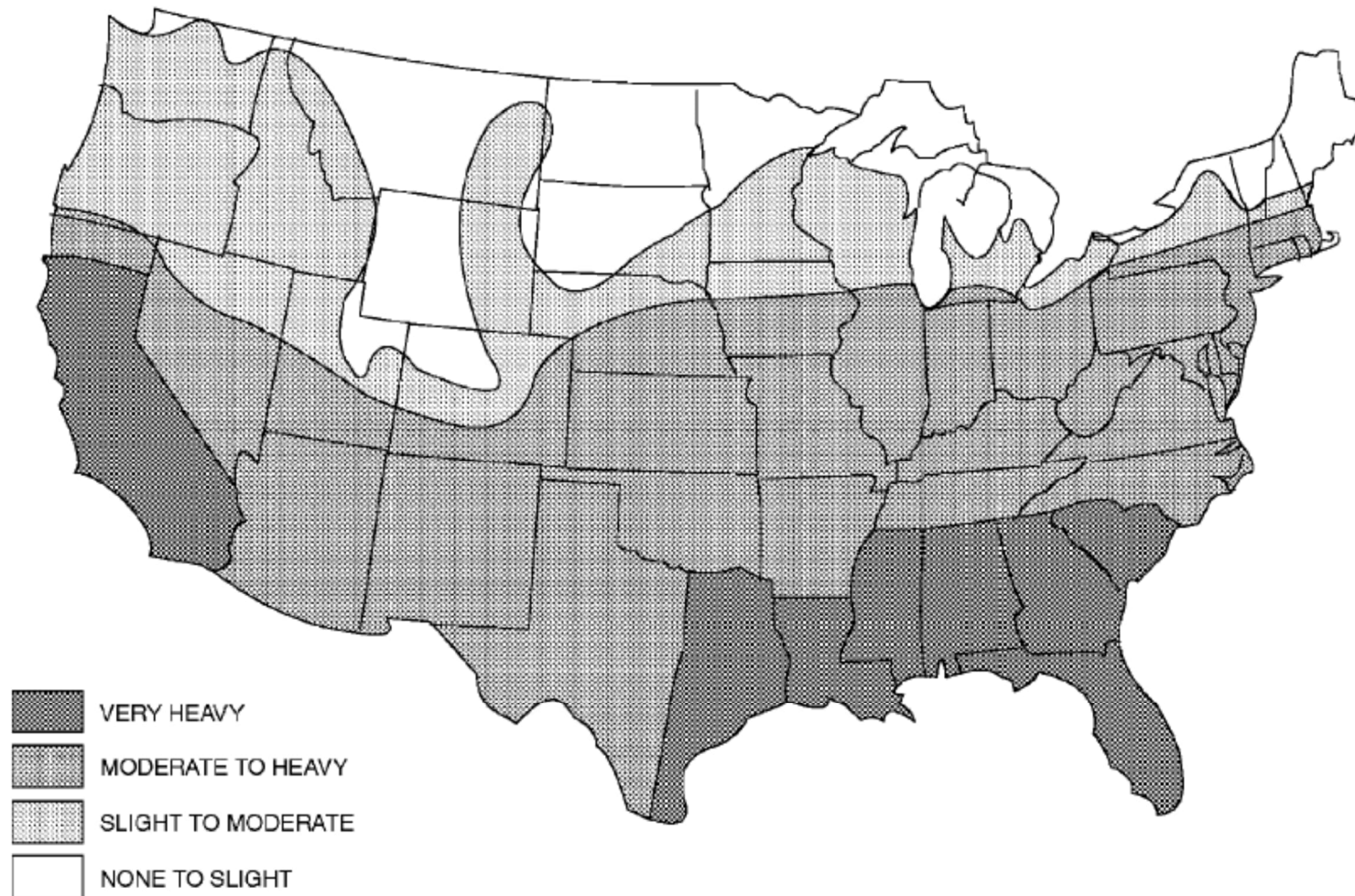
D E L E T E D portion of Figure 301.2(6) for western U.S



For SI: 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 mile = 1.61 km.

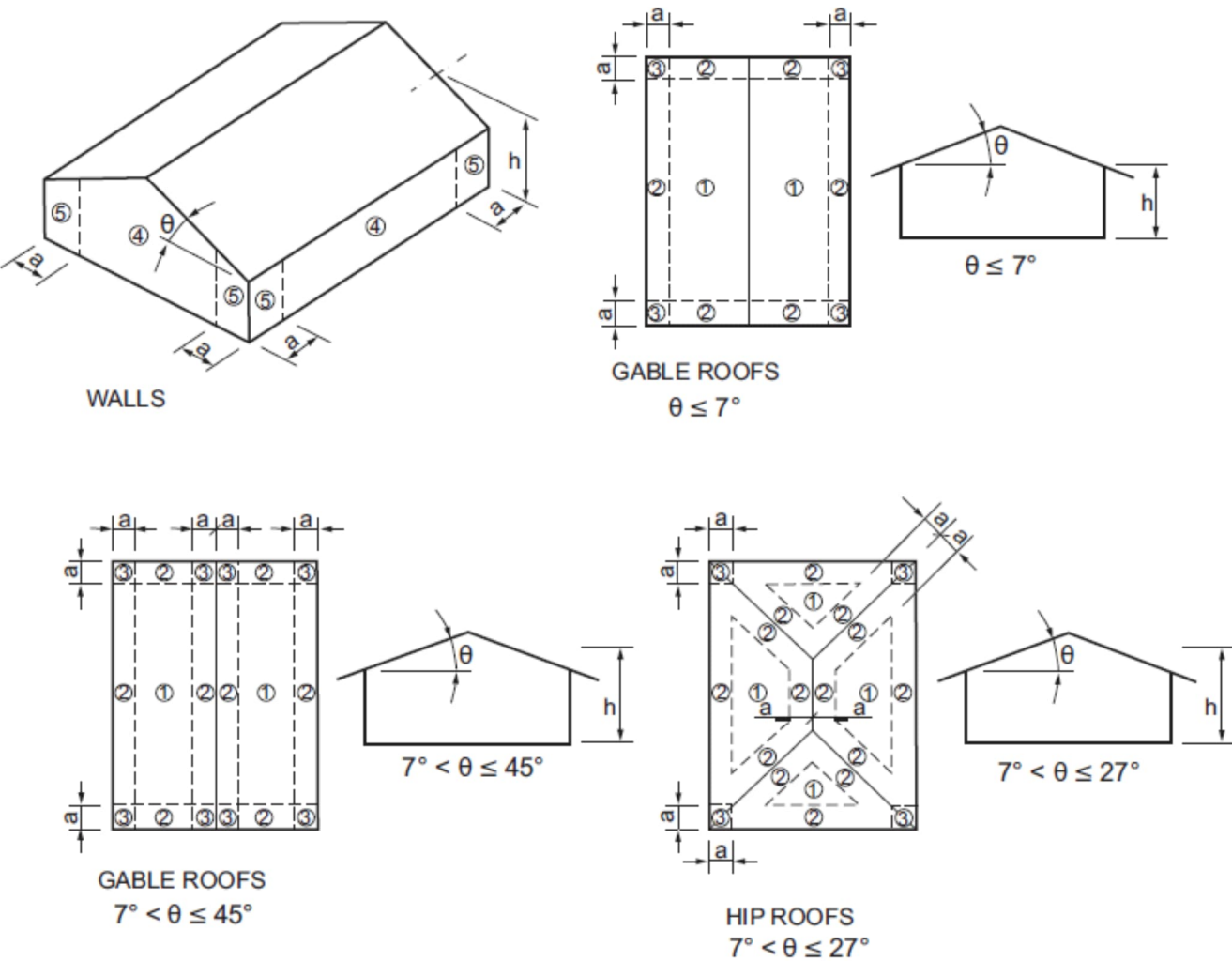
- In CS areas, site-specific Case Studies are required to establish ground snow loads. Extreme local variations in ground snow loads in these areas preclude mapping at this scale.
- Numbers in parentheses represent the upper elevation limits in feet for the ground snow load values presented below. Site-specific case studies are required to establish ground snow loads at elevations not covered.

FIGURE 301.2(6)
GROUND SNOW LOADS, P_g , (lb/ft²)
FOR THE *EASTERN* UNITED STATES



Note: Lines defining areas are approximate only. Local conditions may be more or less severe than indicated by the region classification

FIGURE 301.2(7)
TERMITE INFESTATION PROBABILITY MAP



For SI: 1 foot = 304.8 mm, 1 degree = 0.0175 rad.
Note: $a = 4$ feet in all cases.

FIGURE 301.2(8)
COMPONENT AND CLADDING PRESSURE ZONES

301.2.1.5 Topographic wind effects. Deleted

TABLE 301.2.1.5.1
ULTIMATE DESIGN WIND SPEED MODIFICATION FOR
TOPOGRAPHIC WIND EFFECT^{a, b}
Deleted

Deleted

**FIGURE 301.2.1.5.1(1)
TOPOGRAPHIC FEATURES FOR WIND SPEED-UP EFFECT**

Deleted

**FIGURE 301.2.1.5.1(2)
ILLUSTRATION OF WHERE ON A TOPOGRAPHIC FEATURE,
WIND SPEED INCREASE IS APPLIED**

Deleted

**FIGURE 301.2.1.5.1(3)
UPWIND OBSTRUCTION**

301.2.1.5.1 Simplified topographic wind speed-up method. *Deleted*

301.2.2 Seismic provisions. Buildings in Seismic Design Categories C shall be constructed in accordance with the requirements of this section and other seismic requirements of this code. The seismic provisions of this code shall apply as follows:

1. *Buildings with four or more dwelling units* in Seismic Design Categories C.
2. *Deleted*

Components of buildings not required to be designed to resist seismic loads shall be constructed in accordance with the provisions of this code.

301.2.2.1 Determination of seismic design category. Buildings shall be assigned a seismic design category in accordance with Figure 301.2(2) and Table 301.2.2.1.1

301.2.2.1.1 Alternate determination of seismic design category. The seismic design categories and corresponding short-period design spectral response accelerations, S_{DS} , shown in Figure 301.2(2), are based on soil Site Class D, used as an assumed default, as defined in Section 1613.2 of the *Ohio Building Code*. If soil conditions are determined by the building official to be Site Class A, B, or D, the seismic design category and short-period design spectral response accelerations, S_{DS} , for a site shall be allowed to be determined in accordance with Figure 301.2(3), or Section 1613.3 of the *Ohio Building Code*. The value of S_{DS} determined in accordance with Section

1613.3 of the *Ohio Building Code* is permitted to be used to set the seismic design category in accordance with Table 301.2.2.1.1, and to interpolate between values in Tables 602.10.3(3), 603.9.2(1) and other seismic design requirements of this code.

**TABLE 301.2.2.1.1
SEISMIC DESIGN CATEGORY DETERMINATION**

CALCULATED S_{DS}	SEISMIC DESIGN CATEGORY
$S_{DS} \leq 0.17g$	A
$0.17g < S_{DS} \leq 0.33g$	B
$0.33g < S_{DS} \leq 0.50g$	C

301.2.2.1.2 Alternative determination of Seismic Design Category
E. *Deleted*

301.2.2.2 Weights of materials. Average dead loads shall not exceed 15 pounds per square foot (720 Pa) for the combined roof and ceiling assemblies (on a horizontal projection) or 10 pounds per square foot (480 Pa) for floor assemblies, except as further limited by Section 301.2.2. Dead loads for walls above grade shall not exceed:

1. Fifteen pounds per square foot (720 Pa) for exterior light-frame wood walls.
2. Fourteen pounds per square foot (670 Pa) for exterior light-frame cold-formed steel walls.
3. Ten pounds per square foot (480 Pa) for interior light-frame wood walls.
4. Five pounds per square foot (240 Pa) for interior light-frame cold-formed steel walls.
5. Eighty pounds per square foot (3830 Pa) for 8-inch-thick (203 mm) masonry walls.
6. Eighty-five pounds per square foot (4070 Pa) for 6-inch-thick (152 mm) concrete walls.
7. Ten pounds per square foot (480 Pa) for SIP walls.

Exceptions:

1. Roof and ceiling dead loads not exceeding 25 pounds per square foot (1190 Pa) shall be permitted provided that the wall bracing amounts in Section 602.10.3 are increased in accordance with Table 602.10.3(4).
2. Light-frame walls with stone or masonry veneer shall be permitted in accordance with the provisions of Sections 702.1 and 703.

3. Fireplaces and chimneys shall be permitted in accordance with Chapter 10.

301.2.2.3 Stone and masonry veneer. Anchored stone and masonry veneer shall comply with the requirements of Sections 702.1 and 703.

301.2.2.4 Masonry construction. *Deleted*

301.2.2.5 Concrete construction. Buildings with exterior above-grade concrete walls shall comply with PCA 100 or shall be designed in accordance with ACI 318.

Exception: Detached one-, two- *and three*-family dwellings in Seismic Design Category C with exterior above-grade concrete walls are allowed to comply with the requirements of Section 608.

301.2.2.6 Irregular buildings. The seismic provisions of this code shall not be used for structures, or portions thereof, located in Seismic Design Categories C and considered to be irregular in accordance with this section. A building or portion of a building shall be considered to be irregular where one or more of the conditions defined in Items 1 through 7 occur. Irregular structures, or irregular portions of structures, shall be designed in accordance with accepted engineering practice to the extent the irregular features affect the performance of the remaining structural system. Where the forces associated with the irregularity are resisted by a structural system designed in accordance with accepted engineering practice, the remainder of the building shall be permitted to be designed using the provisions of this code.

1. **Shear wall or braced wall offsets out of plane.** Conditions where exterior shear wall lines or braced wall panels are not in one plane vertically from the foundation to the uppermost story in which they are required.

Exception: For wood light-frame construction, floors with cantilevers or setbacks not exceeding four times the nominal depth of the wood floor joists are permitted to support braced wall panels that are out of plane with braced wall panels below provided that all of the following are satisfied:

1. Floor joists are nominal 2 inches by 10 inches (51 mm by 254 mm) or larger and spaced not more than 16 inches (406 mm) on center.
2. The ratio of the back span to the cantilever is not less than 2 to 1.
3. Floor joists at ends of braced wall panels are doubled.

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 11/2 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 602.7(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 502.6.1.
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 602 or cold-formed steel wall framing in accordance with Section 603 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.

301.2.2.7 Height limitations. Wood-framed buildings shall be limited to three stories above grade plane or the limits given in Table 602.10.3(3). 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 202. Structural insulated panel buildings shall be limited to two stories above grade plane.

301.2.2.8 Cold-formed steel framing in Seismic Design Categories D₀, D₁ and D₂. *Deleted*

301.2.2.9 Masonry chimneys. *Deleted*

301.2.2.10 Anchorage of water heaters. *Deleted*

301.2.3 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.

301.2.4 Floodplain construction. Buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table 301.2(1), 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 322. 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.

301.2.4.1 Alternative provisions. As an alternative to the requirements in Section 322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

301.2.4.2 Supplemental drainage system provisions. *In addition to requirements under Sections 322 and 405, a jurisdiction may adopt legislation establishing supplemental requirements of a drainage system for new buildings and structures constructed in whole or in part in flood hazard areas (including A or V Zones) as established in Table 301.2(1) or constructed in portions of the jurisdiction that have historical data documenting damage caused by flooding.*

301.3 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 602.3(5).
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 608 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 610 tables shall not exceed 10 feet (3048 mm).

Individual walls or wall studs shall be permitted to exceed these limits as permitted by Chapter 6 provisions, provided that story heights 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 *Ohio building code*.

301.4 Dead load. The actual weights of materials and construction shall be used for determining dead load with consideration for the dead load of fixed service equipment.

301.5 Live load. The minimum uniformly distributed live load shall be as provided in Table 301.5.

TABLE 301.5
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS
(in pounds per square foot)

USE	LIVE LOAD
Uninhabitable attics without storage ^b	10
Uninhabitable attics with limited storage ^{b, g}	20
Habitable attics and attics served with fixed stairs	30
Balconies (exterior) and decks ^e	40
Fire escapes	40
Guards and handrails ^d	200 ^h
Guard in-fill components ^f	50 ^h
Passenger vehicle garages ^a	50 ^a
Rooms other than sleeping rooms	40
Sleeping rooms	30
Stairs	40 ^c

For SI: 1 pound per square foot = 0.0479 kPa, 1 square inch = 645 mm², 1 pound = 4.45 N.

- a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.
- b. Uninhabitable attics without storage are those where the clear height between joists and rafters is not more than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater,

within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

- c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of 4 square inches, whichever produces the greater stresses.
- d. A single concentrated load applied in any direction at any point along the top.
- e. See Section 507.1 for decks attached to exterior walls.
- f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.
- g. Uninhabitable attics with limited storage are those where the clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.

The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:

1. The attic area is accessed from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is not less than 30 inches.
2. The slopes of the joists or truss bottom chords are not greater than 2 inches vertical to 12 units horizontal.
3. Required insulation depth is less than the joist or truss bottom chord member depth.

The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.

- h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the infill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

301.6 Roof load. The roof shall be designed for the live load indicated in Table 301.6 or the snow load indicated in Table 301.2(1), whichever is greater.

TABLE 301.6
MINIMUM ROOF LIVE LOADS IN POUNDS-FORCE PER
SQUARE FOOT OF HORIZONTAL PROJECTION

ROOF SLOPE	TRIBUTARY LOADED AREA IN SQUARE FEET FOR ANY STRUCTURAL MEMBER		
	0 to 200	201 to 600	Over 600
Flat or rise less than 4 inches per foot (1:3)	20	16	12
Rise 4 inches per foot (1:3) to less than 12 inches per foot (1:1)	16	14	12
Rise 12 inches per foot (1:1) and greater	12	12	12

For SI: 1 square foot = 0.0929 m², 1 pound per square foot = 0.0479 kPa, 1 inch per foot = 83.3 mm/m.

301.7 Deflection. The allowable deflection of any structural member under the live load listed in Sections 301.5 and 301.6 or wind loads determined by Section 301.2.1 shall not exceed the values in Table 301.7.

TABLE 301.7
ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS ^{b, c}

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with finished ceiling not attached to rafters	$L/180$
Interior walls and partitions	$H/180$
Floors	$L/360$
Ceilings with brittle finishes (including plaster and stucco)	$L/360$
Ceilings with flexible finishes (including gypsum board)	$L/240$
All other structural members	$L/240$
Exterior walls—wind loads ^a with plaster or stucco finish	$H/360$
Exterior walls—wind loads ^a with other brittle finishes	$H/240$
Exterior walls—wind loads ^a with flexible finishes	$H/120^d$
Lintels supporting masonry veneer walls ^e	$L/600$

Note: L = span length, H = span height.

- For the purpose of the determining deflection limits herein, the wind load shall be permitted to be taken as 0.7 times the component and cladding (ASD) loads obtained from Table 301.2(2).
- For cantilever members, L shall be taken as twice the length of the cantilever.
- For aluminum structural members or panels used in roofs or walls of sunroom additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed $L/60$. For continuous aluminum structural members supporting edge of glass, the total load deflection shall not exceed $L/175$ for each glass lite or $L/60$ for the entire length of the member, whichever is more stringent. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed $L/120$.
- Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of $H/180$.
- Refer to Section 703.8.2.

301.8 Nominal sizes. For the purposes of this code, dimensions of lumber specified shall be deemed to be nominal dimensions unless specifically designated as actual dimensions.

SECTION 302 FIRE-RESISTANT CONSTRUCTION

302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table 302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section 2904 shall comply with Table 302.1(2).

Exceptions:

- Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
- Walls of individual dwelling units and their accessory structures located on the same lot.
- Detached tool sheds and storage sheds, playhouses and similar structures exempted from *approval by Section 102.10* are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.

4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
5. Foundation vents installed in compliance with this code are permitted.
6. *Detached garages accessory to a dwelling with an exterior wall located greater than or equal to 3 feet from a lot line.*

Where referenced in this code, an unoccupied space on an adjoining property may be included in the required fire separation distance, provided that the adjoining property is dedicated or deeded so as to preclude, for the life of the structure, the erection of any building or structure on such space (see section 3781.02 of the Revised Code).

**TABLE 302.1(1)
EXTERIOR WALLS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.3 703.2.2 of the <i>Ohio building code</i> with exposure from both sides	0 feet
	Not fire-resistance rated	0 hours	≥5 feet
Projections	Not allowed	N/A	< 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant-treated wood ^{a, b}	≥2 feet to < 5 feet
	Not fire-resistance rated	0 hours	≥5 feet
Openings in walls	Not allowed	N/A	< 3 feet
	25% maximum of wall area	0 hours	3 feet
	Unlimited	0 hours	5 feet
Penetrations	All	Comply with Section 302.4	< 3 feet
		None required	3 feet

For SI: 1 foot = 304.8 mm. N/A = Not Applicable.

- a. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.
- b. The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where gable vent openings are not installed.

**TABLE 302.1(2)
EXTERIOR WALLS—DWELLINGS WITH FIRE SPRINKLERS**

EXTERIOR WALL ELEMENT		MINIMUM FIRE-RESISTANCE RATING	MINIMUM FIRE SEPARATION DISTANCE
Walls	Fire-resistance rated	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.3 703.2.2 of the <i>Ohio building code</i> with exposure from the outside	0 feet

	Not fire-resistance rated	0 hours	3 feet ^a
Projections	Not allowed	N/A	< 2 feet
	Fire-resistance rated	1 hour on the underside, or heavy timber, or fire-retardant-treated wood ^{b, c}	2 feet ^a
	Not fire-resistance rated	0 hours	3 feet
Openings in walls	Not allowed	N/A	< 3 feet
	Unlimited	0 hours	3 feet ^a
Penetrations	All	Comply with Section 302.4	< 3 feet
		None required	3 feet ^a

For SI: 1 foot = 304.8 mm. N/A = Not Applicable.

- For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section 2904, the fire separation distance for exterior walls not fire-resistance rated and for fire-resistance-rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.
- The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the eave overhang if fireblocking is provided from the wall top plate to the underside of the roof sheathing.
- The fire-resistance rating shall be permitted to be reduced to 0 hours on the underside of the rake overhang where gable vent openings are not installed.

302.2 Residential structures with more than two dwelling units. *In structures with more than two dwelling units, each grouping of two dwelling units shall be separated from an adjacent dwelling unit or an adjacent grouping of two dwelling units by two wall assemblies, each having a fire resistance rating of one hour when tested in accordance with ASTM E119 or UL 263 and/or a floor ceiling assembly having a fire resistance rating of two hours when tested in accordance with ASTM E119 or UL 263.*

Alternatively, each grouping of two dwelling units shall be separated from an adjacent dwelling unit or an adjacent grouping of two dwelling units by a common wall assembly having a fire resistance rating of not less than two hours when tested in accordance with ASTM E119 or UL 263 and/or a floor ceiling assembly having a fire resistance rating of two hours when tested in accordance with ASTM E119 or UL 263. This option is only permissible if the common wall does not contain plumbing or mechanical equipment, ducts or vents in the cavity of the common wall. The common wall shall be rated for fire exposure from both sides and shall extend to and be tight against exterior walls and the underside of the roof sheathing. Penetrations of electrical outlet boxes shall be in accordance with Section 302.4.

Additionally, within any grouping of two dwelling units, separated as indicated above, the individual dwelling units shall be separated vertically and horizontally from adjacent dwelling units by wall and/or floor assemblies having a fire resistance rating of not less than one hour when tested in accordance with ASTM E119 or UL 263.

When assemblies are required to be fire-resistance-rated, the supporting construction of such assemblies shall have an equal or greater fire-resistive rating.

302.2.1 Double walls. *Deleted*

302.2.2 Common walls. *Deleted*

302.2.3 Continuity. The fire-resistance-rated wall or assembly separating *dwelling 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.

302.2.4 Parapets. Parapets constructed in accordance with Section 302.2.5 shall be constructed for *dwelling units* as an extension of exterior walls or common walls 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 802.1.5 and 803.2.1.2.

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.

302.2.5 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 counterflashing 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).

302.2.6 Structural independence. Each individual *dwelling 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. *Dwelling units* separated by a common wall as provided in Section 302.2.2, Item 1 or 2.
6. *Dwelling units stacked vertically.*

302.3 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 703.3 of the *Ohio building code*. 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 NFPA 13.
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 302.12.1 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 *and the dwelling is equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13D.*

302.3.1 Supporting construction. Where floor assemblies are required to be fire-resistance rated by Section 302.3, the supporting construction of such assemblies shall have an equal or greater fire-resistance rating.

302.4 Dwelling unit rated penetrations. Penetrations of wall or floor-ceiling assemblies required to be fire-resistance rated in accordance with Section 302.2 or 302.3 shall be protected in accordance with this section.

302.4.1 Through penetrations. Through penetrations of fire-resistance-rated wall or floor assemblies shall comply with Section 302.4.1.1 or 302.4.1.2.

Exception: Where the penetrating items are steel, ferrous or copper pipes, tubes or conduits, the annular space shall be protected as follows:

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. The nominal diameter of the penetrating item is not more than 6 inches (152 mm).
 - 1.2. The area of the opening through the wall does not exceed 144 square inches (92,900 mm²).
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.

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

302.4.1.2 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.

302.4.2 Membrane penetrations. Membrane penetrations shall comply with Section 302.4.1. 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 m²) in area provided that the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m²) in any 100 square feet (9.29 m²) of wall area. The annular space between the wall membrane and the box shall not exceed 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 302.11.
 - 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 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 302.11.
 - 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 provided that it is covered by a metal escutcheon plate.
4. Ceiling membrane penetrations by listed *and labeled* 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.

302.5 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 302.5.1 through 302.5.3.

302.5.1 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.

302.5.2 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.

302.5.3 Other penetrations. Penetrations through the separation required in Section 302.6 shall be protected as required by Section 302.11, Item 4.

302.6 Dwelling-garage fire separation. The garage shall be separated as required by Table 302.6. Openings in garage walls shall comply with Section 302.5. Attachment of gypsum board shall comply with Table 702.3.5. The wall separation provisions of Table 302.6 shall not apply to garage walls that are perpendicular to the adjacent dwelling unit wall.

TABLE 302.6
DWELLING-GARAGE SEPARATION ¹

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.

1. To determine fire resistance equivalents, refer to section 302.14

302.6.1 Boathouse. *Where a boathouse is attached to a dwelling unit, the boathouse shall be separated from the dwelling unit 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 703.3 of the Ohio building code. 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.*

302.7 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.

302.8 Foam plastics. For requirements for foam plastics, see Section 316.

302.9 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 302.9.1 through 302.9.4.

302.9.1 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.

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

302.9.3 Testing. Tests shall be made in accordance with ASTM E84 or UL 723.

302.9.4 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 m².

302.10 Flame spread index and smoke-developed index for insulation. Flame spread and smoke-developed index for insulation shall be in accordance with Sections 302.10.1 through 302.10.5.

302.10.1 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 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 302.10.3 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 316.

302.10.2 Loose-fill insulation. Loose-fill insulation materials that cannot be mounted in the ASTM E84 or UL723 apparatus without a screen or artificial supports shall comply with the flame spread and smoke-developed limits of Section 302.10.1 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 302.10.1 and 302.10.3.

302.10.3 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.

302.10.4 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.

302.10.5 Testing. Tests for critical radiant flux shall be made in accordance with ASTM E970.

302.11 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 302.7.
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 1003.19.
6. *In buildings or structures with more than one dwelling unit, fireblocking of cornices is required at the line of dwelling unit separation.*

302.11.1 Fireblocking materials. Except as provided in Section 302.11, 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.

302.11.1.1 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.

302.11.1.2 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.

302.11.1.3 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.

302.11.2 Fireblocking integrity. The integrity of fire-blocks shall be maintained.

302.12 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 m²). 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.

302.12.1 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.

302.13 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 board membrane, 5/8-inch (16 mm) wood structural panel membrane, or equivalent material, which complies with section 302.15, on the underside of the floor framing member.

Exceptions:

1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section 2904, NFPA 13D, *NFPA 13R* or *NFPA 13* as referenced in Chapter 44 of this code.
2. Floor assemblies located directly over an underfloor space as referenced in section 408 and 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 shall not exceed 80 square feet (7.4 m²) per story.
 - 3.2. Fireblocking in accordance with Section 302.11.1 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.

302.14 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 1102.4.5 of this code.

302.15 Fire resistance determination for assemblies and materials. *When this chapter requires a fire resistive assembly or component, and there is no available evidence matching the assembly or component to a rated assembly or component tested in accordance with ASTM E 119 or UL 263, the fire resistance rating of the assembly or component can be evaluated by using section 721 in the "Ohio Building Code" or "Resource A, Guidelines on Fire Ratings of Archaic Materials and Assemblies in the International Existing Buildings Code."*

When this code requires an assembly or component to serve in a fire resistive manner but the assembly or component is not required to be fire resistance rated, equivalent fire resistive values can be derived from section 721 in the "Ohio Building Code" or "Resource A, Guidelines on Fire Ratings of Archaic Materials and Assemblies in the International Existing Building Code."

SECTION 303 LIGHT, VENTILATION AND HEATING

303.1 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. The glazed areas need not be openable where the opening is not required by Section 310 and a whole-house mechanical ventilation system is installed in accordance with Section 1505.
2. 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.
3. Use of sunroom and patio covers, as defined in Section 202, 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.

303.2 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 floor area of the interior room and not less than 25 square feet (2.3 m²).

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 m²). The minimum openable area to the outdoors shall be based on the total floor area being ventilated.

303.3 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 m²), 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 1505. Exhaust air from the space shall be exhausted directly to the outdoors.

303.4 Mechanical ventilation. Where the air infiltration rate of a dwelling unit is 5 air changes per hour or less where tested with a blower door at a pressure of 0.2 inch w.c. (50 Pa) in accordance with Section 1102.4.1.2 or Section 1112.2.4.2.1, the dwelling unit shall be provided with whole-house mechanical ventilation in accordance with Section 1505.4.

303.5 Opening location. Outdoor intake and exhaust openings shall be located in accordance with Sections 303.5.1 and 303.5.2.

303.5.1 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 1502.3.

303.5.2 Exhaust openings. Exhaust air shall not be directed onto walkways.

303.6 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 $\frac{1}{4}$ -inch (6 mm) and a maximum opening size of $\frac{1}{2}$ -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.

303.7 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 foot-candle (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.

303.8 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.

303.9 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.

303.9.1 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).

303.10 Required heating. Where the winter design temperature in Table 301.2(1) 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 304 MINIMUM ROOM AREAS

304.1 Minimum area. Habitable rooms shall have a floor area of not less than 70 square feet (6.5 m²).

Exception: Kitchens.

304.2 Minimum dimensions. Habitable rooms shall be not less than 7 feet (2134 mm) in any horizontal dimension.

Exception: Kitchens.

304.3 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 305 CEILING HEIGHT

305.1 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.

305.1.1 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).

Exceptions:

1. 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.
2. *Habitable spaces created in existing basements shall be permitted to have ceiling heights of not less than 6 feet 8 inches (2032 mm). Obstructions may project to within 6 feet 4 inches of the basement floor.*

SECTION 306

SANITATION

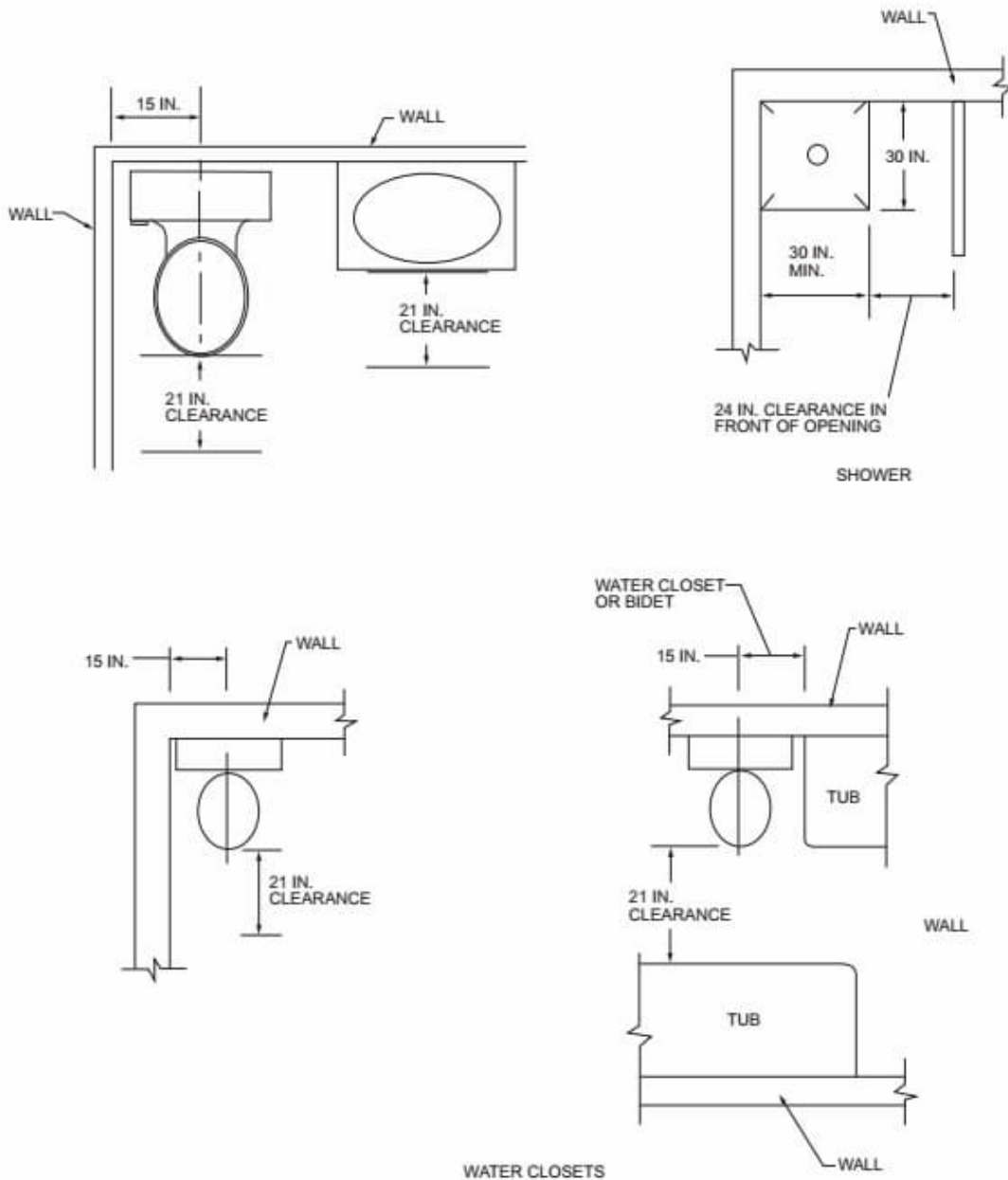
306.1 Toilet facilities. Every dwelling unit shall be provided with a water closet, lavatory, and a bathtub or shower. (*OPC §403.1, Table 403.1*)

306.2 Kitchen. Each dwelling unit shall be provided with a kitchen area and every kitchen area shall be provided with a sink.

306.3 Sewage disposal. Plumbing fixtures shall be connected to a sanitary sewer or to an approved private sewage disposal system.

306.4 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 307 TOILET, BATH AND SHOWER SPACES



For SI: 1 inch = 25.4 mm.

FIGURE 307.1
MINIMUM FIXTURE CLEARANCES

307.1 Space required. Fixtures shall be spaced in accordance with Figure 307.1, and in accordance with the requirements of *the plumbing code*.

307.2 Bathtub and shower spaces. Bathtub and shower floors and walls above

bathbubs 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 308 GLAZING

308.1 Identification. Except as indicated in Section 308.1.1 each pane of glazing installed in hazardous locations as defined in Section 308.4 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.

308.1.1 Identification of multiple assemblies. Multi-pane assemblies having individual panes not exceeding 1 square foot (0.09 m²) in exposed area shall have not less than one pane in the assembly identified in accordance with Section 308.1. Other panes in the assembly shall be labeled "CPSC 16 CFR 1201" or "ANSI Z97.1" as appropriate.

308.2 Louvered windows or jalousies. Regular, float, wired or patterned glass in jalousies 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.

308.2.1 Wired glass prohibited. Wired glass with wire exposed on longitudinal edges shall not be used in jalousies or louvered windows.

308.3 Human impact loads. Individual glazed areas, including glass mirrors in hazardous locations such as those indicated as defined in Section 308.4, shall pass the test requirements of Section 308.3.1.

Exceptions:

1. Louvered windows and jalousies shall comply with Section 308.2.

2. Mirrors and other glass panels mounted or hung on a surface that provides a continuous backing support.
3. Glass unit masonry complying with Section 607.

308.3.1 Impact test. Where required by other sections of the code, glazing shall be tested in accordance with CPSC 16 CFR 1201. Glazing shall comply with the test criteria for Category II unless otherwise indicated in Table 308.3.1(1).

Exception: Glazing not in doors or enclosures for hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers shall be permitted to be tested in accordance with ANSI Z97.1. Glazing shall comply with the test criteria for Class A unless otherwise indicated in Table 308.3.1(2).

TABLE 308.3.1(1)
MINIMUM CATEGORY CLASSIFICATION OF GLAZING USING CPSC 16 CFR 1201

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZING IN STORM OR COMBINATION DOORS (Category Class)	GLAZING IN DOORS (Category Class)	GLAZED PANELS REGULATED BY SECTION 308.4.3 (Category Class)	GLAZED PANELS REGULATED BY SECTION 308.4.2 (Category Class)	GLAZING IN DOORS AND ENCLOSURES REGULATED BY SECTION 308.4.5 (Category Class)	SLIDING GLASS DOORS PATIO TYPE (Category Class)
9 square feet or less	I	I	NR	I	II	II
More than 9 square feet	II	II	II	II	II	II

For SI: 1 square foot = 0.0929 m². NR = No Requirement.

TABLE 308.3.1(2)
MINIMUM CATEGORY CLASSIFICATION OF GLAZING USING ANSI Z97.1

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZED PANELS REGULATED BY SECTION 308.4.3 (Category Class)	GLAZED PANELS REGULATED BY SECTION 308.4.2 (Category Class)	DOORS AND ENCLOSURES REGULATED BY SECTION 308.4.5 ^a (Category Class)
9 square feet or less	No requirement	B	A
More than 9 square feet	A	A	A

For SI: 1 square foot = 0.0929 m².

a. Use is permitted only by the exception to Section 308.3.1.

308.4 Hazardous locations. The locations specified in Sections 308.4.1 through 308.4.7 shall be considered to be specific hazardous locations for the purposes of glazing.

308.4.1 Glazing in doors. Glazing in fixed and operable panels of swinging, sliding and bifold doors shall be considered to be a hazardous location.

Exceptions:

1. Glazed openings of a size through which a 3 -inch-diameter (76 mm) sphere is unable to pass.
2. Decorative glazing.

308.4.2 Glazing adjacent to doors. Glazing in an individual fixed or operable panel adjacent to a door shall be considered to be a hazardous location where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the floor or walking surface and it meets either of the following conditions:

1. Where the glazing is within 24 inches (610 mm) of either side of the door in the plane of the door in a closed position.
2. Where the glazing is on a wall less than 180 degrees (3.14 rad) from the plane of the door in a closed position and within 24 inches (610 mm) of the hinge side of an in-swinging door.

Exceptions:

1. Decorative glazing.
2. Where there is an intervening wall or other permanent barrier between the door and the glazing.
3. Where access through the door is to a closet or storage area 3 feet (914 mm) or less in depth. Glazing in this application shall comply with Section 308.4.3.
4. Glazing that is adjacent to the fixed panel of patio doors.

308.4.3 Glazing in windows. Glazing in an individual fixed or operable panel that meets all of the following conditions shall be considered to be a hazardous location:

1. The exposed area of an individual pane is larger than 9 square feet (0.836 m²).
2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor.
3. The top edge of the glazing is more than 36 inches (914 mm) above the floor.
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 45degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.

308.4.4 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.

308.4.4.1 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.

308.4.5 Glazing and wet surfaces. Glazing in walls, enclosures or fences containing or facing 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 and in a straight line, 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.

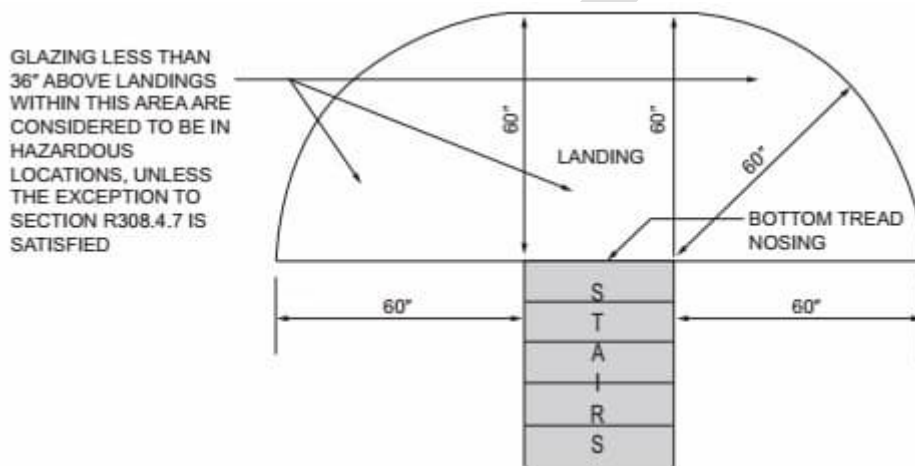
308.4.6 Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than 36 inches (914 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered to be a hazardous location.

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.

308.4.7 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.

Exception: Where the glazing is protected by a guard complying with Section 312 and the plane of the glass is more than 18 inches (457 mm) from the guard.



For SI: 1 inch = 25.4 mm.

FIGURE 308.4.7
HAZARDOUS GLAZING LOCATIONS AT BOTTOM STAIR LANDINGS

308.5 Site-built fenestration products. Site-built *fenestration products* shall comply with Section 2404 of the *Ohio building code*.

308.6 Skylights and sloped glazing. Skylights and sloped glazing shall comply with the following sections.

308.6.1 Definitions. The following terms are defined in Chapter 2:

SKYLIGHT, UNIT.

SKYLIGHTS AND SLOPED GLAZING.

TUBULAR DAYLIGHTING DEVICE (TDD).

308.6.2 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 m²) 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.

308.6.3 Screens, general. For fully tempered or heat-strengthened glass, a retaining screen meeting the requirements of Section 308.6.7 shall be installed below the glass, except for fully tempered glass that meets either condition listed in Section 308.6.5.

308.6.4 Screens with multiple glazing. Where the inboard pane is fully tempered, heat-strengthened or wired glass, a retaining screen meeting the requirements of Section 308.6.7 shall be installed below the glass, except for either condition listed in Section 308.6.5. Other panes in the multiple glazing shall be of any type listed in Section 308.6.2.

308.6.5 Screens not required. Screens shall not be required where fully tempered glass is used as single glazing or the inboard pane in multiple glazing and either of the following conditions are met:

1. The glass area is 16 square feet (1.49 m²) or less; the highest point of glass is not more than 12 feet (3658 mm) above a walking surface; the nominal glass thickness is not more than ³/₁₆ inch (4.8 mm); and (for multiple glazing only) the other pane or panes are fully tempered, laminated or wired glass.
2. The glass area is greater than 16 square feet (1.49 m²); the glass is sloped 30 degrees (0.52 rad) or less from vertical; and the highest point of glass is not more than 10 feet (3048 mm) above a walking surface.

308.6.6 Glass in greenhouses. Any glazing material is permitted to be installed without screening in the sloped areas of greenhouses, provided that the greenhouse height at the ridge does not exceed 20 feet (6096 mm) above grade.

308.6.7 Screen characteristics. The screen and its fastenings shall be capable of supporting twice the weight of the glazing, be firmly and substantially fastened to the framing members, and have a mesh opening of not more than 1 inch by 1 inch (25 mm by 25 mm).

308.6.8 Curbs for skylights. Unit skylights installed in a roof with a pitch of less than three units vertical in 12 units horizontal (25-percent slope) shall be mounted on a curb extending not less than 4 inches (102 mm) above the plane of the roof, unless otherwise specified in the manufacturer's installation instructions.

308.6.9 Testing and labeling. Unit skylights and tubular daylighting devices shall be tested by an approved independent laboratory, and bear a label identifying manufacturer, performance grade rating and approved inspection agency to indicate compliance with the requirements of AAMA/WDMA/CSA 101/I.S.2/A440.

308.6.9.1 Comparative analysis for glass-glazed unit skylights. Structural wind load design pressures for glass-glazed unit skylights different than the size tested in accordance with Section 308.6.9 shall be permitted to be different than the design value of the tested unit where determined in accordance with one of the following comparative analysis methods:

1. Structural wind load design pressures for glass-glazed unit skylights smaller than the size tested in accordance with Section 308.6.9 shall be permitted to be higher than the design value of the tested unit provided that such higher pressures are determined by accepted engineering analysis. Components of the smaller unit shall be the same as those of the tested unit. Such calculated design pressures shall be validated by an additional test of the glass-glazed unit skylight having the highest allowable design pressure.
2. In accordance with WDMA I.S. 11.

SECTION 309

GARAGES AND CARPORTS

309.1 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.

309.2 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.

309.3 Flood hazard areas. For buildings located in flood hazard areas as established by Table 301.2(1), garage floors shall be one of the following:

1. Elevated to or above the design flood elevation as determined in accordance with Section 322.
2. Located below the design flood elevation provided that the floors are at or above grade on not less than one side, are used solely for parking, building access or storage, meet the requirements of Section 322 and are otherwise constructed in accordance with this code.

309.4 Automatic garage door openers. Automatic garage door openers, if provided, shall be listed and labeled in accordance with UL 325.

309.5 Fire sprinklers. Private garages shall be protected by fire sprinklers where the garage wall has been designed based on Table 302.1(2), Note a. Sprinklers in garages shall be connected to an automatic sprinkler system that complies with Section 2904. Garage sprinklers shall be residential sprinklers or quick-response sprinklers, designed to provide a density of 0.05 gpm/ft². Garage doors shall not be considered obstructions with respect to sprinkler placement.

SECTION 310 EMERGENCY ESCAPE AND RESCUE OPENINGS

310.1 Emergency escape and rescue opening required. *Every* sleeping room shall have not less than one operable emergency escape and rescue opening. Emergency escape and rescue openings shall open directly into a public way, or to a yard or court that opens to a public way.

Exceptions: Where the dwelling *or dwelling unit* is equipped with an automatic sprinkler system installed in accordance with Section 2904, sleeping rooms in basements shall not be required to have emergency escape and rescue openings provided that the basement has one of the following:

1. One means of egress complying with Section 311 and one emergency escape and rescue opening.
2. Two means of egress complying with Section 311.

310.1.1 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 on windows serving as a required emergency escape and rescue opening shall comply with ASTM F2090.

310.2 Emergency escape and rescue openings. Emergency escape and rescue openings shall have minimum dimensions as specified in this section.

310.2.1 Minimum opening area. Emergency and escape rescue openings shall have a net clear opening of not less than 5.7 square feet (0.530 m²). The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. The net clear height of the opening shall be not less than 24 inches (610 mm) and the net clear width shall be not less than 20 inches (508 mm).

Exception: Grade floor openings or below-grade openings shall have a net clear opening area of not less than 5 square feet (0.465 m²).

310.2.2 Window sill height. Where a window is provided as the emergency escape and rescue opening, it shall have a sill height of not more than 44 inches (1118 mm) above the floor; where the sill height is below grade, it shall be provided with a window well in accordance with Section 310.2.3.

310.2.3 Window wells. The horizontal area of the window well shall be not less than 9 square feet (0.9 m²), with a horizontal projection and width of not less than 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

Exception: The ladder or steps required by Section 310.2.3.1 shall be permitted to encroach not more than 6 inches (152 mm) into the required dimensions of the window well.

310.2.3.1 Ladder and steps. Window wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by this section shall not be required to comply with Section 311.7. Ladders or 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 window well.

310.2.3.2 Drainage. Window wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section 405.1 or by an approved alternative method.

Exception: A drainage system for window 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 405.1.

310.2.4 Emergency escape and rescue openings under decks and porches. Emergency escape and rescue openings installed under decks and porches shall be fully openable and provide a path not less than 36 inches (914 mm) in height to a yard or court.

310.2.5 Replacement windows. Replacement windows installed in buildings meeting the scope of this code shall be exempt from the maximum sill height requirements of Section 310.2.2 and the requirements of Section 310.2.1, 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.

Exception: Replacement windows installed in accordance with Section 113.5.1 shall not be required to comply with 310.2.1

310.3 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 slider. Where the opening is below the adjacent grade, it shall be provided with an area well.

310.3.1 Minimum door opening size. The minimum net clear height opening for any door that serves as an emergency and escape rescue opening shall be in accordance with Section 310.2.1.

310.3.2 Area wells. Area wells shall have a width of not less than 36 inches (914 mm). The area well shall be sized to allow the emergency escape and rescue door to be fully opened.

310.3.2.1 Ladder and steps. Area wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the door in the fully open position. Ladders or steps required by this section shall not be required to comply with Section 311.7. Ladders or 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 exterior stairwell.

310.3.2.2 Drainage. Area wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section 405.1 or by an approved alternative method.

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 405.1.

310.4 Bars, grilles, covers and screens. Where bars, grilles, covers, screens or similar devices are placed over emergency escape and rescue openings, area wells, or window wells, the minimum net clear opening size shall comply with Sections 310.2.1 through 310.2.3, and such devices shall be releasable or removable from the inside without the use of a key, tool, special knowledge or force greater than that required for the normal operation of the escape and rescue opening.

310.5 Dwelling additions. Where dwelling additions contain sleeping rooms, an emergency escape and rescue opening shall be provided in each new sleeping room.

310.6 Alterations or repairs of existing basements. An emergency escape and rescue opening is not required where existing basements undergo alterations or repairs.

Exception: New sleeping rooms created in an existing basement shall be provided with emergency escape and rescue openings in accordance with Section 310.1.

SECTION 311 MEANS OF EGRESS

311.1 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.

311.2 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.

311.2.1 Garage access doors. *Garages shall be served by at least one side-hinged door not less than 2 feet 6 inches (760 mm) in width and 6 feet 8 inches (2032 mm) in height. Such door located between a dwelling and an attached garage shall be acceptable for meeting this requirement.*

311.3 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 m²) 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.

311.3.1 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 $8\frac{1}{4}$ -inches (209 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 311.8 or a stairway in accordance with Section 311.7.

311.3.2 Floor elevations at other exterior doors. Doors other than the required egress door shall be provided with landings or floors not more than $8\frac{1}{4}$ -inches (209 mm) below the top of the threshold.

Exception: A top landing is not required *for the* stairway located on the exterior side of the door, provided that *the threshold of the door is not more than 30" above the adjacent grade and* the door does not swing over the stairway.

311.3.3 Storm and screen doors. Storm and screen doors shall be permitted

to swing over exterior stairs and landings.

311.4 Vertical egress. Egress from habitable levels including habitable attics and basements that are not provided with an egress door in accordance with Section 311.2 shall be by a ramp in accordance with Section 311.8 or a stairway in accordance with Section 311.7.

311.5 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.

311.6 Hallways. The width of a hallway shall be not less than 3 feet (914 mm).

311.7 Stairways.

311.7.1 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 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 311.7.10.1.

311.7.2 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 3/4 inches (121 mm).
2. The headroom for spiral stairways shall be in accordance with Section 311.7.10.1.

311.7.3 Vertical rise. A flight of stairs shall not have a vertical rise larger than 148 1/2 inches (3772 mm) between floor levels or landings.

311.7.4 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.

311.7.5 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.

311.7.5.1 Risers. The riser height shall be not more than $8\frac{1}{4}$ -inches (209 mm). The riser 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 311.7.10.1.

311.7.5.2 Treads. The tread depth shall be not less than 9 -inches (229 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).

311.7.5.2.1 Winder treads. Winder treads shall have a tread depth of not less than 9 -inches (229 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 311.7.10.1.

311.7.5.3 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).

311.7.5.4 Exterior plastic composite stair treads. Plastic composite exterior stair treads shall comply with the provisions of this section and Section 507.2.2.

311.7.6 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.

311.7.7 Stairway walking surface. The walking surface of treads and landings of stairways shall be sloped not steeper than one unit vertical in 48 inches horizontal (2-percent slope).

311.7.8 Handrails. Handrails shall be provided on not less than one side of each flight of stairs with four or more risers.

311.7.8.1 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 (956 mm).

311.7.8.2 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.

311.7.8.3 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.

311.7.8.4 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 or shall terminate in newel posts or safety terminals.

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.
3. *Two or more separate rails shall be considered continuous if the termination of the rails occurs over a single tread and positioned within 4 inches of each other. If the transition occurs between a wall mounted handrail and handrail/guardrail combination, the wall mounted handrail shall return into the wall.*

311.7.8.5 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).

311.7.8.6 Exterior plastic composite handrails. Plastic composite exterior handrails shall comply with the requirements of Section 507.2.2.

311.7.9 Illumination. Stairways shall be provided with illumination in accordance with Sections 303.7 and 303.8.

311.7.10 Special stairways. Spiral stairways and bulkhead enclosure stairways shall comply with the requirements of Section 311.7 except as specified in Sections 311.7.10.1 and 311.7.10.2.

311.7.10.1 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 no 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).

311.7.10.2 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 311.3 and 311.7 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.

311.7.11 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 (18.6m²) or less where such devices do not provide exclusive access to a kitchen or bathroom.

311.7.11.1 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 8½ inches (216 mm), a tread width of not less than 7 inches (178 mm) and a riser height of not more than 9½ 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.

311.7.11.2 Handrails of alternating tread devices. Handrails shall be provided on both sides of alternating tread devices and shall comply with Sections 311.7.8.2 to 311.7.8.6. Handrail height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

311.7.12 Ships ladders. Ships ladders shall not be used as an element of a means of egress. Ships 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: Ships 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 m2) or less that do not provide exclusive access to a kitchen or bathroom.

311.7.12.1 Treads of ships 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 nosing projection is not less than 8½ inches (216

mm). The riser height shall be not more than 9½ inches (241 mm).

311.7.12.2 Handrails of ships ladders. Handrails shall be provided on both sides of ships ladders and shall comply with Sections 311.7.8.2 to 311.7.8.6. Handrail height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

311.8 Ramps.

311.8.1 Maximum slope. ~~Ramps serving the egress door required by Section 311.2 shall have a slope of not more than 1 unit vertical in 8 units horizontal (12.5 percent slope).~~ Ramps serving the egress door required by Section 311.2 shall have a slope of not more than 1 unit vertical in 12 units horizontal (8.3 percent slope).

Other ramps shall have a slope of not more than 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).

311.8.2 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 36 inches (914 mm).

311.8.3 Handrails required. Handrails shall be provided on not less than one side of ramps exceeding a slope of one unit vertical in 12 units horizontal (8.33-percent slope).

311.8.3.1 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).

311.8.3.2 Grip size. Handrails on ramps shall comply with Section 311.7.8.5.

311.8.3.3 Continuity. Handrails where required on ramps shall be continuous for the full length of ramp. Handrail ends shall return 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 312 GUARDS AND WINDOW FALL PROTECTION

312.1 Guards. Guards shall be provided in accordance with Sections 312.1.1 through 312.1.4.

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

***Exception:** Guards are not required where a protective bar is installed 34 inches to 38 inches (864 mm to 965 mm) above the porch or deck on the interior side of the screening. The protective bar shall be capable of resisting a horizontal load of 50 pounds per lineal foot (730 N/m) without contacting the screen and be a minimum of 1½ inches (38 mm) in height.*

312.1.2 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.

312.1.3 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 4³/₈-inches (111 mm) in diameter.

312.1.4 Exterior plastic composite guards. Plastic composite exterior guards shall comply with the requirements of Section 317.4.

312.2 Window fall protection. *When provided, window fall protection shall be in accordance with Sections 312.2.1 and 312.2.2.*

312.2.1 Window fall prevention devices. *Window fall prevention devices and window guards, where provided, shall comply with the requirements of ASTM F 2090.*

312.2.2 Window opening limiting devices. *Where provided, window opening limiting devices shall comply with the provisions of this section.*

312.2.2.1 General requirements. *Window opening limiting devices shall be self-acting and shall be positioned to prohibit the free passage of a 4-in. (102-mm) diameter rigid sphere through the window opening when the window opening limiting device is installed in accordance with the manufacturer's instructions.*

312.2.2.2 Operation for emergency escape. *Window opening limiting devices shall be designed with release mechanisms to allow for emergency escape through the window opening without the need for keys, tools or special knowledge. Window opening limiting devices shall comply with all of the following:*

- 1. Release of the window opening-limiting device shall require no more than 15 pounds (66 N) of force.*
- 2. The window opening limiting device release mechanism shall operate properly in all types of weather.*
- 3. Window opening limiting devices shall have their release mechanisms clearly identified for proper use in an emergency.*
- 4. The window opening limiting device shall not reduce the minimum net clear opening area of the window unit below what is required by Section 310.1.1 of the code.*

SECTION 313

AUTOMATIC FIRE SPRINKLER SYSTEMS

313.1 Dwelling unit automatic fire sprinkler systems. An automatic residential fire sprinkler system is *not required* to be installed in buildings with four or more dwelling units or other Group R occupancies permitted to use this code.

313.1.1 Design and installation for non-required systems. *When a non-required automatic residential fire sprinkler system is intended to be installed within a building with four or more dwelling units or a dwelling in another R-3 occupancy using this code, the system shall be designed and installed in accordance with Section 2904, NFPA 13, NFPA 13R or NFPA 13D as referenced in Chapter 44 of this code.*

313.2 One-, two- and three-family dwellings automatic fire systems. An automatic residential fire sprinkler system *is not required to be installed in one-, two-, or three-family dwellings.*

313.2.1 Design and installation for non-required systems. *When an automatic residential fire sprinkler system is intended to be installed, it shall be designed and installed in accordance with Section 2904, NFPA 13, NFPA 13R or NFPA 13D as referenced in Chapter 44 of this code.*

313.3 Design and installation of non-required fire sprinkler systems. *Any full or partial fire sprinkler system not required by this code shall be permitted to be installed for partial or complete protection provided that such system meets the requirements of this code to the extent of the intended installation.*

SECTION 314 SMOKE ALARMS

314.1 General. Smoke alarms shall comply with *the household fire warning equipment provisions of NFPA 72, and Section 314* *and the manufacturer's installation instructions.*

314.1.1 Listings. Smoke alarms shall be listed *and labeled* in accordance with UL 217. Combination smoke and carbon monoxide alarms shall be listed *and labeled* in accordance with UL 217 and UL 2034.

~~**314.1.2 Technologies.** *On each level within each dwelling unit smoke alarms utilizing photoelectric and ionization technologies shall be installed. Separate or dual sensing smoke alarms may be used. A smoke alarm located in accordance with section 314.3(2) shall include photoelectric technology.*~~

~~**Exception:** *A system meeting the requirements of Section 314.7 is not required to include both technologies.*~~

314.2 Where required. Smoke alarms shall be provided in accordance with this section.

314.2.1 New construction. Smoke alarms shall be provided in dwelling units *in the locations described in Section 314.3.*

314.2.2 Alterations, repairs and additions. Where alterations, repairs or additions requiring *an approval* occur, *smoke alarms shall be installed, as required for new construction, as follows:*

1. *When alterations or repairs are made to spaces described in items 1 and 2 of Section 314.3, smoke alarms shall be provided in those areas.*
2. *When one or more sleeping rooms are added to or created in existing dwelling units, the new sleeping rooms and the immediate vicinity outside each sleeping room shall be equipped with smoke alarms.*

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.

314.3 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 *sleeping rooms.*
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. Smoke alarms shall be installed 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.

314.3.1 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 314.3.

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.

314.4 Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling unit in accordance with Section 314.3, 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 *and labeled* wireless alarms are installed and all alarms sound upon activation of one alarm.

Exception: Interconnection of smoke alarms in existing areas shall not be required where the alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

314.5 Combination alarms. Combination smoke and carbon monoxide alarms shall be permitted to be used in lieu of smoke alarms.

314.6 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. *Hard-wiring of smoke alarms in existing areas shall not be required where the alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for hard wiring without the removal of interior finishes.*

314.7 Fire alarm systems. Fire alarm systems shall be permitted to be used in lieu of smoke alarms and shall comply with Sections 314.7.1 through 314.7.4.

314.7.1 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.

314.7.2 Location. Smoke detectors shall be installed in the locations specified in Section 314.3.

314.7.3 Permanent fixture. Where a household fire alarm system is installed, it shall become a permanent fixture of the occupancy, owned by the homeowner.

***Exception.** Where separate smoke alarms are provided meeting all other requirements of this section, the fire alarm system is not required to be a permanent fixture of the occupancy or owned by the homeowner.*

314.7.4 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.

314.8 Boathouse heat detection. The boat well portion of a boathouse is to have a rate of rise heat detector that provides occupant notification both inside the boathouse as well as one notification device on the exterior of the boathouse.

314.8.1 Attached dwelling unit. Where a boathouse is attached to a dwelling unit, the rate of rise heat detector is to be powered by premises wiring with battery backup and is interconnected with smoke alarms of the dwelling unit.

SECTION 315 CARBON MONOXIDE ALARMS

315.1 General. Carbon monoxide alarms shall comply with Section 315.

315.1.1 Listings. Carbon monoxide alarms shall be listed *and labeled* in accordance with UL 2034 *and shall be installed in accordance with the manufacturer's instructions*. Combination carbon monoxide and smoke alarms shall be listed *and labeled* in accordance with UL 2034 and UL 217.

315.2 When required. Carbon monoxide alarms shall be provided in accordance with Sections 315.2.1 and 315.2.2.

315.2.1 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

315.2.2 Alterations, repairs and additions. *In existing dwelling units, having fuel-fired appliances or an attached garage, where an application for approval is required for work involving any of the following areas or systems within that dwelling unit, the individual dwelling unit shall be equipped with carbon monoxide alarms located as required for new dwellings:*

- 1. The addition or creation of a new sleeping room*
- 2. An alteration of a sleeping room*
- 3. An alteration in the immediate vicinity outside of a sleeping room;*
- 4. An addition of, or an alteration to, an attached garage;*
- 5. An addition, alteration, repair or replacement of a fuel-fired appliance.*

315.3 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.

315.4 Combination alarms. Combination carbon monoxide and smoke alarms shall be permitted to be used in lieu of carbon monoxide alarms.

315.5 Interconnectivity. *Deleted*

315.6 Power source. *Deleted*

315.7 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 315.7.1 through 315.7.4.

315.7.1 General. Household carbon monoxide detection systems shall comply with NFPA 720. Carbon monoxide detectors shall be listed *and labeled* in accordance with UL 2075.

315.7.2 Location. Carbon monoxide detectors shall be installed in the locations specified in Section 315.3. These locations supersede the locations specified in NFPA 720.

315.7.3 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.

Exception. *Where separate carbon monoxide alarms are provided meeting*

all other requirements of this section, the carbon monoxide detection system is not required to be a permanent fixture of the occupancy or owned by the homeowner.

315.7.4 Combination detectors. Combination carbon monoxide and smoke detectors installed in carbon monoxide detection systems in lieu of carbon monoxide detectors shall be listed *and labeled* in accordance with UL 2075 and UL 268.

SECTION 316 FOAM PLASTIC

316.1 General. The provisions of this section shall govern the materials, design, application, construction and installation of foam plastic materials.

316.2 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.

316.3 Surface burning characteristics. Unless otherwise allowed in Section 316.5, foam plastic, or foam plastic cores used as a component in manufactured assemblies, used in building construction shall have a flame spread index of not more than 75 and shall have a smoke-developed index of not more than 450 when tested in the maximum thickness and density intended for use in accordance with ASTM E84 or UL 723. Loose-fill-type foam plastic insulation shall be tested as board stock for the flame spread index and smoke- developed index.

Exception: Foam plastic insulation more than 4 inches (102 mm) thick 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 not more than 4 inches (102 mm), provided that the end use is approved in accordance with Section 316.6 using the thickness and density intended for use.

316.4 Thermal barrier. Unless otherwise allowed in Section 316.5, 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.

316.5 Specific requirements. The following requirements shall apply to these uses of foam plastic unless specifically approved in accordance with Section 316.6 or by other sections of the code or the requirements of Sections 316.2 through 316.4 have been met.

316.5.1 Masonry or concrete construction. The thermal barrier specified in Section 316.4 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.

316.5.2 Roofing. The thermal barrier specified in Section 316.4 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 803, that is not less than $1^{5}/_{32}$ 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.

316.5.3 Attics. The thermal barrier specified in Section 316.4 is not required where all of the following apply:

1. Attic access is required by Section 807.1.
2. The space is entered only for purposes of repairs or maintenance.
3. The foam plastic insulation has been tested in accordance with Section 316.6 or the foam plastic insulation is protected against ignition using one of the following ignition barrier materials:
 - 3.1. $1^{1}/_{2}$ -inch-thick (38 mm) mineral fiber insulation.
 - 3.2. $1/4$ -inch-thick (6.4 mm) wood structural panels.
 - 3.3. $3/8$ -inch (9.5 mm) particleboard
 - 3.4. $1/4$ -inch (6.4 mm) hardboard.
 - 3.5. $3/8$ -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. $1^{1}/_{2}$ -inch-thick (38 mm) cellulose insulation.
 - 3.8. $1/4$ -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 316.6.

316.5.4 Crawl spaces. The thermal barrier specified in Section 316.4 is not

required where all of the following apply:

1. Crawl space access is required by Section 408.4.
2. Entry is made only for purposes of repairs or maintenance.
3. The foam plastic insulation has been tested in accordance with Section 316.6 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.

316.5.5 Foam-filled exterior doors. Foam-filled exterior doors are exempt from the requirements of Sections 316.3 and 316.4.

316.5.6 Foam-filled garage doors. Foam-filled garage doors in attached or detached garages are exempt from the requirements of Sections 316.3 and 316.4.

316.5.7 Foam backer board. The thermal barrier specified in Section 316.4 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/m²) 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 316.6.

316.5.8 Re-siding. The thermal barrier specified in Section 316.4 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/m²) when tested in accordance with NFPA 259.

316.5.9 Interior trim. The thermal barrier specified in Section 316.4 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/m³).
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.

316.5.10 Interior finish. Foam plastics used as interior finishes shall comply with Section 316.6 and shall meet the flame spread index and smoke-developed index requirements of Sections 302.9.1 and 302.9.2.

316.5.11 Sill plates and headers. Foam plastic be spray applied to sill plates and headers or installed in the perimeter joist space without the thermal barrier specified in Section 316.4 shall comply with all of the following:

1. The thickness of the foam plastic shall be not more than 3¹/₄ inches (83mm).
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/m³).
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.

316.5.12 Sheathing. Foam plastic insulation used as sheathing shall comply with Section 316.3 and Section 316.4. Where the foam plastic sheathing is exposed to the attic space at a gable or kneewall, the provisions of Section 316.5.3 shall apply. Where foam plastic insulation is used as exterior wall sheathing on framed wall assemblies, it shall comply with Section 316.8.

316.5.13 Floors. The thermal barrier specified in Section 316.4 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 more than a nominal 1/2 -inch-thick (12.7 mm) wood structural panel or equivalent. The thermal barrier specified in Section 316.4 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.

316.6 Specific approval. Foam plastic not meeting the requirements of Sections 316.3 through 316.5 shall be specifically approved on the basis of one of the following approved tests: NFPA 286 with the acceptance criteria of Section 302.9.4, 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.

316.7 Termite damage. The use of foam plastics in areas of “very heavy” termite infestation probability shall be in accordance with Section 318.4.

316.8 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 317 PROTECTION OF WOOD AND WOOD-BASED PRODUCTS AGAINST DECAY

317.1 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 AWP A U1.

1. Wood joists or the bottom of a wood structural floor where closer than 18 inches (457 mm) or wood girders where closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. Wood framing members that rest 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.

317.1.1 Field treatment. *Deleted*

317.1.2 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.

317.1.3 Geographical areas. In geographical areas where experience has demonstrated a specific need, approved naturally durable or pressure-preservative-treated wood shall be used for those portions of wood 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. Depending on local experience, such members typically include:

1. Horizontal members such as girders, joists and decking.
2. Vertical members such as posts, poles and columns.
3. Both horizontal and vertical members.

317.1.4 Wood columns. Wood columns shall be approved wood of natural decay resistance or approved pressure-preservative-treated wood.

Exceptions:

1. Columns exposed to the weather or in basements where supported by concrete piers or metal pedestals projecting 1 inch (25 mm) above a concrete floor or 6 inches (152 mm) above exposed earth and the earth is covered by an approved impervious moisture barrier.
2. Columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building where supported by a concrete pier or metal

pedestal at a height more than 8 inches (203 mm) from exposed earth and the earth is covered by an impervious moisture barrier.

3. Deck posts supported by concrete piers or metal pedestals projecting not less than 1 inch (25 mm) above a concrete floor or 6 inches (152 mm) above exposed earth.

317.1.5 Exposed glued-laminated timbers. The portions of glued-laminated timbers that form the structural supports of a building or other structure and are exposed to weather and not properly protected by a roof, eave or similar covering shall be pressure treated with preservative, or be manufactured from naturally durable or preservative-treated wood.

317.2 Quality mark. Lumber and plywood required to be pressure-preservative treated in accordance with Section 318.1 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.

317.2.1 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.

317.3 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.

317.3.1 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. $\frac{1}{2}$ -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.

317.3.2 Fastenings for wood foundations. Fastenings, including nuts and washers, for wood foundations shall be as required in AWC PWF.

317.3.3 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.

317.3.4 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 317.3.3 shall apply.

317.4 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 507.2.2.

SECTION 318

PROTECTION AGAINST SUBTERRANEAN TERMITES

318.1 Subterranean termite control methods. In areas subject to damage from termites as indicated by Table 301.2(1), protection shall be by one, or a combination, of the following methods:

1. Chemical termiticide treatment in accordance with Section 318.2.
2. Termite-baiting system installed and maintained in accordance with the label.
3. Pressure-preservative-treated wood in accordance with the provisions of Section 317.1.
4. Naturally durable termite-resistant wood.
5. Physical barriers in accordance with Section 318.3 and used in locations as specified in Section 317.1.
6. Cold-formed steel framing in accordance with Sections 505.2.1 and 603.2.1.

318.1.1 Quality mark. Lumber and plywood required to be pressure-preservative treated in accordance with Section 318.1 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.

318.1.2 Field treatment. *Deleted*

318.2 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.

318.3 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.

318.4 Foam plastic protection. In areas where the probability of termite infestation is “very heavy” as indicated in Figure 301.2(7), 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 318.1, 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 319
SITE ADDRESS**

319.1 Address identification. *Buildings shall have approved address numbers, building numbers or approved building identification placed in a position that is plainly legible and visible from the street or road fronting the property. 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 320
ACCESSIBILITY**

320.1 Scope. *Where there are four or more dwelling units or sleeping units in a single structure, and the design qualifies for this code to apply, the provisions of section 320 shall apply.*

In structures with 1, 2 or 3 dwelling units, the accessibility provisions of this code are not required but when non-required accessibility components are intended to be installed inside the dwellings, they shall comply with the provisions for Type A, Type B, Type C (Visitable), or Accessible units in ICC/ANSI A117.1 listed in Chapter 44 to the extent of the installation.

In existing buildings, where compliance with these sections is technically infeasible, the components shall conform to the requirements to the maximum extent technically feasible.

320.1.1 Guestrooms. *A dwelling with guestrooms for primarily transient occupants shall comply with the provisions of Chapter 11 of the Ohio building code for Group R-3. For the purpose of applying the requirements of Chapter*

11 of the *Ohio building code*, guestrooms shall be considered to be sleeping units.

Exception: Owner-occupied lodging houses with five or fewer guestrooms constructed in accordance with the Residential Code of *Ohio* are not required to be accessible.

320.2 Applicability. *Where there are four or more dwelling units or sleeping units intended to be occupied as residences in a single structure, every dwelling unit shall be a Type B unit designed and constructed for accessibility in accordance with section 320 and the provisions for Type B units in Chapter 10 of the ICC/ANSI A117.1 listed in Chapter 44.*

Exception: *The number of Type B units is permitted to be reduced in accordance with Section 320.4.*

When this code applies to structures of four or more dwellings and Type B units are required, the common and public use areas serving the Type B dwellings and the accessible route connecting the common and public use areas to the Type B units shall comply with ICC/ANSI A117.1 listed in Chapter 44.

320.3 Accessible route. *At least one accessible route shall connect accessible building or facility entrances with the primary entrance of each Type B unit within the building or facility and with those exterior and interior spaces and facilities that serve the Type B units.*

Exception:

If due to circumstances outside the control of the owner, either the slope of the finished ground level between accessible facilities and buildings exceeds one unit vertical in 12 units horizontal (1:12), or where physical barriers or legal restrictions prevent the installation of an accessible route, a vehicular route with parking that complies with ICC/ANSI A117.1 listed in Chapter 44 at each public or common use facility or building is permitted in place of the accessible route.

320.4 General exceptions. *The required number of Type B units is permitted to be reduced in accordance with Sections 320.4.1 through 320.4.5.*

320.4.1 Structures without elevator service. *Where no elevator service is provided in a structure, only the dwelling units that are located on stories indicated in Sections 320.4.1.1 and 320.4.1.2 are required to be Type B units, respectively.*

320.4.1.1 One story with Type B units required. *At least one story*

containing dwelling units or sleeping units intended to be occupied as a residence shall be provided with an accessible entrance from the exterior of the structure and all units intended to be occupied as a residence on that story shall be Type B units.

320.4.1.2 Additional stories with Type B units. *On all other stories that have a building entrance in proximity to arrival points intended to serve units on that story, as indicated in Items 1 and 2, all dwelling units intended to be occupied as a residence served by that entrance on that story shall be Type B units.*

- 1. Where the slopes of the undisturbed site measured between the planned entrance and all vehicular or pedestrian arrival points within 50 feet (15 240 mm) of the planned entrance are 10 percent or less, and*
- 2. Where the slopes of the planned finished grade measured between the entrance and all vehicular or pedestrian arrival points within 50 feet (15 240 mm) of the planned entrance are 10 percent or less.*

Where no such arrival points are within 50 feet (15 240 mm) of the entrance, the closest arrival point shall be used unless that arrival point serves the story required by Section 320.4.1.1.

320.4.2 Multistory units. *A multistory dwelling which is not provided with elevator service is not required to be a Type B unit. Where a multistory unit is provided with external elevator service to only one floor, the floor provided with elevator service shall be the primary entry to the unit, shall comply with the requirements for a Type B unit and a toilet facility shall be provided on that floor.*

For purposes of applying section 320, multistory units are dwellings with finished, habitable space on more than one level of the unit.

320.4.3 Elevator service to the lowest story with units. *Where elevator service in the building provides an accessible route only to the lowest story containing dwelling or sleeping units intended to be occupied as a residence, only the units on that story which are intended to be occupied as a residence are required to be Type B units.*

320.4.4 Site impracticality. *On a site with multiple non-elevator buildings, the number of units required by Section 320.4.1 to be Type B units is permitted to be reduced to a percentage which is equal to the percentage of the entire site*

having grades, prior to development, which are less than 10 percent, provided that all of the following conditions are met:

- 1. Not less than 20 percent of the units required by Section 320.4.1 on the site are Type B units;*
- 2. Units required by Section 320.4.1, where the slope between the building entrance serving the units on that story and a pedestrian or vehicular arrival point is no greater than 8.33 percent, are Type B units;*
- 3. Units required by Section 320.4.1, where an elevated walkway is planned between a building entrance serving the units on that story and a pedestrian or vehicular arrival point and the slope between them is 10 percent or less are Type B units; and*
- 4. Units served by an elevator in accordance with Section 320.4.3 are Type B units.*

320.4.5 Design flood elevation. *The required number of Type B units shall not apply to a site where the required elevation of the lowest floor or the lowest horizontal structural building members of non-elevator buildings are at or above the design flood elevation resulting in:*

- 1. A difference in elevation between the minimum required floor elevation at the primary entrances and vehicular and pedestrian arrival points within 50 feet (15 240 mm) exceeding 30 inches (762 mm), and*
- 2. A slope exceeding 10 percent between the minimum required floor elevation at the primary entrances and vehicular and pedestrian arrival points within 50 feet (15.24 m).*

Where no such arrival points are within 50 feet (15.24 m) of the primary entrances, the closest arrival points shall be used.

SECTION 321 ELEVATORS AND PLATFORM LIFTS

321.1 Elevators. Where provided, passenger elevators, limited-use and limited-application elevators or private residence elevators shall comply with ASME A17.1/CSA B44.

321.2 Platform lifts. Where provided, platform lifts shall comply with ASME A18.1.

321.3 Accessibility. Elevators or platform lifts that are part of an accessible route shall *also* comply with ICC A117.1.

SECTION 322 FLOOD-RESISTANT CONSTRUCTION

322.1 General. *Except where approved by the Flood Plain Administrator having jurisdiction or by variance granted, 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 301.2(1), 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.*

322.1.1 Alternative provisions. As an alternative to the requirements in Section 322, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

322.1.2 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.

322.1.3 Flood-resistant construction. Buildings and structures erected in areas prone to flooding shall be constructed by methods and practices that minimize flood damage.

322.1.4 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.

322.1.4.1 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.

322.1.4.2 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.

322.1.5 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.

322.1.6 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 322.2 or 322.3. 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 322.2 or 322.3 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 design flood elevation in accordance with ASCE 24. Electrical 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.

322.1.7 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 code*.

322.1.8 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 322.2 or 322.3 shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2.

322.1.9 Manufactured homes. Deleted

322.1.10 As-built elevation documentation. A registered design professional shall prepare and seal documentation of the elevations specified in Section 322.2 or 322.3.

322.2 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 322.3. Buildings and structures constructed in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections 322.2.1 through ~~322.2.3~~ 322.2.5.

322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, 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.

Exception: Enclosed areas below the design flood elevation, including basements with floors that are not below grade on all sides, shall meet the requirements of Section 322.2.2.

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

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria and are installed in accordance with Section 322.2.2.1:
 - 2.1. The total net area of nonengineered openings shall be not less than 1 square inch (645 mm²) for each square foot (0.093 m²) 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.

322.2.2.1 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 below the design flood elevation, 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.

322.2.3 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 404:

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.

322.2.4 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 322.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood.

322.2.5 Local Supplemental Drainage System Requirements. *Local supplemental requirements shall be permitted in accordance with Section 301.2.4.2, shall be established in conjunction/coordination with the jurisdiction's Flood Plain Administrator and shall be consistent with the National Flood Insurance Program.*

322.3 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 322.3.1 through 322.3.10.

322.3.1 Location and site preparation.

1. New buildings and buildings that are determined to be substantially improved pursuant to Section 113.4 shall be located landward of the

reach of mean high tide.

2. For any alteration of sand dunes and *other coastal features*, the building official shall require submission of an engineering analysis that demonstrates that the proposed alteration will not increase the potential for flood damage.

322.3.2 Elevation requirements.

1. 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.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. 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.
5. Walls and partitions enclosing areas below the design flood elevation shall meet the requirements of Sections 322.3.5 and 322.3.6.

322.3.3 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. 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 322.3.5. Pilings shall have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift). Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile systems design and installation shall be certified in accordance with Section 322.3.9. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section 401.4 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.

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.

322.3.4 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:

1. 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.
2. 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.

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

1. 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
2. Are constructed with insect screening or open lattice; or
3. 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 design flood 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 322.2.2, Item 2.

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

322.3.6.1 Protection of building envelope. An exterior door that meets the requirements of Section 609 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 322.3.5.

322.3.7 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Section 322.3.2 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 design flood elevation unless such walls are constructed in accordance with Section 322.3.5.

322.3.8 Decks and porches. Attached decks and porches shall meet the elevation requirements of Section 322.3.2 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 322.3.2 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.

322.3.9 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.

322.3.10 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 322.3.2. 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 322.3.

SECTION 323 STORM SHELTERS

323.1 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/NSSA-500.

SECTION 324 SOLAR ENERGY SYSTEMS

324.1 General. Solar energy systems shall comply with the provisions of this section.

324.2 Solar thermal systems. Solar thermal systems shall be designed and installed in accordance with Chapter 23.

324.3 Photovoltaic systems. Photovoltaic systems shall be designed and installed in accordance with Sections 324.3.1 through 324.7.1, NFPA 70, *the fire code* and the manufacturer's installation instructions.

324.3.1 Equipment listings. Photovoltaic panels and modules shall be listed and labeled in accordance with UL 1703. Inverters shall be listed and labeled in accordance with UL 1741. Systems connected to the utility grid shall use inverters listed for utility interaction.

324.4 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.

324.4.1 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.

324.4.1.1 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 301.4 and 301.6. 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 301.2(1).
2. Dead load (excluding photovoltaic panel weight) plus roof live load or snow load, whichever is greater, in accordance with Section 301.6.

324.4.1.2 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 301.2(2), adjusted for height and exposure in accordance with Table 301.2(3).

324.4.2 Fire classification. Rooftop-mounted photovoltaic panel systems shall have the same fire classification as the roof assembly required in Section 902.

324.4.3 Roof penetrations. Roof penetrations shall be flashed and sealed in accordance with Chapter 9.

324.5 Building-integrated photovoltaic systems. Building-integrated photovoltaic systems that serve as roof coverings shall be designed and installed in accordance with Section 905.

324.5.1 Photovoltaic shingles. Photovoltaic shingles shall comply with Section 905.16.

324.5.2 Fire classification. Building-integrated photovoltaic systems shall have a fire classification in accordance with Section 902.3.

324.6 Roof access and pathways. Roof access, pathways and setback requirements shall be provided in accordance with Sections 324.6.1 through 324.6.2.1. 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, non-habitable 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 two units vertical in 12 units horizontal (17-percent slope) or less.

324.6.1 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.

324.6.2 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.

324.6.2.1 Alternative setback at ridge. Where an automatic sprinkler system is installed within the dwelling in accordance with NFPA 13D or Section 2904, 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.

324.6.2.2 Emergency escape and rescue opening. 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.

324.7 Ground-mounted photovoltaic systems. Ground-mounted photovoltaic systems shall be designed and installed in accordance with Section 301.

324.7.1 Fire separation distances. Ground-mounted photovoltaic systems shall be subject to the fire separation distance requirements determined by the local jurisdiction.

SECTION 325 MEZZANINES

- Deleted

SECTION 326 SWIMMING POOLS, SPAS AND HOT TUBS

- Deleted

SECTION 327 STATIONARY STORAGE BATTERY SYSTEMS

327.1 General. Stationary storage battery system shall comply with the provisions of this section.

327.2 Equipment listings. Stationary storage battery systems shall be listed and labeled for residential use in accordance with UL 9540.

Exceptions:

1. 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.
2. Battery systems that are an integral part of an electric vehicle are allowed provided that the installation complies with Section 625.48 of NFPA 70.
 3. Battery systems less than 1 kWh (3.6 megajoules).

327.3 Installation. Stationary storage battery systems shall be installed in accordance with the manufacturer's instructions and their listing, if applicable, and shall not be installed within the habitable space of a dwelling unit.

327.4 Electrical installation. Stationary storage battery systems 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.

327.5 Ventilation. Indoor installations of stationary storage battery systems that include batteries that produce hydro- gen or other flammable gases during charging shall be provided with ventilation in accordance with Section 1307.4.

327.6 Protection from impact. Stationary storage battery systems installed in a location subject to vehicle damage shall be protected by approved barriers.

SECTION 328

POST FRAME ACCESSORY STRUCTURES

328.1 Post frame accessory structures. *The following requirements serve as minimum standards for post and frame structures within all of the following structural limitations:*

1. Residential accessory structures,
2. Single story,
3. Solid exterior structural sheathing or metal roof, and solid wall panels,
4. No attic storage,
5. Maximum building width of thirty six feet including the overhang,
6. Maximum wall height of sixteen feet,
7. Maximum mean roof height of twenty feet, and
8. Maximum post spacing of eight feet.

Post and frame structures and portions thereof outside the above structural limitations of this standard shall be accompanied by structural calculations as required by the residential building official or designed under the provisions of section 106.5 of the Residential Code of Ohio (RCO). Post and frame structures

shall comply with the structural design requirements of section 301 of the RCO.

328.2 Definition. Post frame accessory structures consist of primary members (wood posts, beams & single span roof trusses or ceiling joist and rafters) and secondary members (wood roof purlins, wall girts, bracing & sheathing) where all loads are transmitted from the sheathing and the secondary members to the primary members which transfer all combined loads to the soil through vertical posts bearing on footings embedded in the ground. See Figure 328.

328.3 Footings and foundations. Footings and foundations shall comply with applicable provisions of 401. Post frame structures shall have poured in-place concrete footings installed below all posts. The top of the footing shall be a minimum of 48 inches below finished grade and have footing diameters complying with Table 328.3.

TABLE 328.3
POST FRAME PIER FOOTING DIAMETERS^{1,2,3,4}

	Building width (length of truss) including overhang (feet)			
	24	28	32	36
Diameter (inches) 20# roof snow load	18	20	22	22
Diameter (inches) 30# roof snow load	18	22	24	26

1. Pier footing thickness shall be a minimum one-half of the diameter of the footing.
2. Based upon 2000 PSF soil bearing capacity and truss loads of 20 or 30 PSF live or snow load top chord, 10 PSF dead load top chord, 5 PSF dead load on the bottom chord and no live load on the bottom chord
3. Fractional widths shall be rounded to the next higher pier footing diameter.
4. Table not to be used in Ohio case study areas.

328.4 Post and wall construction. Posts shall be three (3) ply unspliced, reinforced spliced or solid wood and shall not be less than 4 inch by 6 inch nominal size. Posts shall comply with the requirements of Section 317.

328.4.1 Uplift protection: Posts shall have uplift protection by one of the following methods:

1. Two 2x6x12 inch post uplift protection blocks attached to each side of the base of the post. The post uplift blocks shall be placed horizontally, attached per Table 328.7 and comply with Section 317;
2. 12 inch high, concrete collar poured on top of footing around the post, with 2-#5x9 inch rebar placed through the post at 3 inches and 9 inches from bottom of post in opposite directions. The rebar ends must be 1 ½ inches from the soil. See Figure 328.1;

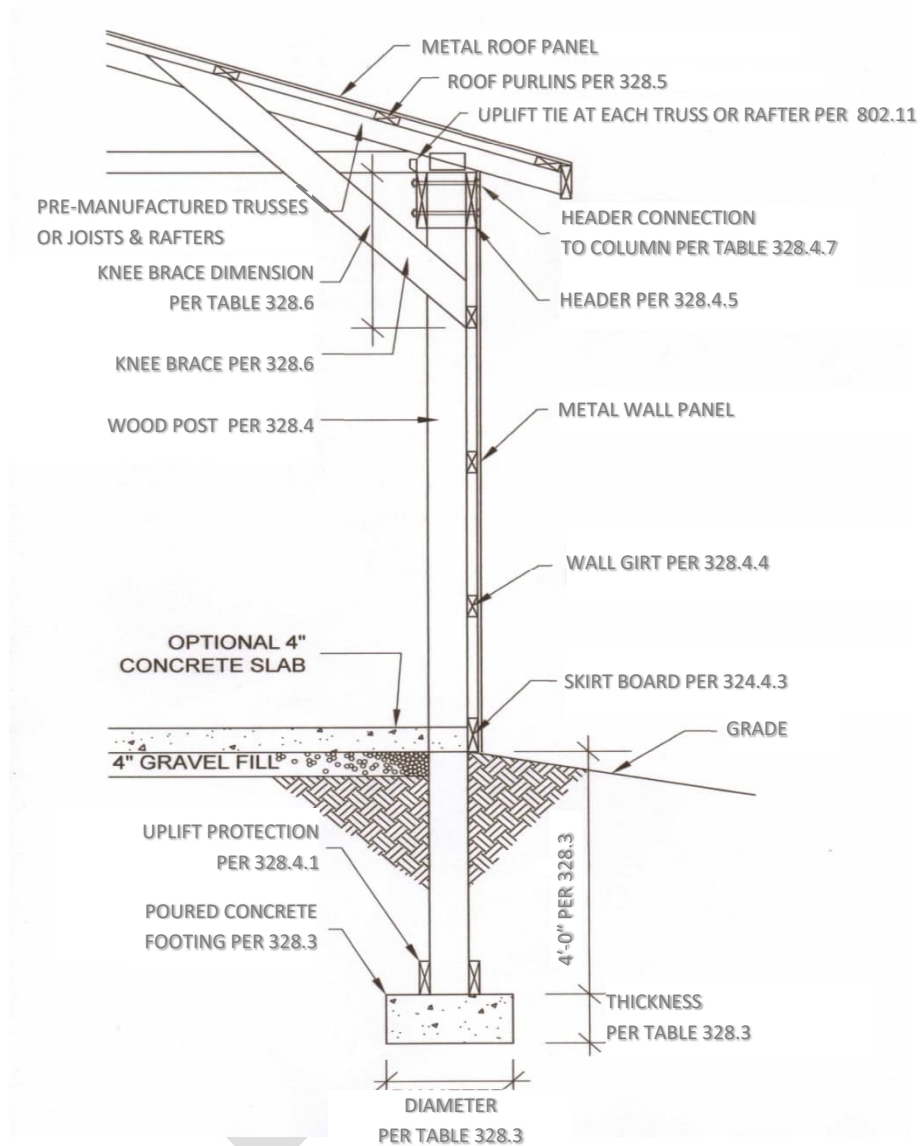


FIGURE 328
POST AND FRAME WALL SECTION.

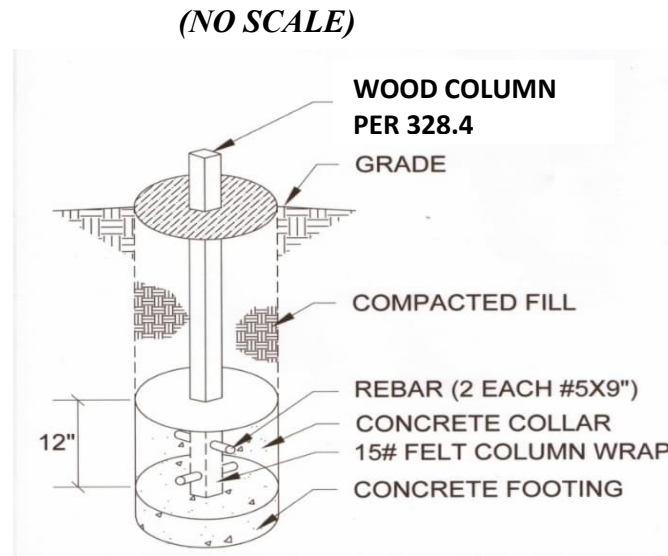


FIGURE 328.1
POST UPLIFT PROTECTION EXCEPTION
(NO SCALE)

328.4.2 Post Spacing. The maximum spacing for posts shall be (eight) 8 feet on center.

328.4.3 Skirt Boards. Skirt boards shall be treated lumber meeting the requirements of Section 317 and attached per Table 328.7.

328.4.4 Wall girts. Wall girts shall be not less than 2 x 4 inches nominal and spaced not more than twenty-four (24) inches on center.

328.4.5 Load bearing beams and headers: Load bearing beams and headers shall comply with ~~Table 502.5(1)~~ Table 602.7(1).

Exceptions:

1. Bearing beams are not required if the trusses or ceiling joists and rafters bear directly on the posts.
2. Headers in the gable-end wall which do not support more than five square feet of wall area per lineal foot of header shall be sized per Table 328.4.5.

**TABLE 328.4.5
GABLE END HEADER SIZES.**

Opening Width (feet)	10	12	16
Header Size (inches)	2-2x8	2-2x10	2-2x12

328.4.6 Bracing. Wall bracing shall be provided to resist all racking and shearing forces and must comply with the applicable provisions of section 602.10 or by installing 2x6 diagonal cross braces in the bays between adjacent posts as described in this section. The diagonal cross braces shall be placed from the top header or girt to the next adjacent post at the skirt board. The cross bracing shall be placed or installed on all sides of the building and shall be spaced at a maximum of 25 feet on center and within 12 feet of the corners of the building and attached per Table 328.7. Any splices of the diagonal brace required due to excessive length, must lap over two consecutive wall girts.

328.4.7 Beams supporting trusses or rafters and ceiling joists attachment to column. Bearing beams supporting roof trusses or rafters and ceiling joists shall be connected to the posts by one of the following methods:

1. Bolts that are ½ inch diameter through-bolted to the side of the post;
2. Bolts that are ½ inch diameter, directly attached to a 3-ply post notch, enclosing the truss or rafter at the top of post; or
3. Other fasteners with minimum shear or withdraw values stated in Table 328.4.7

328.4.7.1 Number of fasteners. The minimum numbers of through bolts or other fasteners with minimum shears or withdraw values required per Table 328.4.7.

**TABLE 328.4.7
BEAM OR TRUSS CONNECTION AT POSTS
MINIMUM FASTENERS OR TOTAL SHEAR OR WITHDRAW VALUES ^{a,b,c}**

	Building Width (Length of Truss) including overhang (feet)			
	24	28	32	36
Shear or withdraw (pounds) 20 lb snow load	3360	3920	4480	5040
Number of Bolts, 20 lb roof snow load	2	2	2	3
Shear or withdraw (pounds) 30 lb roof snow load	4320	5040	5760	6480
Number of Bolts, 30 lb roof snow load	2	3	3	3

- a. Based upon truss loads of 20 or 30 PSF live or snow load top chord, 10 PSF dead load top chord, 5 PSF live load on the bottom chord and no live load on the bottom chord.
- b. Based upon post spacing at intervals not exceeding 8 feet.
- c. When beams are attached at each side of the column and fasteners do not extend through both beams such

as through-bolts, the required values are one-half the amount shown above for each beam.

328.5 Roof purlins. Roof purlins shall be a minimum of 4x2 SPF#2 laid flat for spans up to 4 feet, and 4x2 SPF#2 laid on edge for spans up to 8 feet. Roof purlins shall be spaced not more than 24 inches on center.

328.6 Knee bracing: A 2x6 brace shall extend from the post to the top chord of the truss or rafter adjacent to the post at a 45 degree angle. The vertical distance down from the bottom chord of the truss or ceiling joist to the point where the brace attaches to the posts shall be in compliance with Table 328.6 as shown on Figure 328. Trusses or rafters must be spaced such that they align with the post intervals. Attachment of knee brace shall be per Table 328.7.

TABLE 328.6
KNEE BRACE VERTICAL DISTANCE.

Wall Height	Vertical Dimension
8'-0" and 9'-0"	1'-6"
10'-0" and 11'-0"	2'-0"
12'-0" and 13'-0"	3'-0"
14'-0" through 16'-0"	4'-0"

328.7 Attachment details. Structural fastener details for post and frame buildings shall comply with Table 328.7.

TABLE 328.7
STRUCTURAL FASTENERS

Fastener Schedule for Structural Members		
Description of Building Element	Number and Type of Fastener	Attachment type
Uplift blocking to post	5-16d Hot Dipped Galvanized	Each block
Skirt board to post	2-16d Hot Dipped Galvanized	Face nail
Wall girt to post	2-16d Hot Dipped Galvanized	Face nail
Diagonal cross bracing to post	2-16d Hot Dipped Galvanized	Face nail
Diagonal cross bracing to skirt board	2-10d Hot Dipped Galvanized	Face nail
Diagonal cross bracing to wall girts, beam, or header	2-10d	Face nail
Knee brace to post	3-16d Hot Dipped Galvanized	Face nail
Knee brace to top chord of truss or rafter	3-10d	Face nail
Knee brace to bottom chord of truss or ceiling joist	3-10d	Face nail
Roof purlin to truss or rafter with span of 2' or 4'	2-16d	Face nail
Roof purlin to truss or rafter with span of 8'	Mechanical fastener with uplift protection greater than 225 pounds.	Per manufacturer installation manual

328.8 Roof trusses. Engineered roof trusses, where used, shall be accompanied by

drawings sealed by the registered design professional responsible for their preparation and shall be submitted to the residential building official for approval prior to the framing inspection. The truss design shall comply with Sections 802.10 and 802.11 and shall account for all loads imposed on the truss as a result of the prescriptive requirements of this section.

SECTION 329 **TINY HOUSES**

329.1 Scope. *This section shall be applicable to tiny houses used as single dwelling units. Tiny houses shall comply with this code except as otherwise stated in this section.*

329.2 Minimum ceiling height. *Habitable space and hallways in tiny houses shall have a ceiling height of not less than 6 feet 8 inches (2032 mm). Bathrooms, toilet rooms and kitchens shall have a ceiling height of not less than 6 feet 4 inches (1930 mm). Obstructions including, but not limited to, beams, girders, ducts and lighting, shall not extend below these minimum ceiling heights.*

Exception: *Ceiling heights in lofts are permitted to be less than 6 feet 8 inches (2032 mm).*

329.3 Lofts.

329.3.1 Minimum loft area and dimensions. *Lofts used as a sleeping or living space shall meet the minimum area and dimension requirements of Sections 329.3.1.1 through 329.3.1.3.*

329.3.1.1 Minimum area. *Lofts shall have a floor area of not less than 35 square feet (3.25 m²).*

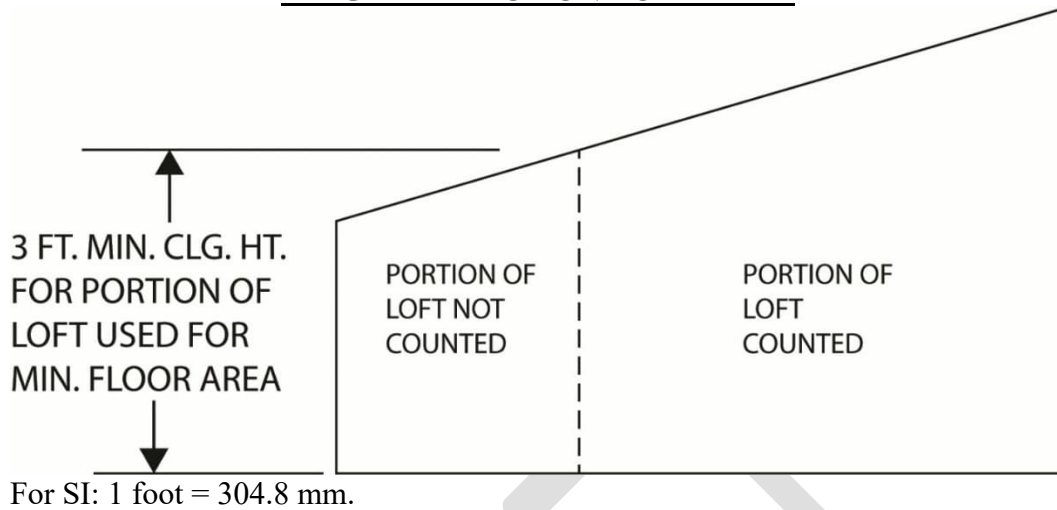
329.3.1.2 Minimum horizontal dimensions. *Lofts shall be not less than 5 feet (1524 mm) in any horizontal dimension.*

329.3.1.3 Height effect on loft area. *Portions of a loft with a sloped ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft. See Figure 329.3.3.*

Exceptions: *Under gable roofs with a minimum slope of 6 units vertical in 12 units horizontal (50-percent slope), portions of a loft with a sloped ceiling measuring less than 16 inches (406 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required area for the loft.*

FIGURE 329.3.3

HEIGHT EFFECT ON LOFT AREA



329.3.2 Loft access and egress. *The access to and primary egress from lofts shall be of any type described in Sections 329.3.2.1 through 329.3.2.5. The loft access and egress element along its required minimum width shall meet the loft where its ceiling height is not less than 3 feet (914 mm).*

329.3.2.1 Stairways. *Stairways accessing lofts shall comply with this code or with Sections 329.3.2.1 through 329.3.2.7.*

329.3.2.1.1 Width. *Stairways accessing a loft shall not be less than 17 inches (432 mm) in clear width at or above the handrail. The width below the handrail shall be not less than 20 inches (508 mm).*

329.3.2.1.2 Headroom. *The headroom above stairways accessing a loft shall be not less than 6 feet 2 inches (1880 mm), as measured vertically, from a sloped line connecting the tread, landing or landing platform nosings in the center of their width and vertically from the landing platform along the center of its width.*

329.3.2.1.3 Treads and risers. *Risers for stairs accessing a loft shall be not less than 7 inches (178 mm) and not more than 12 inches (305 mm) in height. Tread depth and riser height shall be calculated in accordance with one of the following formulas:*

- 1. The tread depth shall be 20 inches (508 mm) minus four-thirds of the riser height.*
- 2. The riser height shall be 15 inches (381 mm) minus three-fourths of the tread depth.*

329.3.2.1.4 Landings. *Intermediate landings and landings at the bottom of stairways shall comply with Section 311.7.6, except that the depth in the direction of travel shall be not less than 24 inches (610 mm).*

329.3.2.1.5 Landing platforms. *The top tread and riser of stairways accessing lofts shall be constructed as a landing platform where the loft ceiling height is less than 6 feet 2 inches (1880 mm) where the stairway meets the loft. The landing platform shall be not less than 20 inches (508 mm) in width and in depth measured horizontally from and perpendicular to the nosing of the landing platform. The landing platform riser height to the loft floor shall be not less than 16 inches (406 mm) and not greater than 18 inches (457 mm).*

329.3.2.1.6 Handrails. *Handrails shall comply with Section 311.7.8.*

329.3.2.1.7 Stairway guards. *Guards at open sides of stairways, landings and landing platforms shall comply with Section 312.1.*

329.3.2.2 Ladders. *Ladders accessing lofts shall comply with Sections 329.3.2.2.1 and 329.3.2.2.2.*

329.3.2.2.1 Size and capacity. *Ladders accessing lofts shall have a rung width of not less than 12 inches (305 mm), and 10-inch (254 mm) to 14-inch (356 mm) spacing between rungs. Ladders shall be capable of supporting a 300-pound (136 kg) load on any rung. Rung spacing shall be uniform within 3/8 inch (9.5 mm).*

329.3.2.2.2 Incline. *Ladders shall be installed at 70 to 80 degrees from horizontal.*

329.3.2.3 Alternating tread devices. *Alternating tread devices accessing lofts shall comply with Sections 311.7.12.1 and 311.7.12.2. The clear width at and below the handrails shall be not less than 20 inches (508 mm).*

329.3.2.4 Ship's ladders. *Ship's ladders accessing lofts shall comply with Sections 311.7.13.1 and 311.7.13.2. The clear width at and below handrails shall be not less than 20 inches (508 mm).*

329.3.2.5 Loft guards. *Loft guards shall be located along the open sides of lofts. Loft guards shall be not less than 36 inches (914 mm) in height or one-half of the clear height to the ceiling, whichever is less. Loft guards shall comply with Section 312.1.3 and Table 301.5 for their components.*

329.4 Emergency escape and rescue openings. *Tiny houses shall meet the requirements of Section 310 for emergency escape and rescue openings.*

Exception: *Egress roof access windows in lofts used as sleeping rooms shall be deemed to meet the requirements of Section 310 where installed such that the bottom of the opening is not more than 44 inches (1118 mm) above the loft floor, provided the egress roof access window complies with the minimum opening area requirements of Section 310.2.1.*

329.5 Energy conservation.

329.5.1 Air leakage testing. *The air leakage rate for tiny houses shall not exceed 0.30 cubic feet per minute at 50 Pascals of pressure per square foot of the dwelling unit enclosure area. The air leakage testing shall be in accordance with the testing methods required in Section 1102.4.1.2. The dwelling unit enclosure area shall be the sum of the areas of ceilings, floors and walls that separate the conditioned space of a dwelling unit from the exterior, its adjacent unconditioned spaces and adjacent dwelling units.*

329.5.1.1 Whole-house mechanical ventilation. *Where the air leakage rate is in accordance with Section 329.5.1, the tiny house shall be provided with whole-house mechanical ventilation in accordance with Section 1505.4.*

329.5.2 Alternative compliance. *Tiny houses shall be deemed to be in compliance with Chapter 11 of this code, provided that the following conditions are met:*

- 1. The insulation and fenestration meet the requirements of Table 1102.1.2.*
- 2. The thermal envelope meets the requirements of Section 1102.4.1.1 and Table 1102.4.1.1.*
- 3. Solar, wind or other renewable energy source supplies not less than 90 percent of the energy use for the structure.*
- 4. Solar, wind or other renewable energy source supplies not less than 90 percent of the energy for service water heating.*
- 5. Permanently installed lighting is in accordance with Section 1104.*
- 6. Mechanical ventilation is provided in accordance with Section 1505 and operable fenestration is not used to meet ventilation requirements.*

SECTION 330**ACCESSORY DWELLING UNITS (ADU)**

330.1 Scope. *Accessory dwelling units (ADUs) proposed for existing residential construction shall be in accordance with this section and other applicable requirements in this code, and the existing building together with the ADUs shall not exceed the scoping limitations of Section 101.2.*

330.1.1 Prohibited conditions. *An ADU shall not be permitted within:*

- 1. Live/work units located in other than a single family dwelling.*
- 2. Owner-occupied lodging houses with five or fewer guestrooms.*
- 3. A building made exclusively of dwelling units where at least one dwelling unit is used as a care facility.*

330.2 Conditions. ADUs shall be permitted without requiring a change of occupancy where in compliance with all of the following:

1. An ADU shall be permitted within an existing single-family detached dwelling or within an existing townhouse unit that is within the scope of this code.
2. Only one ADU shall be permitted for each primary dwelling unit.
3. The owner of a property containing an ADU shall reside in either the primary dwelling unit or the ADU, as of the date of approval.
4. An ADU shall have a separate house number from the primary dwelling unit.
5. ADUs shall be secondary in size and function to the primary dwelling unit and shall comply with all of the following limits:
 - 5.1. Not less than 190 square feet (17.65 m²) in area.
 - 5.2. Not more than 50 percent of the area of the primary dwelling unit.
 - 5.3. Not more than 1,200 square feet (111 m²) in area.
6. An ADU shall be provided with a separate entrance from that serving the primary dwelling unit, either from the exterior of the building or from a common hallway located within the building.
7. An ADU shall have a maximum number of two bedrooms.
8. The location of a detached ADU shall comply with Section 302.
9. An ADU shall be provided with adequate provisions for electricity, water supply and sewage disposal.

330.3 Design. Except as modified by this section, building planning shall be in accordance with Chapter 3 and building structure shall comply with this code.

330.4 Means of egress. The path of egress travel from an ADU to a public way or to a yard or court that opens to a public way shall be independent of, and not pass through, the primary dwelling unit.

330.5 Fire separation. For ADUs adjoining the primary dwelling unit, the 1-hour fire-resistance-rated wall and floor assembly provisions of Section 302.3 shall not be required, provided that both of the following conditions have been met:

1. The interconnection of smoke alarms per Section 310.4 activates the smoke alarms in both the primary dwelling unit and the ADU.
2. The interconnection of carbon monoxide alarms per Section 311.5 activates the carbon monoxide alarms in both the primary dwelling unit and the ADU.

330.6 Smoke and carbon monoxide alarms. *For ADUs adjoining the primary dwelling unit, the interconnectivity of smoke alarms and carbon monoxide alarms may be independent for the primary dwelling unit and the ADU, provided that a 1-hour fire-resistance rating is provided for walls and floor assemblies in accordance with Section 302.3.*

330.7 Heating, ventilation and air-conditioning systems. *A primary dwelling unit and an ADU shall be provided with:*

- 1. A separate heating system.*
- 2. Separate ducting for heating and cooling systems. Return air openings for heating, ventilation and air-conditioning shall not be taken from another dwelling unit.*
- 3. Separate climate controls.*

330.8 Electrical systems. *A primary dwelling unit and an ADU shall be provided with:*

- 1. Ready access to the service disconnecting means serving the dwelling unit.*
- 2. Ready access for each occupant to all overcurrent devices protecting the conductors supplying the dwelling unit in which they reside.*

330.9 Gas piping. *A primary dwelling unit and an ADU shall be provided with:*

- 1. Ready access for each occupant to shutoff valves serving the dwelling unit in which they reside.*
- 2. Ready access for each occupant to appliance shutoff valves serving appliances in the dwelling unit in which they reside.*

330.10 Water service. *A primary dwelling unit and an ADU may share a common potable water system, provided that there are separate, accessible main shutoff valves allowing the water to be turned off on one side without affecting the other.*

SECTION 331 **PATIO COVERS**

331.1 Scope. *Patio covers shall conform to the requirements of Sections 331.1 through 331.5.*

331.2 Permitted uses. *Patio covers detached from or attached to dwelling units shall be used only for recreational, outdoor living purposes, and not as*

carports, garages, storage rooms or habitable rooms.

331.3 Exterior walls and openings.

331.3.1 Enclosure walls. Enclosure walls shall be permitted to be of any configuration, provided that the open or glazed area of the longer wall and one additional wall is not less than 65 percent of the area below 6 feet 8 inches (2032 mm) of each wall, measured from the floor. Openings shall be enclosed with any of the following:

1. Insect screening.
2. Approved translucent or transparent plastic not more than 0.125 inch (3.2 mm) in thickness.
3. Glass conforming to the provisions of Section 308.
4. Any combination of the foregoing.

331.3.2 Light, ventilation and emergency egress. Exterior openings required for light and ventilation into a patio structure conforming to this section shall be unenclosed where such openings serve as emergency egress or rescue openings from sleeping rooms. Where such exterior openings serve as an exit from the dwelling unit, the patio structure, unless unenclosed, shall be provided with exits conforming to the provisions of Section 311.

331.4 Height. Patio covers are limited to one-story structures not exceeding 12 feet (3657 mm) in height.

331.5 Structural provisions.

331.5.1 Design loads. Patio covers shall be designed and constructed to sustain, within the stress limits of this code, all dead loads plus a vertical live load of not less than 10 pounds per square foot (0.48 kN/m²), except that snow loads shall be used where such snow loads exceed this minimum. Such covers shall be designed to resist the minimum wind loads set forth in Section 301.2.1.

4101:8-4-01 Foundations.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

SECTION 401 GENERAL

401.1 Application. The provisions of this chapter shall control the design and construction of the foundation and foundation spaces for buildings. In addition to the provisions of this chapter, the design and construction of foundations in flood hazard areas as established by Table 301.2(1) shall meet the provisions of Section 322. Wood foundations shall be designed and installed in accordance with AWC PWF.

Exception: The provisions of this chapter shall be permitted to be used for wood foundations only in the following situations:

1. In buildings that have not more than two floors and a roof.
2. Where interior basement and foundation walls are constructed at intervals not exceeding 50 feet (15 240 mm).

401.2 Requirements. Foundation construction shall be capable of accommodating all loads in accordance with Section R301 and of transmitting the resulting loads to the supporting soil. Fill soils that support footings and foundations shall be designed, installed and tested in accordance with accepted engineering practice.

401.3 Drainage. Surface drainage shall be diverted to a storm sewer conveyance or other approved point of collection that does not create a hazard. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall not fewer than 6 inches (152 mm) within the first 10 feet (3048 mm).

Exception: Where lot lines, walls, slopes or other physical barriers prohibit 6 inches (152 mm) of fall within 10 feet (3048 mm), drains or swales shall be constructed to ensure drainage away from the structure. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped not less than 2 percent away from the building.

401.4 Soil tests. Where quantifiable data created by accepted soil science

methodologies indicate expansive soils, compressible soils, shifting soils or other questionable soil characteristics are likely to be present, the building official *may* determine whether to require a soil test to determine the soil's characteristics at a particular location. This test shall be done by an approved agency using an approved method.

401.4.1 Geotechnical evaluation. In lieu of a complete geotechnical evaluation, the load-bearing values in Table 401.4.1 shall be assumed.

**TABLE 401.4.1
PRESUMPTIVE LOAD-BEARING VALUES OF FOUNDATION MATERIALS ^a**

CLASS OF MATERIAL	LOAD-BEARING PRESSURE (pounds per square foot)
Crystalline bedrock	12,000
Sedimentary and foliated rock	4,000
Sandy gravel and/or gravel (GW and GP)	3,000
Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, SC, GM and GC)	2,000
Clay, sandy, silty clay, clayey silt, silt and sandy siltclay (CL, ML, MH and CH)	1,500 ^b

For SI: 1 pound per square foot = 0.0479 kPa.

- a. Where soil tests are required by Section 401.4, the allowable bearing capacities of the soil shall be part of the recommendations.
- b. Where the building official determines that in-place soils with an allowable bearing capacity of less than 1,500 psf are likely to be present at the site, the allowable bearing capacity shall be determined by a soils investigation.

401.4.2 Controlled low-strength material (CLSM). *Where footings will bear on controlled low-strength material (CLSM), the CLSM shall comply with the provisions of an approved report. The report shall contain the following:*

1. *Specifications for the preparation of the site prior to placement of CLSM.*
2. *Specifications for the CLSM.*
3. *Laboratory or field test method(s) to be used to determine the compressive strength or bearing capacity of the CLSM.*
4. *Test methods for determining the acceptance of the CLSM in the field.*
5. *Number and frequency of field tests required to determine compliance with Item 4.*

401.4.3 Compressible or shifting soil. Instead of a complete geotechnical evaluation, where top or subsoils are compressible or shifting, they shall be removed to a depth and width sufficient to ensure stable moisture content in each active zone and shall not be used as fill or stabilized within each active zone by chemical, dewatering or presaturation.

SECTION 402 MATERIALS

402.1 Wood foundations. Wood foundation systems shall be designed and installed in accordance with the provisions of this code.

402.1.1 Fasteners. Fasteners used below grade to attach plywood to the exterior side of exterior basement or crawl-space wall studs, or fasteners used in knee wall construction, shall be of Type 304 or 316 stainless steel. Fasteners used above grade to attach plywood and all lumber-to-lumber fasteners except those used in knee wall construction shall be of Type 304 or 316 stainless steel, silicon bronze, copper, hot-dipped galvanized (zinc coated) steel nails, or hot-tumbled galvanized (zinc coated) steel nails. Electro-galvanized steel nails and galvanized (zinc coated) steel staples shall not be permitted.

402.1.2 Wood treatment. Lumber and plywood shall be pressure-preservative treated and dried after treatment in accordance with AWPA U1 (Commodity Specification A, Special Requirement 4.2), and shall bear the label of an accredited agency. Where lumber or plywood is cut or drilled after treatment, the treated surface shall be field treated with copper naphthenate, the concentration of which shall contain not less than 2-percent copper metal, by repeated brushing, dipping or soaking until the wood cannot absorb more preservative.

402.2 Concrete. Concrete shall have a minimum specified compressive strength of f'_c , as shown in Table 402.2. Concrete subject to moderate or severe weathering as indicated in Table 301.2(1) shall be air entrained as specified in Table 402.2. The maximum weight of fly ash, other pozzolans, silica fume, slag or blended cements that is included in concrete mixtures for garage floor slabs and for exterior porches, carport slabs and steps that will be exposed to deicing chemicals shall not exceed the percentages of the total weight of cementitious materials specified in Section 19.3.3.4 of ACI 318. Materials used to produce concrete and testing thereof shall comply with the applicable standards listed in Chapters 19 and 20 of ACI 318 or ACI 332.

402.2.1 Materials for concrete. Materials for concrete shall comply with the requirements of Section 608.5.1.

TABLE 402.2
MINIMUM SPECIFIED COMPRESSIVE STRENGTH OF CONCRETE

TYPE OR LOCATION OF CONCRETE CONSTRUCTION	MINIMUM SPECIFIED COMPRESSIVE STRENGTH ^a (f'_c)		
	Weathering Potential ^b		
	Negligible	Moderate	Severe
Basement walls, foundations and other concrete not exposed to the weather	2,500	2,500	2,500 ^c

TYPE OR LOCATION OF CONCRETE CONSTRUCTION	MINIMUM SPECIFIED COMPRESSIVE STRENGTH ^a (f' _c)		
	Weathering Potential ^b		
	Negligible	Moderate	Severe
Basement slabs and interior slabs on grade, except garage floor slabs	2,500	2,500	2,500 ^c
Basement walls, foundation walls, exterior walls and other vertical concrete work exposed to the weather	2,500	3,000 ^d	3,000 ^d
Porches, carport slabs and steps exposed to the weather, and garage floor slabs	2,500	3,000 ^{d, e, f}	3,500 ^{d, e, f}

For SI: 1 pound per square inch = 6.895 kPa.

- Strength at 28 days psi.
- See Table 301.2(1) for weathering potential.
- Concrete in these locations that is subject to freezing and thawing during construction shall be air-entrained concrete in accordance with Footnote d.
- Concrete shall be air-entrained. Total air content (percent by volume of concrete) shall be not less than 5 percent or more than 7 percent.
- See Section 402.2 for maximum cementitious materials content.
- For garage floors with a steel-troweled finish, reduction of the total air content (percent by volume of concrete) to not less than 3 percent is permitted if the specified compressive strength of the concrete is increased to not less than 4,000 psi.

402.3 Precast concrete. Precast concrete foundations shall be designed in accordance with Section 404.5 and shall be installed in accordance with the provisions of this code and the manufacturer's instructions.

402.3.1 Precast concrete foundation materials. Materials used to produce precast concrete foundations shall meet the following requirements.

- All concrete used in the manufacture of precast concrete foundations shall have a minimum compressive strength of 5,000 psi (34 470 kPa) at 28 days. Concrete exposed to a freezing and thawing environment shall be air entrained with a minimum total air content of 5 percent.
- Structural reinforcing steel shall meet the requirements of ASTM A615, A706 or A996. The minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa). Steel reinforcement for pre-cast concrete foundation walls shall have a minimum concrete cover of ³/₄-inch (19.1 mm).
- Panel-to-panel connections shall be made with Grade II steel fasteners.
- The use of nonstructural fibers shall conform to ASTM C1116.
- Grout used for bedding precast foundations placed on concrete footings shall meet ASTM C1107.

402.4 Masonry. Masonry systems shall be designed and installed in accordance with this chapter and shall have a minimum specified compressive strength of 1,500 psi (10.3 MPa).

SECTION 403 FOOTINGS

403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, crushed stone footings, wood foundations, or other approved structural systems that shall be of sufficient design to accommodate all loads according to Section 301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill. Concrete footing shall be designed and constructed in accordance with the provisions of Section 403 or in accordance with ACI 332.

403.1.1 Minimum size. The minimum width, W , and thickness, T , for concrete footings shall be in accordance with Tables 403.1(1) through 403.1(3) and Figure 403.1(1) or 403.1.3, as applicable. The footing width shall be based on the load-bearing value of the soil in accordance with Table 401.4.1. Footing projections, P , shall be not less than 2 inches (51 mm) and shall not exceed the thickness of the footing. Footing thickness and projection for fireplaces shall be in accordance with Section 1001.2. The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with Table 401.4.1. Footings for wood foundations shall be in accordance with the details set forth in Section 403.2, and Figures 403.1(2) and 403.1(3). Footings for precast foundations shall be in accordance with the details set forth in Section 403.4, Table 403.4, and Figures 403.4(1) and 403.4(2).

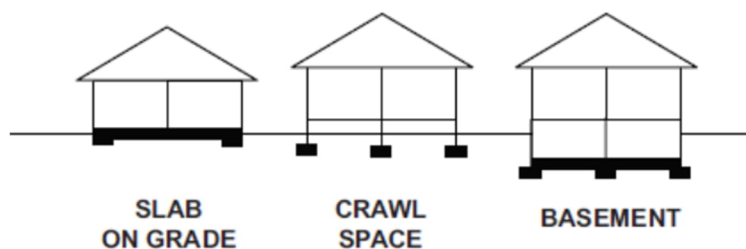
TABLE 403.1(1)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT-FRAME CONSTRUCTION (inches) ^{a, b}

SNOW LOAD OR ROOF LIVE LOAD	STORY AND TYPE OF STRUCTURE WITH LIGHT FRAME	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
30 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	23 x 6	17 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
50 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	25 x 7	19 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	22 x 6	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story—plus basement	28 x 9	21 x 6	17 x 6	14 x 6	12 x 6	12 x 6
70 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	27 x 9	20 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	3 story—plus basement	30 x 10	23 x 6	18 x 6	15 x 6	12 x 6	12 x 6

For SI: 1 inch = 25.4 mm, 1 plf = 14.6 N/m, 1 pound per square foot = 47.9 N/m².

a. Interpolation allowed. Extrapolation is not allowed.

b. Based on 32-foot-wide house with load-bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house, add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).



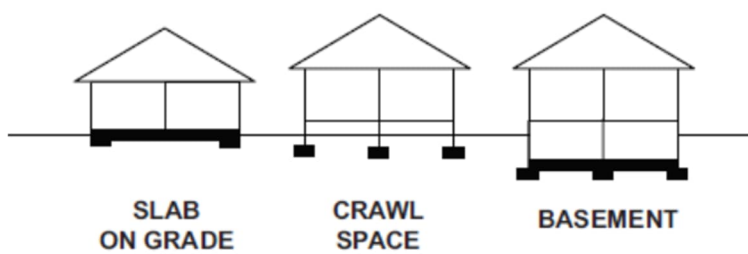
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TABLE 403.1(2)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS FOR LIGHT-FRAME CONSTRUCTION
WITH BRICK VENEER (inches) ^{a, b}

SNOW LOAD OR ROOF LIVE	STORY AND TYPE OF STRUCTURE WITH BRICK VENEER	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	21 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story—plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
30 psf	1 story—slab-on-grade	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	16 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	22 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	27 x 9	21 x 6	16 x 6	14 x 6	12 x 6	12 x 6
	3 story—slab-on-grade	21 x 6	16 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	27 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	3 story—plus basement	33 x 11	24 x 7	20 x 6	16 x 6	14 x 6	12 x 6
50 psf	1 story—slab-on-grade	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	24 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story—plus basement	29 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	3 story—slab-on-grade	27 x 7	18 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	3 story—with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	3 story—plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
70 psf	1 story—slab-on-grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story—slab-on grade	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story—plus basement	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story—slab-on-grade	26 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	3 story—with crawl space	31 x 11	23 x 7	19 x 6	16 x 6	13 x 6	12 x 6
	3 story—plus basement	37 x 13	28 x 9	22 x 6	18 x 6	16 x 6	14 x 6

For SI: 1 inch = 25.4 mm, 1 plf = 14.6 N/m, 1 pound per square foot = 47.9 N/m².

- Interpolation allowed. Extrapolation is not allowed.
- Based on 32-foot-wide house with load-bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house, add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).



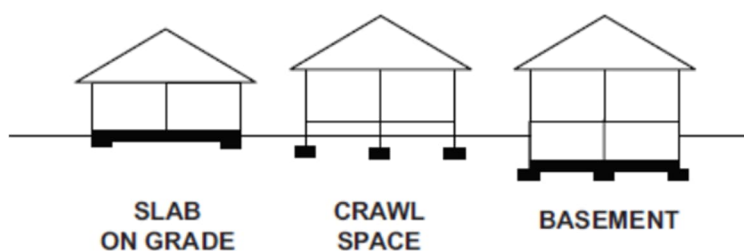
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TABLE 403.1(3)
MINIMUM WIDTH AND THICKNESS FOR CONCRETE FOOTINGS
WITH CAST-IN-PLACE CONCRETE OR FULLY GROUTED MASONRY WALL CONSTRUCTION (inches)^{a, b}

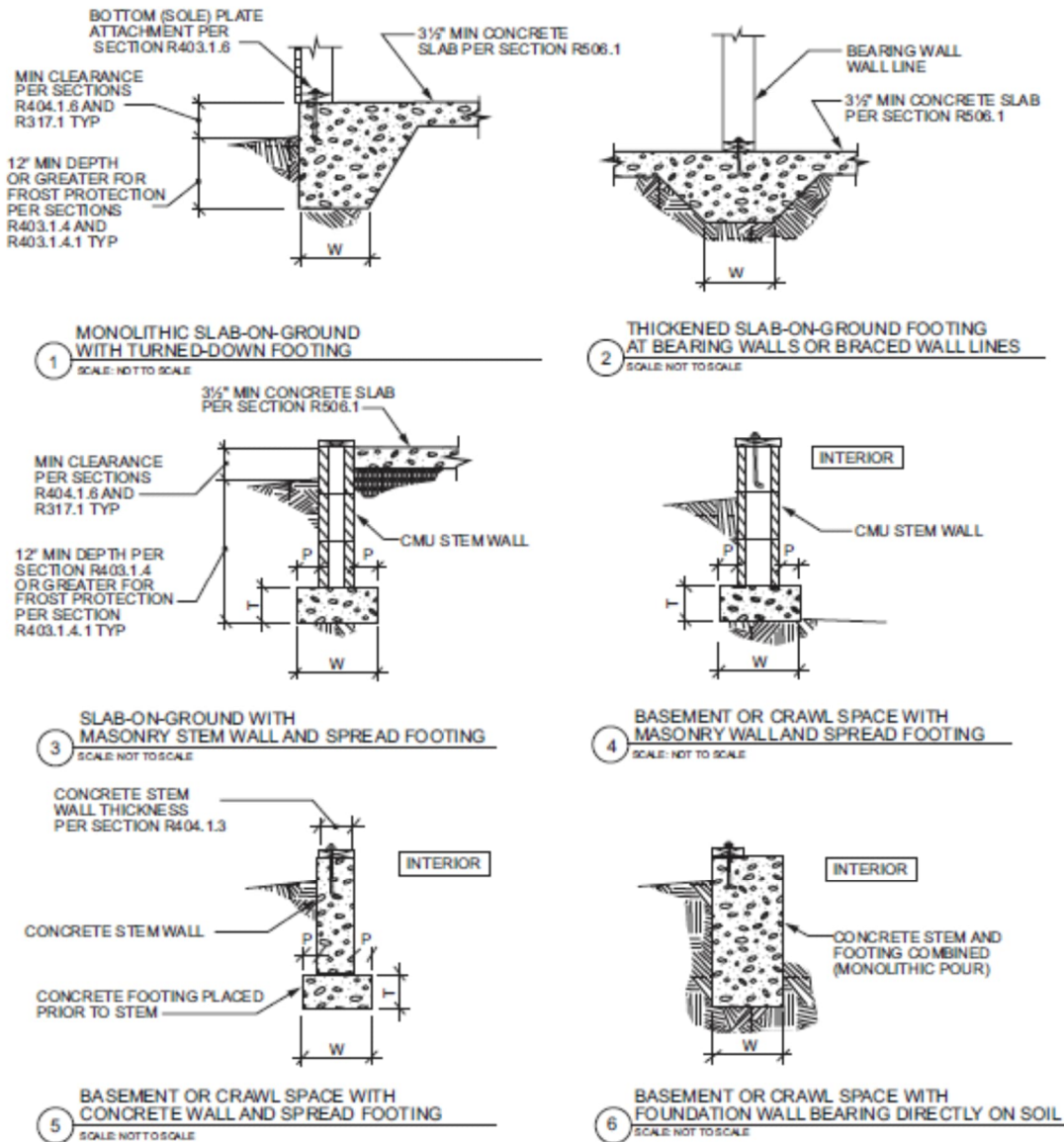
SNOW LOAD OR ROOF LIVE LOAD	STORY AND TYPE OF STRUCTURE WITH CMU	LOAD-BEARING VALUE OF SOIL (psf)					
		1500	2000	2500	3000	3500	4000
20 psf	1 story—slab-on-grade	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	25 x 8	19 x 6	15 x 6	13 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	23 x 7	18 x 6	14 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story—plus basement	35 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	3 story—slab-on-grade	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	3 story—with crawl space	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story—plus basement	43 x 17	33 x 11	26 x 8	22 x 6	19 x 6	16 x 6
30 psf	1 story—slab-on-grade	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	20 x 6	15 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	26 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	24 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	2 story—with crawl space	30 x 10	22 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story—plus basement	36 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story—slab-on-grade	33 x 12	25 x 7	20 x 6	17 x 6	14 x 6	12 x 6
	3 story—with crawl space	39 x 14	29 x 9	23 x 7	19 x 6	17 x 6	14 x 6
	3 story—plus basement	44 x 17	33 x 12	27 x 8	22 x 6	19 x 6	17 x 6
50 psf	1 story—slab-on-grade	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	22 x 6	17 x 6	13 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	28 x 9	21 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story—slab-on-grade	27 x 8	20 x 6	16 x 6	13 x 6	12 x 6	12 x 6
	2 story—with crawl space	32 x 11	24 x 7	19 x 6	16 x 6	14 x 6	12 x 6
	2 story—plus basement	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story—slab-on-grade	35 x 13	27 x 8	21 x 6	18 x 6	15 x 6	13 x 6
	3 story—with crawl space	41 x 15	31 x 10	24 x 7	20 x 6	17 x 6	15 x 6
	3 story—plus basement	47 x 18	35 x 12	28 x 9	23 x 7	20 x 6	17 x 6
70 psf	1 story—slab-on-grade	19 x 6	14 x 6	12 x 6	12 x 6	12 x 6	12 x 6
	1 story—with crawl space	25 x 7	18 x 6	15 x 6	12 x 6	12 x 6	12 x 6
	1 story—plus basement	30 x 10	23 x 6	18 x 6	15 x 6	13 x 6	12 x 6
	2 story—slab-on-grade	29 x 9	22 x 6	17 x 6	14 x 6	12 x 6	12 x 6
	2 story—with crawl space	34 x 12	26 x 8	21 x 6	17 x 6	15 x 6	13 x 6
	2 story—plus basement	40 x 15	30 x 10	24 x 7	20 x 6	17 x 6	15 x 6
	3 story—slab-on-grade	38 x 14	28 x 9	23 x 6	19 x 6	16 x 6	14 x 6
	3 story—with crawl space	43 x 16	32 x 11	26 x 8	21 x 6	18 x 6	16 x 6
	3 story—plus basement	49 x 19	37 x 13	29 x 10	24 x 7	21 x 6	18 x 6

For SI: 1 inch = 25.4 mm, 1 plf = 14.6 N/m, 1 pound per square foot = 47.9 N/m².

- Interpolation allowed. Extrapolation is not allowed.
- Based on 32-foot-wide house with load-bearing center wall that carries half of the tributary attic, and floor framing. For every 2 feet of adjustment to the width of the house add or subtract 2 inches of footing width and 1 inch of footing thickness (but not less than 6 inches thick).



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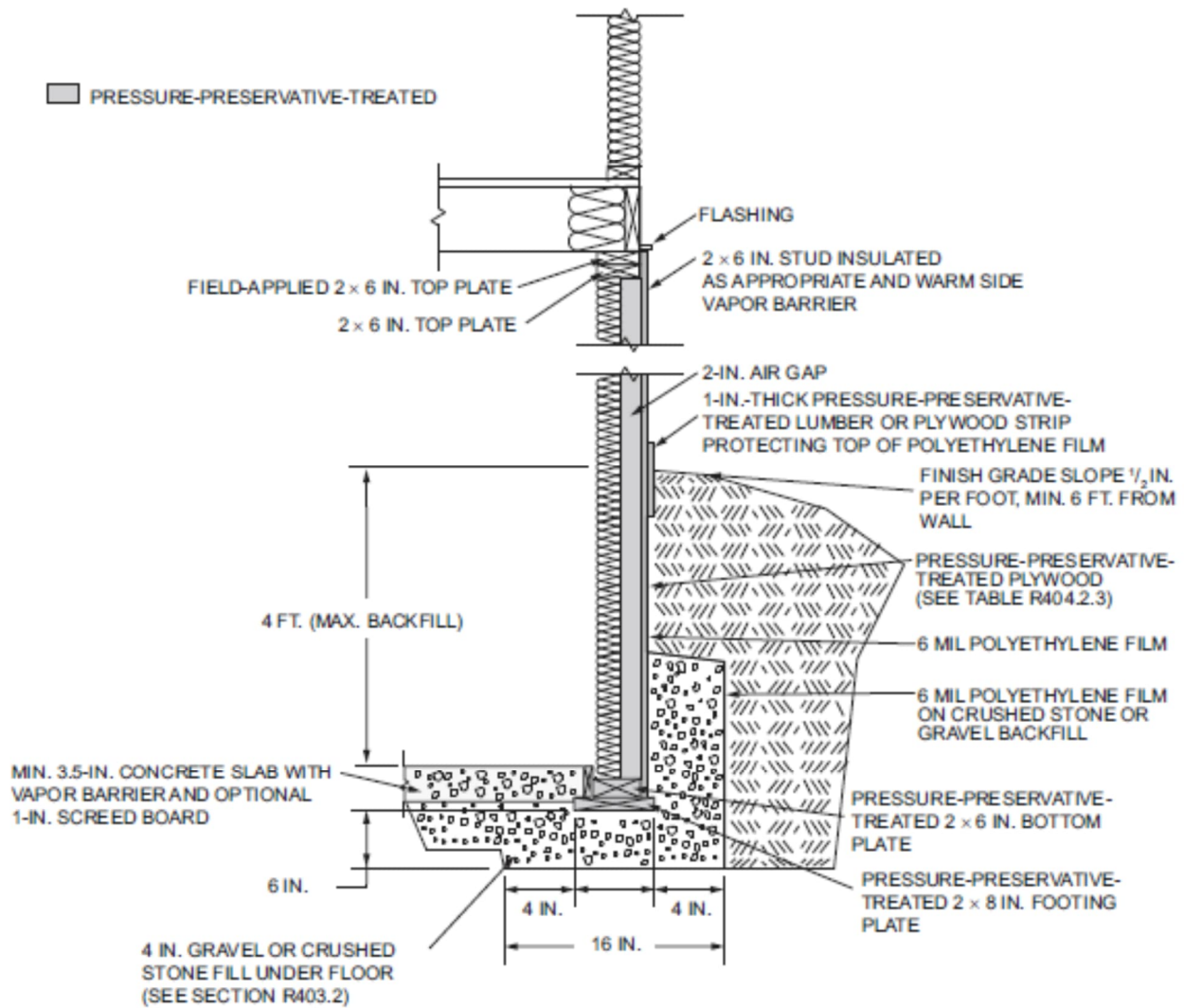
For SI: 1 inch = 25.4 mm.

W = Width of footing, T = Thickness of footing and P = Projection per Section 403.1.1

NOTES:

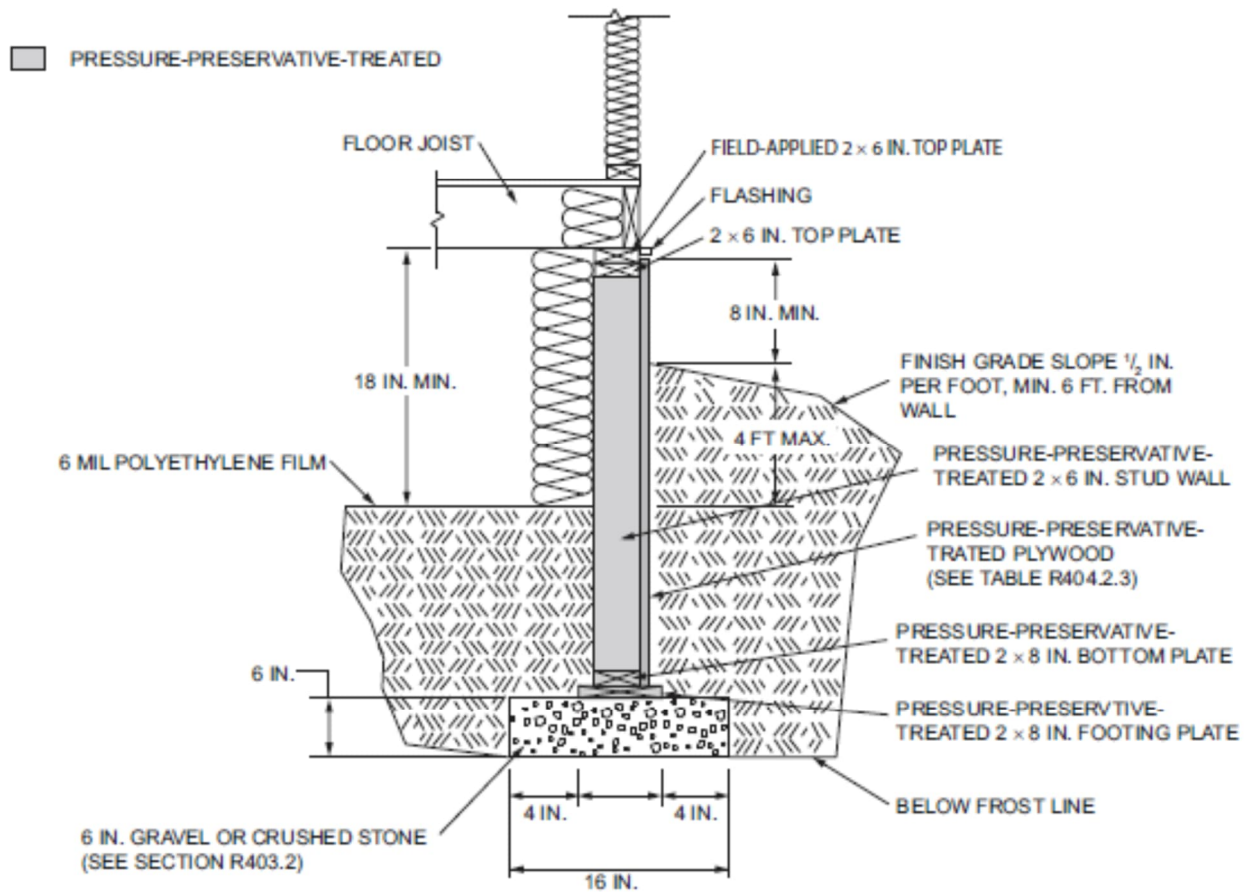
- a. See Section 404.3 for sill requirements.
- b. See Section 403.1.6 for sill attachment.
- c. See Section 506.2.3 for vapor barrier requirements.
- d. See Section 403.1 for base.
- e. Deleted
- f. See Section 408 for under-floor ventilation and access requirements.

FIGURE 403.1(1)
PLAIN CONCRETE FOOTINGS WITH MASONRY AND
CONCRETE STEM WALLS IN SDC A, B and C a, b, c, d, e, f



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254.

FIGURE 403.1(2)
PERMANENT WOOD FOUNDATION BASEMENT WALL SECTION



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mil = 0.0254 mm.

FIGURE 403.1(3)
PERMANENT WOOD FOUNDATION CRAWL SPACE SECTION

403.1.2 Continuous footing in Seismic Design Categories D₀, D₁ and D₂.
Deleted

403.1.3 Footing and stem wall reinforcing in Seismic Design Categories D₀, D₁, and D₂. *Deleted*

403.1.3.1 Concrete stem walls with concrete footings. *Deleted*

403.1.3.2 Masonry stem walls with concrete footings. *Deleted*

403.1.3.3 Slabs-on-ground with turned-down footings. *Deleted*

403.1.3.4 Interior bearing and braced wall panel (1219 mm) footings in Seismic Design Categories D₀, D₁ and D₂. *Deleted*

403.1.3.5 Reinforcement. *Deleted*

403.1.3.5.1 Steel reinforcement. *Deleted*

403.1.3.5.2 Location of reinforcement in wall. *Deleted*

403.1.3.5.3 Support and cover. *Deleted*

403.1.3.5.4 Lap splices. *Deleted*

403.1.3.6 Isolated concrete footings. *Deleted*

Deleted figure

FIGURE 403.1.3
REINFORCED CONCRETE FOOTINGS AND
MASONRY AND CONCRETE STEM WALLS IN SDC D₀, D₁ AND D₂ ^{a, b, c, d, e, f}

403.1.4 Minimum depth. Exterior footings shall be placed not less than 12 inches (305 mm) below the undisturbed ground surface. Where applicable, the depth of footings shall also conform to Sections 403.1.4.1.

403.1.4.1 Frost protection. Except where otherwise protected from frost, foundation walls, piers and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods:

1. Extended below the frost line specified in Table 301.2(1).
2. Constructed in accordance with Section 403.3.
3. Constructed in accordance with ASCE 32.
4. Erected on solid rock.

Footings shall not bear on frozen soil unless the frozen condition is permanent that extend below the frost line.

Exceptions:

1. ~~Protection of freestanding accessory structures with an area of 600 square feet (56 m²) or less, of light-frame construction, with an eave height of 10 feet (3048 mm) or less is not required.~~
2. ~~Protection of freestanding accessory structures with an area of 400 square feet (37 m²) or less, of other than light-frame construction, with an eave height of 10 feet (3048 mm) or less is not required.~~
3. Decks not supported by a dwelling need not be provided with footings that extend below the frost line.

403.1.5 Slope. The top surface of footings shall be level. The bottom surface of footings shall not have a slope exceeding one unit vertical in 10 units horizontal (10-percent slope). Footings shall be stepped where it is necessary to change the elevation of the top surface of the footings or where the slope of the bottom surface of the footings will exceed one unit vertical in 10 units horizontal (10-percent slope).

403.1.6 Foundation anchorage. Wood sill plates and wood walls supported directly on continuous foundations shall be anchored to the foundation in accordance with this section.

Cold-formed steel framing shall be anchored directly to the foundation or fastened to wood sill plates in accordance with Section 505.3.1 or 603.3.1, as applicable. Wood sill plates supporting cold-formed steel framing shall be anchored to the foundation in accordance with this section.

Wood sole plates at all exterior walls on monolithic slabs, wood sole plates of braced wall panels at building interiors on monolithic slabs and all wood sill plates shall be anchored to the foundation with minimum 1/2 -inch diameter (12.7 mm) anchor bolts spaced not greater than 6 feet (1829 mm) on center or approved anchors or anchor straps spaced as required to provide equivalent anchorage to 1/2 -inch diameter (12.7 mm) anchor bolts. Bolts shall extend not less than 7 inches (178 mm) into concrete or grouted cells of concrete masonry units. A nut and washer shall be tightened on each anchor bolt. There shall be not fewer than two bolts per plate section with one bolt located not more than 12 inches (305 mm) or less than seven bolt diameters from each end of the plate section. Interior bearing wall sole plates on monolithic slab foundation that are not part of a braced wall panel shall be positively anchored with approved fasteners. Sill plates and sole plates shall be protected against decay and termites where required by Sections 317 and 318.

Exceptions:

1. Walls 24 inches (610 mm) total length or shorter connecting offset braced wall panels shall be anchored to the foundation with not fewer than one anchor bolt located in the center third of the plate section and shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table 602.3(1).
2. Connection of walls 12 inches (305 mm) total length or shorter connecting offset braced wall panels to the foundation without anchor bolts shall be permitted. The wall shall be attached to adjacent braced wall panels at corners as shown in Item 9 of Table 602.3(1).

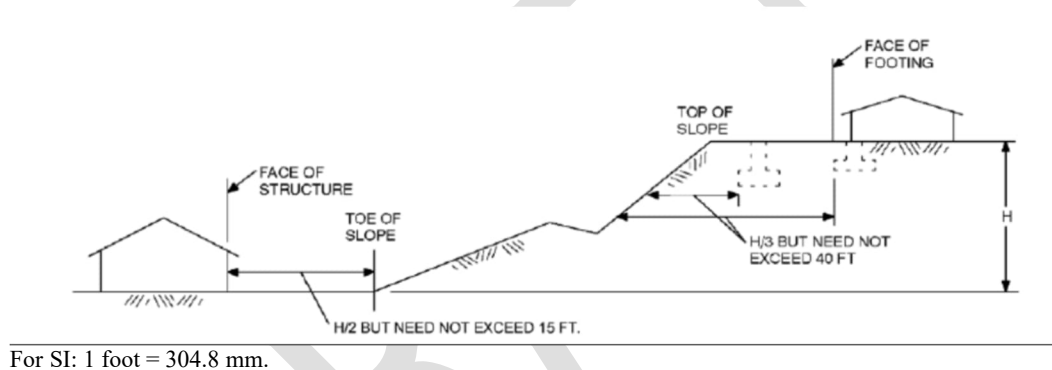
403.1.6.1 Foundation anchorage in Seismic Design Categories C. In addition to the requirements of Section 403.1.6, the following requirements shall apply to wood light-frame *dwelling with four or more dwelling units* in Seismic Design Categories C:

1. Plate washers conforming to Section 602.11.1 shall be provided for all anchor bolts over the full length of required braced wall lines except where approved anchor straps are used. Properly sized cut washers shall be permitted for anchor bolts in wall lines not containing braced wall panels.
2. Interior braced wall plates shall have anchor bolts spaced at not more than 6 feet (1829 mm) on center and located within 12 inches (305 mm) of the ends of each plate section where supported on a continuous foundation.
3. Interior bearing wall sole plates shall have anchor bolts spaced at not more than 6 feet (1829 mm) on center and located within 12 inches (305 mm) of the ends of each plate section where supported on a continuous foundation.
4. The maximum anchor bolt spacing shall be 4 feet (1219 mm) for buildings over two stories in height.
5. Stepped cripple walls shall conform to Section 602.11.2.
6. Where continuous wood foundations in accordance with Section 404.2 are used, the force transfer shall have a capacity equal to or greater than the connections required by Section 602.11.1 or the braced wall panel shall be connected to the wood foundations in accordance with the braced wall panel-to-floor fastening requirements of Table 602.3(1).

403.1.7 Footings on or adjacent to slopes. The placement of buildings and structures on or adjacent to slopes steeper than one unit vertical in three units horizontal (33.3-percent slope) shall conform to Sections 403.1.7.1 through

403.1.7.4.

403.1.7.1 Building clearances from ascending slopes. In general, buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion and shallow failures. Except as provided in Section 403.1.7.4 and Figure 403.1.7.1, the following criteria will be assumed to provide this protection. Where the existing slope is steeper than one unit vertical in one unit horizontal (100-percent slope), the toe of the slope shall be assumed to be at the intersection of a horizontal plane drawn from the top of the foundation and a plane drawn tangent to the slope at an angle of 45 degrees (0.79 rad) to the horizontal. Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope.



**FIGURE 403.1.7.1
FOUNDATION CLEARANCE FROM SLOPES**

403.1.7.2 Footing setback from descending slope surfaces. Footings on or adjacent to slope surfaces shall be founded in material with an embedment and setback from the slope surface sufficient to provide vertical and lateral support for the footing without detrimental settlement. Except as provided for in Section 403.1.7.4 and Figure 403.1.7.1, the following setback is deemed adequate to meet the criteria. Where the slope is steeper than one unit vertical in one unit horizontal (100-percent slope), the required setback shall be measured from an imaginary plane 45 degrees (0.79 rad) to the horizontal, projected upward from the toe of the slope.

403.1.7.3 Foundation elevation. On graded sites, the top of any exterior foundation shall extend above the elevation of the street gutter at point of discharge or the inlet of an approved drainage device not less than 12 inches (305 mm) plus 2 percent. Alternate elevations are permitted subject to the

approval of the building official, provided that it can be demonstrated that required drainage to the point of discharge and away from the structure is provided at all locations on the site.

403.1.7.4 Alternate setbacks and clearances. Alternate setbacks and clearances are permitted, subject to the approval of the building official. The building official is permitted to require an investigation and recommendation of a qualified engineer to demonstrate that the intent of this section has been satisfied. Such an investigation shall include consideration of material, height of slope, slope gradient, load intensity and erosion characteristics of slope material.

403.1.8 Foundations on expansive soils. Foundation and floor slabs for buildings located on expansive soils shall be designed in accordance with Section 1808.6 of the *Ohio building code*.

Exception: Slab-on-ground and other foundation systems that have performed adequately in soil conditions similar to those encountered at the building site are permitted subject to the approval of the building official.

403.1.8.1 Expansive soils classifications. Soils meeting all of the following provisions shall be considered to be expansive, except that tests to show compliance with Items 1, 2 and 3 shall not be required if the test prescribed in Item 4 is conducted:

1. Plasticity Index (*PI*) of 15 or greater, determined in accordance with ASTM D4318.
2. More than 10 percent of the soil particles pass a No. 200 sieve (75 μ m), determined in accordance with ASTM D422.
3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM D422.
4. Expansion Index greater than 20, determined in accordance with ASTM D4829.

403.2 Footings for wood foundations. Footings for wood foundations shall be in accordance with Figures 403.1(2) and 403.1(3). Gravel shall be washed and well graded. The maximum size stone shall not exceed $\frac{3}{4}$ -inch (19.1 mm). Gravel shall be free from organic, clayey or silty soils. Sand shall be coarse, not smaller than $\frac{1}{16}$ -inch (1.6 mm) grains and shall be free from organic, clayey or silty soils. Crushed stone shall have a maximum size of $\frac{1}{2}$ -inch (12.7 mm)

403.3 Frost-protected shallow foundations. For buildings where the monthly mean temperature of the building is maintained at not less than 64°F (18°C),

footings are not required to extend below the frost line where protected from frost by insulation in accordance with Figure 403.3(1) and Table 403.3(1). Foundations protected from frost in accordance with Figure 403.3(1) and Table 403.3(1) shall not be used for unheated spaces such as porches, utility rooms, garages and carports, and shall not be attached to basements or crawl spaces that are not maintained at a minimum monthly mean temperature of 64°F (18°C).

Materials used below grade for the purpose of insulating footings against frost shall be labeled as complying with ASTM C578.

403.3.1 Foundations adjoining frost-protected shallow foundations.

Foundations that adjoin frost-protected shallow foundations shall be protected from frost in accordance with Section 403.1.4.

403.3.1.1 Attachment to unheated slab-on-ground structure. Vertical wall insulation and horizontal insulation of frost-protected shallow foundations that adjoin a slab-on-ground foundation that does not have a monthly mean temperature maintained at not less than 64°F (18°C) shall be in accordance with Figure 403.3(3) and Table 403.3(1). Vertical wall insulation shall extend between the frost-protected shallow foundation and the adjoining slab foundation. Required horizontal insulation shall be continuous under the adjoining slab foundation and through any foundation walls adjoining the frost-protected shallow foundation. Where insulation passes through a foundation wall, it shall be either of a type complying with this section and having bearing capacity equal to or greater than the structural loads imposed by the building, or the building shall be designed and constructed using beams, lintels, cantilevers or other means of transferring building loads such that the structural loads of the building do not bear on the insulation.

403.3.1.2 Attachment to heated structure. Where a frost-protected shallow foundation abuts a structure that has a monthly mean temperature maintained at not less than 64°F (18°C), horizontal insulation and vertical wall insulation shall not be required between the frost-protected shallow foundation and the adjoining structure. Where the frost-protected shallow foundation abuts the heated structure, the horizontal insulation and vertical wall insulation shall extend along the adjoining foundation in accordance with Figure 403.3(4) a distance of not less than Dimension A in Table 403.3(1).

Exception: Where the frost-protected shallow foundation abuts the heated structure to form an inside corner, vertical insulation extending along the adjoining foundation is not required.

403.3.2 Protection of horizontal insulation below ground. Horizontal insulation placed less than 12 inches (305 mm) below the ground surface or that portion of horizontal insulation extending outward more than 24 inches (610 mm) from the foundation edge shall be protected against damage by use of a concrete slab or asphalt paving on the ground surface directly above the insulation or by cementitious board, plywood rated for below-ground use, or other approved materials placed below ground, directly above the top surface of the insulation.

403.3.3 Drainage. Final grade shall be sloped in accordance with Section 401.3. In other than Group I Soils, as detailed in Table 405.1, gravel or crushed stone beneath horizontal insulation below ground shall drain *by gravity or mechanical means into an approved drainage system or other location that complies with the plumbing code.*

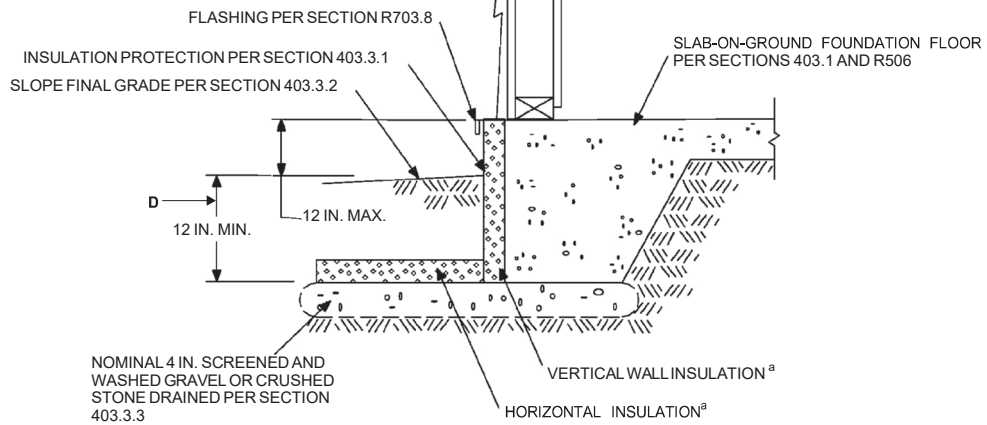
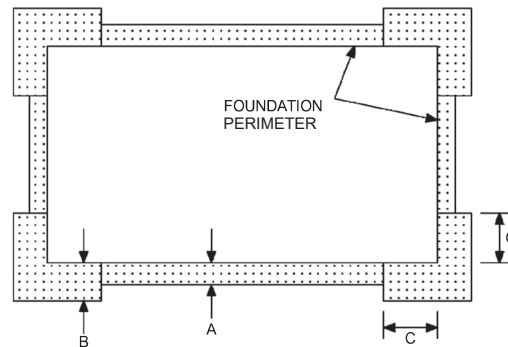
403.3.4 Termite protection. The use of foam plastic in areas of “very heavy” termite infestation probability shall be in accordance with Section 318.4.

TABLE 403.3(1)
MINIMUM FOOTING DEPTH AND INSULATION REQUIREMENTS FOR
FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS ^a

AIR FREEZING INDEX (°F-days) ^b	MINIMUM FOOTING DEPTH, <i>D</i>	VERTICAL INSULATION R-VALUE ^{c, d}	HORIZONTAL INSULATION R-VALUE ^{c, e}		HORIZONTAL INSULATION DIMENSIONS PER FIGURE 403.3(1) (inches)		
			Along walls	At corners	A	B	C
1,500 or less	12	4.5	Not required	Not required	Not required	Not required	Not required
2,000	14	5.6	Not required	Not required	Not required	Not required	Not required

For SI: 1 inch = 25.4 mm, °C = [(°F) - 32]/1.8.

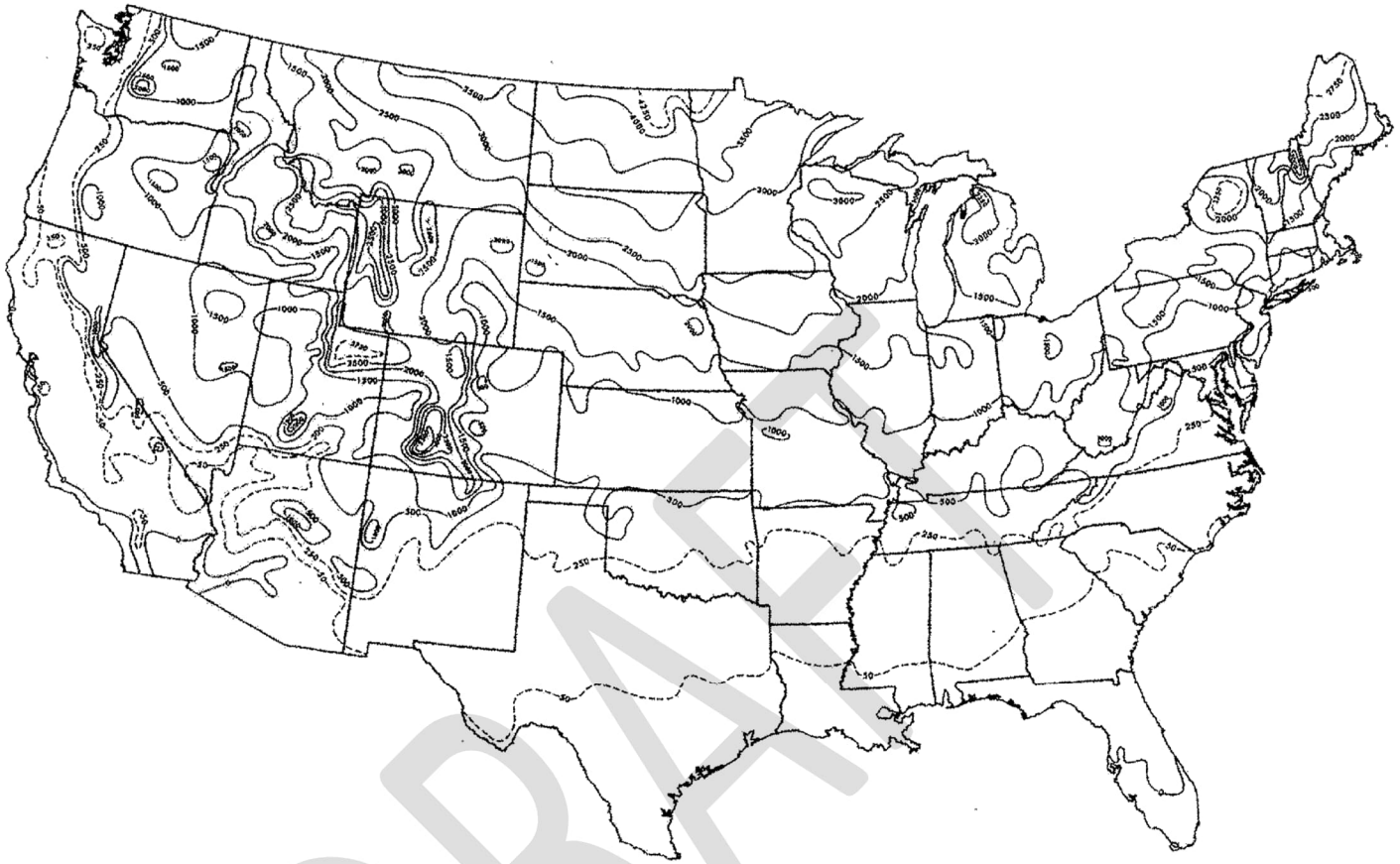
- a. Insulation requirements are for protection against frost damage in heated buildings. Greater values could be required to meet energy conservation standards.
- b. See Figure 403.3(2) or Table 403.3(2) for Air Freezing Index values.
- c. Insulation materials shall provide the stated minimum *R*-values under long-term exposure to moist, below-ground conditions in freezing climates. The following *R*-values shall be used to determine insulation thicknesses required for this application: Type II expanded polystyrene (EPS)-3.2 *R* per inch for vertical insulation and 2.6 *R* per inch for horizontal insulation; Type IX expanded polystyrene (EPS)-3.4 *R* per inch for vertical insulation and 2.8 *R* per inch for horizontal insulation; Types IV, V, VI, VII, and X extruded polystyrene (XPS)-4.5 *R* per inch for vertical insulation and 4.0 *R* per inch for horizontal insulation.
- d. Vertical insulation shall be expanded polystyrene insulation or extruded polystyrene insulation.
- e. Horizontal insulation shall be expanded polystyrene insulation or extruded polystyrene insulation.

INSULATION DETAIL**HORIZONTAL INSULATION PLAN**

For SI: 1 inch = 25.4 mm.

a. See Table 403.3(1) for required dimensions and *R*-values for vertical and horizontal insulation and minimum footing depth.

FIGURE 403.3(1)
INSULATION PLACEMENT FOR
FROST-PROTECTED FOOTINGS IN HEATED BUILDINGS



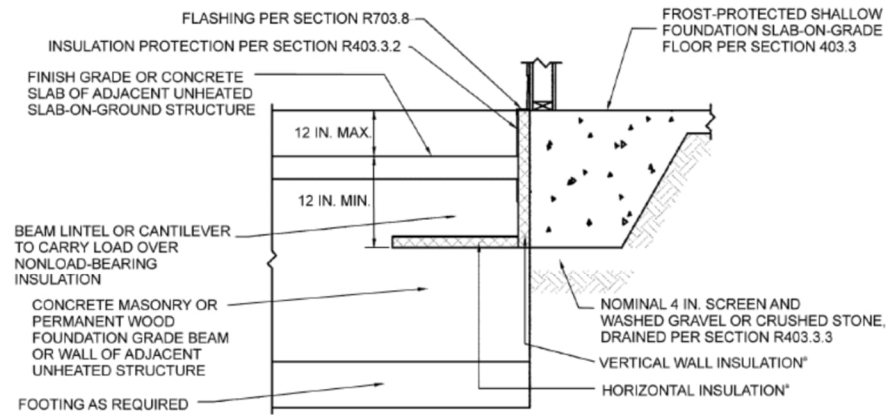
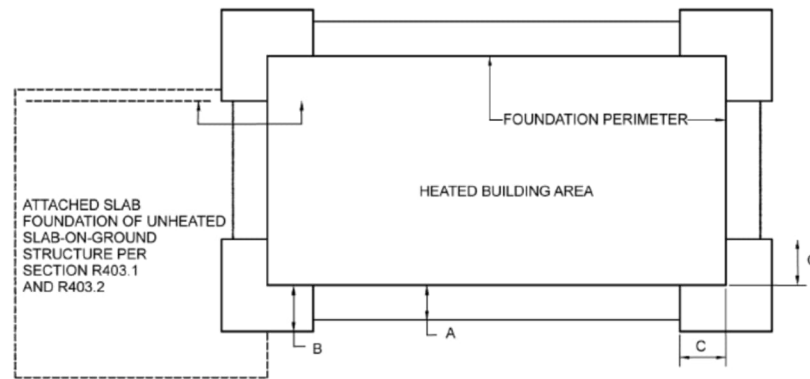
For SI: $^{\circ}\text{C} = [(^{\circ}\text{F}) - 32]/1.8$.

Note: The air-freezing index is defined as cumulative degree days below 32°F. It is used as a measure of the combined magnitude and duration of air temperature below freezing. The index was computed over a 12-month period (July-June) for each of the 3,044 stations used in the above analysis. Dates from the 1951-80 period were fitted to a Weibull probability distribution to produce an estimate of the 100-year return period.

FIGURE 403.3(2)
AIR-FREEZING INDEX AN ESTIMATE OF THE 100-YEAR RETURN PERIOD

TABLE 403.3(2)
AIR-FREEZING INDEX FOR U.S. LOCATIONS BY COUNTY

STATE	AIR-FREEZING INDEX					
	1500 or less	2000	2500	3000	3500	4000
Ohio	All counties not listed	Ashland, Crawford, Defiance, Holmes, Huron, Knox, Licking, Morrow, Paulding, Putnam, Richland, Seneca, Williams	—	—	—	—

INSULATION DETAIL**HORIZONTAL INSULATION PLAN**

For SI: 1 inch = 25.4 mm.

1. See Table 403.3(1) for required dimensions and *R*-values for vertical and horizontal insulation.

FIGURE 403.3(3)
INSULATION PLACEMENT FOR FROST-PROTECTED FOOTINGS
ADJACENT TO UNHEATED SLAB-ON-GROUND STRUCTURE

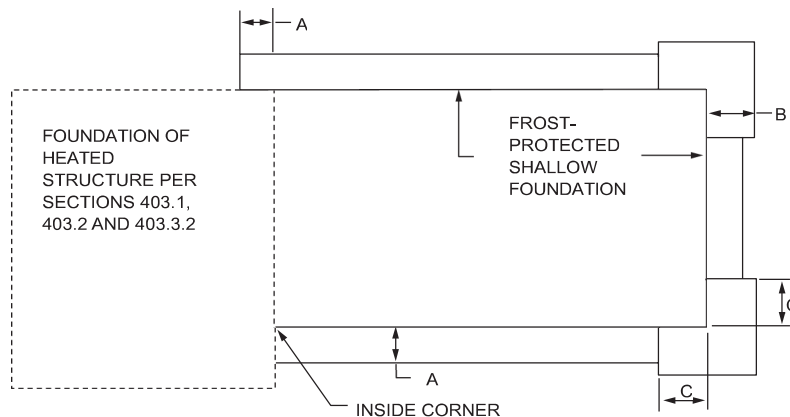


FIGURE 403.3(4)
INSULATION PLACEMENT FOR FROST-PROTECTED FOOTINGS

ADJACENT TO HEATED STRUCTURE

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TABLE 403.4
MINIMUM DEPTH (*D*) AND WIDTH (*W*) OF CRUSHED STONE FOOTINGS ^{a, b} (inches)

NUMBER OF STORIES	UNIFORM WALL LOAD	DEPTH (<i>D</i>) AND WIDTH (<i>W</i>)	LOAD-BEARING VALUE OF SOIL (psf)																	
			1500			2000			2500			3000			3500			4000		
			MH, CH, CL, ML ^c			SC, GC, SM, GM, SP, SW ^c						GP, GW ^c								
			Wall width (inches)			Wall width (inches)			Wall width (inches)			Wall width (inches)			Wall width (inches)			Wall width (inches)		
8	10	12	8	10	12	8	10	12	8	10	12	8	10	12	8	10	12			
Conventional light-frame construction																				
1-story	1100 plf	D	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
		W	13	15	17	13	15	17	13	15	17	13	15	17	13	15	17	13	15	17
2-story	1800 plf	D	6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
		W	15	15	17	13	15	17	13	15	17	13	15	17	13	15	17	13	15	17
3-story	2900 plf	D	14	12	10	9	7	5	6	4	4	4	4	4	4	4	4	4	4	
		W	25	24	24	19	19	18	15	15	17	13	15	17	13	15	17	13	15	17
4-inch brick veneer over light-frame or 8-inch hollow concrete masonry																				
1-story	1500 plf	D	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		W	13	15	17	13	15	17	13	15	17	13	15	17	13	15	17	13	15	17
2-story	2700 plf	D	12	11	9	8	6	4	5	4	4	4	4	4	4	4	4	4	4	
		W	22	23	23	18	17	17	14	15	17	13	15	17	13	15	17	13	15	17
3-story	4000 plf	D	21	20	18	14	13	11	10	8	7	7	6	4	5	4	4	4	4	4
		W	33	34	33	25	26	25	20	20	21	17	17	17	14	15	17	13	15	17
8-inch solid or fully grouted masonry																				
1-story	2000 plf	D	7	6	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
		W	17	17	17	13	15	17	13	15	17	13	15	17	13	15	17	13	15	17
2-story	3600 plf	D	19	17	15	12	11	9	9	7	5	6	4	4	4	4	4	4	4	
		W	30	30	30	22	23	23	19	19	18	15	15	17	13	15	17	13	15	17
3-story	5300 plf	D	30	29	27	21	19	18	16	14	12	12	10	8	9	8	6	7	6	4
		W	43	44	44	33	32	33	27	27	26	22	22	22	19	20	19	17	17	17

For SI: 1 inch = 25.4 mm, 1 plf = 14.6 N/m, 1 pound per square foot = 47.9 N/m².

- Linear interpolation of stone depth between wall widths is permitted within each Load-Bearing Value of Soil (psf).
- Crushed stone must be consolidated in 8-inch lifts with a plate vibrator.
- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 4045.1.

403.4 Footings for precast concrete foundations. Footings for precast concrete foundations shall comply with Section 403.4.

403.4.1 Crushed stone footings. Clean crushed stone shall be free from organic, clayey or silty soils. Crushed stone shall be angular in nature and meet ASTM C33, with the maximum size stone not to exceed $\frac{1}{2}$ -inch (12.7 mm) and the minimum stone size not to be smaller than $\frac{1}{16}$ -inch (1.6 mm). Crushed stone footings for precast foundations shall be installed in accordance with Figure 403.4(1) and Table 403.4. Crushed stone footings shall be consolidated using a vibratory plate in not greater than 8-inch (203 mm) lifts. Crushed stone footings shall be limited to Seismic Design Categories A, B and C.

403.4.2 Concrete footings. Concrete footings shall be installed in accordance with Section 403.1 and Figure 403.4(2).

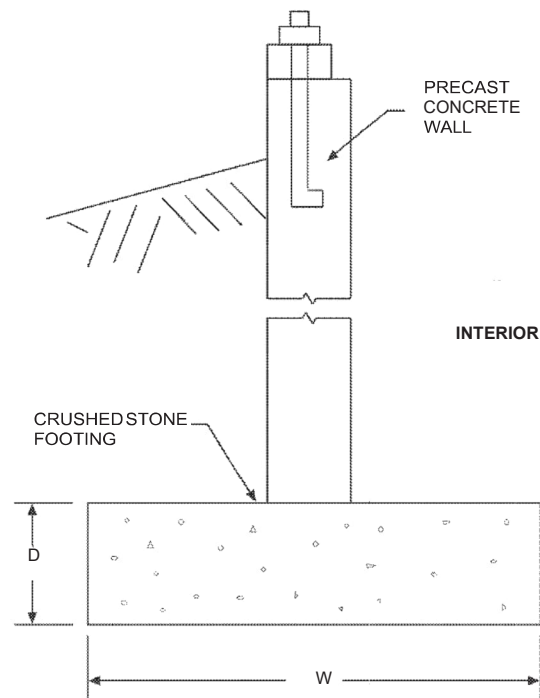


FIGURE 403.4(1)
BASEMENT OR CRAWL SPACE WITH PRECAST FOUNDATION
WALL BEARING ON CRUSHED STONE

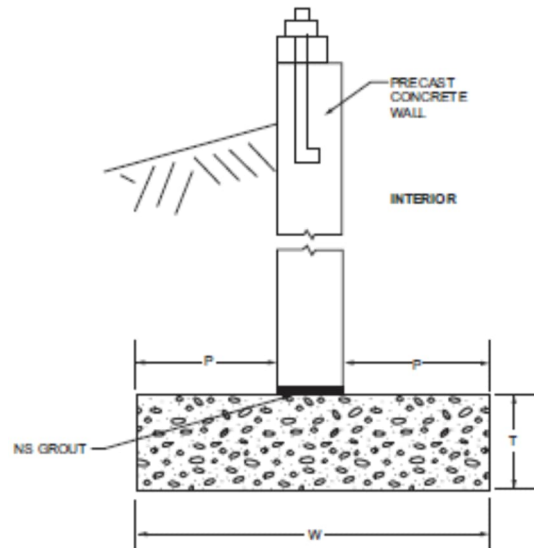


FIGURE 403.4(2)
BASEMENT OR CRAWL SPACE WITH PRECAST FOUNDATION
WALL ON SPREAD FOOTING

403.5 Exterior deck footings. See Section 507 for exterior deck foundation requirements.

SECTION 404

FOUNDATION AND RETAINING WALLS

404.1 Concrete and masonry foundation walls. Concrete foundation walls shall be selected and constructed in accordance with the provisions of Section 404.1.3. Masonry foundation walls shall be selected and constructed in accordance with the provisions of Section 404.1.2.

404.1.1 Design required. Concrete or masonry foundation walls shall be designed in accordance with accepted engineering practice where either of the following conditions exists:

1. Walls are subject to hydrostatic pressure from ground water.
2. Walls supporting more than 48 inches (1219 mm) of unbalanced backfill that do not have permanent lateral support at the top or bottom.

TABLE 404.1.1(1)
PLAIN MASONRY FOUNDATION WALLS ^f

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^c (feet)	PLAIN MASONRY ^a MINIMUM NOMINAL WALL THICKNESS (inches)		
		Soil classes ^b		
		GW, GP, SW and SP	GM, GC, SM, SM-SC and ML	SC, MH, ML-CL and inorganic CL
5	4	6 solid ^d or 8	6 solid ^d or 8	6 solid ^d or 8
	5	6 solid ^d or 8	8	10
6	4	6 solid ^d or 8	6 solid ^d or 8	6 solid ^d or 8
	5	6 solid ^d or 8	8	10
	6	8	10	12
7	4	6 solid ^d or 8	8	8
	5	6 solid ^d or 8	10	10
	6	10	12	10 solid ^d
	7	12	10 solid ^d	12 solid ^d
8	4	6 solid ^d or 8	6 solid ^d or 8	8
	5	6 solid ^d or 8	10	12
	6	10	12	12 solid ^d
	7	12	12 solid ^d	Footnote e
	8	10 grout ^d	12 grout ^d	Footnote e
9	4	6 grout ^d or 8	6 grout ^d or 8	8 grout ^d or 10
	5	6 grout ^d or 10	8 grout ^d or 12	8 grout ^d
	6	8 grout ^d or 12	10 grout ^d	10 grout ^d
	7	solid ^d	10 grout ^d	12 grout
	8	10 grout ^d	12 grout	Footnote e
	9	12 grout	Footnote e	Footnote e

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 Pa.

- Mortar shall be Type M or S and masonry shall be laid in running bond. UngROUTED hollow masonry units are permitted except where otherwise indicated.
- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 405.1.
- Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
- Solid indicates solid masonry unit; grout indicates grouted hollow units.
- Wall construction shall be in accordance with either Table 404.1.1(2), Table 404.1.1(3), Table 404.1.1(4), or a design shall be provided.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.1(2)
8-INCH MASONRY FOUNDATION WALLS WITH
REINFORCING WHERE $d \geq 5$ INCHES ^{a, c, f}

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^e	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) ^{b, c}		
		Soil classes and lateral soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils	GM, GC, SM, SM-SC and ML soils	SC, ML-CL and inorganic CL soils
		30	45	60
6 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet 8 inches	#4 at 48	#5 at 48	#6 at 48
7 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet	#4 at 48	#5 at 48	#5 at 48
	7 feet 4 inches	#5 at 48	#6 at 48	#6 at 40
8 feet	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#4 at 48
	6 feet	#4 at 48	#5 at 48	#5 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet	#5 at 48	#6 at 48	#6 at 32
8 feet 8 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet 8 inches	#6 at 48	#6 at 32	#6 at 24
9 feet 4 inches	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 40
	8 feet	#6 at 48	#6 at 40	#6 at 24
10 feet	9 feet 4 inches	#6 at 40	#6 at 24	#6 at 16
	4 feet (or less)	#4 at 48	#4 at 48	#4 at 48
	5 feet	#4 at 48	#4 at 48	#5 at 48
	6 feet	#4 at 48	#5 at 48	#6 at 48
	7 feet	#5 at 48	#6 at 48	#6 at 32
	8 feet	#6 at 48	#6 at 32	#6 at 24
	9 feet	#6 at 40	#6 at 24	#6 at 16
	10 feet	#6 at 32	#6 at 16	#6 at 16

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- Mortar shall be Type M or S and masonry shall be laid in running bond.
- Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A, B and C.
- Vertical reinforcement shall be Grade 60 minimum. The distance, d , from the face of the soil side of the wall to the center of vertical reinforcement shall be not less than 5 inches.
- Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table 405.1.
- Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.1(3)
10-INCH MASONRY FOUNDATION WALLS WITH
REINFORCING WHERE $d \geq 6.75$ INCHES ^{a, c, f}

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^e	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) ^{b, c}		
		Soil classes and later soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet 8 inches	#4 at 56	#5 at 56	#5 at 56
7 feet 4 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet 4 inches	#4 at 56	#5 at 56	#6 at 56
8 feet	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet	#5 at 56	#6 at 56	#6 at 48
8 feet 8 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#4 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet 8 inches	#5 at 56	#6 at 48	#6 at 32
9 feet 4 inches	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#4 at 56	#5 at 56	#6 at 56
	8 feet	#5 at 56	#6 at 56	#6 at 40
10 feet	9 feet 4 inches	#6 at 56	#6 at 40	#6 at 24
	4 feet (or less)	#4 at 56	#4 at 56	#4 at 56
	5 feet	#4 at 56	#4 at 56	#4 at 56
	6 feet	#4 at 56	#5 at 56	#5 at 56
	7 feet	#5 at 56	#6 at 56	#6 at 48
	8 feet	#5 at 56	#6 at 48	#6 at 40
10 feet	9 feet	#6 at 56	#6 at 40	#6 at 24
	10 feet	#6 at 48	#6 at 32	#6 at 24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- Mortar shall be Type M or S and masonry shall be laid in running bond.
- Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A B and C.
- Vertical reinforcement shall be Grade 60 minimum. The distance, d , from the face of the soil side of the wall to the center of vertical reinforcement shall be not less than 6.75 inches.
- Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table 405.1.
- Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground level. Where an interior concrete slab-on-grade is provided and is in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height from the exterior finish ground level to the top of the interior concrete slab is permitted.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.1(4)
12-INCH MASONRY FOUNDATION WALLS
WITH REINFORCING WHERE $d \geq 8.75$ INCHES^{a, c, f}

WALL HEIGHT	HEIGHT OF UNBALANCED BACKFILL ^c	MINIMUM VERTICAL REINFORCEMENT AND SPACING (INCHES) ^{b, e}		
		Soil classes and lateral soil load ^d (psf per foot below grade)		
		GW, GP, SW and SP soils 30	GM, GC, SM, SM-SC and ML soils 45	SC, ML-CL and inorganic CL soils 60
6 feet 8 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet 8 inches	#4 at 72	#4 at 72	#5 at 72
7 feet 4 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet 4 inches	#4 at 72	#5 at 72	#6 at 72
8 feet	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 64
8 feet 8 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#4 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet 8 inches	#5 at 72	#7 at 72	#6 at 48
9 feet 4 inches	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#5 at 72	#5 at 72
	7 feet	#4 at 72	#5 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 56
	9 feet 4 inches	#6 at 72	#6 at 48	#6 at 40
10 feet	4 feet (or less)	#4 at 72	#4 at 72	#4 at 72
	5 feet	#4 at 72	#4 at 72	#4 at 72
	6 feet	#4 at 72	#5 at 72	#5 at 72
	7 feet	#4 at 72	#6 at 72	#6 at 72
	8 feet	#5 at 72	#6 at 72	#6 at 48
	9 feet	#6 at 72	#6 at 56	#6 at 40
	10 feet	#6 at 64	#6 at 40	#6 at 32

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.157 kPa/mm.

- Mortar shall be Type M or S and masonry shall be laid in running bond.
- Alternative reinforcing bar sizes and spacings having an equivalent cross-sectional area of reinforcement per lineal foot of wall shall be permitted provided the spacing of the reinforcement does not exceed 72 inches in Seismic Design Categories A, B and C.
- Vertical reinforcement shall be Grade 60 minimum. The distance, d , from the face of the soil side of the wall to the center of vertical reinforcement shall be not less than 8.75 inches.
- Soil classes are in accordance with the Unified Soil Classification System and design lateral soil loads are for moist conditions without hydrostatic pressure. Refer to Table 405.1.
- Unbalanced backfill height is the difference in height between the exterior finish ground level and the lower of the top of the concrete footing that supports the foundation wall or the interior finish ground levels. Where an interior concrete slab-on-grade is provided and in contact with the interior surface of the foundation wall, measurement of the unbalanced backfill height is permitted to be measured from the exterior finish ground level to the top of the interior concrete slab is permitted.
- The use of this table shall be prohibited for soil classifications not shown.

404.1.2 Design of masonry foundation walls. Masonry foundation walls shall be designed and constructed in accordance with the provisions of this section or in accordance with the provisions of TMS 402.

404.1.2.1 Masonry foundation walls. Concrete masonry and clay masonry foundation walls shall be constructed as set forth in Table 404.1.1(1), 404.1.1(2), 404.1.1(3) or 404.1.1(4) and shall comply with applicable provisions of Section 606. Rubble stone masonry foundation walls shall be constructed in accordance with Sections 404.1.8 and 606.4.2.

TABLE 404.1.2(1)
MINIMUM HORIZONTAL REINFORCEMENT FOR
CONCRETE BASEMENT WALLS ^{a, b}

MAXIMUM UNSUPPORTED HEIGHT OF BASEMENT WALL (feet)	LOCATION OF HORIZONTAL REINFORCEMENT
≤ 8	One No. 4 bar within 12 inches of the top of the wall story and one No. 4 bar near mid-height of the wall story.
> 8	One No. 4 bar within 12 inches of the top of the wall story and one No. 4 bar near third points in the wall story.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square inch = 6.895 kPa.

- a. Horizontal reinforcement requirements are for reinforcing bars with a minimum yield strength of 40,000 psi and concrete with a minimum concrete compressive strength of 2,500 psi.
- b. See Section 404.1.3.2 for minimum reinforcement required for foundation walls supporting above-grade concrete walls.

TABLE 404.1.2(2)
MINIMUM VERTICAL REINFORCEMENT FOR
6-INCH NOMINAL FLAT CONCRETE BASEMENT WALLS b, c, d, e, g, h, i, j, k

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^f (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML-CL and inorganic CL 60
8	4	NR	NR	NR
	5	NR	6 @ 39	6 @ 48
	6	5 @ 39	6 @ 48	6 @ 35
	7	6 @ 48	6 @ 34	6 @ 25
	8	6 @ 39	6 @ 25	6 @ 18
9	4	NR	NR	NR
	5	NR	5 @ 37	6 @ 48
	6	5 @ 36	6 @ 44	6 @ 32
	7	6 @ 47	6 @ 30	6 @ 22
	8	6 @ 34	6 @ 22	6 @ 16
	9	6 @ 27	6 @ 17	DR
10	4	NR	NR	NR
	5	NR	5 @ 35	6 @ 48
	6	6 @ 48	6 @ 41	6 @ 30
	7	6 @ 43	6 @ 28	6 @ 20
	8	6 @ 31	6 @ 20	DR
	9	6 @ 24	6 @ 15	DR
	10	6 @ 19	DR	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot per foot = 0.1571 kPa²/m,

1 pound per square inch = 6.895 kPa.

NR = Not Required.

DR = Design Required.

- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 405.1.
- Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section 404.1.3.3.7.2.
- Vertical reinforcement with a yield strength of less than 60,000 psi and bars of a different size than specified in the table are permitted in accordance with Section 404.1.3.3.7.6 and Table 404.1.2(9).
- Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
- Interpolation is not permitted.
- Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
- NR indicates vertical wall reinforcement is not required, except for 6-inch-nominal walls formed with stay-in-place forming systems in which case vertical reinforcement shall be No. 4@48 inches on center.
- See Section 404.1.3.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
- See Table 608.3 for tolerance from nominal thickness permitted for flat walls.
- DR means design is required in accordance with the applicable building code, or in the absence of a code, in accordance with ACI 318.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.2(3)
MINIMUM VERTICAL REINFORCEMENT FOR
8-INCH (203 mm) NOMINAL FLAT CONCRETE BASEMENT WALLS ^{b, c, d, e, f, h, i, j}

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^g (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM- SC and ML 45	SC, ML-CL and inorganic CL 60
8	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6 @ 37
	7	NR	6 @ 36	6 @ 35
	8	6 @ 41	6 @ 35	6 @ 26
9	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6 @ 35
	7	NR	6 @ 35	6 @ 32
	8	6 @ 36	6 @ 32	6 @ 23
	9	6 @ 35	6 @ 25	6 @ 18
10	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	6 @ 35
	7	NR	6 @ 35	6 @ 29
	8	6 @ 35	6 @ 29	6 @ 21
	9	6 @ 34	6 @ 22	6 @ 16
	10	6 @ 27	6 @ 17	6 @ 13

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot per foot = 0.1571 kPa²/m,

1 pound per square inch = 6.895 kPa.

NR = Not Required.

- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 405.1.
- Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi, concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section 404.1.3.3.7.2.
- Vertical reinforcement with a yield strength of less than 60,000 psi and bars of a different size than specified in the table are permitted in accordance with Section 404.1.3.3.7.6 and Table 404.1.2(9).
- NR indicates vertical reinforcement is not required.
- Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
- Interpolation is not permitted.
- Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
- See Section 404.1.3.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
- See Table 608.3 for tolerance from nominal thickness permitted for flat walls.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.2(4)
MINIMUM VERTICAL REINFORCEMENT FOR
10-INCH NOMINAL FLAT CONCRETE BASEMENT WALLS ^{b, c, d, e, f, h, i, j}

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^g (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML-CL and inorganic CL 60
8	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	NR
	8	6 @ 48	6 @ 35	6 @ 28
9	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	6 @ 31
	8	NR	6 @ 31	6 @ 28
	9	6 @ 37	6 @ 28	6 @ 24
10	4	NR	NR	NR
	5	NR	NR	NR
	6	NR	NR	NR
	7	NR	NR	6 @ 28
	8	NR	6 @ 28	6 @ 28
	9	6 @ 33	6 @ 28	6 @ 21
	10	6 @ 28	6 @ 23	6 @ 17

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot per foot = 0.1571 kPa²/m,
 1 pound per square inch = 6.895 kPa. NR = Not Required.

- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 405.1.
- Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section 404.1.3.3.7.2.
- Vertical reinforcement with a yield strength of less than 60,000 psi and bars of a different size than specified in the table are permitted in accordance with Section 404.1.3.3.7.6 and Table 404.1.2(9).
- NR indicates vertical reinforcement is not required.
- Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
- Interpolation is not permitted.
- Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
- See Section 404.1.3.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
- See Table 608.3 for tolerance from nominal thickness permitted for flat walls.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.2(5)
MINIMUM VERTICAL WALL REINFORCEMENT FOR
6-INCH WAFFLE-GRID BASEMENT WALLS ^{b, c, d, e, g, h, i, j}

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^f (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML-CL and inorganic CL 60
8	4	4 @ 48	4 @ 46	6 @ 39
	5	4 @ 45	5 @ 46	6 @ 47
	6	5 @ 45	6 @ 40	DR
	7	6 @ 44	DR	DR
	8	6 @ 32	DR	DR
9	4	4 @ 48	4 @ 46	4 @ 37
	5	4 @ 42	5 @ 43	6 @ 44
	6	5 @ 41	6 @ 37	DR
	7	6 @ 39	DR	DR
	> 8	DR ⁱ	DR	DR
10	4	4 @ 48	4 @ 46	4 @ 35
	5	4 @ 40	5 @ 40	6 @ 41
	6	5 @ 38	6 @ 34	DR
	7	6 @ 36	DR	DR
	> 8	DR	DR	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot per foot = 0.1571 kPa²/m,

1 pound per square inch = 6.895 kPa.

DR = Design Required.

- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 405.1.
- Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section 404.1.3.3.7.2.
- Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and bars of a different size than specified in the table are permitted in accordance with Section 404.1.3.3.7.6 and Table 404.1.2(9).
- Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
- Interpolation is not permitted.
- Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
- See Section 404.1.3.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
- See Table 608.3 for thicknesses and dimensions of waffle-grid walls.
- DR means design is required in accordance with the applicable building code, or in the absence of a code, in accordance with ACI 318.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.2(6)
MINIMUM VERTICAL REINFORCEMENT FOR
8-INCH WAFFLE-GRID BASEMENT WALLS ^{b, c, d, e, f, h, i, j, k}

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^g (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML-CL and inorganic CL 60
8	4	NR	NR	NR
	5	NR	5 @ 48	5 @ 46
	6	5 @ 48	5 @ 43	6 @ 45
	7	5 @ 46	6 @ 43	6 @ 31
	8	6 @ 48	6 @ 32	6 @ 23
9	4	NR	NR	NR
	5	NR	5 @ 47	5 @ 46
	6	5 @ 46	5 @ 39	6 @ 41
	7	5 @ 42	6 @ 38	6 @ 28
	8	6 @ 44	6 @ 28	6 @ 20
	9	6 @ 34	6 @ 21	DR
10	4	NR	NR	NR
	5	NR	5 @ 46	5 @ 44
	6	5 @ 46	5 @ 37	6 @ 38
	7	5 @ 38	6 @ 35	6 @ 25
	8	6 @ 39	6 @ 25	DR
	9	6 @ 30	DR	DR
	10	6 @ 24	DR	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot per foot = 0.1571 kPa²/m,

1 pound per square inch = 6.895 kPa.

NR = Not Required.

DR = Design Required.

- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 405.1.
- Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section 404.1.3.3.7.2.
- Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 (420 MPa) and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and bars of a different size than specified in the table are permitted in accordance with Section 404.1.3.3.7.6 and Table 404.1.2(9).
- NR indicates vertical reinforcement is not required.
- Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
- Interpolation shall not be permitted.
- Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
- See Section 404.1.3.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
- See Table 608.3 for thicknesses and dimensions of waffle-grid walls.
- DR means design is required in accordance with the applicable building code, or in the absence of a code, in accordance with ACI 318.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.2(7)
MINIMUM VERTICAL REINFORCEMENT FOR
6-INCH (152 mm) SCREEN-GRID BASEMENT WALLS ^{b, c, d, e, g, h, i, j}

MAXIMUM UNSUPPORTED WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^f (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)		
		Soil classes ^a and design lateral soil (psf per foot of depth)		
		GW, GP, SW, SP 30	GM, GC, SM, SM-SC and ML 45	SC, ML-CL and inorganic CL 60
8	4	4 @ 48	4 @ 48	5 @ 43
	5	4 @ 48	5 @ 48	5 @ 37
	6	5 @ 48	6 @ 45	6 @ 32
	7	6 @ 48	DR	DR
	8	6 @ 36	DR	DR
9	4	4 @ 48	4 @ 48	4 @ 41
	5	4 @ 48	5 @ 48	6 @ 48
	6	5 @ 45	6 @ 41	DR
	7	6 @ 43	DR	DR
	> 8	DR	DR	DR
10	4	4 @ 48	4 @ 48	4 @ 39
	5	4 @ 44	5 @ 44	6 @ 46
	6	5 @ 42	6 @ 38	DR
	7	6 @ 40	DR	DR
	> 8	DR	DR	DR

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot per foot = 0.1571 kPa²/m,
 1 pound per square inch = 6.895 kPa.

DR = Design Required.

- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 405.1.
- Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi, concrete with a minimum specified compressive strength of 2,500 psi and vertical reinforcement being located at the centerline of the wall. See Section 404.1.3.3.7.2.
- Maximum spacings shown are the values calculated for the specified bar size. Where the bar used is Grade 60 and the size specified in the table, the actual spacing in the wall shall not exceed a whole-number multiple of 12 inches (12, 24, 36 and 48) that is less than or equal to the tabulated spacing. Vertical reinforcement with a yield strength of less than 60,000 psi and bars of a different size than specified in the table are permitted in accordance with Section 404.1.3.3.7.6 and Table 404.1.2(9).
- Deflection criterion is $L/240$, where L is the height of the basement wall in inches.
- Interpolation is not permitted.
- Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
- See Sections 404.1.3.2 for minimum reinforcement required for basement walls supporting above-grade concrete walls.
- See Table 608.3 for thicknesses and dimensions of screen-grid walls.
- DR means design is required in accordance with the applicable building code, or in the absence of a code, in accordance with ACI 318.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.2(8)
MINIMUM VERTICAL REINFORCEMENT FOR
6-, 8-, 10- AND 12-INCH NOMINAL FLAT BASEMENT WALLS ^{b, c, d, e, f, h, i, k, n, o}

MAXIMUM WALL HEIGHT (feet)	MAXIMUM UNBALANCED BACKFILL HEIGHT ^g (feet)	MINIMUM VERTICAL REINFORCEMENT-BAR SIZE AND SPACING (inches)											
		Soil classes ^a and design lateral soil (psf per foot of depth)											
		GW, GP, SW, SP 30				GM, GC, SM, SM-SC and ML 45				SC, ML-CL and inorganic CL 60			
		Minimum nominal wall thickness (inches)											
		6	8	10	12	6	8	10	12	6	8	10	12
5	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
6	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR ¹	NR	NR	4 @ 35	NR ¹	NR	NR
	6	NR	NR	NR	NR	5 @ 48	NR	NR	NR	5 @ 36	NR	NR	NR
7	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	NR	NR	NR	NR	5 @ 47	NR	NR	NR
	6	NR	NR	NR	NR	5 @ 42	NR	NR	NR	6 @ 43	5 @ 48	NR ¹	NR
	7	5 @ 46	NR	NR	NR	6 @ 42	5 @ 46	NR ¹	NR	6 @ 34	6 @ 48	NR	NR
8	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4 @ 38	NR ¹	NR	NR	5 @ 43	NR	NR	NR
	6	4 @ 37	NR ¹	NR	NR	5 @ 37	NR	NR	NR	6 @ 37	5 @ 43	NR ¹	NR
	7	5 @ 40	NR	NR	NR	6 @ 37	5 @ 41	NR ¹	NR	6 @ 34	6 @ 43	NR	NR
	8	6 @ 43	5 @ 47	NR ¹	NR	6 @ 34	6 @ 43	NR	NR	6 @ 27	6 @ 32	6 @ 44	NR
9	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4 @ 35	NR ¹	NR	NR	5 @ 40	NR	NR	NR
	6	4 @ 34	NR ¹	NR	NR	6 @ 48	NR	NR	NR	6 @ 36	6 @ 39	NR ¹	NR
	7	5 @ 36	NR	NR	NR	6 @ 34	5 @ 37	NR	NR	6 @ 33	6 @ 38	5 @ 37	NR ¹
	8	6 @ 38	5 @ 41	NR ¹	NR	6 @ 33	6 @ 38	5 @ 37	NR ¹	6 @ 24	6 @ 29	6 @ 39	4 @ 48 ^m
	9	6 @ 34	6 @ 46	NR	NR	6 @ 26	6 @ 30	6 @ 41	NR	6 @ 19	6 @ 23	6 @ 30	6 @ 39
10	4	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	5	NR	NR	NR	NR	4 @ 33	NR ¹	NR	NR	5 @ 38	NR	NR	NR
	6	5 @ 48	NR ¹	NR	NR	6 @ 45	NR	NR	NR	6 @ 34	5 @ 37	NR	NR
	7	6 @ 47	NR	NR	NR	6 @ 34	6 @ 48	NR	NR	6 @ 30	6 @ 35	6 @ 48	NR ¹
	8	6 @ 34	5 @ 38	NR	NR	6 @ 30	6 @ 34	6 @ 47	NR ¹	6 @ 22	6 @ 26	6 @ 35	6 @ 45 ^m
	9	6 @ 34	6 @ 41	4 @ 48	NR ¹	6 @ 23	6 @ 27	6 @ 35	4 @ 48 ^m	DR	6 @ 22	6 @ 27	6 @ 34
	10	6 @ 28	6 @ 33	6 @ 45	NR	DR ^j	6 @ 23	6 @ 29	6 @ 38	DR	6 @ 22	6 @ 22	6 @ 28

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 pound per square foot per foot = 0.1571 kPa²/m, 1 pound per square inch = 6.895 kPa.

NR = Not Required. DR = Design Required.

- Soil classes are in accordance with the Unified Soil Classification System. Refer to Table 405.1.
- Table values are based on reinforcing bars with a minimum yield strength of 60,000 psi.
- Vertical reinforcement with a yield strength of less than 60,000 psi and bars of a different size than specified in the table are permitted in accordance with Section 404.1.3.3.7.6 and Table 404.1.2(9).
- NR indicates vertical wall reinforcement is not required, except for 6-inch nominal walls formed with stay-in-place forming systems in which case vertical reinforcement shall be No. 4@48 inches on center.
- Allowable deflection criterion is $L/240$, where L is the unsupported height of the basement wall in inches.
- Interpolation is not permitted.
- Where walls will retain 4 feet or more of unbalanced backfill, they shall be laterally supported at the top and bottom before backfilling.
- Vertical reinforcement shall be located to provide a cover of $1\frac{1}{4}$ -inches measured from the inside face of the wall. The center of the steel shall not vary from the specified location by more than the greater of 10 percent of the wall thickness or $\frac{3}{8}$ -inch.
- Concrete cover for reinforcement measured from the inside face of the wall shall be not less than $\frac{3}{4}$ -inch. Concrete cover for reinforcement measured from the outside face of the wall shall be not less than $1\frac{1}{2}$ -inches for No. 5 bars and smaller, and not less than 2 -inches for larger bars.
- DR means design is required in accordance with the applicable building code, or in the absence of a code, in accordance with ACI 318.
- Concrete shall have a specified compressive strength, f'_c , of not less than 2,500 psi at 28 days, unless a higher strength is required by Footnote l or m.
- The minimum thickness is permitted to be reduced 2 inches, provided that the minimum specified compressive strength of concrete, f'_c , is 4,000 psi.
- A plain concrete wall with a minimum nominal thickness of 12 inches is permitted, provided that the minimum specified compressive strength of concrete, f'_c , is 3,500 psi.
- See Table 608.3 for tolerance from nominal thickness permitted for flat walls.
- The use of this table shall be prohibited for soil classifications not shown.

TABLE 404.1.2(9)
MINIMUM SPACING FOR ALTERNATE BAR SIZE AND
ALTERNATE GRADE OF STEEL^{a, b, c}

BAR SPACING FROM APPLICABLE TABLE IN SECTION 404.1.3.2 (inches)	BAR SIZE FROM APPLICABLE TABLE IN SECTION 404.1.3.2														
	#4					#5					#6				
	Alternate bar size and alternate grade of steel desired														
	Grade 60		Grade 40			Grade 60		Grade 40			Grade 60		Grade 40		
	#5	#6	#4	#5	#6	#4	#6	#4	#5	#6	#4	#5	#4	#5	#6
	Maximum spacing for alternate bar size and alternate grade of steel (inches)														
8	12	18	5	8	12	5	11	3	5	8	4	6	2	4	5
9	14	20	6	9	13	6	13	4	6	9	4	6	3	4	6
10	16	22	7	10	15	6	14	4	7	9	5	7	3	5	7
11	17	24	7	11	16	7	16	5	7	10	5	8	3	5	7
12	19	26	8	12	18	8	17	5	8	11	5	8	4	6	8
13	20	29	9	13	19	8	18	6	9	12	6	9	4	6	9
14	22	31	9	14	21	9	20	6	9	13	6	10	4	7	9
15	23	33	10	16	22	10	21	6	10	14	7	11	5	7	10
16	25	35	11	17	23	10	23	7	11	15	7	11	5	8	11
17	26	37	11	18	25	11	24	7	11	16	8	12	5	8	11
18	28	40	12	19	26	12	26	8	12	17	8	13	5	8	12
19	29	42	13	20	28	12	27	8	13	18	9	13	6	9	13
20	31	44	13	21	29	13	28	9	13	19	9	14	6	9	13
21	33	46	14	22	31	14	30	9	14	20	10	15	6	10	14
22	34	48	15	23	32	14	31	9	15	21	10	16	7	10	15
23	36	48	15	24	34	15	33	10	15	22	10	16	7	11	15
24	37	48	16	25	35	15	34	10	16	23	11	17	7	11	16
25	39	48	17	26	37	16	35	11	17	24	11	18	8	12	17
26	40	48	17	27	38	17	37	11	17	25	12	18	8	12	17
27	42	48	18	28	40	17	38	12	18	26	12	19	8	13	18
28	43	48	19	29	41	18	40	12	19	26	13	20	8	13	19
29	45	48	19	30	43	19	41	12	19	27	13	20	9	14	19
30	47	48	20	31	44	19	43	13	20	28	14	21	9	14	20
31	48	48	21	32	45	20	44	13	21	29	14	22	9	15	21
32	48	48	21	33	47	21	45	14	21	30	15	23	10	15	21
33	48	48	22	34	48	21	47	14	22	31	15	23	10	16	22
34	48	48	23	35	48	22	48	15	23	32	15	24	10	16	23
35	48	48	23	36	48	23	48	15	23	33	16	25	11	16	23
36	48	48	24	37	48	23	48	15	24	34	16	25	11	17	24
37	48	48	25	38	48	24	48	16	25	35	17	26	11	17	25
38	48	48	25	39	48	25	48	16	25	36	17	27	12	18	25
39	48	48	26	40	48	25	48	17	26	37	18	27	12	18	26
40	48	48	27	41	48	26	48	17	27	38	18	28	12	19	27
41	48	48	27	42	48	26	48	18	27	39	19	29	12	19	27
42	48	48	28	43	48	27	48	18	28	40	19	30	13	20	28
43	48	48	29	44	48	28	48	18	29	41	20	30	13	20	29
44	48	48	29	45	48	28	48	19	29	42	20	31	13	21	29
45	48	48	30	47	48	29	48	19	30	43	20	32	14	21	30
46	48	48	31	48	48	30	48	20	31	44	21	32	14	22	31
47	48	48	31	48	48	30	48	20	31	44	21	33	14	22	31
48	48	48	32	48	48	31	48	21	32	45	22	34	15	23	32

For SI: 1 inch = 25.4 mm, 1 pound per square inch = 6.895 kPa.

- This table is for use with tables in Section 404.1.3.2 that specify the minimum bar size and maximum spacing of vertical wall reinforcement for foundation walls and above-grade walls. Reinforcement specified in tables in Section 404.1.3.2 is based on Grade 60 steel reinforcement.
- Bar spacing shall not exceed 48 inches on center and shall be not less than one-half the nominal wall thickness.
- For Grade 50 steel bars (ASTM A996, Type R), use spacing for Grade 40 bars or interpolate between Grades 40 and 60.

404.1.3 Concrete foundation walls. Concrete foundation walls that support light-frame walls shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are within the applicability limits of Section 608.2 shall be designed and constructed in accordance with the provisions of this section, ACI 318, ACI 332 or PCA 100. Concrete foundation walls that support above-grade concrete walls that are not within the applicability limits of Section 608.2 shall be designed and constructed in accordance with the provisions of ACI 318, ACI 332 or PCA 100.

404.1.3.1 Concrete cross-section. Concrete walls constructed in accordance with this code shall comply with the shapes and minimum concrete cross-sectional dimensions required by Table 608.3. Other types of forming systems resulting in concrete walls not in compliance with this section and Table 608.3 shall be designed in accordance with ACI 318.

404.1.3.2 Reinforcement for foundation walls. Concrete foundation walls shall be laterally supported at the top and bottom. Horizontal reinforcement shall be provided in accordance with Table 404.1.2(1). Vertical reinforcement shall be provided in accordance with Table 404.1.2(2), 404.1.2(3), 404.1.2(4), 404.1.2(5), 404.1.2(6), 404.1.2(7) or 404.1.2(8). Vertical reinforcement for flat basement walls retaining 4 feet (1219 mm) or more of unbalanced backfill is permitted to be determined in accordance with Table 404.1.2(8). For basement walls supporting above-grade concrete walls, vertical reinforcement shall be the greater of that required by Tables 404.1.2(2) through 404.1.2(8) or by Section 608.6 for the above-grade wall.

404.1.3.2.1 Concrete foundation stem walls supporting above-grade concrete walls. Foundation stem walls that support above-grade concrete walls shall be designed and constructed in accordance with this section.

1. Stem walls not laterally supported at top. Concrete stem walls that are not monolithic with slabs-on-ground or are not otherwise laterally supported by slabs-on-ground shall comply with this section. Where unbalanced backfill retained by the stem wall is less than or equal to 18 inches (457 mm), the stem wall and above-grade wall it supports shall be provided with vertical reinforcement in accordance with Section 608.6 and Table 608.6(1), 608.6(2) or 608.6(3) for above-grade walls. Where unbalanced backfill retained by the stem wall is greater than 18 inches (457 mm), the stem wall and above-grade wall it

supports shall be provided with vertical reinforcement in accordance with Section 608.6 and Table 608.6(4).

2. Stem walls laterally supported at top. Concrete stem walls that are monolithic with slabs-on-ground or are otherwise laterally supported by slabs-on-ground shall be vertically reinforced in accordance with Section 608.6 and Table 608.6(1), 608.6(2) or 608.6(3) for above-grade walls. Where the unbalanced backfill retained by the stem wall is greater than 18 inches (457 mm), the connection between the stem wall and the slab-on-ground, and the portion of the slab-on-ground providing lateral support for the wall shall be designed in accordance with PCA 100 or with accepted engineering practice. Where the unbalanced backfill retained by the stem wall is greater than 18 inches (457 mm), the minimum nominal thickness of the wall shall be 6 inches (152 mm).

404.1.3.2.2 Concrete foundation stem walls supporting light-frame above-grade walls. Concrete foundation stem walls that support light-frame, above-grade walls shall be designed and constructed in accordance with this section.

1. Stem walls not laterally supported at top. Concrete stem walls that are not monolithic with slabs-on-ground or are not otherwise laterally supported by slabs-on-ground and retain 48 inches (1219 mm) or less of unbalanced fill, measured from the top of the wall, shall be constructed in accordance with Section 404.1.3. Foundation stem walls that retain more than 48 inches (1219 mm) of unbalanced fill, measured from the top of the wall, shall be designed in accordance with Sections 404.1.4 and 404.4.
2. Stem walls laterally supported at top. Concrete stem walls that are monolithic with slabs-on-ground or are otherwise laterally supported by slabs-on-ground shall be constructed in accordance with Section 404.1.3. Where the unbalanced backfill retained by the stem wall is greater than 48 inches (1219 mm), the connection between the stem wall and the slab-on-ground, and the portion of the slab-on-ground providing lateral support for the wall, shall be designed in accordance with PCA 100 or in accordance with accepted engineering practice.

404.1.3.3 Concrete, materials for concrete, and forms. Materials used in concrete, the concrete itself and forms shall conform to requirements of this section or ACI 318.

404.1.3.3.1 Compressive strength. The minimum specified compressive strength of concrete, f'_c , shall comply with Section 402.2 and shall be not less than 2,500 psi (17.2 MPa) at 28 days in buildings assigned to Seismic Design Category A, B or C.

404.1.3.3.2 Concrete mixing and delivery. Mixing and delivery of concrete shall comply with ASTM C94 or ASTM C685.

404.1.3.3.3 Maximum aggregate size. The nominal maximum size of coarse aggregate shall not exceed one-fifth the narrowest distance between sides of forms, or three-fourths the clear spacing between reinforcing bars or between a bar and the side of the form.

Exception: Where approved, these limitations shall not apply where removable forms are used and workability and methods of consolidation permit concrete to be placed without honeycombs or voids.

404.1.3.3.4 Proportioning and slump of concrete. Proportions of materials for concrete shall be established to provide workability and consistency to permit concrete to be worked readily into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding. Slump of concrete placed in removable forms shall not exceed 6 inches (152 mm).

Exception: Where approved, the slump is permitted to exceed 6 inches (152 mm) for concrete mixtures that are resistant to segregation, and are in accordance with the form manufacturer's recommendations.

Slump of concrete placed in stay-in-place forms shall exceed 6 inches (152 mm). Slump of concrete shall be determined in accordance with ASTM C143.

404.1.3.3.5 Consolidation of concrete. Concrete shall be consolidated by suitable means during placement and shall be worked around embedded items and reinforcement and into corners of forms. Where stay-in-place forms are used, concrete shall be consolidated by internal vibration.

Exception: Where approved for concrete to be placed in stay-in-place forms, self-consolidating concrete mixtures with slumps equal to or greater than 8 inches (203 mm) that are specifically designed

for placement without internal vibration need not be internally vibrated.

404.1.3.3.6 Form materials and form ties. Forms shall be made of wood, steel, aluminum, plastic, a composite of cement and foam insulation, a composite of cement and wood chips, or other approved material suitable for supporting and containing concrete. Forms shall provide sufficient strength to contain concrete during the concrete placement operation.

Form ties shall be steel, solid plastic, foam plastic, a composite of cement and wood chips, a composite of cement and foam plastic, or other suitable material capable of resisting the forces created by fluid pressure of fresh concrete.

404.1.3.3.6.1 Stay-in-place forms. Stay-in-place concrete forms shall comply with this section.

1. Surface burning characteristics. The flame-spread index and smoke-developed index of forming material, other than foam plastic, left exposed on the interior shall comply with Section 302. The surface burning characteristics of foam plastic used in insulating concrete forms shall comply with Section 316.3.
2. Interior covering. Stay-in-place forms constructed of rigid foam plastic shall be protected on the interior of the building as required by Section 316. Where gypsum board is used to protect the foam plastic, it shall be installed with a mechanical fastening system. Use of adhesives in addition to mechanical fasteners is permitted.
3. Exterior wall covering. Stay-in-place forms constructed of rigid foam plastics shall be protected from sunlight and physical damage by the application of an approved exterior wall covering complying with this code. Exterior surfaces of other stay-in-place forming systems shall be protected in accordance with this code.
4. Termite protection. In areas where the probability of termite infestation is “very heavy” as indicated by Table 301.2(1) or Figure 301.2(7), foam plastic insulation shall be permitted below grade on foundation walls in accordance with Section 318.4.
5. Flat ICF wall system forms shall conform to ASTM E2634.

404.1.3.3.7 Reinforcement.

404.1.3.3.7.1 Steel reinforcement. Steel reinforcement shall comply with the requirements of ASTM A615, A706, or A996. ASTM A996 bars produced from rail steel shall be Type R. In buildings assigned to Seismic Design Category A, B or C, the minimum yield strength of reinforcing steel shall be 40,000 psi (Grade 40) (276 MPa).

404.1.3.3.7.2 Location of reinforcement in wall. The center of vertical reinforcement in basement walls determined from Tables 404.1.2(2) through 404.1.2(7) shall be located at the centerline of the wall. Vertical reinforcement in basement walls determined from Table 404.1.2(8) shall be located to provide a maximum cover of $1\frac{1}{4}$ -inches (32 mm) measured from the inside face of the wall. Regardless of the table used to determine vertical wall reinforcement, the center of the steel shall not vary from the specified location by more than the greater of 10 percent of the wall thickness and $\frac{3}{8}$ -inch (10 mm). Horizontal and vertical reinforcement shall be located in foundation walls to provide the minimum cover required by Section 404.1.3.3.7.4.

404.1.3.3.7.3 Wall openings. Vertical wall reinforcement required by Section 404.1.3.2 that is interrupted by wall openings shall have additional vertical reinforcement of the same size placed within 12 inches (305 mm) of each side of the opening.

404.1.3.3.7.4 Support and cover. Reinforcement shall be secured in the proper location in the forms with tie wire or other bar support system to prevent displacement during the concrete placement operation. Steel reinforcement in concrete cast against the earth shall have a minimum cover of 3 inches (75 mm). Minimum cover for reinforcement in concrete cast in removable forms that will be exposed to the earth or weather shall be $1\frac{1}{2}$ -inches (38 mm) for No. 5 bars and smaller, and 2 inches (50 mm) for No. 6 bars and larger. For concrete cast in removable forms that will not be exposed to the earth or weather, and for concrete cast in stay-in-place forms, minimum cover shall be $\frac{3}{4}$ -inch (19 mm). The minus tolerance for cover shall not exceed the smaller of one-third the required cover or $\frac{3}{8}$ -inch (10 mm).

404.1.3.3.7.5 Lap splices. Vertical and horizontal wall reinforcement shall be the longest lengths practical. Where splices are necessary in reinforcement, the length of lap splice shall be in accordance with Table 608.5.4(1) and Figure 608.5.4(1). The

maximum gap between noncontact parallel bars at a lap splice shall not exceed the smaller of one-fifth the required lap length and 6 inches (152 mm) [See Figure 608.5.4(1)].

404.1.3.3.7.6 Alternate grade of reinforcement and spacing.

Where tables in Section 404.1.3.2 specify vertical wall reinforcement based on minimum bar size and maximum spacing, which are based on Grade 60 (414 MPa) steel reinforcement, different size bars or bars made from a different grade of steel are permitted provided that an equivalent area of steel per linear foot of wall is provided. Use of Table 404.1.2(9) is permitted to determine the maximum bar spacing for different bar sizes than specified in the tables or bars made from a different grade of steel. Bars shall not be spaced less than one-half the wall thickness, or more than 48 inches (1219 mm) on center.

404.1.3.3.7.7 Standard hooks. Where reinforcement is required by this code to terminate with a standard hook, the hook shall comply with Section 608.5.4.5 and Figure 608.5.4(3).

404.1.3.3.7.8 Construction joint reinforcement. Construction joints in foundation walls shall be made and located to not impair the strength of the wall. Construction joints in plain concrete walls, including walls required to have not less than No. 4 bars at 48 inches (1219 mm) on center by Sections 404.1.3.2 and 404.1.4.2, shall be located at points of lateral support, and not fewer than one No. 4 bar shall extend across the construction joint at a spacing not to exceed 24 inches (610 mm) on center. Construction joint reinforcement shall have not less than 12 inches (305 mm) embedment on both sides of the joint. Construction joints in reinforced concrete walls shall be located in the middle third of the span between lateral supports, or located and constructed as required for joints in plain concrete walls.

Exception: Use of vertical wall reinforcement required by this code is permitted in lieu of construction joint reinforcement provided that the spacing does not exceed 24 inches (610 mm), or the combination of wall reinforcement and No. 4 bars described in this section does not exceed 24 inches (610 mm).

404.1.3.3.8 Exterior wall coverings. Requirements for installation of masonry veneer, stucco and other wall coverings on the exterior of concrete walls and other construction details not covered in this section

shall comply with the requirements of this code.

404.1.3.4 Requirements for Seismic Design Category C. Concrete foundation walls supporting above-grade concrete walls in *dwelling units with four or more dwelling units* assigned to Seismic Design Category C shall comply with ACI 318, ACI 332 or PCA 100 (see Section 404.1.3).

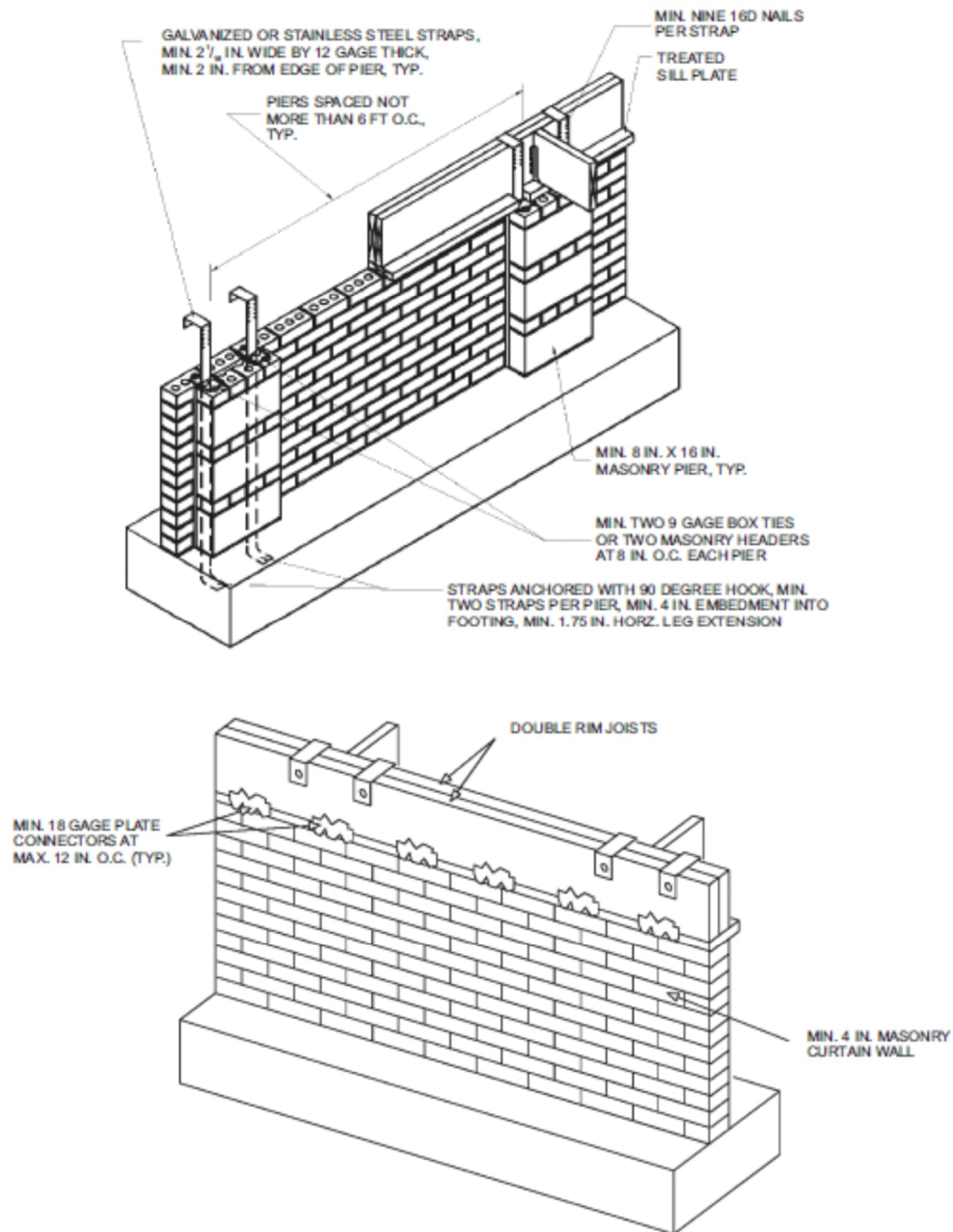
404.1.4 Seismic Design Category D₀, D₁ or D₂. *deleted*

404.1.4.1 Masonry foundation walls. *deleted*

404.1.4.2 Concrete foundation walls. *deleted*

404.1.5 Foundation wall thickness based on walls supported. The thickness of masonry or concrete foundation walls shall be not less than that required by Section 404.1.5.1 or 404.1.5.2, respectively.

404.1.5.1 Masonry wall thickness. Masonry foundation walls shall be not less than the thickness of the wall supported, except that masonry foundation walls of not less than 8- inch (203 mm) nominal thickness shall be permitted under brick veneered frame walls and under 10- inch-wide (254 mm) cavity walls where the total height of the wall supported, including gables, is not more than 20 feet (6096 mm), provided that the requirements of Section 404.1.1 are met.



For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.0175 rad

FIGURE 404.1.5(1)
FOUNDATION WALL CLAY MASONRY CURTAIN WALL WITH
CONCRETE MASONRY PIERS

404.1.5.2 Concrete wall thickness. The thickness of concrete foundation walls shall be equal to or greater than the thickness of the wall in the story above. Concrete foundation walls with corbels, brackets or other projections built into the wall for support of masonry veneer or other purposes are not within the scope of the tables in this section.

Where a concrete foundation wall is reduced in thickness to provide a shelf for the support of masonry veneer, the reduced thickness shall be equal to or greater than the thickness of the wall in the story above. Vertical reinforcement for the foundation wall shall be based on Table 404.1.2(8) and located in the wall as required by Section 404.1.3.3.7.2 where that table is used. Vertical reinforcement shall be based on the thickness of the thinner portion of the wall.

Exception: Where the height of the reduced thickness portion measured to the underside of the floor assembly or sill plate above is less than or equal to 24 inches (610 mm) and the reduction in thickness does not exceed 4 inches (102 mm), the vertical reinforcement is permitted to be based on the thicker portion of the wall.

404.1.5.3 Pier and curtain wall foundations. Use of pier and curtain wall foundations shall be permitted to support light-frame construction not more than two stories in height, provided that the following requirements are met:

1. All load-bearing walls shall be placed on continuous concrete footings placed integrally with the exterior wall footings.
2. The minimum actual thickness of a load-bearing masonry wall shall be not less than 4 inches (102 mm) nominal or $3\frac{3}{8}$ -inches (92 mm) actual thickness, and shall be bonded integrally with piers spaced in accordance with Section 606.6.4.
3. Piers shall be constructed in accordance with Sections 606.7 and 606.7.1, and shall be bonded into the load-bearing masonry wall in accordance with Section 606.13.1 or 606.13.1.1.
4. The maximum height of a 4-inch (102 mm) load-bearing masonry foundation wall supporting wood-frame walls and floors shall be not more than 4 feet (1219 mm).
5. Anchorage shall be in accordance with Section 403.1.6, Figure 404.1.5(1), or as specified by engineered design accepted by the building official.
6. The unbalanced fill for 4-inch (102 mm) foundation walls shall not exceed 24 inches (610 mm) for solid masonry or 12 inches (305 mm) for hollow masonry.
7. *deleted*

404.1.6 Height above finished grade. Concrete and masonry foundation walls shall extend above the finished grade adjacent to the foundation at all points not less than 4 inches (102 mm) where masonry veneer is used and not less than 6 inches (152 mm) elsewhere.

404.1.7 Backfill placement. Backfill shall not be placed against the wall until the wall has sufficient strength and has been anchored to the floor above, or has been sufficiently braced to prevent damage by the backfill.

Exception: Bracing is not required for walls supporting less than 4 feet (1219 mm) of unbalanced backfill.

404.1.8 Rubble stone masonry. Rubble stone masonry foundation walls shall have a minimum thickness of 16 inches (406 mm), shall not support an unbalanced backfill exceeding 8 feet (2438 mm) in height *and* shall not support a soil pressure greater than 30 pounds per square foot per foot (4.71 kPa/m), and shall not be constructed *for dwellings with four or more dwelling units* in Seismic Design Category C, as established in Figure 301.2(2)

404.1.9 Isolated masonry piers. Isolated masonry piers shall be constructed in accordance with this section and the general masonry construction requirements of Section 606. Hollow masonry piers shall have a minimum nominal thickness of 8 inches (203 mm), with a nominal height not exceeding four times the nominal thickness and a nominal length not exceeding three times the nominal thickness. Where hollow masonry units are solidly filled with concrete or grout, piers shall be permitted to have a nominal height not exceeding ten times the nominal thickness. Footings for isolated masonry piers shall be sized in accordance with Section 403.1.1.

404.1.9.1 Pier cap. Hollow masonry piers shall be capped with 4 inches (102 mm) of solid masonry or concrete, a masonry cap block, or shall have cavities of the top course filled with concrete or grout. Where required, termite protection for the pier cap shall be provided in accordance with Section 318.

404.1.9.2 Masonry piers supporting floor girders. Masonry piers supporting wood girders sized in accordance with Tables 602.7(1) and 602.7(2) shall be permitted in accordance with this section. Piers supporting girders for interior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 10 feet (3048 mm) from top of footing to bottom of sill plate or girder. Piers supporting girders for

exterior bearing walls shall have a minimum nominal dimension of 12 inches (305 mm) and a maximum height of 4 feet (1220 mm) from top of footing to bottom of sill plate or girder. Girders and sill plates shall be anchored to the pier or footing in accordance with Section 403.1.6 or Figure 404.1.5(1). Floor girder bearing shall be in accordance with Section 502.6.

404.1.9.3 Masonry piers supporting braced wall panels. Masonry piers supporting braced wall panels shall be designed in accordance with accepted engineering practice.

404.1.9.4 Seismic design of masonry piers. Masonry piers in *dwelling units* located in Seismic Design Category C, shall be designed in accordance with accepted engineering practice.

404.1.9.5 Masonry piers in flood hazard areas. Masonry piers for dwellings in flood hazard areas shall be designed in accordance with Section 322.

404.2 Wood foundation walls. Wood foundation walls shall be constructed in accordance with the provisions of Sections 404.2.1 through 404.2.6 and with the details shown in Figures 403.1(2) and 403.1(3).

404.2.1 Identification. Load-bearing lumber shall be identified by the grade mark of a lumber grading or inspection agency that has been approved by an accreditation body that complies with DOC PS 20. In lieu of a grade mark, a certificate of inspection issued by a lumber grading or inspection agency meeting the requirements of this section shall be accepted. Wood structural panels shall conform to DOC PS 1 or DOC PS 2 and shall be identified by a grade mark or certificate of inspection issued by an approved agency.

404.2.2 Stud size. The studs used in foundation walls shall be 2-inch by 6-inch (51 mm by 152 mm) members. Where spaced 16 inches (406 mm) on center, a wood species with an F_b value of not less than 1,250 pounds per square inch (8619 kPa) as listed in ANSI AWC NDS shall be used. Where spaced 12 inches (305 mm) on center, an F_b of not less than 875 psi (6033 kPa) shall be required.

404.2.3 Height of backfill. For wood foundations that are not designed and installed in accordance with AWC PWF, the height of backfill against a foundation wall shall not exceed 4 feet (1219 mm). Where the height of fill is more than 12 inches (305 mm) above the interior grade of a crawl space or floor of a basement, the thickness of the plywood sheathing shall meet the

requirements of Table 404.2.3.

TABLE 404.2.3
PLYWOOD GRADE AND THICKNESS FOR WOOD FOUNDATION
CONSTRUCTION (30 pcf equivalent-fluid weight soil pressure)

HEIGHT OF FILL (inches)	STUD SPACING (inches)	FACE GRAIN ACROSS			FACE GRAIN PARALLEL TO STUDS		
		Grade ^a	Minimum thickness (inches)	Span rating	Grade ^a	Minimum thickness (inches) ^{b, c}	Span rating
24	12	B	15/32	32/16	A	15/32	32/16
					B	15/32 ^c	32/16
	16	B	15/32	32/16	A	15/32 ^c	32/16
					B	19/32 ^c (4, 5 ply)	40/20
36	12	B	15/32	32/16	A	15/32	32/16
					B	15/32 ^c (4, 5 ply)	32/16
					B	19/32 (4, 5 ply)	40/20
	16	B	15/32 ^c	32/16	A	19/32	40/20
					B	23/32	48/24
48	12	B	15/32	32/16	A	15/32 ^c	32/16
					B	19/32 ^c (4, 5 ply)	40/20
	16	B	19/32	40/20	A	19/32 ^c	40/20
					A	23/32	48/24

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per cubic foot = 0.1572 kN/m³.

- a. Plywood shall be of the following minimum grades in accordance with DOC PS 1 or DOC PS 2:
 1. DOC PS 1 Plywood grades marked:
 - 1.1. Structural I C-D (Exposure 1).
 - 1.2. C-D (Exposure 1).
 2. DOC PS 2 Plywood grades marked:
 - 2.1. Structural I Sheathing (Exposure 1).
 - 2.2. Sheathing (Exposure 1).
 3. Where a major portion of the wall is exposed above ground and a better appearance is desired, the following plywood grades marked exterior are suitable:
 - 3.1. Structural I A-C, Structural I B-C or Structural I C-C (Plugged) in accordance with DOC PS 1.
 - 3.2. A-C Group 1, B-C Group 1, C-C (Plugged) Group 1 or MDO Group 1 in accordance with DOC PS 1.
 - 3.3. Single Floor in accordance with DOC PS 1 or DOC PS 2.
- b. Minimum thickness ¹⁵/₃₂ -inch, except crawl space sheathing shall have not less than ³/₈ -inch for face grain across studs 16 inches on center and maximum 2-foot depth of unequal fill.
- c. For this fill height, thickness and grade combination, panels that are continuous over less than three spans (across less than three stud spacings) require blocking 16 inches above the bottom plate. Offset adjacent blocks and fasten through studs with two 16d corrosion-resistant nails at each end.

404.2.4 Backfilling. Wood foundation walls shall not be backfilled until the basement floor and first floor have been constructed or the walls have been braced. For crawl space construction, backfill or bracing shall be installed on the interior of the walls prior to placing backfill on the exterior.

404.2.5 Drainage and dampproofing. Wood foundation basements shall be drained and dampproofed in accordance with Sections 405 and 406, respectively.

404.2.6 Fastening. Wood structural panel foundation wall sheathing shall be attached to framing in accordance with Table 602.3(1) and Section 402.1.1.

404.3 Wood sill plates. Wood sill plates shall be not less than 2-inch by 4-inch (51 mm by 102 mm) nominal lumber. Sill plate anchorage shall be in accordance with Sections 403.1.6 and 602.11.

404.4 Retaining walls. Retaining walls that are not laterally supported at the top and that retain in excess of 48 inches (1219 mm) of unbalanced fill, or retaining walls exceeding 24 inches (610 mm) in height that resist lateral loads in addition to soil, shall be designed in accordance with accepted engineering practice to ensure stability against overturning, sliding, excessive foundation pressure and water uplift. Retaining walls shall be designed for a safety factor of 1.5 against lateral sliding and overturning. This section shall not apply to foundation walls supporting buildings.

404.5 Precast concrete foundation walls.

404.5.1 Design. Precast concrete foundation walls shall be designed in accordance with accepted engineering practice. The design and manufacture of precast concrete foundation wall panels shall comply with the materials requirements of Section 402.3 or ACI 318. The panel design drawings shall be in accordance with Section 106.4.5.

404.5.2 Precast concrete foundation design drawings. Precast concrete foundation wall design drawings shall be submitted to the building official and approved prior to installation. Drawings shall include, at a minimum, the following information:

1. Design loading as applicable.
2. Footing design and material.
3. Concentrated loads and their points of application.
4. Soil bearing capacity.
5. Maximum allowable total uniform load.
6. Seismic design category.
7. Basic wind speed.

404.5.3 Identification. Precast concrete foundation wall panels shall be

identified by a certificate of inspection label issued by an approved inspection agency.

SECTION 405 FOUNDATION DRAINAGE

405.1 Concrete or masonry foundations. Drains shall be provided around concrete or masonry foundations that retain earth and enclose habitable or usable spaces located below grade. Drainage tiles, gravel or crushed stone drains, perforated pipe or other approved systems or materials shall be installed at or below the top of the footing or below the bottom of the slab and shall discharge by gravity or mechanical means into an approved drainage system *or other location that complies with the plumbing code*. Gravel or crushed stone drains shall extend not less than 1 foot (305 mm) beyond the outside edge of the footing and 6 inches (152 mm) above the top of the footing and be covered with an approved filter membrane material. The top of open joints of drain tiles shall be protected with strips of building paper. Except where otherwise recommended by the drain manufacturer, perforated drains shall be surrounded with an approved filter membrane or the filter membrane shall cover the washed gravel or crushed rock covering the drain. Drainage tiles or perforated pipe shall be placed on not less than 2 inches (51 mm) of washed gravel or crushed rock not less than one sieve size larger than the tile joint opening or perforation and covered with not less than 6 inches (152 mm) of the same material.

Exception: A drainage system is not required where the foundation is installed on well-drained ground or sand-gravel mixture soils according to the Unified Soil Classification System, Group I soils, as detailed in Table 405.1.

TABLE 405.1
PROPERTIES OF SOILS
CLASSIFIED ACCORDING TO THE UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL GROUP	UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOL	SOIL DESCRIPTION	DRAINAGE CHARACTERISTICS ^a	FROST-HEAVE POTENTIAL	VOLUME CHANGE POTENTIAL EXPANSION ^b
Group I	GW	Well-graded gravels, gravel sand mixtures, little or no fines	Good	Low	Low
	GP	Poorly graded gravels or gravel sand mixtures, little or no fines	Good	Low	Low
	SW	Well-graded sands, gravelly sands, little or no fines	Good	Low	Low
	SP	Poorly graded sands or gravelly sands, little or no fines	Good	Low	Low
	GM	Silty gravels, gravel-sand-silt mixtures	Good	Medium	Low
	SM	Silty sand, sand-silt mixtures	Good	Medium	Low
Group II	GC	Clayey gravels, gravel-sand-clay mixtures	Medium	Medium	Low
	SC	Clayey sands, sand-clay mixture	Medium	Medium	Low
	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	Medium	High	Low
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Medium	Medium	Medium to Low
Group III	CH	Inorganic clays of high plasticity, fat clays	Poor	Medium	High
	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	Poor	High	High
Group IV	OL	Organic silts and organic silty clays of low plasticity	Poor	Medium	Medium
	OH	Organic clays of medium to high plasticity, organic silts	Unsatisfactory	Medium	High
	Pt	Peat and other highly organic soils	Unsatisfactory	Medium	High

For SI: 1 inch = 25.4 mm.

- a. The percolation rate for good drainage is over 4 inches per hour, medium drainage is 2 inches to 4 inches per hour, and poor is less than 2 inches per hour.
- b. Soils with a low potential expansion typically have a plasticity index (*PI*) of 0 to 15, soils with a medium potential expansion have a *PI* of 10 to 35 and soils with a high potential expansion have a *PI* greater than 20.

405.1.1 Precast concrete foundation. Precast concrete walls that retain earth and enclose habitable or useable space located below-grade that rest on crushed stone footings shall have a perforated drainage pipe installed below the base of the wall on either the interior or exterior side of the wall, not less than 1 foot (305 mm) beyond the edge of the wall. If the exterior drainage pipe is used, an approved filter membrane material shall cover the pipe. The drainage system shall discharge, *by gravity or mechanical means*, into an approved *drainage system or other location that complies with the plumbing code*.

405.2 Wood foundations. Wood foundations enclosing habitable or usable spaces

located below grade shall be adequately drained in accordance with Sections 405.2.1 through 405.2.3.

405.2.1 Base. A porous layer of gravel, crushed stone or coarse sand shall be placed to a minimum thickness of 4 inches (102 mm) under the basement floor. Provision shall be made for automatic draining of this layer and the gravel or crushed stone wall footings.

405.2.2 Vapor retarder. A 6-mil-thick (0.15 mm) polyethylene vapor retarder shall be applied over the porous layer with the basement floor constructed over the polyethylene.

405.2.3 Drainage system. In other than Group I soils, a sump shall be provided to drain the porous layer and footings. The sump shall be not less than 24 inches (610 mm) in diameter or 20 inches square (0.0129 m²), shall extend not less than 24 inches (610 mm) below the bottom of the basement floor and shall be capable of positive gravity or mechanical drainage to remove any accumulated water. The drainage system shall discharge, *by gravity or mechanical means*, into an approved *drainage system or other location that complies with the plumbing code*.

405.3 Local supplemental Drainage System Requirements. *Local supplemental drainage system requirements shall be permitted in accordance with section 301.2.4.2. The discharge shall be by gravity or mechanical means into an approved drainage system or other location that complies with the Ohio Plumbing Code.*

SECTION 406 FOUNDATION WATERPROOFING AND DAMPPROOFING

406.1 Concrete and masonry foundation dampproofing. Except where required by Section 406.2 to be waterproofed, foundation walls that retain earth and enclose interior spaces and floors below grade shall be dampproofed from the higher of (a) the top of the footing or (b) 6 inches (152 mm) below the top of the basement floor, to the finished grade. Masonry walls shall have not less than ³/₈ -inch (9.5 mm) Portland cement parging applied to the exterior of the wall. The parging shall be dampproofed in accordance with one of the following:

1. Bituminous coating.
2. Three pounds per square yard (1.63 kg/m²) of acrylic modified cement.
3. One-eighth-inch (3.2 mm) coat of surface bonding cement complying with ASTM C887.
4. Any material permitted for waterproofing in Section 406.2.

5. Other approved methods or materials.

Exception: Parging of unit masonry walls is not required where a material is approved for direct application to the masonry.

Concrete walls shall be dampproofed by applying any one of the listed dampproofing materials or any one of the waterproofing materials listed in Section 406.2 to the exterior of the wall.

Exception: *Existing foundations shall not be required to be dampproofed where a supplemental interior foundation drainage system is installed and connected to a sump pump.*

406.2 Concrete and masonry foundation waterproofing. In areas where a high water table or other severe soil-water conditions are known to exist, exterior foundation walls that retain earth and enclose interior spaces and floors below grade shall be waterproofed from the higher of (a) the top of the footing or (b) 6 inches (152 mm) below the top of the basement floor, to the finished grade. Walls shall be water-proofed in accordance with one of the following:

1. Two-ply hot-mopped felts.
2. Fifty-five-pound (25 kg) roll roofing.
3. Six-mil (0.15 mm) polyvinyl chloride.
4. Six-mil (0.15 mm) polyethylene.
5. Forty-mil (1 mm) polymer-modified asphalt.
6. Sixty-mil (1.5 mm) flexible polymer cement.
7. One-eighth-inch (3 mm) cement-based, fiber-reinforced, waterproof coating.
8. Sixty-mil (1.5 mm) solvent-free liquid-applied synthetic rubber.

All joints in membrane waterproofing shall be lapped and sealed with an adhesive compatible with the membrane.

Exception:

1. Organic-solvent-based products such as hydrocarbons, chlorinated hydrocarbons, ketones and esters shall not be used for ICF walls with expanded polystyrene form material. Use of plastic roofing cements, acrylic coatings, latex coatings, mortars and pargings to seal ICF walls is permitted. Cold-setting asphalt or hot asphalt shall conform to Type C of ASTM D449. Hot asphalt shall be applied at a temperature of less than 200°F (93°C).
2. *Where existing exterior or interior dampproofing exists, no waterproofing shall be required.*
3. *Where an existing home has a supplemental interior foundation drainage system connected to a sump pump, no waterproofing shall be*

required.

406.3 Dampproofing for wood foundations. Wood foundations enclosing habitable or usable spaces located below grade shall be dampproofed in accordance with Sections 406.3.1 through 406.3.4.

406.3.1 Panel joint sealed. Plywood panel joints in the foundation walls shall be sealed full length with a caulking compound capable of producing a moisture-proof seal under the conditions of temperature and moisture content at which it will be applied and used.

406.3.2 Below-grade moisture barrier. A 6-mil-thick (0.15 mm) polyethylene film shall be applied over the below-grade portion of exterior foundation walls prior to backfilling. Joints in the polyethylene film shall be lapped 6 inches (152 mm) and sealed with adhesive. The top edge of the polyethylene film shall be bonded to the sheathing to form a seal. Film areas at grade level shall be protected from mechanical damage and exposure by a pressure-preservative treated lumber or plywood strip attached to the wall several inches above finished grade level and extending approximately 9 inches (229 mm) below grade. The joint between the strip and the wall shall be caulked full length prior to fastening the strip to the wall. Where approved, other coverings appropriate to the architectural treatment shall be permitted to be used. The polyethylene film shall extend down to the bottom of the wood footing plate but shall not overlap or extend into the gravel or crushed stone footing.

406.3.3 Porous fill. The space between the excavation and the foundation wall shall be backfilled with the same material used for footings, up to a height of 1 foot (305 mm) above the footing for well-drained sites, or one-half the total backfill height for poorly drained sites. The porous fill shall be covered with strips of 30-pound (13.6 kg) asphalt paper or 6-mil (0.15 mm) polyethylene to permit water seepage while avoiding infiltration of fine soils.

406.3.4 Backfill. The remainder of the excavated area shall be backfilled with the same type of soil as was removed during the excavation.

406.4 Precast concrete foundation system dampproofing. Except where required by Section 406.2 to be waterproofed, precast concrete foundation walls enclosing habitable or useable spaces located below grade shall be dampproofed in accordance with Section 406.1.

406.4.1 Panel joints sealed. Precast concrete foundation panel joints shall be sealed full height with a sealant meeting ASTM C920, Type S or M, Grade NS, Class 25, Use NT, M or A. Joint sealant shall be installed in accordance with the manufacturer's instructions.

SECTION 407 COLUMNS

407.1 Wood column protection. Wood columns shall be protected against decay as set forth in Section 317.

407.2 Steel column protection. All surfaces (inside and outside) of steel columns shall be given a shop coat of rust inhibitive paint, except for corrosion-resistant steel and steel treated with coatings to provide corrosion resistance.

407.3 Structural requirements. The columns shall be restrained to prevent lateral displacement at the bottom end. Wood columns shall be not less in nominal size than 4 inches by 4 inches (102 mm by 102 mm). Steel columns shall be not less than 3-inch-diameter (76 mm) Schedule 40 pipe manufactured in accordance with ASTM A53 Grade B or approved equivalent.

Exception: In Seismic Design Categories A, B and C, columns not more than 48 inches (1219 mm) in height on a pier or footing are exempt from the bottom end lateral displacement requirement within under-floor areas enclosed by a continuous foundation.

SECTION 408 UNDER-FLOOR SPACE

408.1 Ventilation. The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls. The minimum net area of ventilation openings shall be not less than 1 square foot (0.0929 m²) for each 150 square feet (14 m²) of under-floor space area, unless the ground surface is covered by a Class 1 vapor retarder material. Where a Class 1 vapor retarder material is used, the minimum net area of ventilation openings shall be not less than 1 square foot (0.0929 m²) for each 1,500 square feet (140 m²) of under-floor space area. One such ventilating opening shall be within 3 feet (914 mm) of each corner of the building.

408.2 Openings for under-floor ventilation. The minimum net area of ventilation openings shall be not less than 1 square foot (0.0929 m²) for each 150 square feet

(14 m²) of under-floor area. One ventilation opening shall be within 3 feet (915 mm) of each corner of the building. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed ¼-inch (6.4 mm):

1. Perforated sheet metal plates not less than 0.070 -inch (1.8 mm) thick
2. Expanded sheet metal plates not less than 0.047 -inch (1.2 mm) thick.
3. Cast-iron grill or grating
4. Extruded load-bearing brick vents
5. Hardware cloth of 0.035 -inch (0.89 mm) wire or heavier
6. Corrosion resistant wire mesh, with the least dimension being 1/8 -inch (3.2 mm) thick.

Exception: The total area of ventilation openings shall be permitted to be reduced to 1/1,500 of the under-floor area where the ground surface is covered with an approved Class I vapor retarder material and the required openings are placed to provide cross ventilation of the space. The installation of operable louvers shall not be permitted.

408.3 Unvented crawl space. Ventilation openings in under-floor spaces specified in Sections 408.1 and 408.2 shall not be required where the following items are provided:

1. Exposed earth is covered with a continuous Class I vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall or insulation.
2. One of the following is provided for the under-floor space:
 - 2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of crawl space floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section 1102.2.11 of this code.
 - 2.2. Conditioned air supply sized to deliver at a rate equal to 1 cubic foot per minute (0.47 L/s) for each 50 square feet (4.7 m²) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section 1102.2.11 of this code.
 - 2.3. Plenum in existing structures complying with Section 1601.5, if under-floor space is used as a plenum.
 - 2.4. Dehumidification sized to provide 70 pints (33 liters) of moisture removal per day for every 1,000 square feet (93 m²) of crawl space

floor area.

408.4 Access. Access shall be provided to all under-floor spaces. Access openings through the floor shall be not smaller than 18 inches by 24 inches (457 mm by 610 mm). Openings through a perimeter wall shall be not less than 16 inches by 24 inches (407 mm by 610 mm). Where any portion of the of the through-wall access is below grade, an areaway not less than 16 inches by 24 inches (407 mm by 610 mm) shall be provided. The bottom of the areaway shall be below the threshold of the access opening. Through wall access openings shall not be located under a door to the residence. See Section 1305.1.4 for access requirements where mechanical equipment is located under floors.

408.5 Removal of debris. The under-floor grade shall be cleaned of all vegetation and organic material. Wood forms used for placing concrete shall be removed before a building is occupied or used for any purpose. Construction materials shall be removed before a building is occupied or used for any purpose.

408.6 Finished grade. The finished grade of under-floor surface shall be permitted to be located at the bottom of the footings; however, where there is evidence that the ground-water table can rise to within 6 inches (152 mm) of the finished floor at the building perimeter or where there is evidence that the surface water does not readily drain from the building site, the grade in the under-floor space shall be as high as the outside finished grade, unless an approved drainage system is provided.

408.7 Flood resistance. For buildings located in flood hazard areas as established in Table 301.2(1) *unless otherwise approved by the local flood plain administrator:*

1. Walls enclosing the under-floor space shall be provided with flood openings in accordance with Section 322.2.2.
2. The finished ground level of the under-floor space shall be equal to or higher than the outside finished ground level on at least one side.

Exception: Under-floor spaces that meet the requirements of FEMA TB 11-1.

SECTION 409

FOUNDATION INSULATION

409.1 Protection of exposed foundation insulation. *Foundation walls and the edges of slab-on-grade floors with exterior applied insulation shall have a rigid, opaque and weather-resistant protective covering to prevent the degradation of thermal performance. The protective covering shall cover the exposed insulation*

and extend to a minimum of 6 inches (153 mm) below grade.

DRAFT

4101:8-14-01 Heating and cooling equipment and appliances.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

SECTION 1401 GENERAL

1401.1 Installation. Heating and cooling equipment and appliances shall be installed in accordance with the manufacturer's instructions and the requirements of this code.

1401.2 Access. Heating and cooling equipment and appliances shall be located with respect to building construction and other equipment and appliances to permit maintenance, servicing and replacement. Clearances shall be maintained to permit cleaning of heating and cooling surfaces; replacement of filters, blowers, motors, controls and vent connections; lubrication of moving parts; and adjustments.

Exception: Access shall not be required for ducts, piping, or other components approved for concealment.

1401.3 Equipment and appliance sizing. Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S or other approved sizing methodologies based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

Exception: Heating and cooling equipment and appliance sizing shall not be limited to the capacities determined in accordance with Manual S where either of the following conditions applies:

1. The specified equipment or appliance utilizes multi- stage technology or variable refrigerant flow technology and the loads calculated in accordance with the approved heating and cooling calculation methodology are within the range of the manufacturer's published capacities for that equipment or appliance.
2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with the approved heating and cooling calculation methodology and the next larger standard size unit is

specified.

1401.4 Outdoor installations. Equipment and appliances installed outdoors shall be listed and labeled for outdoor installation. Supports and foundations shall prevent excessive vibration, settlement or movement of the equipment. Supports and foundations shall be in accordance with Section 1305.1.3.1.

1401.5 Flood hazard. In flood hazard areas as established by Table 301.2(1), heating and cooling equipment and appliances shall be located or installed in accordance with Section 322.1.6.

SECTION 1402 CENTRAL FURNACES

1402.1 General. Oil-fired central furnaces shall conform to ANSI/UL 727. Electric furnaces shall conform to UL 1995 *or UL/CSA 60335-2-40*.

1402.2 Clearances. Clearances shall be provided in accordance with the listing and the manufacturer's installation instructions.

1402.3 Combustion air. Combustion air shall be supplied in accordance with Chapter 17. Combustion air openings shall be unobstructed for a distance of not less than 6 inches (152 mm) in front of the openings.

SECTION M1403 HEAT PUMP EQUIPMENT

1403.1 Heat pumps. Electric heat pumps shall be listed and labeled in accordance with UL 1995 or UL/CSA/ANCE 60335-2-40.

SECTION 1404 REFRIGERATION COOLING EQUIPMENT

1404.1 Compliance. Refrigeration cooling equipment shall comply with Section 1411.

SECTION 1405 BASEBOARD CONVECTORS

1405.1 General. Electric baseboard convectors shall be installed in accordance with the manufacturer's instructions and *NFPA 70 as modified by* Chapter 34.

Electric baseboard heaters shall be listed and labeled in accordance with UL 1042.

SECTION 1406 RADIANT HEATING SYSTEMS

1406.1 General. Electric radiant heating systems shall be installed in accordance with the manufacturer's instructions and *NFPA 70 as modified by* Chapter 34 and shall be listed for the application.

1406.2 Clearances. Clearances for radiant heating panels or elements to any wiring, outlet boxes and junction boxes used for installing electrical devices or mounting luminaires shall comply with *NFPA 70 as modified by* Chapter 34.

1406.3 Installation of radiant panels. Radiant panels installed on wood framing shall conform to the following requirements:

1. Heating panels shall be installed parallel to framing members and secured to the surface of framing members or mounted between framing members.
2. Mechanical fasteners shall penetrate only the unheated portions provided for this purpose. Panels shall not be fastened at any point closer than $\frac{1}{4}$ inch (6.4 mm) to an element. Other methods of attachment of the panels shall be in accordance with the panel manufacturer's instructions.
3. Unless listed and labeled for field cutting, heating panels shall be installed as complete units.

1406.4 Installation in concrete or masonry. Radiant heating systems installed in concrete or masonry shall conform to the following requirements:

1. Radiant heating systems shall be identified as being suitable for the installation, and shall be secured in place as specified in the manufacturer's installation instructions.
2. Radiant heating panels or radiant heating panel sets shall not be installed where they bridge expansion joints unless protected from expansion and contraction.

1406.5 Finish surfaces. Finish materials installed over radiant heating panels or systems shall be installed in accordance with the manufacturer's instructions. Surfaces shall be secured so that nails or other fastenings do not pierce the radiant heating elements.

SECTION 1407 DUCT HEATERS

1407.1 General. Electric duct heaters shall be installed in accordance with the

manufacturer's instructions and *NFPA 70 as modified by* Chapter 34. Electric duct heaters shall comply with UL 1996.

1407.2 Installation. Electric duct heaters shall be installed so that they will not create a fire hazard. Class 1 ducts, duct coverings and linings shall be interrupted at each heater to provide the clearances specified in the manufacturer's installation instructions. Such interruptions are not required for duct heaters listed and labeled for zero clearance to combustible materials. Insulation installed in the immediate area of each heater shall be classified for the maximum temperature produced on the duct surface.

1407.3 Installation with heat pumps and air conditioners. Duct heaters located within 4 feet (1219 mm) of a heat pump or air conditioner shall be listed and labeled for such installations. The heat pump or air conditioner shall additionally be listed and labeled for such duct heater installations.

1407.4 Access. Duct heaters shall be located to allow access for servicing, and clearance shall be maintained to permit adjustment, servicing and replacement of controls and heating elements.

1407.5 Fan interlock. The fan circuit shall be provided with an interlock to prevent heater operation when the fan is not operating.

SECTION 1408 VENTED FLOOR FURNACES

1408.1 General. Oil-fired vented floor furnaces shall comply with UL 729 and shall be installed in accordance with their listing, the manufacturer's instructions and the requirements of this code.

1408.2 Clearances. Vented floor furnaces shall be installed in accordance with their listing and the manufacturer's instructions.

1408.3 Location. Location of floor furnaces shall conform to the following requirements:

1. Floor registers of floor furnaces shall be installed not less than 6 inches (152 mm) from a wall.
2. Wall registers of floor furnaces shall be installed not less than 6 inches (152 mm) from the adjoining wall at inside corners.
3. The furnace register shall be located not less than 12 inches (305 mm) from doors in any position, draperies or similar combustible objects.

4. The furnace register shall be located not less than 5 feet (1524 mm) below any projecting combustible materials.
5. The floor furnace burner assembly shall not project into an occupied under-floor area.
6. The floor furnace shall not be installed in concrete floor construction built on grade.
7. The floor furnace shall not be installed where a door can swing within 12 inches (305 mm) of the grille opening.

1408.4 Access. An opening in the foundation not less than 18 inches by 24 inches (457 mm by 610 mm), or a trap door not less than 22 inches by 30 inches (559 mm by 762 mm) shall be provided for access to a floor furnace. The opening and passageway shall be large enough to allow replacement of any part of the equipment.

1408.5 Installation. Floor furnace installations shall conform to the following requirements:

1. Thermostats controlling floor furnaces shall be located in the room in which the register of the floor furnace is located.
2. Floor furnaces shall be supported independently of the furnace floor register.
3. Floor furnaces shall be installed not closer than 6 inches (152 mm) to the ground. The minimum clearance shall be 2 inches (51 mm), where the lower 6 inches (152 mm) of the furnace is sealed to prevent water entry.
4. Where excavation is required for a floor furnace installation, the excavation shall extend 30 inches (762 mm) beyond the control side of the floor furnace and 12 inches (305 mm) beyond the remaining sides. Excavations shall slope outward from the perimeter of the base of the excavation to the surrounding grade at an angle not exceeding 45 degrees (0.79 rad) from horizontal.
5. Floor furnaces shall not be supported from the ground.

SECTION 1409

VENTED WALL FURNACES

1409.1 General. Oil-fired vented wall furnaces shall comply with UL 730 and shall be installed in accordance with their listing, the manufacturer's instructions and the requirements of this code.

1409.2 Location. The location of vented wall furnaces shall conform to the following requirements:

1. Vented wall furnaces shall be located where they will not cause a fire hazard to walls, floors, combustible furnishings or doors. Vented wall furnaces installed between bathrooms and adjoining rooms shall not circulate air from bathrooms to other parts of the building.
2. Vented wall furnaces shall not be located where a door can swing within 12 inches (305 mm) of the furnace air inlet or outlet measured at right angles to the opening. Doorstops or door closers shall not be installed to obtain this clearance.

1409.3 Installation. Vented wall furnace installations shall conform to the following requirements:

1. Required wall thicknesses shall be in accordance with the manufacturer's installation instructions.
2. Ducts shall not be attached to a wall furnace. Casing extensions or boots shall be installed only where listed as part of a listed and labeled appliance
3. A manual shutoff valve shall be installed ahead of all controls.

1409.4 Access. Vented wall furnaces shall be provided with access for cleaning of heating surfaces; removal of burners; replacement of sections, motors, controls, filters and other working parts; and for adjustments and lubrication of parts requiring such attention. Panels, grilles and access doors that must be removed for normal servicing operations shall not be attached to the building construction.

SECTION 1410 VENTED ROOM HEATERS

1410.1 General. Vented room heaters shall be tested in accordance with ASTM E1509 for pellet-fuel burning, UL 896 for oil-fired or UL 1482 for solid fuel-fired and installed in accordance with their listing, the manufacturer's installation instructions and the requirements of this code.

1410.2 Floor mounting. Room heaters shall be installed on noncombustible floors or approved assemblies constructed of noncombustible materials that extend not less than 18 inches (457 mm) beyond the appliance on all sides.

Exceptions:

1. Listed room heaters shall be installed on noncombustible floors, assemblies constructed of noncombustible materials or floor protectors listed and labeled in accordance with UL 1618. The materials and dimensions shall be in accordance with the appliance manufacturer's instructions.
2. Room heaters listed for installation on combustible floors without floor

protection shall be installed in accordance with the appliance manufacturer's instructions.

SECTION 1411 HEATING AND COOLING EQUIPMENT

1411.1 Approved refrigerants. Refrigerants used in direct refrigerating systems shall conform to the applicable provisions of ANSI/ASHRAE 34.

1411.2 Refrigeration coils in warm-air furnaces. Where a cooling coil is located in the supply plenum of a warm-air furnace, the furnace blower shall be rated at not less than 0.5 -inch water column (124 Pa) static pressure unless the furnace is listed and labeled for use with a cooling coil. Cooling coils shall not be located upstream from heat exchangers unless listed and labeled for such use. Conversion of existing furnaces for use with cooling coils shall be permitted provided that the furnace will operate within the temperature rise specified for the furnace.

1411.3 Condensate disposal. Condensate from cooling coils and evaporators shall be conveyed from the drain pan outlet to an approved place of disposal. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than $\frac{1}{8}$ unit vertical in 12 units horizontal (1-percent slope). Condensate shall not discharge into a street, alley or other area where it would cause a nuisance.

1411.3.1 Auxiliary and secondary drain systems. In addition to the requirements of Section 1411.3, a secondary drain or auxiliary drain pan shall be required for each cooling or evaporator coil where damage to any building components will occur as a result of overflow from the equipment drain pan or stoppage in the condensate drain piping. Such piping shall maintain a minimum horizontal slope in the direction of discharge of not less than $\frac{1}{8}$ unit vertical in 12 units horizontal (1-percent slope). Drain piping shall be not less than $\frac{3}{4}$ -inch (19 mm) nominal pipe size. One of the following methods shall be used:

1. An auxiliary drain pan with a separate drain shall be installed under the coils on which condensation will occur. The auxiliary pan drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The pan shall have a minimum depth of 1.5 inches (38 mm), shall be not less than 3 inches (76 mm) larger than the unit or the coil dimensions in width and length and shall be constructed of corrosion-resistant material. Galvanized sheet steel pans shall have a minimum thickness of not less than 0.0236-inch

(0.6010 mm) (No. 24 Gage). Nonmetallic pans shall have a minimum thickness of not less than 0.0625 inch (1.6 mm).

2. A separate overflow drain line shall be connected to the drain pan installed with the equipment. This overflow drain shall discharge to a conspicuous point of disposal to alert occupants in the event of a stoppage of the primary drain. The overflow drain line shall connect to the drain pan at a higher level than the primary drain connection.
3. An auxiliary drain pan without a separate drain line shall be installed under the coils on which condensation will occur. This pan shall be equipped with a water level detection device conforming to UL 508 that will shut off the equipment served prior to overflow of the pan. The pan shall be equipped with a fitting to allow for drainage. The auxiliary drain pan shall be constructed in accordance with Item 1 of this section.
4. A water-level detection device conforming to UL 508 shall be installed that will shut off the equipment served in the event that the primary drain is blocked. The device shall be installed in the primary drain line, the overflow drain line or the equipment-supplied drain pan, located at a point higher than the primary drain line connection and below the overflow rim of such pan.

1411.3.1.1 Water-level monitoring devices. On down-flow units and other coils that do not have secondary drain or provisions to install a secondary or auxiliary drain pan, a water-level monitoring device shall be installed inside the primary drain pan. This device shall shut off the equipment served in the event that the primary drain becomes restricted. Devices shall not be installed in the drain line.

1411.3.2 Drain pipe materials and sizes. Components of the condensate disposal system shall be ABS, cast iron, copper, cross-linked polyethylene, CPVC, galvanized steel, PE-RT, polyethylene, polypropylene or PVC pipe or tubing. Components shall be selected for the pressure and temperature rating of the installation. Joints and connections shall be made in accordance with the applicable provisions of Chapter 25. Condensate waste and drain line size shall be not less than $\frac{3}{4}$ -inch (19 mm) nominal diameter from the drain pan connection to the place of condensate disposal. Where the drain pipes from more than one unit are manifolded together for condensate drainage, the pipe or tubing shall be sized in accordance with an approved method.

1411.3.3 Drain line maintenance. Condensate drain lines shall be configured to permit the clearing of blockages and performance of maintenance without requiring the drain line to be cut.

1411.3.4 Appliances, equipment and insulation in pans. Where appliances, equipment or insulation are subject to water damage when auxiliary drain pans fill, those portions of the appliances, equipment and insulation shall be installed above the flood level rim of the pan. Supports located inside of the pan to support the appliance or equipment shall be water resistant and approved.

1411.4 Condensate pumps. Condensate pumps located in uninhabitable spaces, such as attics and crawl spaces, shall be connected to the appliance or equipment served such that when the pump fails, the appliance or equipment will be prevented from operating. Pumps shall be installed in accordance with the manufacturer's instructions.

1411.5 Auxiliary drain pan. Category IV condensing appliances shall have an auxiliary drain pan where damage to any building component will occur as a result of stoppage in the condensate drainage system. These pans shall be installed in accordance with the applicable provisions of Section 1411.3.

Exception: Fuel-fired appliances that automatically shut down operation in the event of a stoppage in the condensate drainage system.

1411.6 Insulation of refrigerant piping. Piping and fittings for refrigerant vapor (suction) lines shall be insulated with insulation having a thermal resistivity of not less than R-4 and having external surface permeance not exceeding 0.05 perm [2.87 ng/(sm²Pa)] when tested in accordance with ASTM E96.

1411.7 Location and protection of refrigerant piping. Refrigerant piping installed within 1-1/2 inches (38 mm) of the underside of roof decks shall be protected from damage caused by nails and other fasteners.

1411.8 Locking access port caps. Refrigerant circuit access ports located outdoors shall be fitted with locking-type tamper-resistant caps or shall be otherwise secured to prevent unauthorized access.

SECTION 1412 ABSORPTION COOLING EQUIPMENT

1412.1 Approval of equipment. Absorption systems shall be installed in accordance with the manufacturer's instructions. Absorption equipment shall comply with UL 1995 or UL/CSA/ANCE 60335-2-40.

1412.2 Condensate disposal. Condensate from the cooling coil shall be disposed of as provided in Section 1411.3.

1412.3 Insulation of piping. Refrigerant piping, brine piping and fittings within a building shall be insulated to prevent condensation from forming on piping.

1412.4 Pressure-relief protection. Absorption systems shall be protected by a pressure-relief device. Discharge from the pressure-relief device shall be located where it will not create a hazard to persons or property.

SECTION 1413 EVAPORATIVE COOLING EQUIPMENT

1413.1 General. Evaporative cooling equipment and appliances shall comply with UL 1995 or UL/CSA/ANCE 60335-2-40 and shall be installed:

1. In accordance with the manufacturer's instructions.
2. On level platforms in accordance with Section 1305.1.3.1.
3. So that openings in exterior walls are flashed in accordance with Section 703.4.
4. So as to protect the potable water supply in accordance with *the plumbing code and Chapter 25*.
5. So that air intake opening locations are in accordance with Section 303.5.1.

SECTION 1414 FIREPLACE STOVES

1414.1 General. Fireplace stoves shall be listed, labeled and installed in accordance with the terms of the listing. Fireplace stoves shall be tested in accordance with UL 737.

1414.2 Hearth extensions. Hearth extensions for fireplace stoves shall be installed in accordance with the listing of the fireplace stove. The supporting structure for a hearth extension for a fireplace stove shall be at the same level as the supporting structure for the fireplace unit. The hearth extension shall be readily distinguishable from the surrounding floor area.

SECTION 1415 MASONRY HEATERS

1415.1 General. Masonry heaters shall be constructed in accordance with Section 1002.

4101:8-25-01 Plumbing Administration.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 25 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 2501.1 as follows:

(1) Replace the phrase “establish the general administrative requirements applicable to plumbing systems and inspection requirements of this code.” with “regulate the design, construction, installation, testing, and operation of the plumbing in detached one-, two-, or three-family dwellings.”

(2) Add new section 2501.1.1 to read as follows:

2501.1.1 Compliance paths. Compliance shall be demonstrated by meeting the requirements of one of the following options:

- 1. Chapters 25 through 33 of this code.*
- 2. The Ohio Plumbing Code as referenced in Chapter 44 of this code and as amended by Section 2501.1.3 shall cover the installation, testing and operation of the plumbing in buildings within the scope of this code.*

(3) Add new section 2501.1.2 to read as follows:

2501.1.2 Traps, Interceptors, and Separators. The rules of the Ohio Environmental Protection Agency and the Ohio Department of Health may also govern the design, installation, and discharge of pretreatment devices such as traps, interceptors, and separators. Discharge of such devices are to be conveyed to an approved place of disposal.

(4) Add new section 2501.1.3 to read as follows:

2501.1.3 Modifications to the “Ohio Plumbing Code”. The following sections of the “Ohio Plumbing Code” shall be deleted and replaced with the following language:

421.5.2 Shower lining requirements. *Floors under shower compartments, except where prefabricated receptors have been provided, shall be lined and made water tight utilizing material complying with Sections 421.5.2.1 through 421.5.2.6. Such liners shall turn up on all sides at least 2 inches (51 mm) above the finished threshold level. Liners shall be recessed and fastened to an approved backing so as not to occupy the space required for wall covering, and shall not be nailed or perforated at any point less than 1 inch (25 mm) above the finished threshold. Liners shall be pitched one-fourth unit vertical in 12 units horizontal (2-percent slope) and shall be sloped toward the fixture drains and be securely fastened to the waste outlet at the seepage entrance, making a water-tight joint between the liner and the outlet.*

Exceptions:

- 1. Floor surfaces under shower heads provided for rinsing laid directly on the ground are not required to comply with this section.*
- 2. Where a sheet-applied, load-bearing, bonded, waterproof membrane is installed as the shower lining, the membrane shall not be required to be recessed.*

1002.4 Trap seals. *Each fixture trap shall have a liquid seal of not less than 2 inches (51 mm) and not more than 4 inches (102 mm), or deeper for special designs relating to accessible fixtures. Where a trap seal is subject to loss by evaporation, a trap seal primer valve shall be installed. Trap seal primer valves shall connect to the trap at a point above the level of the trap seal. A trap seal primer valve shall conform to ASSE 1018 or ASSE 1044.*

Exceptions:

- 1. Where a trap is supplied with water on a regular basis, a trap seal primer valve shall not be required.*
- 2. A trap seal primer valve is not required in garage floor drains in one-, two- and three-family dwellings.*

(B) Modify section 2503.3 as follows:

(1) Replace the heading “Responsibility of permittee.” with “Responsibility.”

(2) Replace the phrase “by the permittee.” with “by the owner or authorized agent.”

(C) Replace section 2503.4 with the following:

2503.4 Building sewer testing. Deleted.

(D) Replace section 2503.5 in its entirety with the following:

2503.5 Drain, waste and vent systems testing. Rough-in and finished plumbing installations of drain, waste and vent systems shall be tested in accordance with Sections 2503.5.1 and 2503.5.2.

2503.5.1 Rough plumbing. *Drainage and vent rough-in test. Drainage and vent piping and fittings are to be tested prior to the installation of the plumbing fixtures and prior to the installation of wall and ceiling coverings to verify the integrity of the system in accordance with one of the following methods prescribed in Section 2503.5.1.1, 2503.5.1.2, or 2503.5.1.3:*

2503.5.1.1 Drainage and vent rough-in water test. *A water test is to be applied to the drainage system either in its entirety or in sections. If applied to the entire system, all openings in the piping are to be tightly closed, except the highest opening, and the system is to be filled with water to the point of overflow. If the system is tested in sections, each opening is to be tightly plugged except the highest openings of the section under test, and each section is to be filled with water, but sections are not to be tested with less than a 10-foot (3048 mm) head of water. In testing successive sections, not less than the upper 10 feet (3048 mm) of the next preceding section is to be tested so that no joint or pipe in the building, except the uppermost 10 feet (3048 mm) of the system, is to have been submitted to a test of less than a 10-foot (3048 mm) head of water. This pressure is to be held for not less than 15 minutes. The system is to be tight at all points.*

2503.5.1.2 Drainage and vent rough-in air test. *When permitted by the manufacturer of the piping, fittings, and solvent cement (if part of the plumbing system), an air test is to be made by forcing air into the system until there is a uniform gauge pressure of 5 psi (34.5 kPa) or sufficient to balance a 10-inch (254 mm) column of mercury. This pressure is to be held for a test period of not less than 15 minutes. Any adjustments to the test pressure required because of changes in ambient temperatures or the seating of gaskets are to be made prior to the beginning of the test period. Testing is to be done with dual pressure relief valves rated for 7.5 psig.*

2503.5.1.3 Alternative drainage and vent rough-in test. When permitted by the manufacturer of the piping, fittings, and solvent cement (if part of the plumbing system), an alternative method of testing the drainage and vent system, such as compressed gas or vacuum, may be permitted to meet the drainage and vent rough-in test requirements of this code as long as the test is conducted strictly in accordance with the requirements published in the manufacturer's installation instructions.

2503.5.2 Finished plumbing. After the plumbing fixtures have been set and their traps filled with water, the entire drainage system is to be subjected to one of the following final tests as prescribed by the building official:

1. Visual and operational final test. All plumbing fixtures are to be operated and a visual inspection of accessible piping and joints are to be performed to determine that there are no visible leaks.
2. Drainage and vent final test. The final test of the completed drainage and vent systems is to be made, after the fixtures are connected, as follows:
 - 2.1 Close all stack openings;
 - 2.2 A manometer tube is to be placed through a trap seal to the system side and water is to be added to a fixture until an equivalent of at least 1-inch water column (248.8 Pa) is read on the manometer gauge or water can. Water may be added to a water closet bowl or trap tailpiece extension until the water level is at least 1 inch (25 mm) higher than the original trap seal;
 - 2.3 Maintain the initial water column for fifteen (15) minutes;
 - 2.4 After fifteen (15) minutes, the system is to be separated at a trap seal, air admittance valve (AAV), or other means as directed by the plumbing inspector for verification that the entire system is interconnected.
3. Alternative drainage and vent final test. Any other testing method equal to the 1 inch water column (248.8 Pa). Except as provided for in Section 312.4.2, compressed or stored air may be used only if permitted by the manufacturer of piping, fittings, and solvent cement (if part of the plumbing system).

(E) Replace section 2503.6 with the following:

2503.6 Shower liner test. Floors under shower compartments, except where prefabricated receptors have been provided, shall be lined and made water

tight utilizing material complying with Sections 2709.2.1 through 2709.2.4 of the plumbing code. Such liners shall turn up on all sides at least 2 inches (51 mm) above the finished threshold level. Liners shall be recessed and fastened to an approved backing so as not to occupy the space required for wall covering, and shall not be nailed or perforated at any point less than 1 inch (25 mm) above the finished threshold. Liners shall be pitched one-fourth unit vertical in 12 units horizontal (2-percent slope) and shall be sloped toward the fixture drains and be securely fastened to the waste outlet at the seepage entrance, making a water-tight joint between the liner and the outlet.

(F) Replace section 2503.7 in its entirety with the following:

2503.7 Water-supply system testing. Upon completion of a section of or the entire water supply system, or portion completed, is to be tested to verify the integrity of the system in accordance with one of the following methods prescribed in Sections 2503.7.1 or 2503.7.2:

2503.7.1 Water supply working pressure test. A water pressure test is to be performed to prove the system water-tight. The test pressure is to be not less than the working pressure under which the system will be used, and the system will hold the test pressure for at least 15 minutes. The water utilized for tests is to be obtained from a potable source of supply.

2503.7.2 Water supply air test. When permitted by the manufacturer of the piping, fittings, and solvent cement (if part of the plumbing system), an air test is to be performed to prove the system airtight. The test pressure is to be not less than 50 psi (344 kPa) and the system will hold the test pressure for at least 15 minutes.

(G) Replace section 2503.8 in its entirety with the following:

2503.8 Inspection and testing of isolation backflow prevention devices required by this code. Inspection and testing of isolation backflow prevention devices shall comply with Sections 2503.8.1 and 2503.8.2.

Exception: Inspection and testing requirements for containment backflow prevention devices required by the water supplier is to be in accordance with rule 3745-95-06 of the Administrative Code and enforced by the water supplier.

2503.8.1 Inspections. Inspections shall be made of backflow prevention assemblies to determine whether they are operable.

2503.8.2 Testing. Reduced pressure principle, double check, double check detector and pressure vacuum breaker backflow preventer assemblies shall be tested at the time of installation, immediately after repairs or relocation and every year thereafter. *The testing procedure shall be performed in accordance with one of the following standards: ASSE 5013, ASSE 5015, ASSE 5020, ASSE 5047, ASSE 5048, ASSE 5052, ASSE 5056, CSA B64.10 or CSA B64.10.1. Test gauges shall comply with ASSE 1064.*

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4101:8-26-01 General Plumbing Requirements.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 26 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 2601.2 as follows:

Replace the exception with the following:

Exception: Bathtubs, showers, lavatories, clothes washers and laundry trays shall not be required to discharge to the sanitary drainage system where such fixtures discharge to recycled water systems approved by the Ohio Environmental Protection Agency in accordance with Section 3745-42 of the Ohio Administrative Code or approved by the Ohio Department of Health in accordance with Section 3701-28 of the Ohio Administrative Code.

(B) Replace section 2602.1 in its entirety with the following:

2602.1 General. The water-distribution system of any building or premises where plumbing fixtures are installed shall be connected to a public water supply. Where a public water-supply system is not available, or connection to the supply is not feasible, an individual water supply shall be provided. Individual water supplies shall be constructed and installed in accordance with the applicable state and local laws.

Sanitary drainage piping from plumbing fixtures in buildings and sanitary drainage piping systems from premises shall be connected to a public sewer. Where a public sewer is not available, the sanitary drainage piping and systems shall be connected to a private sewage disposal system in compliance with state or local requirements.

2602.1.1 Recycled water systems. Sanitary drainage piping and systems that convey only the discharge from bathtubs, showers, lavatories, clothes washers and laundry trays may be connected to a recycled water system where approved by the Ohio Environmental Protection Agency in accordance with

Section 3745-42 of the Ohio Administrative Code or approved by the Ohio Department of Health in accordance with Section 3701-28 of the Ohio Administrative Code.

(C) Replace section 2603.5.1 with the following:

2603.5.1 Sewer depth. Deleted.

(D) Modify section 2609.3 as follows:

Replace the phrase “be third-party certified as conforming to NSF 14” with “be listed by an approved agency”

(E) Modify section 2609.4 as follows:

Replace the phrase “be listed by a third-party certification agency” with “be listed by an approved agency”

4101:8-27-01 Plumbing Fixtures.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 27 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Add a sentence at the end of section 2709.3 to read as follows:

The assembly shall be tested in accordance with Section 2503.6 when required by the shower liner manufacturer's installation instructions.

4101:8-28-01 Water Heaters.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 28 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Add new section 2800 and its subsection to read as follows:

SECTION 2800 **SCOPE**

2800.1 Scope. *The provisions of this chapter shall govern the materials, design, and installation of water heaters and the related safety devices and appurtenances.*

Exception: *Water heaters are to comply with the Ohio Boiler and Pressure Vessels rules, Chapters 4101:4-1 to 4101:4-10 of the Ohio Administrative Code, when any of the following limitations are exceeded:*

- 1. Heat input of 200,000 BTU per hour;*
- 2. Water temperature of 210°F (99°C);*
- 3. Nominal water containing capacity of 120 gallons (454 L).*

4101:8-29-01 Water Supply and Distribution.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 29 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Replace section 2901 in its entirety with the following:

2901.1 Scope. *Unless otherwise provided in this code, potable water shall be supplied to plumbing fixtures and plumbing appliances. On-site non-potable water reuse systems, non-potable rainwater collection and distribution systems, and reclaimed water systems are considered Private Water Systems as defined in Section 3701.344 of the Revised Code. Private Water Systems and recycled water systems are regulated by the Ohio Department of Health rules found in Chapter 3701-28 of the Administrative Code.*

2901.2 Identification of nonpotable water systems. *Deleted.*

2901.2.1 Signage required. *Deleted.*

FIGURE 2901.2.1 PICTOGRAPH—DO NOT DRINK *Deleted.*

2901.2.2 Distribution pipe labeling and marking. *Deleted.*

2901.2.2.1 Color. *Deleted.*

2901.2.2.2 Lettering size. *Deleted.*

Table 2901.2.2.2 *Deleted.*

2901.2.2.3 Identification tape. *Deleted.*

(B) Add a sentence to the end of section 2902.5.1 to read as follows:

If the boiler feedwater, water treatment, or makeup water pipe is not provided with a high temperature check valve [rated at not less than 250°F (121°C)] near the boiler stop valve, then the temperature rating of the backflow preventer is to be not less than 250°F (121°C).

4101:8-30-01 Sanitary Drainage.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 30 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 3001.1 as follows:

(1) Add the sentence “In accordance with Section 3781.03 of the Revised Code, the department of the city engineer, in cities having such departments, the boards of health districts, or the sewer purveyor, as appropriate, has complete supervision and regulation of the entire sewerage and drainage system of the jurisdiction, including the building sewer and all laterals draining into the street sewers.” after the end of the last sentence.

(2) Add new exception to read as follows:

Exception: Private sewage disposal systems within the scope of the Ohio Department of Health rules contained within Chapter 3701-29 of the Administrative Code, “Household Sewage Disposal Systems.”

(B) Replace section 3002.2 to read as follows:

3002.2 Building Sewer. Deleted.

Table 3002.2 Deleted.

3002.2.1 Building sewer pipe near the water service. Deleted.

(C) Modify section 3003.9.2 as follows:

Replace exception 1 with the following:

- 1. The solvent cement used is listed by an approved agency as conforming to ASTM D2564.*

(D) Modify section 3005.1.1 as follows:

Add new subparagraph to read as follows:

When a through penetration of an exterior foundation wall assembly occurs, drainage fitting joints are not to occur within that exterior foundation wall assembly.

(E) Replace section 3005.2.2 to read as follows:

3005.2.2 Building Sewers. Deleted.

(F) Replace section 3007.2 to read as follows:

3007.2 Valves required. *A check valve shall be installed in the pump or ejector discharge piping between the pump or ejector and the gravity drainage system. Access shall be provided to such valves. Such valves shall be located above the sump cover required by Section 3007.3.2 or, where the discharge pipe from the ejector is below grade, the valves shall be accessibly located outside the sump below grade in an access pit with a removable access cover.*

(G) Modify section 3009.4 as follows:

Replace “section 109” with “section 108.”

(H) Replace section 3011 in its entirety with the following:

SECTION 3011
RELINING OF BUILDING DRAINS

3011.1 General. *This section shall govern the relining of existing building drainage piping.*

3011.2 Applicability. *The relining of existing building drainage piping shall be limited to gravity drainage piping 4 inches (102 mm) in diameter and larger. The relined piping shall be of the same nominal size as the existing piping.*

3011.3 Preinstallation inspection. Deleted.

3011.4 Pipe. Deleted.

3011.5 Installation. *The installation of relining materials shall be performed in accordance with the manufacturer’s installation instructions, applicable referenced standards and this code.*

3011.5.1 Material data report. *The installer shall record the data as required by the relining material manufacturer and applicable standards. The recorded data shall include, but is not limited to, the location of the project, relining material type, amount of product installed and conditions of the installation. A*

copy of the data report shall be provided to the building official prior to final approval.

3011.6 Cleanouts. Deleted.

3011.7 Post-installation inspection. Deleted.

3011.8 Pressure testing. Deleted.

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4101:8-31-01 Vents.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 31 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 3103.1.1 as follows:

Replace the phrase “not less than 6 inches (150 mm) above the roof” with “not less than 12 inches (304.8 mm) above the roof”

(B) Modify section 3103.1.2 as follows:

Add the phrase “within 10 feet (3048 mm) of the occupiable area.” to the end of the sentence.

(C) Modify section 3109.2 as follows:

Replace the phrase “discharge of water closets” with “discharge of clinical or flushing rim sinks, water closets” in the last sentence.

(D) Replace section 3114.8 with the following:

3114.8 Prohibited installations. Air admittance valves shall not be used or installed in any of the following conditions:

- 1. To vent sumps or tanks except where the vent system for the sump or tank has been designed in accordance with Section 918 of the plumbing code.*
- 2. On outdoor vent terminals for the sole purpose of reducing clearances to gravity or mechanical air intakes.*
- 3. In spaces utilized as supply or return air plenums.*
- 4. Where limited by the manufacturer’s installation instructions.*

4101:8-32-01 Traps.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 32 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Replace section 3201.2 with the following:

3201.2 Trap seals. *Each fixture trap shall have a liquid seal of not less than 2 inches (51 mm) and not more than 4 inches (102 mm), or deeper for special designs relating to accessible fixtures. Where a trap seal is subject to loss by evaporation, a trap seal primer valve shall be installed. Trap seal primer valves shall connect to the trap at a point above the level of the trap seal. A trap seal primer valve shall conform to ASSE 1018 or ASSE 1044.*

***Exception:** Where a trap is supplied with water on a regular basis, a trap seal primer valve shall not be required.*

(B) Modify section 3201.2.1 as follows:

Add new exception to read as follows:

***Exception:** Trap seal protection is not required in garage floor drains in one-, two-, and three-family dwellings.*

(C) Modify section 3201.6 as follows:

Add the phrase “, except as otherwise permitted by this code.” to the end of the first sentence.

4101:8-33-01 Storm drainage.

Chapter 33 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 3303.1.4 as follows:

(1) Replace the phrase “Sections 3002.1, 3002.2, 3002.3 and 3003” with “Sections 3002.1, 3002.3 and 3003”

(2) Add new exception to read as follows:

Exception: Only a check valve is required on the discharge piping from the pump or ejector.

(B) Add new section 3303.1.5 to read as follows:

3303.1.5 Water-powered sump pumps. *Water-powered sump pumps are only to be used as a secondary back-up pump for the subsoil drainage system and only with appropriate backflow prevention in place as required by Section 2902.3.*

4101:8-34-01 General Requirements.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 34 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Replace section 3401.1 in its entirety with the following:

3401.1 Applicability. The provisions of this chapter establish the general scope of the electrical system and equipment requirements of this code. Chapters 34 through 43 cover those wiring methods and materials most commonly encountered in the construction of one-, two- and three-family dwellings and structures regulated by this code. Other wiring methods, materials and subject matter covered in NFPA 70 are also allowed by this code. Except as provided by Section 3401.2, compliance is to be demonstrated by meeting the requirements of one of the following options:

1. Chapters 34 through 43 cover the installation of electrical systems, equipment and components indoors and outdoors that are within the scope of this code.
2. National Electrical Code, NFPA 70 as referenced in Chapter 44 of this code and as amended by Section 3401.5 cover the installation of electrical systems, equipment and components indoors and outdoors.

(B) Replace section 3401.2 in its entirety with the following:

3401.2 Scope. Chapters 34 through 43 cover the installation of electrical systems, equipment and components indoors and outdoors that are within the scope of this code, including services, power distribution systems, fixtures, appliances, devices and appurtenances. Services within the scope of this code are limited to 120/240-volt, 0- to 400-ampere, single-phase systems. These chapters specifically cover the equipment, fixtures, appliances, wiring methods and materials that are most commonly used in the construction or alteration of one-, two- and three-family dwellings and accessory structures regulated by this code. The omission from these chapters of any material or method of construction provided for in the referenced standard NFPA 70 is not to be construed as prohibiting the use of such material or method of

construction. Electrical systems, equipment or components not specifically covered in these chapters are to comply with the applicable provisions of NFPA 70.

(C) Insert section 3401.5 in its entirety with the following:

3401.5 National Electrical Code, NFPA 70. *The provisions of the National Electrical Code, NFPA 70, shall be incorporated herein and shall govern the installation, testing and operation of the electrical systems of one-, two- and three-family dwellings and their accessory structures including amendments (1) through (10) listed below.*

For the purposes of this chapter, any reference in NFPA 70 to “one- and two- family dwellings” will include “one-, two- and three-family dwellings.” Where the NFPA 70 requirement identifies a one-family dwelling or a two-family dwelling, a three-family dwelling is regulated as a “multi-family dwelling” (i.e. Section 210.52(E)(1)).

1. Modify Section 210.8(A) to read:

(A) Dwelling units. *All 125-volt, single phase, 15- and 20-ampere receptacles installed in locations specified in 210.8(A)(1) through (A)(12) are to have ground-fault circuit-interrupter protection for personnel.*

2. Modify Section 210.8(A)(2) to read:

(2) Garages, and also accessory buildings that have a floor located at or below grade level not intended as habitable rooms and limited to storage areas, work areas, and areas of similar use except for the receptacle located to serve a garage door opener when the device is a single receptacle and located in the ceiling.

3. Add Exception (5) under Section 210.8(A):

Exception No 5: *A single receptacle located to serve a sump pump shall not be required to have ground-fault circuit-interrupter protection when there is a duplex receptacle with ground-fault circuit-interrupter protection within six (6) feet of the sump pump.*

4. Delete Section 210.8(D) in its entirety.

5. Modify Section 210.8(F) to read:

(F) Outdoor Outlets. *All outdoor outlets for dwellings, other than those covered in 210.8(A), Exception No. 1, garages with floor level at or below grade, accessory buildings and boathouses, where the outlets are supplied*

by single-phase branch circuits rated 150 volts or less to ground, and 50 amperes or less, are to be provided with ground-fault circuit-interrupter protection for personnel.

If equipment supplied by an outlet covered under the requirements of this section is replaced, the outlet is to be supplied with GFCI protection.

Exception No. 1: GFCI protection is not required on lighting outlets other than those covered in 210.8(C).

Exception No. 2: GFCI protection is not required for listed HVAC equipment.

6. Modify Section 215.18(A) to read:

(A) **Surge-Protection Device.** Where provided as part of feeder supplies for the dwelling or dwelling unit, a surge-protection device (SPD) is to be installed in accordance with this section.

7. Modify 225.42(A) to read:

(A) **Surge-Protection Device.** Where provided as part of feeder supplies for the dwelling or dwelling unit, a surge-protection device (SPD) is to be installed in accordance with this section.

8. Modify Section 230.67(A) to read:

a. **Surge-Protection Device.** Where provided as part of the service supplying the dwelling or dwelling unit, surge-protection devices (SPD) are to be installed in accordance with this section.

9. Delete Section 230.85(C) in its entirety.

10. Delete Item (6) Sump Pumps under Section 422.5.

(D) Modify section 3406.3 as follows:

Replace reference “[310.106(A)]” with “[310.3(A)]” after the last sentence.

(E) Modify section 3406.4 as follows:

Replace reference “[310.106(C)]” with “[310.3(C)]” after the last sentence.

(F) Modify section 3406.5 as follows:

Replace reference “[310.10(B), (C), 310.104]” with “[310.10(B), (C), 310.4]” after the last sentence.

(G) Modify section 3406.6 as follows:

Replace reference “[310.10(H)]” with “[310.10(G)]” after the last sentence.

(H) Modify section 3406.11.2 as follows:

Replace reference “[300.13(B)]” with “[300.13(B), 250.148(C)]” after the last sentence.

(I) Modify section 3407.2 as follows:

(1) Delete reference “(250.119)” after the last sentence.

(2) Replace reference “[250.119(A)]” with “[250.119(B)]” after the last sentence in item #3 of the third paragraph.

(3) Replace reference “[250.119(A)(1) Exception]” with “[250.119(B)(1) Exception]” at the end of Exception #1.

(4) Replace reference “[250.119 Exception No. 1]” with “[250.119(A) Exception No. 1]” at the end of Exception #2.

(J) Modify section 3407.3 as follows:

(1) Replace reference “[310.110(C)]” with “[310.6(C)]” after the last sentence of the first paragraph.

(2) Replace reference “[200.7(C)(1)]” with “[200.7(C)(1), (2)]” at the end of the last sentence of the Exception.

(K) Insert section 3408 in its entirety as follows:

SECTION 3408 **EMERGENCY AND STANDBY POWER SYSTEMS**

3408.1 Installation. *Emergency and standby power systems shall be installed in accordance with this code and NFPA 70. The performance, classification, transfer, testing, and maintenance of emergency and standby power systems shall also comply with either NFPA 110 (liquid- and gas-fueled systems) or NFPA 111 (battery and inertia systems), as applicable.*

3408.1.1 Stationary generators. *Stationary emergency and standby power generator assemblies shall be listed in accordance with UL 2200.*

3408.1.1.1 Engine-driven generators. *The installation of liquid- and gas-fueled stationary internal combustion engines and gas turbines*

used to drive generator assemblies shall meet the requirements of NFPA 37.

3408.1.1.1.1 Fuel tanks connected to generator assemblies. Fuel tanks piped to and supplying fuel for engine-driven generator assemblies may be engine-mounted, located inside of a building, outside of a building, or on a roof in accordance with NFPA 37 or NFPA 30.

3408.1.1.1.1.1 Engine-mounted tanks. Engine-mounted tanks located outdoors may be located in accordance with Section 4.1.4 of NFPA 37 and shall be vented in accordance with NFPA 30. Engine-mounted tanks shall be provided with adequate clearance to enable filling, maintenance, and testing, shall be safeguarded against public access, and shall be protected from impact.

3408.1.1.1.1.2 Other fuel tanks. Fuel tanks, other than engine-mounted tanks, piped to and supplying the generator engine shall be located, installed, and vented in accordance with the applicable sections of NFPA 37 or located, installed, and vented in accordance with NFPA 30.

3408.1.1.1.2 Gaseous fuel supply. Where an internal combustion engine supplied with gaseous fuel powers emergency or standby generators, the fuel gas storage and piping system shall comply with NFPA 37 and Chapter 24.

4101:8-35-01 Electrical Definitions.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 35 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify the definition of “DWELLING” as follows:

Insert the definition of “Three-family dwelling” after the definition of “Two-family dwelling” as follows:

Three-family dwelling. A building consisting solely of three dwelling units.

4101:8-36-01 Services.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 36 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 3601.2 as follows:

Replace the phrase “One- and two-family dwellings” with “One-, two- and three-family dwellings”.

(B) Modify section 3601.7 as follows:

Delete reference “[230.71(A)]” after the sentence.

(C) Insert section 3601.8 in its entirety as follows:

3601.8 Emergency disconnects. *For one-, two- and three family dwelling units, all service conductors shall terminate in disconnecting means having a short-circuit current rating equal to or greater than the available fault current, installed in a readily accessible outdoor location. If more than one disconnect is provided, they shall be grouped. Each disconnect shall be one of the following:*

1. Service disconnects marked as follows:

EMERGENCY DISCONNECT, SERVICE DISCONNECT.

2. Meter disconnect switches that have a short-circuit current rating equal to or greater than the available fault current and all metal housings and service enclosures are grounded in accordance with Section 3908.7 and bonded in accordance with Section 3609. A meter disconnect switch shall be capable of interrupting the load served and shall be marked as follows:

EMERGENCY DISCONNECT, METER DISCONNECT, NOT SERVICE EQUIPMENT.

3. Other listed disconnect switches or circuit breakers that are marked suitable for use as service equipment, but not marked as suitable only for use as service equipment and marked as follows:

EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT.

Markings shall comply with Section 3404.12 and both of the following:

1. The marking or labels shall be located on the outside front of the disconnect enclosure with red background and white text.
2. The letters shall be at least 1/2 inch (13mm) high. [230.82 (3), 230.85]

(C) Modify section 3603.1.1 as follows:

- (1) Replace the phrase “two-family dwelling” with “two- or three-family dwelling”.**
- (2) Insert reference “[310.12(A)]” after the sentence.**

(D) Modify section 3603.1.2 as follows:

- (1) Replace the phrase “two-family dwelling” with “two- or three-family dwelling”.**
- (2) Insert reference “[310.12(B)]” after the sentence.**

(E) Modify section 3603.1.3 as follows:

Insert reference “[310.12(C)]” after the sentence.

(E) Modify section 3603.1.4 as follows:

Replace reference “[310.15(B)(7)]” with “[310.12(D)]” after the sentence.

(F) Modify section 3603.1.5 as follows:

Insert reference “(310.12)” after the sentence.

(G) Modify section 3605.5 as follows:

Replace reference “[230.50(1)]” with “[230.50(B)(1)]” after the sentence.

(G) Modify section 3606.4 as follows:

Replace reference “(230.661)” with “[230.66(A) and (B)]” after the last sentence.

(H) Insert section 3606.5 in its entirety as follows:

3606.5 Surge-Protection Device. Where provided as part of service or feeder supplied distribution equipment for the dwelling or dwelling unit, a surge-protection device (SPD) is to be installed in accordance with this section. [215.18(A), 225.42(A), and 230.67(A)]

3606.5.1 Location. The SPD shall be an integral part of the service equipment or shall be located immediately adjacent thereto.

Exception: The SPD shall not be required to be located in the service equipment if located at each next-level distribution equipment downstream toward the load.

3606.5.2 Type. The SPD shall be a Type 1 or Type 2 SPD.

3606.5.3 Replacement. Where service equipment is replaced, all of the requirements of this section shall apply. [230.67]

3606.5.4 Ratings. SPDs shall have a nominal discharge current rating (In) of not less than 10 kA. [230.67]

(I) Modify section 3607.2 as follows:

Replace reference “[250.24(A)(1) and (A)(5)]” with “[250.24(A)(1) and 250.24(B)]” after the last sentence.

(J) Modify section 3607.3 as follows:

Delete reference “[250.32(A) Exception]” after the last sentence in the Exception.

(K) Modify section 3607.4 as follows:

Replace reference “[250.24(D)]” with “[250.24(E)]” after the last sentence.

(L) Modify section 3607.5 as follows:

Replace reference “[250.24(B)]” with “[250.24(C)]” after the sentence.

(M) Modify section 3608.1.4.1 as follows:

Replace reference “(250.53(G))” with “/250.53(A)(4)/” after the last sentence.

(N) Modify section 3610.4 as follows:

(1) Replace reference “(250.121)” with “[250.118(B)]” after the last sentence.

(2) Replace reference “[250.121 Exception, 250.6(A)]” with “[250.118(B)(1) Exception, 250.6(A)]” after the last sentence in the Exception.

(O) Modify section 3611.1 as follows:

Replace reference “(250.70)” with “[250.70(A)]” after the last sentence.

4101:8-37-01 Branch Circuit and Feeder Requirements.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 37 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 3701.2 as follows:

- (1) Replace reference “[210.19(A)(1)(a) and 215.2(A)(1)(a)]” with “[210.19(A)(1) and (A)(2) and 215.2(A)(1) and (2)]” after the last sentence.**
- (2) Replace reference “[215.1(A)(1) Exception No. 2]” with “[215.1(A)(1) Exception No. 3]” after the sentence in the Exception.**

(B) Modify section 3701.3 as follows:

- (1) Replace reference “[310.15(A)(2)]” with “[310.14(A)(2)]” after the last sentence.**
- (2) Replace reference “[310.15(A)(2) Exception]” with “[310.14(A)(2) Exception]” after the sentence in the Exception.**

(C) Modify section 3701.4 as follows:

Replace reference “[210.19(A)(2)]” with “[210.19(B)]” after the last sentence.

(D) Modify section 3701.5.2 as follows:

Replace reference “[210.4(B)]” with “[200.4(B) and 210.4(D)]” after the last sentence.

(E) Modify section 3702.3 as follows:

Replace reference “[210.23(A)(1) and (2)]” with “[210.23(B)(1) and (2)]” after the last sentence.

(F) Modify section 3702.4 as follows:

Replace reference “[210.23(B)]” with “[210.23(C)]” after the last sentence.

(G) Modify section 3702.5 as follows:

Replace reference “[210.23(A), (B), and (C)]” with “[210.23(B), (C), and (D)]” after the last sentence.

(H) Modify section 3702.7 as follows:

Replace reference “[220.18(A)]” with “[220.11(A)]” after the last sentence.

(I) Modify section 3702.8 as follows:

Replace reference “[220.18(B)]” with “[220.11(B)]” after the last sentence.

(J) Modify section 3702.9 as follows:

Replace reference “(220.55 Note 4)” with “(220.55 Notes 4, 5 and 6)” after the last sentence.

(K) Modify section 3702.9.1 as follows:

Replace reference “[210.19(A)(3)]” with “[210.19(C)]” after the last sentence.

(L) Modify section 3702.10 as follows:

Replace reference “[424.3(A)]” with “[422.13, 424.3(A) and (B)]” after the last sentence.

(M) Modify section 3702.13 as follows:

Replace reference “(625.40)” with “(625.40 and 625.42)” after the last sentence.

(N) Modify section 3704.4 as follows:

Replace reference “[220.12, Table 220.12, and 220.14(J)]” with “[220.5(C) and 220.41]” after the last sentence.

(O) Modify section 3705.2 as follows:

Replace reference “[310.15(B)(2)]” with “[310.15(B)(1)]” after the last sentence.

(P) Modify section 3705.3 as follows:

(1) Replace reference “[310.15(B)(3)]” with “[310.15(C)(1)]” after the last sentence.

(2) Replace reference “[310.15(B)(3)(2)]” with “[310.15(C)(1)(b)]” after the sentence in Exception #1.

(3) Replace reference “[310.15(B)(3)(4)]” with “[310.15(C)(1)(d)]” after the sentence in Exception #3.3.

(Q) Modify section 3705.5 as follows:

Replace reference “[240.4, 240.21, and 310.15(B)(7)(2)]” with “[240.4, 240.21, and 310.12(B)]” after the last sentence in the second paragraph.

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4101:8-38-01 Wiring Methods.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 38 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 3802.2.2 as follows:

Replace reference “[320.23(B) and 334.23]” with “[300.4(D), 320.23(B) and 334.23]” after the sentence.

(B) Modify section 3802.3.1 as follows:

Replace reference “[334.15(A)]” with “[320.15 and 334.15(A)]” after the sentence.

(C) Modify section 3803.3 as follows:

Replace reference “[300.5(D)(1)]” with “[300.5(D)(1), (2) and (4)]” after the last sentence.

4101:8-39-01 Power and Lighting Distribution.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 39 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 3901.4.1 as follows:

Replace reference “[210.52(C)(1) Exception]” with “[210.52(C)(1) Exception No. 1]” after the sentence in the Exception.

(B) Modify section 3901.4.4 as follows:

Replace reference “[210.52(C)(4)]” with “[210.52(C)(3)]” after the last sentence in the second paragraph.

(C) Modify section 3901.4.5 as follows:

(1) Replace reference “[210.52(C)(5)]” with “[210.52(C)(3)]” after the last sentence.

(2) Delete reference “[210.52(C)(5) Exception]” after the last sentence in the Exception.

(D) Modify section 3901.11 as follows:

Replace reference “[210.52(H)]” with “[210.52(I)]” after the last sentence.

(E) Modify section 3902 as follows:

(1) Replace Section 3902.2 to read as follows:

3902.2 Garage and accessory building receptacles. 125-volt single-phase, 15- and 20-ampere receptacles installed in garages and grade-level portions of unfinished accessory buildings used for storage or work areas are to have ground-fault circuit-interrupter protection for personnel, *except for the receptacle located to serve a garage door opener when the device is a single receptacle and located in the ceiling.* [210.8(A)(2)]

(2) Replace Section 3902.3 to in its entirety read as follows:

3902.3 Outdoor receptacles. 125-volt single-phase 15- and 20-ampere receptacles installed outdoors are to have ground-fault circuit-interrupter protection for personnel. [210.8(A)(3)]

Exceptions:

1. Receptacles as covered in Section 4101.7.
2. GFCI protection is not required for listed HVAC equipment. [210.8(F)]

(3) Replace Section 3902.5 to read as follows:

3902.5 Unfinished basement receptacles. 125-volt single-phase 15- and 20-ampere receptacles installed in unfinished basements are to have ground-fault circuit-interrupter protection for personnel. For purposes of this section, unfinished basements are defined as portions or areas of the basement not intended as habitable rooms. [210.8(A)(5)]

Exceptions:

1. A receptacle supplying only a permanently installed fire alarm or burglar alarm system. Receptacles installed in accordance with this exception shall not be considered as meeting the requirement of Section 3901.9. [210.8(A) Exception No. 3]
2. A single receptacle located to serve a sump pump shall not be required to have ground-fault circuit-interrupter protection when there is a duplex receptacle with ground-fault circuit-interrupter protection within six (6) feet of the sump pump. [210.8(A) Exception 5 and 422.5 Item (6)]

(4) Modify section 3402.7 as follows:

Replace reference “[210.8(A)(7)]” with “[210.8(A)(8)]” after the sentence.

(5) Modify section 3402.8 as follows:

Replace reference “[210.8(A)(8)]” with “[210.8(A)(10)]” after the sentence.

(6) Modify section 3402.9 as follows:

Replace reference “[210.8(A)(9)]” with “[210.8(A)(11)]” after the sentence.

(7) Modify section 3402.10 as follows:

Replace reference “[210.8(D)]” with “[210.8(D)(7)]” after the sentence.

(8) Modify section 3402.11 as follows:

Replace reference “[210.8(A)(8)]” with “[210.8(A)(9)]” after the sentence.

(9) Modify section 3402.12 as follows:

Replace reference “[210.8(C)]” with “[555.35(C)]” after the sentence.

(C) Modify section 3903.3.1 as follows:

(1) Replace reference “[210.70(A)(2)]” with “[210.70(A)(2)(3) and (4)]” after the last sentence.

(2) Replace reference “[210.70(A)(2) Exception]” with “[210.70(A)(2) Exception to (1), (2), and (3)]” after the sentence in the Exception.

(D) Modify section 3903.4 as follows:

Replace reference “[210.70(A)(3)]” with “[210.70(C)]” after the last sentence.

(E) Modify section 3905.3.1 as follows:

Replace reference “(314.7(C))” with “[314.17(B)(2)]” after the last sentence.

(F) Modify section 3905.3.2 as follows:

(1) Replace reference “[314.17(C)]” with “[314.17(B)(2) Exception]” after the last sentence.

(2) Replace reference “[314.17(C) Exception]” with “[314.17(B)(4)]” after the sentence in the Exception.

(G) Modify section 3905.3.3 as follows:

Replace reference “[210.70(A)(3)]” with “[210.70(C)]” after the last sentence.

(H) Modify section 3905.4.2 as follows:

Replace reference “[314.24(B)(2)]” with “[314.24(B)(2) and Exception]” after the sentence in the Exception.

(I) Modify section 3905.10 as follows:

(1) Replace reference “(314.29)” with “[314.29(A) & (B)]” after the sentence.

(2) Replace reference “(314.29 Exception)” with “[314.29(B) Exception]” after the sentence in the Exception.

(J) Modify table 3905.12.2.1 as follows:

Replace reference “[Table 314.16(B)]” with “[Table 314.16(B)(1)]”.

(K) Modify section 3906.1.1 as follows:

Delete reference “[300.4(G) — Exception]” after the sentence in the Exception.

(L) Modify section 3906.3 as follows:

Replace reference “[314.16(C)(1)]” with “[314.17(B)(3)]” after the last sentence.

(M) Modify table 3907.9.2(1) as follows:

Replace reference “[Table 312.6(B)]” with “[Table 312.6(B)(2)]”.

(N) Modify section 3908.11 as follows:

Replace reference “(250.120)” with “/250.120(A)/” after the sentence.

(O) Modify section 3908.12 as follows:

Replace reference “[250.122(A) and (B)]” with “[250.122(B)]” after the last sentence.

(P) Modify section 3908.13 as follows:

Replace reference “[250.148(A), (B) and (E)]” with “[250.8(A) and (B), 250.148(A) and (B)]” after the last sentence.

(Q) Modify section 3908.15 as follows:

Delete reference “[250.8(5) and (6)]” at the end of item #3.

(R) Modify section 3908.19 as follows:

Replace reference “[250.102(D) and 250.122]” with “[250.102(E) and 250.122]” after the last sentence.

4101:8-40-01 Devices and Luminaires.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 40 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 4001.3 as follows:

Insert reference “(404.7)” after the last sentence.

(B) Modify section 4001.6 as follows:

Replace reference “[404.8(A) Exception]” with “[404.8(A)(2)]” after the sentence in the Exception.

(C) Modify section 4001.12 as follows:

Replace reference “[404.14(E)]” with “[404.14(F)]” after the sentence.

(D) Modify section 4001.14 as follows:

Replace reference “[404.14(F)]” with “[404.14(G)]” after the sentence.

(E) Modify section 4001.15 as follows:

Replace the second paragraph to read as follows:

The grounded conductor is to be extended to any switch location as necessary and is to be connected to switching devices that require line-to-neutral voltage to operate the electronics of the switch in the standby mode.

(F) Modify section 4002.12 as follows:

Replace reference “[406.9(E)]” with “[406.9(D)]” after the sentence.

(G) Modify section 4002.14 as follows:

Replace reference “[406.12(A)]” with “[406.12]” after the sentence.

(H) Modify section 4003.3 as follows:

Replace reference “(410.42)” with “(410.42 and 410.42 Exception)” after the sentence.

(I) Modify section 4003.5 as follows:

- (1) Replace reference “[410.115(C)]” with “[410.115(B)]” after the sentence.**
- (2) Replace reference “[410.115(C) Exception No. 1]” with “[410.115(B) Exception No. 1]” after the sentence in Exception #1.**
- (3) Replace reference “[410.115(C) Exception No. 2]” with “[410.115(B) Exception No. 2]” after the sentence in Exception #2.**

(J) Modify section 4003.9 as follows:

- Replace reference “(410.10)” with “[410.10(A)]” after the sentence.**

(K) Modify section 4003.11 as follows:

- Replace reference “[410.4(D)]” with “[410.10(D)]” after the sentence.**

(L) Modify section 4003.12 as follows:

- (1) Replace reference “(410.2)” with “[410.16(A)]” after the last sentence of the first paragraph.**
- (2) Replace reference “[410.16(A) and (B)]” with “[410.16(B) and (C)]” after the last sentence of the second paragraph.**
- (3) Insert reference “[410.16(D)]” after the sentence in Item #4 of the second paragraph.**
- (4) Replace reference “[410.16(C)]” with “[410.16(C) and (D)]” after the sentence in Item #5 of the second paragraph.**

(M) Modify section 4003.13 as follows:

- Replace reference “(410.48)” with “(410.50)” after the last sentence.**

(N) Modify section 4003.13.1 as follows:

- Replace reference “(410.50)” with “(410.51)” after the last sentence.**

(O) Modify section 4005.1 as follows:

- Replace reference “[410.151(A) and (B)]” with “[410.150(A)]” after the sentence.**

(P) Modify section 4005.2 as follows:

- Replace reference “[410.151(A) and (B)]” with “[410.150(A) and (D)]” after the last sentence.**

(Q) Modify section 4005.3 as follows:

- Replace reference “[410.151(B)]” with “[410.150(B)]” after the sentence.**

(R) Modify section 4005.4 as follows:

Replace reference “[410.151(C)]” with “[410.150(C)]” after the sentence in Item #9.

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4101:8-41-01 Appliance Installation.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 41 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 4101.6 as follows:

Replace reference “(422.18)” with “/422.18(A)/” after the sentence.

(B) Modify section 4101.8 as follows:

Insert reference “(110.25)” after the sentence in the Exception.

4101:8-42-01 Swimming Pools.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 42 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 4201.2 as follows:

Delete reference “(680.2)” after the section title.

(B) Modify section 4202.1 as follows:

Replace reference “[680.7; 680.14 (A) and (B); 680.21(A); 680.23(B) and (F); 680.25(A); 680.42; 680.43; and 680.70]” with “[680.7; 680.14; 680.21(A); 680.23(B) and (F); 680.25(A); 680.42; 680.43; and 680.70]” after the last sentence.

(C) Modify section 4202.2.1 as follows:

Delete reference “[680.14 (B)]” after the last sentence.

(D) Modify section 4202.3 as follows:

Replace reference “[680.8(A), (B), and (C); 680.21(A)(5)]” with “[680.8(A) and (B) and 680.21(A)(5)]” after the last sentence in Item #1.

(E) Modify section 4203.1.1 as follows:

Insert reference “[680.22(A)(2)]” after the sentence.

(F) Modify section 4203.4.4 as follows:

Replace reference “[680.22(B)(3)]” with “[680.5(B) and 680.22(B)(3)]” after the sentence.

(G) Modify section 4203.4.6 as follows:

Replace reference “[680.22(B)(4)]” with “[680.5(B) and 680.22(B)(4)]” after the sentence.

(H) Modify section 4203.7 as follows:

Replace reference “(680.11)” with “/680.11(A) and (B)I” after the last sentence.

(I) Modify section 4204.2 as follows:

(1) Delete reference “[680.26(B)(2)]” after Exception 2.2.5.

(2) Delete reference “[680.26(B)(6)]” after Item #6.

(3) Delete reference “[680.26(B)(7) Exception No. 1]” after Exception 1 of Item #7.

(4) Replace reference “[680.26(B)(7) Exception No. 2]” with “[680.26(B)(7) Exception No. 1]” after Exception 2 of Item #7.

(5) Replace reference “[680.26(B)(7) Exception No. 3]” with “[680.26(B)(7)]” after Exception 3 of Item #7.

(J) Modify section 4204.3 as follows:

Insert reference “/680.26(C)I” after the last sentence.

(K) Modify section 4204.5.1 as follows:

Replace reference “[680.43(E)(3)]” with “[680.43(E)(3) and 680.26(B)]” after the last sentence in Item #3.

(L) Modify section 4205.1 as follows:

Delete reference “(680.7)” after the sentence in Item #7.

(M) Modify section 4205.5 as follows:

Delete reference “[680.21(A)(1)]” after the sentence in the second paragraph.

(N) Modify section 4205.6 as follows:

Delete reference “[680.25(A)]” after the sentence in the second paragraph.

(O) Modify section 4205.7 as follows:

Replace reference “[680.7(C)]” with “[680.8(C)]” after the last sentence in Item #3.

(P) Modify section 4205.8 as follows:

Delete reference “(Article 250, Parts V, VI, and VII; and 680.6)” after the last sentence.

(Q) Modify section 4205.9 as follows:

Replace reference “(680.7)” with “(680.7(C))” after the last sentence.

(R) Modify section 4206.2 as follows:

Replace reference “(680.5)” with “[680.5(A) and (B)]” after the last sentence.

(S) Modify section 4206.5 as follows:

Replace reference “[680.23(B)(1)]” with “[680.23(B)(1) and B2]” after the last sentence of the first paragraph.

(T) Modify section 4209.2 as follows:

(1) Replace reference “[680.24(B)(1)]” with “[680.24(B)(1), 680.24(B)(1)(2)]” after Item #1.

(2) Replace reference “[680.24(B)(2)]” with “[680.24(B)(1)(1)]” after Item #2.

(3) Replace reference “[680.24(B)(3)]” with “[680.24(B)(1)(3)]” after Item #3.

(4) Replace reference “[680.24(B)(4)]” with “[680.24(B)(1)(4)]” after Item #4.

(U) Modify section 4206.11 as follows:

(1) Insert reference “[680.27(B)(1) and (B)(2)]” after the last sentence.

(2) Insert reference “[680.27(B)(1) Exception]” after Exception 1.

(3) Replace reference “[680.27(B)(1) and (B)(2)]” with “[680.27 and (B)(2) Exception]” after Exception 2.

(V) Modify section 4206.12 as follows:

Replace reference “(680.9)” with “(680.10)” after the last sentence.

(W) Modify section 4207.5 as follows:

Insert reference “(680.30)” after the sentence.

(X) Modify section 4207.7 as follows:

Insert reference “(680.30)” after the sentence.

(Y) Modify section 4208.2 as follows:

Replace reference “(680.9)” with “(680.10)” after the last sentence.

(Z) Modify section 4208.4 as follows:

Replace reference “(680.41)” with “[680.41(A)]” after the last sentence.

(AA) Modify section 4209.1 as follows:

Insert reference “(680.70)” after the last sentence.

(BB) Modify section 4209.5 as follows:

- (1) Insert reference “/680.74(A)/” after Item #5.**
- (2) Insert reference “/680.74(A) Exceptions 1 and 2/” after Exception 2.**

(CC) Modify section 4209.6 as follows:

Replace reference “(680.74)” with “/680.74(B)/” after the last sentence.

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4101:8-43-01 Remote-Control, Signaling and Power-Limited Circuits.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:8-44-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:8-1-01 of the Administrative Code.]

Chapter 43 of the International Residential Code, 2018 edition, as incorporated by reference, is further modified as follows:

(A) Modify section 4301.2 as follows:

- (1) Delete reference “(725.2)” after the definition of CLASS 2 CIRCUIT.**
- (2) Delete reference “(Article 100)” after the definition of REMOTE-CONTROL CIRCUIT.**
- (3) Delete reference “(Article 100)” after the definition of SIGNALING CIRCUIT.**

(B) Modify section 4302.1 as follows:

Replace reference “[725.121(A)]” with “[725.60(A)]” after Item #5.

(C) Modify section 4302.2 as follows:

Replace reference “[725.121(B)]” with “[725.60(B)]” after the sentence.

(D) Modify section 4303.2 as follows:

Replace reference “(725.130 (B); 725.133; 725.135 (A), (C), (G) and (M); 725.154; Table 725.154; Figure 725.154 (A); and 725.179)” with “[725.130(B); 722.135(A), (B), and (E); Table 722.135(B); Table 722.135(E); and 722.179]” after the last sentence.

(E) Modify section 4302.2.1 as follows:

Replace reference “[725.179(A)]” with “[Table 722.135(B) and 725.179(A)(1)]” after the sentence.

(F) Modify section 4302.2.2 as follows:

Replace reference “[725.179 (C)]” with “[Table 722.135(B) and 725.179(A)(3)]” after the sentence.

(G) Modify section 4302.2.3 as follows:

Replace reference “[725.179 (D)]” with “[Table 722.135(B) and 725.179(A)(5)]” after the sentence.

(H) Modify section 4302.2.4 as follows:

(1) Replace reference “[725.133 (G)]” with “[Table 722.135(B) and 725.179(A)(2)]” after the sentence.

(2) Replace the Exception to read as follows:

Exception: CL2X and CL3X cables with a diameter of less than 1/4 inch (6.4 mm) and CL2P, CL3P, CL3R, CL2 and CL3 cables shall be permitted in risers in one- and two-family dwelling units one-, two-, and three-family dwelling units. [Table 722.135(B) and 725.179(A)(5)]

(G) Modify table 4303.2.5 as follows:

Replace reference “[Table 725.179(J)]” with “[Table 722.179(B)]” after the sentence.

(H) Modify section 4304.1 as follows:

(1) Replace reference “(725.136)” with “/(725.136(A))” after the sentence.

(2) Replace reference “[725.136(B)]” with “[725.136(B) and (C)]” after Exception 1.

(I) Modify section 4304.5 as follows:

Replace reference “[300.11(C)(2), 300.22(C)(1) and 725.24]” with “[300.11(C)(2), 300.22(C)(1), 722.24(A) and 725.24]” after the sentence.

4101:8-44-01 Referenced standards.

4401.1 General. *This chapter lists the standards that are referenced in various sections of this code. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title. The application of the referenced standards shall be as specified in Section 102.5.*

4401.2 Referenced codes. *When indicated in this code, the following codes refer to provisions in the listed chapters of the administrative code:*

Referenced Code	Ohio Administrative Code Chapters
Ohio Building Code Fire Code Mechanical Code Plumbing Code	4101:1-1 to 4101:1-35 1301:7-1 to 1301:7-7 1301:7-7-01 to 1301:7-7-80 4101:2-1 to 4101:2-15 4101:3-1 to 4101:3-15, <u>codified and published as the 2024 Ohio Plumbing Code, effective March 1, 2024 (including update effective October 15, 2025, and as modified in Chapter 25</u>

4401.3 Referenced standard list.

AAMA American Architectural Manufacturers Association 1827 Walden Office Square, Suite 550 Schaumburg, IL 60173	
Standard Referenced	Title
AAMA/WDMA/CSA 101/ I.S.2/ A440—17: 450—10:	North American Fenestration Standards/ Specifications for Windows, Doors and Skylights Voluntary Performance Rating Method for Mulled Fenestration Assemblies
506—16:	Voluntary Specifications for Hurricane Impact and Cycle Testing of Fenestration Products
711—13:	Voluntary Specification for Self-adhering Flashing Used for Installation of Exterior Wall Fenestration Products
712—14:	Voluntary Specification for Mechanically Attached Flexible Flashing

AAMA American Architectural Manufacturers Association 1827 Walden Office Square, Suite 550 Schaumburg, IL 60173	
Standard Referenced	Title
714—15:	Voluntary Specification for Liquid Applied Flashing Used to Create a Water-resistive Seal around Exterior Wall Openings in Buildings
AAMA/NPEA/NSA 2100—12:	Specifications for Sunrooms
ACCA Air Conditioning Contractors of America 2800 Shirlington Road, Suite 300 Arlington, VA 22206	
Standard referenced	Title
Manual D—2016:	Residential Duct Systems
Manual J—2016:	Residential Load Calculation—Eighth Edition
Manual S—2014:	Residential Equipment Selection
ACI American Concrete Institute 38800 Country Club Drive Farmington Hills, MI 48331	
Standard referenced	Title
318—14 318—25:	Building Code Requirements for Structural Concrete
332—14:	Residential Code Requirements for Structural Concrete
AISI American Iron and Steel Institute 25 Massachusetts Avenue, NW Suite 800 Washington, DC 20001	
Standard referenced	Title
AISI S100—16:	North American Specification for the Design of Cold-formed Steel Structural Members, 2016
AISI S220—15:	North American Standard for Cold-formed Steel Framing—Nonstructural Members, 2015
AISI S230—15:	Standard for Cold-formed Steel Framing—Prescriptive Method for One- and Two-family Dwellings, 2015

AISI		American Iron and Steel Institute 25 Massachusetts Avenue, NW Suite 800 Washington, DC 20001
Standard referenced	Title	
AISI S240—15:	North American Standard for Cold-Formed Steel Structural Framing	
AMCA		Air Movement and Control Association International 30 West University Drive Arlington Heights, IL 60004
Standard referenced	Title	
ANSI/AMCA 210- ANSI/ASHRAE 51—07:	Laboratory Methods of Testing Fans for Aerodynamic Performance Rating	
ANSI		American National Standards Institute 25 West 43rd Street, 4th Floor New York, NY 10036
Standard referenced	Title	
A108.1A—17:	Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar	
A108.1B—17:	Installation of Ceramic Tile, Quarry Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex Portland Mortar	
A108.4—17:	Installation of Ceramic Tile with Organic Adhesives or Water-Cleanable Tile-setting Epoxy Adhesive	
A108.5—17:	Installation of Ceramic Tile with Dry-set Portland Cement Mortar or Latex Portland Cement Mortar	
A108.6—17:	Installation of Ceramic Tile with Chemical-resistant, Water-cleanable Tile-setting and -grouting Epoxy	
A108.11—17:	Interior Installation of Cementitious Backer Units	
ANSI 117—2015:	Standard Specifications for Structural Glued Laminated Timber of Softwood Species	
A118.1—17:	American National Standard Specifications for Dry-set Portland Cement Mortar	
A118.3—13:	American National Standard Specifications for Chemical-resistant, Water-cleanable Tile-setting	

ANSI	American National Standards Institute 25 West 43rd Street, 4th Floor New York, NY 10036
Standard referenced	Title
	and -grouting Epoxy, and Water-cleanable Tile-setting Epoxy Adhesive
A118.4—16:	American National Standard Specifications for Modified Dry-Set Cement Mortar
A118.10—17:	Specification for Load-bearing, Bonded, Waterproof Membranes for Thin-set Ceramic Tile and Dimension Stone Installation
A136.1—17:	American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile
A137.1—17:	American National Standard Specifications for Ceramic Tile
LC1/CSA 6.26—18:	Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (CSST)
LC4/CSA 6.32—12:	Press-connect Metallic Fittings for Use in Fuel Gas Distribution Systems
Z21.1—2010:	Household Cooking Gas Appliances
Z21.5.1/ CSA 7.1—14:	Gas Clothes Dryers— Volume I—Type I Clothes Dryers
Z21.8—94 (R2002):	Installation of Domestic Gas Conversion Burners
Z21.10.1/ CSA 4.1—12:	Gas Water Heaters—Volume I—Storage Water Heaters with Input Ratings of 75,000 Btu per hour or Less
Z21.10.3/ CSA 4.3—11:	Gas Water Heaters—Volume III—Storage Water Heaters with Input Ratings above 75,000 Btu per hour, Circulating and Instantaneous
Z21.11.2—11:	Gas-fired Room Heaters—Volume II—Unvented Room Heaters
Z21.13/ CSA 4.9—11:	Gas-fired Low-pressure Steam and Hot Water Boilers
Z21.15/ CSA 9.1—09:	Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves
Z21.22—99 (R2015):	Relief Valves for Hot Water Supply Systems—with Addenda Z21.22a—2000 (R2003) and 21.22b—2001 (R2003)
Z21.24/ CSA 6.10—06:	Connectors for Gas Appliances
Z21.40.1/ CSA 2.91—96 (R2011):	Gas-fired, Heat-activated Air-conditioning and Heat Pump Appliances

ANSI	American National Standards Institute 25 West 43rd Street, 4th Floor New York, NY 10036
Standard referenced	Title
Z21.40.2/ CSA 2.92—96 (R2011): Z21.42—2014: Z21.47/ CSA 2.3—12: Z21.50/ CSA 2.22—16: Z21.54—2009:	Air-conditioning and Heat Pump Appliances (Thermal Combustion) Gas-fired Illuminating Appliances Gas-fired Central Furnaces Vented Gas Fireplaces Gas Hose Connectors for Portable Outdoor Gas-fired Appliances
Z21.56/ CSA 4.7—17: Z21.58—18/ CSA 1.6—18:	Gas-fired Pool Heaters Outdoor Cooking Gas Appliances
Z21.60/ CSA 2.26—12:	Decorative Gas Appliances for Installation in Solid Fuel-burning Fireplaces
Z21.69/ CSA 6.16—09:	Connectors for Movable Gas Appliances
Z21.75/ CSA 6.27—07:	Connectors for Outdoor Gas Appliances and Manufactured Homes
Z21.80/ CSA 6.22—11:	Line Pressure Regulators
ANSI/ CSA FC 1—12:	Stationary Fuel Cell Power Systems
Z21.84—12:	Manually Listed, Natural Gas Decorative Gas Appliances for Installation in Solid Fuel-burning Fireplaces
Z21.86/ CSA 2.32—08:	Gas-fired Vented Space Heating Appliances
Z21.88/ CSA 2.33—16:	Vented Gas Fireplace Heaters
Z21.91—07:	Ventless Firebox Enclosures for Gas-fired Unvented Decorative Room Heaters
Z21.93/ CSA 6.30—13:	Excess Flow Valves for Natural and LP Gas with Pressures up to 5 psig
Z21.97—12:	Outdoor Decorative Appliances
Z83.6—90 (R1998):	Gas-fired Infrared Heaters
Z83.8/ CSA 2.6—09:	Gas-fired Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters and Gas-fired Duct Furnaces
Z83.19—01 (R2009):	Gas-fuel High-intensity Infrared Heaters
Z83.20—08:	Gas-fired Low-intensity Infrared Heaters Outdoor Decorative Appliances
Z97.1—2014:	Safety Glazing Materials Used in Buildings— Safety Performance Specifications and Methods of Test

APA APA—The Engineered Wood Association 7011 South 19th Tacoma, WA 98466	
Standard referenced	Title
ANSI/A190.1—2017:	Structural Glued-laminated Timber
ANSI/ APA PRP 210—2014:	Standard for Performance-rated Engineered Wood Siding
ANSI/ APA PRG 320—2017:	Standard for Performance-rated Cross Laminated Timber
ANSI/ APA PRR 410—2016:	Standard for Performance-rated Engineered Wood Rim Boards
ANSI/ APA PRS 610.1—2013:	Standard for Performance-Rated Structural Insulated Panels in Wall Applications
APA E30—15:	Engineered Wood Construction Guide
ASCE/SEI American Society of Civil Engineers Structural Engineering Institute 1801 Alexander Bell Drive Reston, VA 20191-4400	
Standard referenced	Title
7—16:	Minimum Design Loads and Associated Criteria for Buildings and Other Structures
24—14:	Flood-resistant Design and Construction
32—01:	Design and Construction of Frost-protected Shallow Foundations
ASHRAE ASHRAE 1791 Tullie Circle NE Atlanta, GA 30329	
Standard referenced	Title
ASHRAE—2001:	2001 ASHRAE Handbook of Fundamentals for use in reference to Table 1105.5.2 (1) only
ASHRAE—2017:	ASHRAE Handbook of Fundamentals
ASHRAE 193—2010 (RA 2014):	Method of Test for Determining Air Tightness of HVAC Equipment

ASHRAE		ASHRAE 1791 Tullie Circle NE Atlanta, GA 30329
34—2022:		Designation and Safety Classification of Refrigerants
ASME		American Society of Mechanical Engineers Two Park Avenue New York, NY 10016-5990
Standard referenced	Title	
ASME A17.1—2016/ CSA B44—16:	Safety Code for Elevators and Escalators	
A18.1—2014:	Safety Standard for Platforms and Stairway Chair Lifts	
B1.20.1—2013:	Pipe Threads, General-purpose (Inch)	
B16.33—2012:	Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 psig (Sizes $\frac{1}{2}$ through 2)	
B16.44—2012:	Manually Operated Metallic Gas Valves for Use in Above-ground Piping Systems up to 5 psi	
B36.10M—2004(R2015):	Welded and Seamless Wrought-steel Pipe	
BPVC—2015:	ASME Boiler and Pressure Vessel Code (Sections I, II, IV, V, VI and VIII)	
CSD-1—2016:	Controls and Safety Devices for Automatically Fired Boilers	
ASTM		ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428
Standard referenced	Title	
A36/A36M—14:	Specification for Carbon Structural Steel	
A53/A53M—12:	Specification for Pipe, Steel, Black and Hot-dipped, Zinc-coated Welded and Seamless	
A106/A106M—14:	Specification for Seamless Carbon Steel Pipe for High-temperature Service	
A123/A123M—15:	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products	

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
A153/A153M—09:	Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
A167—99(2009):	Specification for Stainless and Heat-resisting Chromium-nickel Steel Plate, Sheet and Strip
A240/A240M—15A:	Standard Specification for Chromium and Chromium-nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications
A254—12:	Specification for Copper Brazed Steel Tubing
A268—2010:	Standard Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service
A269—2015:	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
A307—14:	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A463/A463M—15:	Standard Specification for Steel Sheet, Aluminum-coated by the Hot-dip Process
A539—99:	Specification for Electric-resistance-welded Coiled Steel Tubing for Gas and Fuel Oil Lines
A563—15:	Standard Specification for Carbon and Alloy Steel Nuts
A615/A615M—2015aE1:	Specification for Deformed and Plain Carbon-steel Bars for Concrete Reinforcement
A641/A641M—09a(2014):	Specification for Zinc-coated (Galvanized) Carbon Steel Wire
A653/A653M—15:	Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-iron Alloy-coated (Galvannealed) by the Hot-dip Process
A706/A706M—15:	Specification for Low-alloy Steel Deformed and Plain Bars for Concrete Reinforcement
A755/A755M—2015:	Specification for Steel Sheet, Metallic Coated by the Hot-dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
A792/A792M—10(2015):	Specification for Steel Sheet, 55% Aluminum-zinc Alloy-coated by the Hot-dip Process
A875/A875M—13:	Specification for Steel Sheet, Zinc-5%, Aluminum Alloy-coated by the Hot-dip Process
A924/A924M—14:	Standard Specification for General Requirements for Steel Sheet, Metallic-coated by the Hot-dip Process
A996/A996M—15:	Specifications for Rail-steel and Axle-steel Deformed Bars for Concrete Reinforcement
A1003/A1003M—15:	Standard Specification for Steel Sheet, Carbon, Metallic and Nonmetallic-coated for Cold-formed Framing Members
B42—2015A:	Specification for Seamless Copper Pipe, Standard Sizes
B43—15:	Specification for Seamless Red Brass Pipe, Standard Sizes
B75/B75M—11:	Specification for Seamless Copper Tube
B88—14:	Specification for Seamless Copper Water Tube
B101—12:	Specification for Lead-coated Copper Sheet and Strip for Building Construction
B135—10:	Specification for Seamless Brass Tube
B209—14:	Specification for Aluminum and Aluminum-alloy Sheet and Plate
B251—10:	Specification for General Requirements for Wrought Seamless Copper and Copper-alloy Tube
B302—12:	Specification for Threadless Copper Pipe, Standard Sizes
B306—13:	Specification for Copper Drainage Tube (DWV)
B370—12:	Specification for Copper Sheet and Strip for Building Construction
B695—04(2009):	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
B813—10:	Specification for Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
B828—02(2010):	Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings
C5—10:	Specification for Quicklime for Structural Purposes
C22/C22M—2015:	Specification for Gypsum
C27—98(2013):	Specification for Standard Classification of Fireclay and High-alumina Refractory Brick
C28/C28M—10(2015):	Specification for Gypsum Plasters
C33/C33M—13:	Specification for Concrete Aggregates
C34—13:	Specification for Structural Clay Load-bearing Wall Tile
C35/C35M—(2014):	Specification for Inorganic Aggregates for Use in Gypsum Plaster
C55—2014A:	Specification for Concrete Building Brick
C56—13:	Standard Specification for Structural Clay Nonloadbearing Tile
C59/C59M—00(2015):	Specification for Gypsum Casting Plaster and Molding Plaster
C61/C61M—00(2015):	Specification for Gypsum Keene's Cement
C62—13A:	Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
C73—14:	Specification for Calcium Silicate Face Brick (Sand Lime Brick)
C90—14:	Specification for Load-bearing Concrete Masonry Units
C91/C91M—12:	Specification for Masonry Cement
C94/C94M—15A:	Standard Specification for Ready-mixed Concrete
C126—15:	Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
C129—14A:	Specification for Nonload-bearing Concrete Masonry Units
C143/C143M—15:	Test Method for Slump of Hydraulic Cement Concrete

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
C145—85:	Specification for Solid Load-bearing Concrete Masonry Units
C150/C150M—15:	Specification for Portland Cement
C199—84(2011):	Test Method for Pier Test for Refractory Mortar
C203—05a(2012):	Standard Test Methods for Breaking Load and Flexural Properties of Block-type Thermal Insulation
C207—06(2011):	Specification for Hydrated Lime for Masonry Purposes
C208—12:	Specification for Cellulosic Fiber Insulating Board
C212—14:	Standard Specification for Structural Clay Facing Tile
C216—15:	Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
C270—14A:	Specification for Mortar for Unit Masonry
C315—07(2011):	Specification for Clay Flue Liners and Chimney Pots
C406/C406M—2015:	Specifications for Roofing Slate
C411—11:	Test Method for Hot-surface Performance of High-temperature Thermal Insulation
C475/C475M—15:	Specification for Joint Compound and Joint Tape for Finishing Gypsum Wallboard
C476—10:	Specification for Grout for Masonry
C503/C503M—2010:	Standard Specification for Marble Dimension Stone
C514—04(2014):	Specification for Nails for the Application of Gypsum Wallboard
C552—15:	Standard Specification for Cellular Glass Thermal Insulation
C557—03(2009)e01:	Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing
C568/C568M—2010:	Standard Specification for Limestone Dimension Stone
C578—15:	Specification for Rigid, Cellular Polystyrene Thermal Insulation
C587—04(2014):	Specification for Gypsum Veneer Plaster

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
C595/C595M—14E1:	Specification for Blended Hydraulic Cements
C615/C615M—11:	Standard Specification for Granite Dimension Stone
C616/C616M—10:	Standard Specification for Quartz-based Dimension Stone
C629/C629M—10:	Standard Specification for Slate Dimension Stone
C631—09(2014):	Specification for Bonding Compounds for Interior Gypsum Plastering
C645—14:	Specification for Nonstructural Steel Framing Members
C652—15:	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)
C685/C685M—14:	Specification for Concrete Made by Volumetric Batching and Continuous Mixing
C726—12:	Standard Specification for Mineral Wool Roof Insulation Board
C728—15:	Standard Specification for Perlite Thermal Insulation Board
C744—14:	Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units
C836/C836M—15:	Specification for High Solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
C841—03(2013):	Standard Specification for Installation of Interior Lathing and Furring
C842—05(2015):	Standard Specification for Application of Interior Gypsum Plaster
C843—99(2012):	Specification for Application of Gypsum Veneer Plaster
C844—2015:	Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster
C847—14A:	Specification for Metal Lath
C887—13:	Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
C897—15:	Specification for Aggregate for Job-mixed Portland Cement-based Plasters
C920—14A:	Standard Specification for Elastomeric Joint Sealants
C926—15B:	Specification for Application of Portland Cement-based Plaster
C933—14:	Specification for Welded Wire Lath
C946—10:	Standard Practice for Construction of Dry-Stacked, Surface-Bonded Walls
C954—15:	Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in (0.84 mm) or to 0.112 in. (2.84 mm) in Thickness
C957/C957M—15:	Specification for High-solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane for Use with Integral Wearing Surface
C1002—14:	Specification for Steel Self-piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
C1029—15:	Specification for Spray-applied Rigid Cellular Polyurethane Thermal Insulation
C1032—14:	Specification for Woven Wire Plaster Base
C1047—14a:	Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
C1063—15A:	Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-based Plaster
C1088—14:	Standard Specification for Thin Veneer Brick Units Made from Clay or Shale
C1107/C1107M—14A:	Standard Specification for Packaged Dry, Hydraulic-cement Grout (Nonshrink)
C1116/C116M—10(2015):	Standard Specification for Fiber-reinforced Concrete and Shotcrete
C1157—11/C1157M—11:	Standard Performance Specification for Hydraulic Cement

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
C1167—11:	Specification for Clay Roof Tiles
C1177/C1177M—13:	Specification for Glass Mat Gypsum Substrate for Use as Sheathing
C1178/C1178M—13:	Specification for Glass Mat Water-resistant Gypsum Backing Panel
C1186—08(2012):	Specification for Flat Fiber Cement Sheets
C1261—13:	Specification for Firebox Brick for Residential Fireplaces
C1278/C1278M—07a(2011):	Specification for Fiber-reinforced Gypsum Panels
C1283—11:	Practice for Installing Clay Flue Lining
C1288—14:	Standard Specification for Discrete Nonasbestos Fiber-cement Interior Substrate Sheets
C1289—15:	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
C1325—14:	Standard Specification for Nonasbestos Fiber-mat Reinforced Cement Interior Substrate Sheets Backer Units
C1328/C1328M—12:	Specification for Plastic (Stucco) Cement
C1363—11:	The Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
C1364—10B:	Standard Specification for Architectural Cast Stone
C1396/C1396M—2014A:	Specification for Gypsum Board
C1405—15:	Standard Specification for Glazed Brick (Single Fired, Brick Units)
C1492—03(2009):	Specification for Concrete Roof Tile
C1513—2013:	Standard Specification for Steel Tapping Screws for Cold-formed Steel Framing Connections
C1634—15:	Standard Specification for Concrete Facing Brick
C1658/C1658M—13:	Standard Specification for Glass Mat Gypsum Panels
C1668—13a:	Standard Specification for Externally Applied Reflective Insulation Systems on Rigid Duct in

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
	Heating, Ventilation, and Air Conditioning (HVAC) Systems
C1670/1670M—16:	Standard Specification for Adhered
	Manufactured Stone Masonry Veneer Units
C1691—11:	Standard Specification for Unreinforced
	Autoclaved Aerated Concrete (AAC) Masonry Units
C1693—11:	Standard Specification for Autoclaved Aerated Concrete (AAC)
C1766—13:	Standard Specification for Factory-Laminated Gypsum Panel Products
D41/D41M—2011:	Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing
D43/D43M—2000(2012)E1:	Specification for Coal Tar Primer Used in Roofing, Dampproofing and Waterproofing
D226/D226M—09:	Specification for Asphalt-saturated (Organic Felt) Used in Roofing and Waterproofing
D227/D227M—03(2011)e1:	Specification for Coal Tar Saturated (Organic Felt) Used in Roofing and Waterproofing
D312/D321M—15:	Specification for Asphalt Used in Roofing
D422—63(2007)E2:	Test Method for Particle-size Analysis of Soils
D449/D449M—03(2014)E1:	Specification for Asphalt Used in Dampproofing and Waterproofing
D450/D450M—07(2013)E1:	Specification for Coal-tar Pitch Used in Roofing, Dampproofing and Waterproofing
D1227—13:	Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
D1248—12:	Specification for Polyethylene Plastics
	Extrusion Materials for Wire and Cable
D1693—15:	Test Method for Environmental Stress-cracking of Ethylene Plastics
D1784—11:	Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
D1863/D1863M—05(2011)e1:	Specification for Mineral Aggregate Used in Built-up Roofs

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
D1970/D1970M—2015A:	Specification for Self-adhering Polymer Modified Bitumen Sheet Materials Used as Steep Roofing
D2178/D2178M—15:	Underlayment for Ice Dam Protection Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
D2412—11:	Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-plate Loading
D2447—03:	Specification for Polyethylene (PE) Plastic Pipe Schedules 40 and 80, Based on Outside Diameter
D2513—2014e1:	Specification for Gas Pressure Pipe, Tubing and Fittings
D2626/D2626M—04 (2012)e1:	Specification for Asphalt-saturated and Coated Organic Felt Base Sheet Used in Roofing
D2683—14:	Specification for Socket-type Polyethylene Fittings for Outside Diameter-controlled Polyethylene Pipe and Tubing
D2822/D2822M—05(2011)e1:	Specification for Asphalt Roof Cement, Asbestos Containing
D2823/D2823M—05(2011)e1:	Specification for Asphalt Roof Coatings, Asbestos Containing
D2824/D2824M—2013:	Specification for Aluminum-pigmented Asphalt Roof Coatings, Nonfibered, Asbestos Fibered and Fibered without Asbestos
D2898—10:	Test Methods for Accelerated Weathering of Fire-retardant-treated Wood for Fire Testing
D3019—08:	Specification for Lap Cement Used with Asphalt Roll Roofing, Nonfibered, Asbestos Fibered and Nonasbestos Fibered
D3161/D3161M—15:	Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan Induced Method)
D3201/D3201M—2013:	Test Method for Hygroscopic Properties of Fire-retardant Wood and Wood-base Products
D3309—96a(2002):	Specification for Polybutylene (PB) Plastic Hot- and Cold-water Distribution System

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
D3350—14:	Specification for Polyethylene Plastic Pipe and Fitting Materials
D3462/D3462M—10A:	Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules
D3468/D3468M—99(2013)E1:	Specification for Liquid-applied Neoprene and Chlorosulfanated Polyethylene Used in Roofing and Waterproofing
D3679—13:	Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding
D3737—2012:	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)
D3747—79(2007):	Specification for Emulsified Asphalt Adhesive for Adhering Roof Insulation
D3909/D3909M—14:	Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules
D4022/D4022M—2007(2012)e1:	Specification for Coal Tar Roof Cement, Asbestos Containing
D4318—10E1:	Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
D4434/D4434M—12:	Specification for Poly (Vinyl Chloride) Sheet Roofing
D4479/D4479M—07(2012)e1:	Specification for Asphalt Roof Coatings— asbestos-free
D4586/D4586M—07(2012)e1:	Specification for Asphalt Roof Cemen— asbestos-free
D4601/D4601M—04(2012)e1:	Specification for Asphalt-coated Glass Fiber Base Sheet Used in Roofing
D4637/D4637M—14E1:	Specification for EPDM Sheet Used in Single-ply Roof Membrane
D4829—11:	Test Method for Expansion Index of Soils
D4869/D4869M—15:	Specification for Asphalt-saturated (Organic Felt) Underlayment Used in Steep Slope Roofing
D4897/D4897M—01(2009):	Specification for Asphalt Coated Glass-fiber Venting Base Sheet Used in Roofing

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
D4990—1997a(2013):	Specification for Coal Tar Glass Felt Used in Roofing and Waterproofing
D5019—07a:	Specification for Reinforced Nonvulcanized Polymeric Sheet Used in Roofing Membrane
D5055—13E1:	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-joists
D5456—14B:	Standard Specification for Evaluation of Structural Composite Lumber Products
D5516—09:	Test Method for Evaluating the Flexural Properties of Fire-retardant-treated Softwood Plywood Exposed to the Elevated Temperatures
D5643/D5643M—06(2012)e1:	Specification for Coal Tar Roof Cement Asbestos-free
D5664—10:	Test Methods For Evaluating the Effects of Fire-retardant Treatments and Elevated Temperatures on Strength Properties of Fire-retardant-treated Lumber
D5665/D5665M—99a(2014)E1:	Specification for Thermoplastic Fabrics Used in Cold-applied Roofing and Waterproofing
D5726—98(2013):	Specification for Thermoplastic Fabrics Used in Hot-applied Roofing and Waterproofing
D6083—05e01:	Specification for Liquid-applied Acrylic Coating Used in Roofing
D6162/D6162M—2000a(2015)E1:	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
D6163/D6163M—2000(2015)E1:	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements
D6164/D6164M—11:	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements
D6222/D6222M—11:	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
	Polyester Reinforcements
D6223/D6223M—02(2009)E1:	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcement
D6298—13:	Specification for Fiberglass-reinforced Styrene Butadiene Styrene (SBS) Modified Bituminous Sheets with a Factory Applied Metal Surface
D6305—08(2015)E1:	Practice for Calculating Bending Strength Design Adjustment Factors for Fire-retardant-treated Plywood Roof Sheathing
D6380/D6380—03(2013)E1:	Standard Specification for Asphalt Roll Roofing (Organic Felt)
D6464—03a(2009)e1:	Standard Specification for Expandable Foam Adhesives for Fastening Gypsum Wallboard to Wood Framing
D6694/D6694M—08(2013)E1:	Standard Specification for Liquid-applied Silicone Coating Used in Spray Polyurethane Foam Roofing Systems
D6754/D6754M—10:	Standard Specification for Ketone-ethylene-ester-based Sheet Roofing
D6757—2013:	Specification for Underlayment Felt Containing Inorganic Fibers Used with Steep Slope Roofing
D6841—08:	Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-retardant-treated Lumber
D6878/D6878M—13:	Standard Specification for Thermoplastic-polyolefin-based Sheet Roofing
D6947/D6947M—07(2013)E1:	Standard Specification for Liquid Applied Moisture Cured Polyurethane Coating Used in Spray Polyurethane Foam Roofing System
D7032—14:	Standard Specification for Establishing Performance Ratings for Wood-plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
D7158—D7158M—2016:	Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)
D7254—15:	Standard Specification for Polypropylene (PP) siding
D7425/D7425M—13:	Standard Specification for Spray Polyurethane Foam Used for Roofing Application
D7672—14:	Standard Specification for Evaluating Structural Capacities of Rim Board Products and Assemblies
D7793—13:	Standard Specification for Insulated Vinyl Siding
E84—2016:	Standard Test Method for Surface Burning Characteristics of Building Materials
E96/E96M—2015:	Test Method for Water Vapor Transmission of Materials
E108—2016:	Test Methods for Fire Tests of Roof Coverings
E119—2016:	Test Methods for Fire Tests of Building Construction and Materials
E136—2016:	Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
E283—04(2012):	Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences across the Specimen
E330/E330M—14:	Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference
E331—00(2009):	Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
E779—10:	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
E814—2013A:	Standard Test Method for Fire Tests of Penetration Firestop Systems

ASTM	ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428
Standard referenced	Title
E970—14:	Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source
E1509—12:	Standard Specification for Room Heaters, Pellet Fuel-burning Type
E1602—03(2010)e1:	Guide for Construction of Solid Fuel Burning Masonry Heaters
E1827—11:	Standard Test Methods for Determining Airtightness of Building Using an Orifice Blower Door
E1886—13A:	Test Method for Performance Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
E1996—2014a:	Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
E2178—2013:	Standard Test Method for Air Permeance of Building Materials
E2231—15:	Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics
E2273—03(2011):	Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
E2568—09e1:	Standard Specification for PB Exterior Insulation and Finish Systems
E2570/E2570M—07(2014)E1:	Standard Test Methods for Evaluating Water-resistant Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
E2634—11(2015):	Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems
F844—07a(2013):	Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use
F876—15A:	Specification for Cross-linked Polyethylene (PEX) Tubing

ASTM ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428	
Standard referenced	Title
F877—2011A:	Specification for Cross-linked Polyethylene (PEX) Plastic Hot- and Cold-water Distribution Systems
F1055—13:	Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene Pipe and Tubing
F1281—11:	Specification for Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene (PEX-AL-PEX) Pressure Pipe
F1282—10:	Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe
F1554—15:	Specification for Anchor Bolts, Steel, 36, 55 and 105-ksi Yield Strength
F1667—15:	Specification for Driven Fasteners, Nails, Spikes and Staples
F1807—15:	Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing
F1924—12:	Standard Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing
F1960—15:	Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing
F1970—12E1:	Standard Specification for Special Engineered Fittings, Appurtenances or Valves for Use in Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Systems
F1973—13E1:	Standard Specification for Factory Assembled Anodeless Risers and Transition Fittings in Polyethylene (PE) and Polyamide 11 (PA 11) Fuel Gas Distribution Systems

ASTM		ASTM International 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428
Standard referenced	Title	
F 2090—17:	Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms	
F2098—08:	Standard Specification for Stainless Steel Clamps for Securing SDR9 Cross-linked Polyethylene (PEX) Tubing to Metal Insert and Plastic Insert Fittings	
F2389—15:	Standard for Pressure-rated Polypropylene (PP) Piping Systems	
F2623—14:	Standard Specification for Polyethylene of Raised Temperature (PE-RT) SDRG Tubing	
F2735—09:	Standard Specification for Plastic Insert Fittings for SDR9 Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing	
F2769—14:	Polyethylene or Raised Temperature (PE-RT) Plastic Hot and Cold-Water Tubing and Distribution Systems	
F2806—10(2015):	Standard Specification for Acrylonitrile-butadiene-styrene (ABS) Plastic Pipe (Metric SDR-PR)	
F2945—2015:	Standard Specification for Polyamide 11 Gas Pressure Pipe, Tubing and Fittings	
F2969—12:	Standard Specification for Acrylonitrile-butadiene-styrene (ABS) IPS Dimensioned Pressure Pipe	
AWC		American Wood Council 222 Catoctin Circle SE, Suite 201 Leesburg, VA 20175
Standard referenced	Title	
AWC STJR—2015:	Span Tables for Joists and Rafters	
ANSI/AWC WFCM—2018:	Wood Frame Construction Manual for One- and Two-family Dwellings	
ANSI/AWC NDS—2018:	National Design Specification (NDS) for Wood Construction—with 2018 Supplement	

ANSI/AWC PWF—2015: Permanent Wood Foundation Design Specification	
AWPA American Wood Protection Association P.O. Box 361784 Birmingham, AL 35236-1784	
Standard referenced	Title
C1—03:	All Timber Products—Preservative Treatment by Pressure Processes
M4—16:	Standard for the Care of Preservative-treated Wood Products
U1—16:	USE CATEGORY SYSTEM: User Specification for Treated Wood Except Commodity Specification H
AWS American Welding Society 8669 NW 36 Street, #130 Miami, FL 33166	
Standard referenced	Title
ANSI/AWS A5.31M/A5.31—2012:	Specification for Fluxes for Brazing and Braze Welding Edition: 2nd
AWWA American Water Works Association 6666 West Quincy Avenue Denver, CO 80235	
Standard referenced	Title
C903—16:	Polyethylene-aluminum-polyethylene (PE-AL-PE) Composite Pressure Pipe, 12 mm ($\frac{1}{2}$ in.) through 50 mm (2 in.), for Water Service
CEN European Committee for Standardization (EN) Central Secretariat Rue de Stassart 36 B-10 50 Brussels	
Standard referenced	Title
EN 15250-2007:	Slow Heat Release Appliances Fired by Solid Fuel Requirements and Test Methods

CPA Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176	
Standard referenced	Title
ANSI A135.4—2012:	Basic Hardboard
ANSI A135.5—2012:	Prefinished Hardboard Paneling
ANSI A135.6—2012:	Engineered Wood Siding
ANSI A135.7—2012:	Engineered Wood Trim
A208.1—2016:	Particleboard
CPSC Consumer Product Safety Commission 4330 East-West Highway Bethesda, MD 20814	
Standard referenced	Title
16 CFR, Part 1201—(2002):	Safety Standard for Architectural Glazing
16 CFR, Part 1209—(2002):	Interim Safety Standard for Cellulose Insulation
16 CFR, Part 1404—(2002):	Cellulose Insulation
CSA CSA Group 8501 East Pleasant Valley Road Cleveland, OH 44131-5516	
Standard referenced	Title
AAMA/WDMA/CSA 101/I.S.2/A440—17:	North American Fenestration Standard/ Specification for Windows, Doors and Unit Skylights
ANSI/CSA FC I—2014:	Fuel Cell Technologies—Part 3-100; Stationary fuel cell power systems-Safety
ASME A17.1/ CSA B44—2016:	Safety Code for Elevators and Escalators
CSA 8—93:	Requirements for Gas Fired Log Lighters for Wood Burning Fireplaces
B44—2016:	Safety Code for Elevators and Escalators
B55.1—2015:	Test Method for Measuring Efficiency and Pressure Loss of Drain Water Heat Recovery Units
B55.2—2015:	Drain Water Heat Recovery Units
B137.9—16:	Polyethylene/Aluminum/Polyethylene (PE-AL- PE) Composite Pressure Pipe Systems

CSA CSA Group 8501 East Pleasant Valley Road Cleveland, OH 44131-5516	
Standard referenced	Title
B137.10—13:	Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene (PE-AL-PE) Composite Pressure Pipe Systems
B137.18—13:	Polyethylene of Raised Temperature (PE-RT) Tubing Systems for Pressure Applications
C22.2 No. 218.1—M89(R2011):	Spas, Hot Tubs and Associated Equipment
C22.2 No. 236—15:	Heating and Cooling Equipment
CSA C448 Series—16:	Design and Installation of Earth Energy Systems
CSA O325—07:	Construction Sheathing
O437-Series—93:	Standards on OSB and Waferboard (Reaffirmed 2006)
CSA C22.2 No. 60335-2-40—2022:	Household and Similar Electrical Appliances - Safety- Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers
CSSB Cedar Shake & Shingle Bureau P.O. Box 1178 Sumas, WA 98295-1178	
Standard referenced	Title
CSSB—97:	Grading and Packing Rules for Western Red Cedar Shakes and Western Red Shingles of the Cedar Shake and Shingle Bureau
DASMA Door & Access Systems Manufacturers Association International 1300 Sumner Avenue Cleveland, OH 44115-2851	
Standard referenced	Title
105—2016:	Test Method for Thermal Transmittance and Air Infiltration of Garage Doors and Rolling Doors
108—2017:	Standard Method for Testing Garage Doors, Rolling Doors and Flexible Doors; Determination

DASMA Door & Access Systems Manufacturers Association International 1300 Sumner Avenue Cleveland, OH 44115-2851	
Standard referenced	Title
115—2016:	of Structural Performance Under Uniform Static Air Pressure Difference Standard Method for Testing Sectional Garage Doors, Rolling Doors and Flexible Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure
DOC United States Department of Commerce 1401 Constitution Avenue, NW Washington, DC 20230	
Standard referenced	Title
PS 1—09:	Structural Plywood
PS 2—10:	Performance Standard for Wood-based Structural-use Panels
PS 20—05:	American Softwood Lumber Standard
DOTn U.S. Department of Transportation 1200 New Jersey Avenue SE East Building, 2nd floor Washington, DC 20590	
Standard referenced	Title
49 CFR, Parts 192.281(e) & 192.283 (b) (2009):	Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards
FEMA Federal Emergency Management Agency 500 C Street SW Washington, DC 20472	
Standard referenced	Title
FEMA TB-2—08:	Flood Damage-resistant Materials Requirements
FEMA TB-11—01:	Crawlspace Construction for Buildings Located in Special Flood Hazard Area

FM		FM Approvals Headquarters Office 1151 Boston-Providence Turnpike P.O. Box 9102 Norwood, MA 02062
Standard referenced	Title	
4450—(1989):	Approval Standard for Class 1 Insulated Steel Deck Roofs—with Supplements through July 1992	
4880—(2015):	Approval Standard for Class 1 Rating of Building Panels or Interior Finish Materials	
GA		Gypsum Association 6525 Belcrest Road, Suite 480 Hyattsville, MD 20782
Standard referenced	Title	
GA-253—2016:	Application of Gypsum Sheathing	
HPVA		Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190
Standard referenced	Title	
ANSI/HPVA HP-1—2016:	American National Standard for Hardwood and Decorative Plywood	
HVI		Home Ventilating Institute 1000 North Rand Road Suite 214 Wauconda, IL 60084
Standard referenced	Title	
916—09	Airflow Test Procedure	

ICC		International Code Council, Inc. 500 New Jersey Avenue NW 6th Floor Washington, DC 20001
Standard referenced	Title	
ANSI/RESNET/ICC 301—2014:	Standard for the Calculation and Labeling of the Energy Performance of Low-Rise Residential Buildings using the Energy Rating Index, March 7, 2014, republished 2016	
ANSI/RESNET/ICC 380—2016:	Standard for Testing Airtightness of Building Enclosures, Airtightness of Heating and Cooling Air Distribution and Airflow of Mechanical Ventilation Systems	
ICC/ANSI A117.1—09: ICC 400—17:	Accessible and Usable Buildings and Facilities Standard on the Design and Construction of Log Structures	
ICC 500—14:	ICC/NSSA Standard on the Design and Construction of Storm Shelters	
ICC 600—14:	Standard for Residential Construction in High-wind Regions	
ICC 900/SRCC 300—2015:	Solar Thermal System Standard	
ICC 901/SRCC 100—2015:	Solar Thermal Collector Standard	
IEBC—18:	International Existing Building Code®	
IECC—18:	International Energy Conservation Code®	
IECC—06:	International Energy Conservation Code® for use with 1101.6 only.	
IFGC—18:	International Fuel Gas Code®	
IEEE		Institute of Electrical and Electronic Engineers, Inc. 3 Park Avenue, 17th Floor New York, NY 10016-5997
Standard referenced	Title	
515.1—2012:	IEEE Standard for the Testing, Design, Installation and Maintenance of Electrical Resistance Trace Heating for Commercial Applications	
ISO		International Organization for Standardization Chemin de Blandonnet 8 CP 401

1214 Vernier Geneva, Switzerland	
Standard referenced	Title
8336—2009:	Fibre-cement Flat Sheets-product Specification and Test Methods
15874—2002:	Polypropylene Plastic Piping Systems for Hot and Cold Water Installations
MSS Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180	
Standard referenced	Title
SP-58—09:	Pipe Hangers and Supports—Materials, Design, Manufacture, Selection, Application and Installation
NAIMA North American Insulation Manufacturers Association 11 Canal Center Plaza, Suite 101 Alexandria, VA 22314	
Standard referenced	Title
AH 116—09:	Fibrous Glass Duct Construction Standards, Fifth Edition
NFPA National Fire Protection Association 1 Batterymarch Park Quincy, MA 02169-7471	
Standard referenced	Title
13—16:	Standard for Installation of Sprinkler Systems
13D—16:	Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes
13R—16:	Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies
30-15	<i>Flammable and combustible liquids code</i>
31—16:	Standard for the Installation of Oil-burning Equipment

NFPA National Fire Protection Association 1 Batterymarch Park Quincy, MA 02169-7471	
Standard referenced	Title
37-10	<i>Standard for the installation and use of stationary combustion engines and gas turbines</i>
58—17:	Liquefied Petroleum Gas Code
70—23:	National Electrical Code (<i>as modified in Chapter 34</i>)
72—16:	National Fire Alarm and Signaling Code
85—15:	Boiler and Combustion Systems Hazards Code
110-10	<i>Standard for emergency and standby power systems</i>
111-10	<i>Standard on stored electrical energy emergency and standby power systems</i>
211—16:	Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances
259—18:	Standard for Test Method for Potential Heat of Building Materials
275—17:	Standard Method of Fire Tests for the Evaluation of Thermal Barriers
286—15:	Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
501—17:	Standard on Manufactured Housing
720—15:	Standard for the Installation of Carbon Monoxide (CO) Detectors and Warning Equipment
853—15:	Standard on the Installation of Stationary Fuel Cell Power Systems
NFRC National Fenestration Rating Council, Inc. 6305 Ivy Lane, Suite 140 Greenbelt, MD 20770	
Standard referenced	Title
100—2017:	Procedure for Determining Fenestration Products <i>U</i> -Factors
200—2017:	Procedure for Determining Fenestration Product Solar Heat Gain Coefficients and Visible Transmittance at Normal Incidence
400—2017:	Procedure for Determining Fenestration Product Air Leakage

NSF		NSF International 789 N. Dixboro Road P.O. Box 130140 Ann Arbor, MI 48105
Standard referenced	Title	
14—2015:	Plastics Piping System Components and Related Materials	
358-1—2014:	Polyethylene Pipe and Fittings for Water-based Ground Source “Geothermal” Heat Pump Systems	
358-2—2012:	Polypropylene Pipe and Fittings for Water-based Ground Source “Geothermal” Heat Pump Systems	
PCA		Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077
Standard referenced	Title	
100—12:	Prescriptive Design of Exterior Concrete Walls for One- and Two-family Dwellings (Pub. No. EB241)	
SBCA		Structural Building Components Association 6300 Enterprise Lane Madison, WI 53719
Standard referenced	Title	
BCSI—2013 (Updated March 2015):	Building Component Safety Information Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses	
CFS-BCSI—2008:	Cold-formed Steel Building Component Safety Information (CFSBCSI) Guide to Good Practice for Handling, Installing & Bracing of Cold-formed Steel Trusses	
FS100—12:	Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies	

SMACNA		Sheet Metal & Air Conditioning Contractors National Assoc. Inc. 4021 Lafayette Center Road Chantilly, VA 22021
Standard referenced	Title	
SMACNA—10:	Fibrous Glass Duct Construction Standards (2003)	
SMACNA/ANSI—2016:	HVAC Duct Construction Standards— Metal and Flexible 4th Edition (ANSI) 2016	
TMS		The Masonry Society 105 South Sunset Street, Suite Q Longmont, CO 80501
Standard referenced	Title	
402—2016:	Building Code Requirements for Masonry Structures	
403—2017:	Direct Design Handbook for Masonry Structures	
404—2016:	Standard for the Design of Architectural Cast Stone	
602—2016:	Specification for Masonry Structures	
TPI		Truss Plate Institute 218 N. Lee Street, Suite 312 Alexandria, VA 22314
Standard referenced	Title	
TPI 1—2014:	National Design Standard for Metal-plate- connected Wood Truss Construction	
UL		UL LLC 333 Pfingsten Road Northbrook, IL 60062
Standard referenced	Title	
17—2008:	Vent or Chimney Connector Dampers for Oil-fired Appliances—with revisions through September 2013	
55A—04:	Materials for Built-up Roof Coverings	
58—96:	Steel Underground Tanks for Flammable and Combustible Liquids—with Revisions through July 1998	
80—2007:	Steel Tanks for Oil-burner Fuel— with revisions through January 2014	
103—2010:	Factory-built Chimneys for Residential Type and Building Heating Appliances— with revisions through July 2012	

UL	
UL LLC 333 Pfingsten Road Northbrook, IL 60062	
Standard referenced	Title
127—2011:	Factory-built Fireplaces— with revisions through May 2015
174—04:	Household Electric Storage Tank Water Heaters— with revisions through April 2015
180—2012:	Liquid-level Indicating Gauges for Oil Burner Fuels and Other Combustible Liquids
181—05:	Factory-made Air Ducts and Air Connectors—with revisions through May 2003
181A—2013:	Closure Systems for Use with Rigid Air Ducts and Air Connectors— with revisions through December 1998
181B—2013:	Closure Systems for Use with Flexible Air Ducts and Air Connectors— with revisions through August 2003
217—06 <u>217—26</u> :	Single- and Multiple-station Smoke Alarms— with revisions through October 2015 <u>January 2026</u>
263—2011:	Standards for Fire Test of Building Construction and Materials—with revisions through June 2015
268—2009:	Smoke Detectors for Fire Alarm Systems
325—02:	Door, Drapery, Gate, Louver and Window Operations and Systems—with revisions through May 2015
343—2008:	Pumps for Oil-burning Appliances— with revisions through June 2013
378—06:	Draft Equipment— with revisions through June 12, 2014
441—10:	Gas Vents—with revisions through June 12, 2014
507—99:	Standard for Electric Fans
508—99:	Industrial Control Equipment— with revisions through October 2013
515—11:	Electrical Resistance Heat Tracing for Commercial and Industrial Applications Including Revisions through July 2015
536—97:	Flexible Metallic Hose— with revisions through December 2014
641—2010:	Type L, Low-temperature Venting Systems— with revisions through June 2013

UL	UL LLC 333 Pfingsten Road Northbrook, IL 60062
Standard referenced	Title
651—2011:	Schedule 40 and Schedule 80 Rigid PVC Conduit and Fittings—with revisions through May 2014
705—04:	Standard for Power Ventilators— with revisions through December 2013
723—08:	Standard for Test for Surface Burning Characteristics of Building Materials— with revisions through August 2013
726—95:	Oil-fired Boiler Assemblies— with revisions through October 2013
727—06:	Oil-fired Central Furnaces— with revisions through October 2013
729—03:	Oil-fired Floor Furnaces— with revisions through October 2013
730—03:	Oil-fired Wall Furnaces— with revisions through October 2013
732—95:	Oil-fired Storage Tank Water Heaters— with revisions through October 2013
737—2011:	Fireplaces Stoves— with revisions through August 2015
790—04:	Standard Test Methods for Fire Tests of Roof Coverings—with revisions through July 2014
795—2011:	Commercial-industrial Gas Heating Equipment— with revisions through November 2013
834—04:	Heating, Water Supply and Power Boilers— Electric—with revisions through December 2013
842—07:	Valves for Flammable Fluids— with revisions through May 2015
858—05:	Household Electric Ranges— with revisions through June 2015
875—09:	Electric Dry-bath Heaters— with revisions through December 2013
896—93:	Oil-burning Stoves— with revisions through November 2013
923—2013:	Microwave Cooking Appliances— with revisions through June 2015
959—2010:	Medium Heat Appliance Factory-built Chimneys— with revisions through June 2014

UL	UL LLC 333 Pfingsten Road Northbrook, IL 60062
Standard referenced	Title
1026—2012:	Electric Household Cooking and Food Serving Appliances—with revisions through August 2015
1040—96:	Fire Test of Insulated Wall Construction—with revisions through October 2012
1042—2009:	Electric Baseboard Heating Equipment—with revisions through September 2014
1256—02:	Fire Test of Roof Deck Construction—with revisions through July 2013
1261—01:	Electric Water Heaters for Pools and Tubs—with revisions through July 2012
1479—03:	Fire Tests of Through-Penetration Firestops—with revisions through June 2015
1482—2011:	Solid-Fuel-type Room Heaters—with revisions through August 2015
1563—2009:	Standard for Electric Spas, Hot Tubs and Associated Equipment—with revisions through March 2015
1618—09:	Wall Protectors, Floor Protectors, and Hearth Extensions—with revisions through October 2015
1693—2010:	Electric Radiant Heating Panels and Heating Panel Sets—with revisions through October 2011
1703—02:	Flat-plate Photovoltaic Modules and Panels—with revisions through October 2015
1715—97:	Fire Test of Interior Finish Material—with revisions through January 2013
1738—2010:	Venting Systems for Gas-burning Appliances, Categories II, III and IV—with revisions through November 2014
1741—2010:	Inverters, Converters, Controllers and Interconnection System Equipment with Distributed Energy Resources—with revisions through January 2015
1777—07:	Chimney Liners—with revisions through October 2015
1897—12:	Uplift Tests for Roof Covering Systems—with revisions through September 2015
1995—2015:	Heating and Cooling Equipment
1996—2009:	Electric Duct Heaters—with revisions through June 2014

UL		UL LLC 333 Pfingsten Road Northbrook, IL 60062
Standard referenced	Title	
2034—08:	Standard for Single- and Multiple-station Carbon Monoxide Alarms—with revisions through March 2015	
2075—2013:	Standard for Gas and Vapor Detectors and Sensors	
2158A—2010:	Outline of Investigation for Clothes Dryer Transition Duct	
2200—15 <u>2200—25</u> :	<i>Stationary engine generator assemblies—with revisions through September 2025</i>	
2523—09:	Standard for Solid Fuel-fired Hydronic Heating Appliances, Water Heaters and Boilers—with revisions through February 2013	
2703—14:	Mounting Systems, Mounting Devices, Clamping/Retention Devices and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels	
9540—14:	Outline of Investigation for Energy Storage Systems and Equipment	
60335-2-40—2022:	Household and Similar Electrical Appliances -Safety-Part 2-40: Particular Requirements for Electrical Heat Pumps, Air-Conditioners and Dehumidifiers	
ULC		ULC 13775 Commerce Parkway Richmond, BC V6V 2V4
Standard referenced	Title	
CAN/ULC S 102.2—2010:	Standard Methods for Test for Surface Burning Characteristics of Building Materials and Assemblies	
US-FTC		United States-Federal Trade Commission 600 Pennsylvania Avenue NW Washington, DC 20580
Standard referenced	Title	
CFR Title 16(2015):	R-value Rule	

WDMA		Window and Door Manufacturers Association 2025 M Street NW, Suite 800 Washington, DC 20036-3309
Standard referenced	Title	
AAMA/WDMA/CSA 101/ I.S2/A440—17: I.S. 11—13:	North American Fenestration Standard/ Specifications for Windows, Doors and Skylights Industry Standard Analytical Method for Design Pressure (DP) Ratings of Fenestration Products	
WMA		World Millwork Alliance (formerly Association of Millwork Distributors Standards AMD) 10047 Robert Trent Parkway New Port Richey, FL 34655-4649
Standard referenced	Title	
ANSI WMA 100—2016:	Standard Method of Determining Structural Performance Ratings of Side Hinged Exterior Door Systems and Procedures for Component Substitution	