

Final Draft Proposed Changes to the 2020 Building Code of New York State
Issued July 2024

This document is being developed for the purpose of posting a notice of rule in development for the New York State Fire Prevention and Building Code Council (Code Council) and the New York State Department of State. The purpose is to show the final draft proposed changes to the current version of the 2020 Building Code of New York State (2020 BCNYS). Separate documents will exist for each of the current NYS specific code books. This document **is not intended to include** all of the proposed code language; it only contains those sections of code that are proposed to be new or modified. Please note that unaltered portions of the 2020 code books are not included within this document and should be considered to remain the same for this code update.

This document is the final draft of the notice of rule in development being released for comment from the public and the Code Council. Accordingly, the Yellow highlighted text included in earlier versions to denote the changes from earlier versions of the documents has been removed.

Please note:

- Chapter 1's are included as a separate document for all of the code books
- This document does not include grammatical, punctuation, and simple word clarifications that do not change the intent or meaning of a provision.
- Where a change is made by NYS, rather than an ICC level change, "[NY]" is added to the section numbers; however, grammatical and punctuation changes made by NYS that do not change the intent or meaning of a provision are not denoted by [NY]. Similarly, updates made by NYS to cross-referenced sections or sections where the only change is to the referenced code book (i.e. ~~International Plumbing Code~~ [Plumbing Code of New York State](#) are not denoted by [NY]).
- Changes to the existing text are denoted in the following manner:
 - Text insertions: [TEXT](#)
 - Text deletions: ~~TEXT~~
- Cross-referenced code sections may not be accurate and/or may change based on existing and future modifications. Code sections are based on the anticipated 2024 ICC code section.
- Where multiple code change proposals are listed together, it represents multiple ICC code changes that dealt with the same code sections and were therefore consolidated.
- Some code changes involve complex tables, lists, or lengthy sections in which a small change was made to only a portion of the section. In those instances, the entire section, table, list, etc. that was unchanged may not be included below. A note has been added to indicate when that happens (i.e. "Items 1 through 13 remain unchanged").
- Reference to Chapter 11 of the Residential Code of New York State for energy provisions will be corrected in the notice of proposed rule making documents to reference the corresponding provision from the Energy Conservation Construction Code of New York State.

General

Revise all instances of occupied with occupiable (occupiable ~~occupied~~) and unoccupied with unoccupiable (unoccupiable ~~unoccupied~~) in the title (as shown below) and/or body of the following sections:

- [BG] PENTHOUSE ...
- 302.1 Occupancy classification ...
- 503.1.4 Occupiable ~~Occupied~~ roofs ...
- 503.1.4.1 Enclosures over occupiable ~~occupied~~ roof areas ...
- 1004.7 Outdoor areas ...
- 1006.1 General ...
- 1006.3 Egress from stories or occupiable occupied roofs ...
- 1006.3.1 Occupant load ...
- 1006.3.2 Path of egress travel ...
- 1006.3.3 Egress based on occupant load ...
- 1006.3.4 Single exits ...
- 1009.2.1 Elevators required ...
- 1011.12 Stairway to roof ...
- 1011.12.2 Roof access ...
- 1011.14 Alternating tread devices
- 1011.15 Ship's ladders ...
- 1011.16 Ladders ...
- 1019.3 Occupancies other than Groups I-2 and I-3 ...
- 1104.4 Multistory buildings and facilities ...

Chapter 2 Definitions

[NY] 201.1 **Scope.** Unless otherwise expressly stated, the ~~following~~ words and terms provided in italics shall, for the purposes of this code, have the meanings indicated in this chapter or as defined within the chapter or appendix where the word or term is found, except as provided in Sections 201.3 and 201.4.

[NY] 201.2 **Interchangeability.** Words and terms used in the present tense include the future; words and terms stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

[NY] 201.3 ~~Terms~~ Words and terms **defined in other codes.** Where italicized words and terms are not defined in this code and are defined in the *Energy Conservation Construction Code of New York State, Fire Code of New York State, Fuel Gas Code of New York State, Mechanical Code of New York State, or Plumbing Code of New York State*, such terms shall have the meanings ascribed to them in those codes.

[NY] 201.4 ~~Terms~~ Words and terms **not defined.** Where words and terms are not italicized or are italicized but not defined through the methods authorized in this section, such words and terms shall have the meanings defined in applicable referenced standards, statutes, or regulations or shall have the ordinarily accepted meanings such as the context implies.

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

[BG] **ATRIUM.** ~~An opening. A vertical space that is closed at the top, connecting two or more stories other than enclosed stairways, elevators, hoistways, escalators, plumbing, electrical, air conditioning or other equipment, which is closed at the top and not defined as a mall. Stories, as used in this definition, do not include balconies within assembly groups or mezzanines that comply with Section 505.~~ A vertical space that is closed at the top, connecting two or more stories in all other occupancies.

[BE] AUTOMATIC FLUSH BOLT. Door locking hardware, installed on the inactive leaf of a pair of doors, which has a bolt that is extended automatically into the door frame or floor when the active leaf is closed after the inactive leaf, and which holds the inactive leaf in a closed position. When the active leaf is opened, the automatic flush bolt retracts the bolt or rod allowing the inactive leaf to be opened (see “Constant latching Bolt,” “Dead Bolt,” “Manual Bolt”).

[F]AUTOMATIC SPRINKLER SYSTEM. An automatic sprinkler system, ~~for fire protection purposes, is an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply. The portion of the system above the ground is a network of specially sized or hydraulically designed piping installed in a structure or area, generally overhead, and to which automatic sprinklers are connected in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area.~~ is an integrated network of piping designed in accordance with fire protection standards.

[BS] BASIC WIND SPEED, V. ~~Basic design wind speeds.~~ The wind speed used for design, as determined in Chapter 16.

[BS] BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) ROOF COVERING. ~~A photovoltaic panel BIPV system that also functions as a component of the building envelope.~~ roof covering. Coverings include, but not limited to, shingles, tiles, and roof panels.

[BS] BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) PRODUCT SYSTEM. A building ~~product~~ system that incorporates photovoltaic modules and functions as ~~a an integral part component~~ of the building envelope, such as roof assemblies and roof coverings, exterior wall envelopes and exterior wall coverings, and fenestration.

~~**[BG] CABLE-RESTRAINED, AIR-SUPPORTED STRUCTURE.** A structure in which the uplift is resisted by cables or webbings which are anchored to either foundations or dead men. Reinforcing cable or webbing is attached by various methods to the membrane or is an integral part of the membrane. This is not a cable-supported structure.~~

[NY] CARBON MONOXIDE SOURCE. A combustion process that has the potential to produce carbon monoxide as a product of combustion under normal or abnormal conditions. Carbon monoxide sources include, but are not limited to solid-, liquid-, or gas-fueled appliances, equipment, devices, or systems, such as fireplaces, furnaces, heaters, boilers, cooking equipment, and vehicles with internal combustion engines.

[NY] Carbon Monoxide Source, Direct. A permanently installed *carbon monoxide source* that is located in an interior space.

[NY] Carbon Monoxide Source, Forced-indirect. A *carbon monoxide source* connected to an interior space by a forced air supply duct.

CAST-IN-PLACE CONCRETE EQUIVALENT DIAPHRAGM. See Section 1905.2

[BF] CEILING RADIATION DAMPER. A *listed* device installed in a ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly to limit automatically the radiative heat transfer through an air inlet/outlet opening. *Ceiling radiation dampers* include air terminal units, ceiling dampers and ceiling air diffusers. *Ceiling radiation dampers* are classified for use in either static systems that will automatically shut down in the event of a fire, or in dynamic systems that continue to operate during a fire. A dynamic ceiling radiation damper is tested and rated for closure under elevated temperature airflow.

[NY] CELL (Group I-3 occupancy). A room within a *housing unit* in a detention or correctional facility used to confine ~~inmates or prisoners~~ incarcerated individuals.

[A] CHANGE OF OCCUPANCY. ~~A change in the use of a building or a portion a building which results in one of the following:~~ Either of the following shall be considered as a *change of occupancy* where this code requires a greater degree of safety, accessibility, structural strength, fire protection, *means of egress*, ventilation or sanitation than is existing in the current building or structure:

- ~~1. A change of occupancy classification.~~ Any change in the occupancy classification of a building or structure.
- ~~2. A change from one group to another group within an occupancy classification.~~ Any change in the purpose of, or a change in the level of activity within, a building or structure.
- ~~3. Any change in use within a group for which there is a change in application of the requirements of this code.~~

[F] COMBUSTIBLE LIQUID. A *liquid* having a closed cup *flash point* at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:

The category of combustible liquids does not include *compressed gases or cryogenic fluids or liquids* that do not have a fire point when tested in accordance with ASTM D92.

Class II. *Liquids* having a closed cup *flash point* at or above 100°F (38°C) and below 140°F (60°C).

Class IIIA. *Liquids* having a closed cup *flash point* at or above 140°F (60°C) and below 200°F (93°C).

Class IIIB. *Liquids* having a closed cup *flash point* at or above 200°F (93°C).

COMPUTER ROOM. A room or portions of a *building* used primarily to house *information technology equipment (ITE)* and serving an ITE load less than or equal to 10 kW or 20 W/ft² (215 W/m²) or less of conditioned floor area.

CONSTANT LATCHING BOLT. Door-locking hardware installed on the inactive leaf of a pair of doors consisting of a bolt that automatically latches into the door frame or floor, holding the inactive leaf in a closed position. The latch bolt is retracted manually to allow the inactive leaf to be opened.

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

CONTINUITY HEAD-OF-WALL SYSTEM. An assemblage of specific materials or products that are designed to resist the passage of fire through voids created at the intersection of fire barriers and the underside of roof assemblies that are not fire-resistance rated for a prescribed period of time.

[BF] 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 thermal* envelope.

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

[BG] CUSTODIAL CARE. Describes *persons who receive assistance* Assistance with day-to-day living tasks such as assistance with cooking, taking medication, bathing, using toilet facilities and other tasks of daily living. Custodial care includes persons receiving care who have the ability to respond to emergency situations and *may receive limited verbal or physical assistance*. These care recipients may evacuate at a slower rate and/or who have mental and psychiatric complications.

[BS] DANGEROUS. Any *building, structure* or portion thereof that meets any of the conditions described below shall be deemed *dangerous*:

1. The *building* or *structure* has collapsed, has partially collapsed, has moved off its foundation or lacks the necessary support of the ground.
2. There exists a significant risk of collapse, detachment or dislodgment of any portion, member, appurtenance or ornamentation of the *building* or *structure* under ~~service loads~~ permanent, routine, or frequent loads; under actual loads already in effect; or under snow, wind, rain, flood, earthquake aftershock, or other environmental loads when such loads are imminent.

DATA CENTER. A room or *building*, or portions thereof, used primarily to house *information technology equipment (ITE)* and serving a total ITE load greater than 10 kW and 20 W/ft² (215 W/m²) of conditioned floor area.

DEAD BOLT. Door locking hardware with a bolt that is extended and retracted by action of the lock mechanism (see "Automatic flush bolt," "Constant latching bolt," "Manual bolt").

[BS] DEAD LOAD. The weight of 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 the weight of fixed service equipment, ~~such as including cranes, plumbing stacks and risers, electrical feeders, heating, ventilating and air conditioning systems and automatic sprinkler systems and material handling systems.~~

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

[BS] DESIGN DISPLACEMENT. See Section ~~1905.1.1.~~

[BS] DETAILED PLAIN CONCRETE STRUCTURAL WALL. See Section ~~1905.1.1.~~ [1905.2.](#)

[BS] DIMENSIONS ~~(for Chapter 21).~~ [This definition applies only to Chapter 21.](#)

Nominal. The *specified dimension* plus an allowance for the joints with which the units are to be laid. Nominal dimensions are usually stated in whole numbers. Thickness is given first, followed by height and then length.

Specified. *Dimensions* specified for the manufacture or construction of a unit, *joint* or element.

[BG] DWELLING UNIT, EFFICIENCY. [A dwelling unit where all permanent provisions for living, sleeping, eating and cooking are contained in a single room.](#)

ELECTRIC VEHICLE CHARGING STATION. [One or more vehicle spaces served by an electric vehicle charging system.](#)

[BE] EMERGENCY ESCAPE AND RESCUE OPENING. An operable [exterior](#) window, door or other similar device that provides for a means of escape and access for rescue in the event of an emergency.

[BF] EMITTANCE. [The ratio of radiant heat flux emitted by a specimen to that emitted by a blackbody at the same temperature and under the same conditions.](#)

[F] ENERGY STORAGE SYSTEM, ELECTROCHEMICAL. [An energy storage system that stores energy and produces electricity using chemical reactions. It includes, among others, battery ESS and capacitor ESS.](#)

[BS] ESSENTIAL FACILITIES. *Buildings* and other *structures* that are intended to remain operational in the event of extreme environmental loading from *flood*, wind, [tornadoes](#), snow or earthquakes.

[BF] EXTERIOR WALL ASSEMBLY-ENVELOPE. A system ~~or assembly of~~ [including the exterior wall, covering, framing and](#) components, ~~including exterior wall finish materials, such as weather-resistive barriers, and insulating materials. This system~~ that provides protection of the building structural members, ~~including framing and sheathing materials,~~ and conditioned interior space from the detrimental effects of the exterior environment.

[BF] EXTERIOR WALL COVERING. A material or assembly of materials applied on the exterior side of *exterior walls* for the purpose of providing a weather-resisting barrier, insulation or for aesthetics, including but not limited to, *veneers*, siding, *exterior insulation and finish systems*, [rainscreen systems](#), architectural *trim* and embellishments such as *cornices*, *soffits*, *facias*, *gutters* and *leaders*.

[BF] F RATING. The time period that the *through-penetration firestop system*, [perimeter fire containment system or continuity head-of-wall system](#) limits the spread of fire through the penetration [or void.](#) ~~when tested in accordance with ASTM E814 or UL 1479.~~

[BF] FIRE PROTECTION RATING. The period of time that an opening protective [prevents or retards the passage of excessive flames](#) ~~will maintain the ability~~ to confine a fire as determined by tests specified in Section 716. Ratings are stated in hours or minutes.

[BF] FIRE PROTECTIVE CURTAIN ASSEMBLY. [An assembly consisting of a fabric curtain, a bottom bar, guides, a coil, and an operating and closing system.](#)

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

[F] FLAMMABLE GAS. A material that is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa)], ~~which also meets one of the following~~, subdivided as follows:

[1. Category 1A. A gas that meets either of the following:](#)

[1. ~~Is ignitable~~ Ignitable](#) at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air.

[1. ~~Has a~~ A](#) flammable range at 14.7 psia (101 kPa) with air of at least 12 percent, regardless of the lower limit, [unless data shows compliance with Category 1B.](#)

[2. Category 1B. A gas that meets the flammability criteria for Category 1A, is not pyrophoric or chemically unstable, and meets one or more of the following:](#)

[2. A lower flammability limit of more than 6 percent by volume of air.](#)

2. A fundamental burning velocity of less than 3.9 inches/second (99 mm/s).

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E681.

Where not otherwise specified, the term “flammable gas” includes both Category 1A and 1B.

[F] FLAMMABLE LIQUID. A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

Class IA. Liquids having a flash point below 73°F (23°C) and a boiling point below 100°F (38°C).

Class IB. Liquids having a flash point below 73°F (23°C) and a boiling point at or above 100°F (38°C).

Class IC. Liquids having a flash point at or above 73°F (23°C) and below 100°F (38°C). The category of flammable liquids does not include compressed gases or cryogenic fluids, or liquids that do not have a fire point when tested in accordance with ASTM D92.

[NY] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a ~~1~~ 0.2-percent or greater chance of flooding in any year.
2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

[BS] FOUNDATION PIER. This definition applies only to Chapter 21.

An isolated vertical foundation member whose horizontal dimension measured at right angles to its thickness does not exceed three times its thickness and whose height is equal to or less than four times its thickness.

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

~~**[BE] GRADE FLOOR OPENING.** GRADE FLOOR EMERGENCY ESCAPE AND RESCUE OPENING. A window or other opening located such that the sill height of the opening is~~ An emergency escape and rescue opening located such that the bottom of the clear opening is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening.

GROUND SNOW LOAD, p_g . Design ground snow loads

GROUND SNOW LOAD, $p_{g(asd)}$. Allowable stress design ground snow loads

GROUND SNOW LOAD GEODATABASE. The ASCE database (version 2022-1.0) of geocoded values of risk-targeted design ground snow load values.

[BS] GYPSUM BOARD. A type of gypsum panel product ~~The generic name for a family of sheet~~ consisting of a noncombustible core primarily of gypsum with paper surfacing. ~~products 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 Table 2506.2, Table 2507.2 and Chapter 35 are types of gypsum board.~~

[BS] GYPSUM PANEL PRODUCT. The general name for a family of sheet products consisting essentially of gypsum, complying with the standards specified in Table 2506.2 and Table 2507.2, and Chapter 35. ~~Gypsum board and glass-mat gypsum panels are examples of gypsum panel products.~~

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

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

[BG] HIGH-RISE BUILDING. A building with an occupied floor or occupiable roof located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

[NY] HISTORIC BUILDING. An existing building ~~or structure~~ that is ~~one or more~~ any of the following:

1. Listed, or certified as eligible for listing, ~~by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places~~ in the National Register of Historic Places or in the New York State 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~~ State Register-listed, or locally designated historic district.

HYBRID FIRE EXTINGUISHING SYSTEM. A system which utilizes a combination of atomized water and inert gas to extinguish fire.

[BS] 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.

[BG] INCAPABLE OF SELF-PRESERVATION. Describes persons ~~Persons~~ who, because of age, physical limitations, mental limitations, chemical dependency or medical treatment, cannot respond as an individual to an emergency situation.

[BS] INDIVIDUAL TRUSS MEMBER. A truss chord or truss web.

INFORMATION TECHNOLOGY EQUIPMENT (ITE). Computers, data storage, servers, and network communication equipment.

INFORMATION TECHNOLOGY EQUIPMENT FACILITIES (ITEF). Data centers and computer rooms used primarily to house information technology equipment.

INSULATED METAL PANEL (IMP). A factory manufactured panel consisting of metal facings and an insulation core intended for use as a system forming an exterior wall, an exterior wall covering, a roof covering, or of a building.

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

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

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

[BF] INTUMESCENT FIRE-~~RESISTIVE~~ ~~RESISTANT~~ MATERIALS. COATINGS. Thin film- A liquid mixture applied to substrates by brush, roller, spray or trowel which expands into a protective insulating ~~foamed~~ layer to provide fire- ~~resistive~~ ~~resistant~~ protection of the substrates when exposed to flame or intense heat.

LANDSCAPED ROOF. An area over a roof assembly incorporating planters, vegetation, hardscaping, or other similar decorative appurtenances that are not part of the roof assembly.

[F] LIFE SAFETY SYSTEMS. Systems, devices and equipment that enhance or facilitate evacuation, smoke control, compartmentation and isolation.

LIMITED VERBAL OR PHYSICAL ASSISTANCE. Describes persons who, because of age, physical limitations, cognitive limitations, treatment or chemical dependency, and may not independently recognize, respond or evacuate without limited verbal or physical assistance during an emergency situation. Limited verbal assistance includes prompting, giving and repeating instructions. Limited physical assistance includes assistance with transfers to walking aids or mobility devices and assistance with egress.

[A] LISTED. Equipment, materials, products or services included in a list published by an organization acceptable to the building official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. Terms that are used to identify listed equipment, products or materials include “listed,” “certified,” “classified” or other terms as determined appropriate by the listing organization.

[NY] LIVE FIRE TRAINING BUILDING. A building in which live fire training, fire, rescue, hazmat, and/or other related training evolutions are conducted on a repetitive basis. This shall include, but not be limited to, containerized training structures, live fire training structures, and training towers, as defined in NFPA 1402.

[BS] LIVE LOAD, ROOF. A load on a roof produced:

1. During maintenance by workers, equipment and materials; or
2. During the life of the structure by movable objects such as planters or other similar small decorative appurtenances that are not occupancy related. ~~;-or~~

~~3.—By the use and occupancy of the roof such as for roof gardens or assembly areas.~~

LOW-SLOPE. A roof slope less than two units vertical in 12 units horizontal (17-percent slope).

MANUAL BOLT. Door-locking hardware operable from one side of the door, or from the edge of a door leaf, with a bolt or rod extended and retracted by manual movement of the bolt or rod, such as a manual flush bolt or manual surface bolt (see "Automatic flush bolt," "Constant latching bolt," "Dead bolt").

[BG] MASS TIMBER. Structural elements of Type IV construction primarily of solid, built-up, panelized or engineered wood products that meet minimum cross-section dimensions of Type IV construction.

~~**[BF] MASTIC FIRE-RESISTANT COATINGS.** Liquid mixture applied to a substrate by brush, roller, spray or trowel that provides fire-resistant protection of a substrate when exposed to flame or intense heat.~~

[BG] MECHANICAL-ACCESS ENCLOSED PARKING GARAGE. An enclosed parking garage that employs parking machines, lifts, elevators or other mechanical devices for vehicle moving from and to street level and in which public occupancy in the garage is prohibited in all areas except the vehicle access bay.

[BS] METAL BUILDING SYSTEM. An integrated set of fabricated components and assemblies that form a complete or partial building shell that is designed by the manufacturer. This system typically includes but is not limited to primary framing composed of built-up structural steel members, secondary members that are cold-formed steel or open-web steel joists, a metal panel roof system and exterior wall cladding. The system is manufactured in a manner that permits plant or field inspection prior to assembly or erection.

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

[BF] NONCOMBUSTIBLE PROTECTION (FOR MASS TIMBER). Noncombustible material, in accordance with Section 703.6, designed to increase the fire-resistance rating and delay the combustion of mass timber.

OCCUPIABLE ROOF. An exterior space on a roof that is designed for human occupancy, other than maintenance or repair, and which is equipped with a *means of egress* system meeting the requirements of this code.

ORDINARY ~~STRUCTURAL~~ PLAIN CONCRETE STRUCTURAL WALL. See Section ~~1905.1.1.~~ 1905.2

ORDINARY PRECAST STRUCTURAL WALL. See Section ~~1905.1.1.~~ 1905.2

ORDINARY REINFORCED CONCRETE STRUCTURAL WALL. See Section ~~1905.1.1.~~ 1905.2

[BS] OTHER STRUCTURES. ~~(for Chapters 16-23).~~ This definition applies only to Chapters 16 through 23.

Structures, other than buildings, for which *loads* are specified in Chapter 16.

OVERHEAD DOORSTOP. Door hardware mounted at the top of the door and to the door frame that limits the swing of the door in the opening.

[A] PEER REVIEW. An independent and objective technical review conducted by an approved third party.

[BG] PENTHOUSE. An enclosed, ~~unoccupied~~ unoccupiable rooftop structure used for sheltering mechanical and electrical equipment, tanks, elevators and related machinery, stairways, and vertical *shaft* openings.

[BF] PERIMETER FIRE CONTAINMENT SYSTEM. An assemblage of specific materials or products that is designed to resist for a prescribed period of time the passage of fire through voids created at the intersection of exterior curtain wall assemblies and fire-resistance-rated floor or floor/ceiling assemblies.

[BS] PERMANENT INDIVIDUAL TRUSS MEMBER DIAGONAL BRACING (PITMDB). Structural member or assembly intended to permanently stabilize the *PITMRs*.

[BS] PERMANENT INDIVIDUAL TRUSS MEMBER RESTRAINT (PITMR). Restraint that is used to prevent local buckling of an individual truss chord or web member because of the axial forces in the *individual truss member*.

[BS] PHOTOVOLTAIC (PV) MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracker, designed to generate DC power when exposed to sunlight.

[BS] PHOTOVOLTAIC (PV) PANEL. A collection of modules mechanically fastened together, wired and designed to provide a field-installable unit.

[BS] PHOTOVOLTAIC (PV) PANEL SYSTEM. A system that incorporates discrete *photovoltaic panels*, that converts solar radiation into electricity, including rack support systems.

PHOTOVOLTAIC (PV) PANEL SYSTEM, GROUND-MOUNTED. An independent photovoltaic (PV) panel system without useable space underneath, installed directly on the ground.

~~**[BS] PHOTOVOLTAIC SHINGLES.** A roof covering resembling shingles that incorporates photovoltaic modules.~~

PHOTOVOLTAIC (PV) SUPPORT STRUCTURE, ELEVATED. . An independent photovoltaic (PV) panel support structure designed with useable space underneath with minimum clear height of 7 feet 6 inches (2286 mm), intended for secondary use such as providing shade or parking of motor vehicles.

~~**[BF] PLASTIC, APPROVED.** Any thermoplastic, thermosetting or reinforced thermosetting plastic material that conforms to combustibility classifications specified in the section applicable to the application and plastic type.~~

[BF] PLASTIC GLAZING. Plastic materials that are glazed or set in a frame or sash or are otherwise supported.

[BG] ~~CHILDREN'S~~ PLAY STRUCTURE. A structure composed of one or more components, where the user enters a play environment.

[BS] PORCELAIN TILE. ~~Tile that conforms to the requirements of ANSI A137.1.3, Section 3.0 for ceramic~~ Ceramic tile having an absorption of 0.5 percent or less in accordance with Table 10 of ANSI A137.1, ~~Section 4.1 and Section 6.1~~ Table 10 or Tables 4 or 5 of ANSI A137.3.

[BS] POSITIVE ROOF DRAINAGE. ~~The drainage condition in which consideration has been made for all loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.~~ A design that accounts for deflections from all design loads and has sufficient additional slope to ensure that drainage of the roof occurs within 48 hours of precipitation.

PRECAST CONCRETE DIAPHRAGM. See Section 1905.2

[BS] PRESERVATIVE-TREATED WOOD. Wood products that, when impregnated with chemicals by a pressure process or other means during manufacture, exhibit reduced susceptibility to damage by fungi, insects, or marine borers.

[BG] PRIMARY STRUCTURAL FRAME. The primary structural frame shall include all of the following structural members:

1. The columns.
2. Structural members having direct connections to the columns, including girders, beams, trusses and spandrels.
3. Members of the floor construction and roof construction having direct connections to the columns.
4. ~~Bracing members~~ Members that are essential to the vertical stability of the primary structural frame under gravity loading. ~~shall be considered part of the primary structural frame whether or not the bracing member carries gravity loads.~~

PUBLIC-OCCUPANCY TEMPORARY STRUCTURE. Any building or structure erected for a period of one year or less that serves an assembly occupancy or other public use.

[BG] PUZZLE ROOM. A puzzle room is a type of special amusement area in which occupants are encouraged to solve a challenge to escape from a room or series of rooms. A puzzle room is sometimes referred to as an escape room.

RAINSCREEN SYSTEM. An assembly applied to the exterior side of an exterior wall which consists of, at minimum, an outer layer, an inner layer, and a cavity between them sufficient for the passive removal of liquid water and water vapor.

RAISED-DECK SYSTEM. (For application to Chapter 15 only). A system consisting of decking or pavers supported by pedestals installed over a roof assembly to provide a walking surface.

RESPONSIVE VAPOR RETARDER. A vapor retarder material complying with a vapor retarder class of Class I or II, but which also has a vapor permeance of 1 perm or greater in accordance with ASTM E96, water method (Procedure B).

~~**[BS] RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATIONS.** The most severe earthquake effects considered by this code, determined for the orientation that results in the largest maximum response to horizontal ground motions and with adjustment for targeted risk.~~

[BG] SECONDARY STRUCTURAL MEMBERS. The following structural members shall be considered secondary members and not part of the *primary structural frame*:

1. Structural members not having direct connections to the columns.
2. Members of the floor construction and roof construction not having direct connections to the columns.
3. Bracing members ~~other than those~~ that are not designated part of ~~the~~ a primary structural frame or bearing wall.

SERVICE LIFE. The period of time that a *structure* serves its intended purpose. For *temporary structures*, this shall be the cumulative time of service for sequential *temporary events* which may occur in multiple locations. For *public-occupancy temporary structures* this is assumed to be a minimum of 10 years.

[BS] SHEAR WALL ~~(for Chapter 23).~~ This definition applies only to Chapter 23.

A wall designed to resist lateral forces parallel to the plane of a wall.

Shear wall, perforated. A wood structural panel sheathed wall with openings, that has not been specifically designed and detailed for force transfer around openings.

Shear wall segment, perforated. A section of shear wall with full-height sheathing that meets the height-to-width ratio limits of Section 4.3.4 of AWC SDPWS.

[BS] SITE CLASS. A classification assigned to a site based on the types of soils present and their engineering properties as defined in ~~Section 1613.2.2.~~ Chapter 20 of ASCE/SEI-7.

~~**[BS] SITE COEFFICIENTS.** The values of F_v and F_a indicated in Table 1613.2.3(1) and Table 1613.2.3(2), respectively.~~

[BG] SMOKE COMPARTMENT. A space within a *building* ~~enclosed by smoke barriers on all sides, including the top and bottom.~~ separated from other interior areas of the building by smoke barriers, including interior walls and horizontal assemblies.

SMOKE PROTECTIVE CURTAIN ASSEMBLY FOR HOISTWAY. An automatic closing smoke and draft control curtain assembly.

[BG] SOFT CONTAINED PLAY EQUIPMENT STRUCTURE. A ~~children's play~~ structure containing one or more components where the user enters a play environment that utilizes pliable materials.

[BG] SPECIAL AMUSEMENT-BUILDING AREA. A ~~special amusement building is any~~ temporary or permanent *building* or portion thereof that is occupied for amusement, entertainment or educational purposes and ~~that contains a device or system that conveys passengers or provides a walkway along, around or over a course in any direction so arranged that the means of egress path is not readily apparent due to visual or audio distractions or is intentionally confounded or is not readily available because of the nature of the attraction or mode of conveyance through the building or structure.~~ is arranged in a manner that meets one or more of the following descriptions:

1. Makes the means of egress path not readily apparent due to visual or audio distractions.
2. Intentionally confounds identification of the means of egress path.
3. Otherwise makes the means of egress path not readily available because of the nature of the attraction or mode of conveyance through the building or structure.

[BG] SPECIAL EVENT STRUCTURE. Any ground-supported structure, platform, stage, stage scaffolding or rigging, canopy, tower or similar structure supporting entertainment-related equipment or signage.

~~**[BS] SPECIAL STRUCTURAL WALL.** See Section 1905.1.1.~~

[BF] SPRAYED-APPLIED FOAM PLASTIC. Single- and multiple-component, spray-applied foam plastic insulation used in nonstructural applications that are installed at locations wherein the material is applied in a liquid or frothed state, permitted to free rise and cure in situ.

[BF] SPRAYED FIRE-RESISTIVE RESISTANT MATERIALS (SRFM). Cementitious or fibrous materials that are sprayed to provide fire-resistant protection of the substrates.

SPRINKLER EXPRESS RISER. A vertical pipe used to supply water to sprinkler systems in a multiple story building.

[BF] STEEP-SLOPE. A roof slope ~~greater than~~ 2 units vertical in 12 units horizontal (17-percent slope): or greater.

[BS] STORAGE RACKS, STEEL. Cold-formed or hot-rolled steel structural members which are formed into steel storage racks, including pallet storage racks, movable-shelf racks, rack-supported systems, automated storage and retrieval systems (stacker racks), push-back racks, pallet-flow racks, case-flow racks, pick modules and rack-supported platforms.

Other types of racks, such as drive-in or drive-through racks, cantilever racks, portable racks or racks made of materials other than steel, are not considered storage racks for the purpose of this code.

[BS] STORAGE RACKS, STEEL CANTILEVERED. A framework or assemblage composed of cold-formed or hot-rolled steel structural members, primarily in the form of vertical columns, extended bases, horizontal arms projecting from the faces of the columns, and longitudinal (down-aisle) bracing between columns. There may be shelf beams between the arms, depending on the products being stored; this definition does not include other types of racks such as pallet storage racks, drive-in racks, drive-through racks, or racks made of materials other than steel.

[BG] STORM SHELTER. A building, structure or portions thereof, constructed in accordance with ICC 500 and designated for use during hurricanes, tornadoes or other severe windstorms. ~~a severe wind storm event, such as a hurricane or tornado.~~

Community storm shelter. A storm shelter not defined as a “Residential storm shelter.”

Residential storm shelter. A storm shelter servicing occupants of *dwelling units* and having an *occupant load* not exceeding 16 persons.

[NY] 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 any of the following:

1. More than 6 feet (1829 mm) above *grade plane*.
2. More than 6 feet (1829 mm) above the finished ground level for more than 50 percent of the total building perimeter.
3. More than 12 feet (3658 mm) above the finished ground level at any point.

[BS] STRENGTH. ~~(For Chapter 21).~~ This term is defined two ways, the first for use in Chapter 16 and the second for use in Chapter 21.

For Chapter 16:

Nominal strength. The capacity of a structure or member to resist the effects of loads, as determined by computations using specified material strengths and dimensions and equations derived from accepted principles of structural mechanics or by field tests or laboratory tests of scaled models, allowing for modeling effects and differences between laboratory and field conditions.

Required strength. Strength of a member, cross section or connection required to resist factored loads or related internal moments and forces in such combinations as stipulated by these provisions.

Strength design. A method of proportioning structural members such that the computed forces produced in the members by factored loads do not exceed the member design strength [also called “load and resistance factor design” (LRFD)]. The term “strength design” is used in the design of concrete and masonry structural elements.

For Chapter 21:

Design strength. Nominal strength multiplied by a strength reduction factor.

Nominal strength. Strength of a member or cross section calculated in accordance with these provisions before application of any strength-reduction factors.

Required strength. Strength of a member or cross section required to resist *factored loads*.

~~[BS] STRENGTH (For Chapter 16).~~

~~Nominal strength.~~ ~~The capacity of a structure or member to resist the effects of loads, as determined by computations using specified material strengths and dimensions and equations derived from accepted principles of structural mechanics or by field tests or laboratory tests of scaled models, allowing for modeling effects and differences between laboratory and field conditions.~~

~~Required strength.~~ ~~Strength of a member, cross section or connection required to resist factored loads or related internal moments and forces in such combinations as stipulated by these provisions.~~

~~Strength design.~~ ~~A method of proportioning structural members such that the computed forces produced in the members by factored loads do not exceed the member design strength [also called “load and resistance factor design” (LRFD)]. The term “strength design” is used in the design of concrete and masonry structural elements.~~

~~[BS] SUSCEPTIBLE BAY.~~ A roof or portion thereof with either of the following:

1. A slope less than 1/4 inch per foot (0.0208 rad).
2. On which water is impounded, in whole or in part, and the secondary drainage system is functional but the primary drainage system is blocked.

~~A roof surface with a slope of 1/4 inch per foot (0.0208 rad) or greater towards points of free drainage is not a susceptible bay.~~

[BF] T RATING. The time period that the *penetration firestop system*, including the penetrating item, or continuity head-of-wall system, limits the maximum temperature rise to 325°F (163 181°C) above its initial temperature through the penetration or void on the nonfire side, ~~when tested in accordance with ASTM E814 or UL 1479.~~

TEMPORARY EVENT. A single use during the *service life of a public-occupancy temporary structure* at a given location which includes its installation, inspection, use and occupancy, and dismantling.

TEMPORARY STRUCTURE. Any *building or structure* erected for a period of 180 days or less to support *temporary events*. Temporary structures include a range of structure types (*public-occupancy temporary structures, temporary special event structures, tents, umbrella and other membrane structures, relocatable buildings, temporary bleachers, etc.*) for a range of purposes (storage, equipment protection, dining, workspace, assembly, etc.).

[BF] TERMINATED STOPS. Factory feature of a door frame where the stops of the door frame are terminated not more than 6 inches (152 mm) from the bottom of the door frame. Terminated stops are also known as “hospital stops” or “sanitary stops.”

~~[NY]~~ **[A] TOWNHOUSE.** A *building* that contains three or more attached *townhouse units*. ~~single-family dwelling unit constructed in a group of three or more attached units in which each unit (1) extends from the foundation to roof, (2) has open space on at least two sides, and (3) has a separate means of egress.~~

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

TREATED WOOD. ~~Wood products that are conditioned to enhance fire-retardant or preservative properties.~~ See “Fire-retardant-treated wood” and “Preservative-treated wood.”

~~**Fire-retardant-treated wood.** Wood products that, when impregnated with chemicals by a pressure process or other means during manufacture, exhibit reduced surface burning characteristics and resist propagation of fire.~~

~~**Preservative-treated wood.** Wood products that, conditioned with chemicals by a pressure process or other means, exhibit reduced susceptibility to damage by fungi, insects or marine borers.~~

TYPE X. A type of *gypsum panel product* with special core additives to increase the fire resistance as specified by the applicable standards listed in Table 2506.2. (See the definition of 'Gypsum panel product')

[BS] UNDERPINNING. The alteration of an existing foundation to transfer *loads* to a lower elevation using new piers, piles or other permanent structural support elements installed below the existing foundation.

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

[BF] 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, when tested in accordance with ~~the desiccant method using~~ Procedure A or Procedure B of ASTM E96. A vapor permeable material permits the passage of moisture vapor.

[BS] VEGETATIVE ROOF. A roof ~~An~~ assembly of interacting components designed to waterproof a building's top surface that includes, by design, a vegetative surface. ~~vegetation and related landscape elements.~~

VERTICAL WATER SUPPLY ZONE. A vertical fire protection zone within the standpipe system or group of floors supplied by a single *sprinkler express riser* in a high-rise building established by pressure limitations based on the design.

[BS] WALL ~~(for Chapter 21).~~ This definition applies only to Chapter 21.

A vertical element with a horizontal length-to-thickness ratio greater than three, used to enclose space.

Cavity wall. A wall built of *masonry units* or of concrete, or a combination of these materials, arranged to provide an airspace within the wall, and in which the inner and outer parts of the wall are tied together with metal ties.

Dry-stacked, surface-bonded wall. A wall built of concrete *masonry units* where the units are stacked dry, without *mortar* on the bed or *head joints*, and where both sides of the wall are coated with a surface-bonding *mortar*.

Parapet wall. The part of any wall entirely above the roof line.

[BS] WALL, LOAD-BEARING. Any wall meeting either of the following classifications:

1. Any metal or wood stud wall that supports more than 100 pounds per linear foot (1459 N/m) of vertical load in addition to its own weight.
2. Any *masonry*, ~~or~~ concrete *or mass timber* wall that supports more than 200 pounds per linear foot (2919 N/m) of vertical *load* in addition to its own weight.

[BS] WIND DESIGN GEODATABASE. The ASCE database (version 2022-1.0) of geocoded wind speed design data. The ASCE Wind Design Geodatabase of geocoded wind speed design data is available at <https://asce7hazardtool.online/>.

[BS] WIND SPEED, BASIC, V. See “Basic wind speed.”

[BS] WINDBORNE DEBRIS REGION. Areas within *hurricane-prone regions* located:

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

For *Risk Category* II buildings and structures and *Risk Category* III buildings and structures, except health care facilities, the windborne debris region shall be based on Figure 1609.3.(1) For *Risk Category* IV buildings and *Risk Category* III health care facilities, the windborne debris region shall be based on Figure 1609.3(2).

Chapter 3 Occupancy Classification and Use

302.1 Occupancy classification.

Occupancy classification is the formal designation of the primary purpose of the building, structure or portion thereof. Structures shall be classified into one or more of the occupancy groups specified in this section based on the nature of the hazards and risks to building occupants generally associated with the intended purpose of the building or structure. An area, room or space that is intended to be occupied at different times for different purposes shall comply with all applicable requirements associated with such potential multipurpose. Structures containing multiple occupancy groups shall comply with Section 508. Where a structure is proposed for a purpose that is not specified in this section, such structure shall be classified in the occupancy it most nearly resembles based on the fire safety and relative hazard. ~~Occupied~~ *Occupiable* roofs shall be classified in the group that the occupancy most nearly resembles, according to the fire safety and relative hazard, and shall comply with Section 503.1.4 .

- 1.Assembly (see Section 303): Groups A-1, A-2, A-3, A-4 and A-5.
- 2.Business (see Section 304): Group B.
- 3.Educational (see Section 305): Group E.
- 4.Factory and Industrial (see Section 306): Groups F-1 and F-2.
- 5.High Hazard (see Section 307): Groups H-1, H-2, H-3, H-4 and H-5.
- 6.Institutional (see Section 308): Groups I-1, I-2, I-3 and I-4.
- 7.Mercantile (see Section 309): Group M.
- 8.Residential (see Section 310): Groups R-1, R-2, R-3 and R-4.
- 9.Storage (see Section 311): Groups S-1 and S-2.

10. Utility and Miscellaneous (see Section 312): Group U.

303.1.5 Special amusement areas.

Special amusement areas shall comply with Section 411.

304.1 Business Group B.

Business Group B occupancy includes, among others, the use of a building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts. Business occupancies shall include, but not be limited to, the following:

Electronic data ~~processing~~ entry

Lithium-ion or lithium metal battery testing, research and development

(NOTE: only the new or modified list items are shown)

304.2 Airport traffic control towers.

Airport traffic control towers shall comply with Section 412.2.

304.3 Ambulatory care facilities.

Ambulatory care facilities shall comply with Section 422.

304.4 Higher education laboratories.

Higher education laboratories shall comply with Section 428.

305.3 Storm shelters in Group E occupancies.

Storm shelters shall be provided for Group E occupancies where required by Section 423.5.

306.2 Moderate-hazard factory industrial, Group F-1.

Factory industrial uses that are not classified as Factory Industrial F-2 Low Hazard shall be classified as F-1 Moderate Hazard and shall include, but not be limited to, the following:

Beverages: over ~~16-20~~-percent alcohol content

Energy storage systems (ESS) in dedicated use buildings

Energy storage systems (ESS) and equipment containing lithium-ion or lithium metal batteries

Lithium-ion batteries

Vehicles powered by lithium-ion or lithium metal batteries

Water/sewer treatment facilities

(NOTE: only the new or modified list items are shown)

306.2.1 Aircraft manufacturing facilities.

Aircraft manufacturing facilities shall comply with Section 412.6.

306.3 Low-hazard factory industrial, Group F-2.

Factory industrial uses that involve the fabrication or manufacturing of noncombustible materials that during finishing, packing or processing do not involve a significant fire hazard shall be classified as F-2 occupancies and shall include, but not be limited to, the following:

- Beverages: up to and including ~~16-20~~-percent alcohol content

307.1 High-hazard Group H.

High-hazard Group H occupancy includes, among others, the use of a *building* or *structure*, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or *health hazard* in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for *control areas* set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the

International Fire Code. Hazardous materials stored or used on top of roofs or *canopies* shall be classified as ~~outdoor~~ rooftop storage or use and shall comply with the *International Fire Code*.

Revise Table 307.1 as follows (portions of table not shown remain unchanged):

[F] TABLE 307.1(1)

MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A
PHYSICAL HAZARD ^{a, c, i, l, j, m, n, p}

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note Ⓕ Ⓔ	NA	NA	See Note Ⓕ Ⓔ	NA	NA	See Note Ⓕ Ⓔ	NA
Combustible fiber ⒻⒺ	Loose Baled Ⓕ	H-3	(100) (1,000)	NA	NA	(100) (1,000)	NA	NA	(20) (200)	NA
Combustible liquid Ⓕ,Ⓕ,Ⓔ	II	H-2 or H-3	NA	120 ^{d, e}	NA	NA	120 ^d	NA	NA	30 ^d
	IIIA	H-2 or H-3		330 ^{d, e}			330 ^d			80 ^d
	IIIB	NA		13,200 ^{e, f}			13,200 ^f			3,300 ^f
Flammable gas	Gaseous	H-2	NA	NA	1,000 ^{d,e}	NA	NA	1,000 ^{d,e}	NA	NA
	1A and 1B (High BV)^p									
	1B(Low BV)^p									
	Liqueified			(150) ^{d,e}	162,500^{d,e}					
	1A and 1B (High BV)^p									
	1B (Low BV)^p									
Flammable liquid Ⓕ,Ⓔ	IA	H-2 or H-3	NA	30 ^{d, e}	NA	NA	30 ^d	NA	10 ^d	
	IB and IC			120 ^{d, e}			120 ^d		30 ^d	
Flammable liquid, combination (IA, IB, IC) Ⓕ,Ⓔ	NA	H-2 or H-3	NA	120 ^{d, e, h}	NA	NA	120 ^{d, h}	NA	NA	30 ^{d, h}

For SI: 1 cubic foot = 0.028 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NL = Not Limited; NA = Not Applicable; UD = Unclassified Detonable.

- a. For use of control areas, see Section 414.2.
- b. The aggregate quantity in use and storage shall not exceed the [maximum allowable](#) quantity specified for storage, [including applicable increases](#).
- c. [For hazardous materials in Group B higher education laboratory occupancies, See Section 428 of this code and Chapter 38 of the International Fire Code. The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited provided the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water miscible liquids with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.](#)
- d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.
- e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms or exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10 of the International Fire Code. Where Note d also applies, the increase for both notes shall be applied accumulatively.
- f. Quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
- g. Allowed only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
- h. Containing not more than the maximum allowable quantity per control area of Class IA, IB or IC flammable liquids.
- ~~i. The maximum allowable quantity shall not apply to fuel oil storage complying with Section 605.4.2 of the International Fire Code.~~
- ~~j. i.~~ Quantities in parentheses indicate quantity units in parentheses at the head of each column.
- ~~k. j.~~ A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment when the storage containers and the manner of storage are approved.
- ~~l. k.~~ Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.
- ~~m. l.~~ For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.
- ~~n. m.~~ For ~~storage and display quantities~~ [oxidizers, unstable \(reactive\) materials, and water reactive materials stored or displayed](#) in Group M [occupancies](#) ~~and storage quantities or stored~~ in Group S occupancies, [see section 414.2.5.1 complying with Section 414.2.5, see Tables 414.2.5\(1\) and 414.2.5\(2\).](#)
- ~~o. n.~~ [For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 414.2.5.2. Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.](#)

- ~~p. The following shall not be included in determining the maximum allowable quantities:~~
- ~~a. Liquid or gaseous fuel in fuel tanks on vehicles.~~
 - ~~b. Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with the International Fire Code.~~
 - ~~c. Gaseous fuels in piping systems and fixed appliances regulated by the International Fuel Gas Code.~~
 - ~~d. Liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code.~~
 - ~~e. Alcohol-based hand rubs classified as Class I or II liquids in dispensers that are installed in accordance with Sections 5705.5 and 5705.5.1 of the International Fire Code. The location of the alcohol-based hand rub (ABHR) dispensers shall be provided in the construction documents.~~
- q. o. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.
- p. "High BV" Category 1B flammable gas has a burning velocity greater than 3.9 inches per second (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 inches per second (10 cm/s) or less.

[F] TABLE 307.1(2) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A HEALTH HAZARD ^{a, c, ~~f~~ h, i}

MATERIAL	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
	Solid pounds ^{d, e, f}	Liquid gallons (pounds) ^{d, e, f}	Gas cubic feet at NTP (pounds) ^d	Solid pounds ^d	Liquid gallons (pounds) ^d	Gas cubic feet at NTP (pounds) ^d	Solid pounds ^d	Liquid gallons (pounds) ^d
Corrosives	5,000	500	Gaseous 810 ^e	5,000	500	Gaseous 810 ^e	1,000	100
			Liquefied (150)			Liquefied (150)		
Highly Toxic	10	(10)	Gaseous 20 ^g	10	(10)	Gaseous 20 ^g	3	(3)
			Liquefied (4) ^g			Liquefied (4) ^g		
Toxic	500	(500)	Gaseous 810 ^e	500	(500)	Gaseous 810 ^e	125	(125)
			Liquefied (150) ^e			Liquefied (150) ^e		

For SI: 1 cubic foot = 0.028 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

- a. For use of control areas, see Section 414.2.
- b. The aggregate quantity in use and storage shall not exceed the quantity specified for storage.
- c. For hazardous materials in Group B higher education laboratory occupancies, See Section 428 of this code and Chapter 38 of the International Fire Code.
~~In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.~~
- d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.
- e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *International Fire Code*. Where Note d also applies, the increase for both notes shall be applied accumulatively.
- f. For corrosive, highly toxic and toxic materials, stored or displayed in Group M occupancies or stored in Group S occupancies, see Section 414.2.5.1.
~~For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5, see Tables 414.2.5(1) and 414.2.5(2).~~

- g. Allowed only where stored in approved exhausted gas cabinets or exhausted enclosures as specified in the *International Fire Code*.
- h. Quantities in parentheses indicate quantity units in parentheses at the head of each column.
- i. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the *International Fire Code*.

[F] 307.1.1 Occupancy Exemptions ~~Uses other than Group H.~~

Storage, use and handling of hazardous materials in accordance with Table 307.1.1 shall not be counted as contributing to Maximum Allowable Quantities and shall not cause classification of an occupancy to be Group H. Such storage, use and handling shall comply with applicable provisions of the *International Fire Code*. ~~An occupancy that stores, uses or handles hazardous materials as described in one or more of the following items shall not be classified as Group H, but shall be classified as the occupancy that it most nearly resembles.~~

- ~~1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the *International Fire Code*.~~
- ~~2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the *International Fire Code*.~~
- ~~3. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.~~
- ~~4. Cleaning establishments that utilize combustible liquid solvents having a flash point of 140°F (60°C) or higher in closed systems employing equipment listed by an approved testing agency, provided that this occupancy is separated from all other areas of the building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both.~~
- ~~5. Cleaning establishments that utilize a liquid solvent having a flash point at or above 200°F (93°C).~~
- ~~6. Liquor stores and distributors without bulk storage.~~
- ~~7. Refrigeration systems.~~
- ~~8. The storage or utilization of materials for agricultural purposes on the premises.~~
- ~~9. Stationary storage battery systems installed in accordance with the *International Fire Code*.~~
- ~~10. Corrosive personal or household products in their original packaging used in retail display.~~
- ~~11. Commonly used corrosive building materials.~~
- ~~12. Buildings and structures occupied for aerosol product storage, aerosol cooking spray products or plastic aerosol products shall be classified as Group S-1, provided that such buildings conform to the requirements of the *International Fire Code*.~~
- ~~13. Display and storage of nonflammable solid and nonflammable or noncombustible liquid hazardous materials in quantities not exceeding the maximum allowable quantity per control area in Group M or S occupancies complying with Section 414.2.5.~~
- ~~14. The storage of black powder, smokeless propellant and small arms primers in Groups M and R-3 and special industrial explosive devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the *International Fire Code*.~~
- ~~15. Stationary fuel cell power systems installed in accordance with the *International Fire Code*.~~
- ~~16. Capacitor energy storage systems in accordance with the *International Fire Code*.~~
- ~~17. Group B higher education laboratory occupancies complying with Section 428 and Chapter 38 of the *International Fire Code*.~~
- ~~18. Distilling or brewing of beverages conforming to the requirements of the *International Fire Code*.~~
- ~~19. The storage of beer, distilled spirits and wines in barrels and casks conforming to the requirements of the *International Fire Code*.~~

TABLE 307.1.1 HAZARDOUS MATERIAL EXEMPTIONS ^a

<u>Material Classification</u>	<u>Occupancy or Application</u>	<u>Exemption</u>
<u>Combustible fiber</u>	<u>Baled Cotton</u>	<u>Densely packed baled cotton shall not be classified as combustible fiber, provided that the bales comply with the packing requirements of ISO 8115</u>
<u>Corrosive</u>	<u>Building materials</u>	<u>The quantity of commonly used building materials that are classified as corrosive materials is not limited</u>
	<u>Personal and household products</u>	<u>The quantity of personal and household products that are classified as corrosive materials is not limited in retail displays, provided that the products are in original packaging</u>
	<u>Retail and wholesale sales occupancies</u>	<u>The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited.</u> <u>To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.</u>
<u>Explosives</u>	<u>Groups B, F, M and S</u>	<u>Storage of special industrial explosive devices is not limited</u>
	<u>Groups M and R-3</u>	<u>Storage of black powder, smokeless propellant, and small arms primers is not limited</u>
<u>Flammable and combustible liquids and gases</u>	<u>Aerosols</u>	<u>Buildings and structures occupied for aerosol product storage, aerosol cooking spray products or plastic aerosol 3 products shall be classified as Group S-1</u>
	<u>Alcoholic beverages</u>	<u>The quantity of alcoholic beverages in liquor stores and distributors without bulk storage is not limited</u>
		<u>The quantity of alcoholic beverages in distilling or brewing of beverages is not limited</u>
		<u>The storage quantity of beer, distilled spirits and wines in barrels and casks is not limited</u>
		<u>The quantity of alcoholic beverages in retail and wholesale sales occupancies is not limited.</u> <u>To qualify for this allowance, beverages shall be packaged in individual containers not exceeding 1.3 gallons</u>
	<u>Cleaning establishments with combustible liquid solvents</u>	<u>The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140°F (60°C) is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both</u>
		<u>The quantity of combustible liquid solvents having a flash point at or above 200°F (93°C) is not limited</u>
	<u>Closed piping systems</u>	<u>The quantity of flammable and combustible liquids and gases utilized for the operation of machinery or equipment is not limited</u>
	<u>Fuel</u>	<u>The quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited</u>
		<u>The quantity of gaseous fuels in piping systems and fixed appliances regulated by the International Fuel Gas Code is not limited</u>
		<u>The quantity of liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code is not limited</u>
	<u>Fuel oil</u>	<u>The quantity of fuel oil storage complying with Section 605.4.2 of the International Fire Code is not limited</u>

	<u>Flammable finishing operations using flammable and combustible liquids</u>	<u>Buildings and structures occupied for the application of flammable finishes. Such buildings and areas shall comply with Section 416</u>
	<u>Hand sanitizer</u>	<u>The quantity of alcohol-based hand rubs classified as Class I or II liquids in dispensers installed in accordance with Sections 5705.5 and 5705.5.1 of the International Fire Code is not limited. The location of the alcohol- based hand rub (ABHR) dispensers shall be provided in the construction documents</u>
	<u>Retail and wholesale sales occupancies with flammable and combustible liquids</u>	<u>The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited</u> <u>To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.</u>
<u>Highly toxic and toxic materials</u>	<u>Retail and wholesale sales occupancies</u>	<u>The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, is not limited.</u> <u>To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.</u>
<u>Any</u>	<u>Agricultural materials</u>	<u>The quantity of agricultural materials stored or utilized for agricultural purposes on the premises is not limited</u>
	<u>Energy storage</u>	<u>The quantity of hazardous materials in stationary storage battery systems is not limited</u>
		<u>The quantity of hazardous materials in stationary fuel cell power systems is not limited</u>
		<u>The quantity of hazardous materials in capacitor energy storage systems is not limited</u>
	<u>Refrigeration systems</u>	<u>The quantity of refrigerants in refrigeration systems is not limited.</u>

For SI: 1 gallon = 3.785L, °C = (°F – 32)/1.8.

a. Exempted materials and conditions listed in this table are required to comply with applicable provisions of the International Fire Code.

307.3 High-hazard Group H-1.

Buildings and structures containing materials that pose a *detonation* hazard shall be classified as Group H-1. Such materials shall include, but not be limited to, the following:

Detonable *pyrophoric* materials

Explosives:

[Division 1.1](#)

[Division 1.2](#)

[Division 1.3](#)

[Division 1.4](#)

[Division 1.5](#)

[Division 1.6](#)

Organic peroxides, unclassified detonable

Oxidizers, Class 4

Unstable (reactive) materials, Class 3 detonable and Class 4

307.3.1 Occupancies containing explosives not classified as H-1.

The following occupancies containing *explosive* materials shall be classified as follows:

1. Division 1.3 *explosive* materials that are used and maintained in a form where either confinement or configuration will not elevate the hazard from a mass fire to mass *explosion* hazard shall be allowed in H-2 occupancies.
2. [Division 1.4 explosive materials shall be allowed in H-3 occupancies.](#)
3. Articles, including articles packaged for shipment, that are not regulated as a Division 1.4 *explosive* under Bureau of Alcohol, Tobacco, Firearms and Explosives regulations, or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles shall be allowed in H-3 occupancies.

[F] 307.4 High-hazard Group H-2.

Buildings and structures containing materials that pose a deflagration hazard or a hazard from accelerated burning shall be classified as Group H-2. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA *flammable or combustible liquids* that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 pounds per square inch gauge (103.4 kPa).
Combustible dusts where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

Cryogenic fluids, flammable.

[Category 1A Flammable gases.](#)

[Category 1B Flammable gases having a burning velocity greater than 3.9 inches per second \(10 cm/s\).](#)

Organic peroxides, Class I.

Oxidizers, Class 3, that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 pounds per square inch gauge (103 kPa).

Pyrophoric liquids, solids and gases, nondetonable.

Unstable (reactive) materials, Class 3, nondetonable.

Water-reactive materials, Class 3.

[F] 307.5 High-hazard Group H-3.

Buildings and structures containing materials that readily support combustion or that pose a *physical hazard* shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:

- Class I, II or IIIA *flammable or combustible liquids* that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103.4 kPa) or less
- Combustible fibers*, other than densely packed *baled cotton*, where manufactured, generated or used in such a manner that the concentration and conditions create a fire or *explosion* hazard based on information prepared in accordance with Section 414.1.3 Consumer *fireworks*, 1.4G (Class C, Common)
- Cryogenic fluids*, oxidizing
- [Category 1B flammable gases having a burning velocity of 3.9 inches per second \(10 cm/s\) or less](#)
- Flammable solids*
- Organic peroxides*, Class II and III
- Oxidizers*, Class 2
- Oxidizers*, Class 3, that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103 kPa) or less
- Oxidizing gases*
- Unstable (reactive) materials*, Class 2
- Water-reactive materials*, Class 2

308.2 Institutional Group I-1.

Institutional Group I-1 occupancy shall include buildings, structures or portions thereof for more than 16 *persons*, excluding staff, who reside on a 24-hour basis in a supervised environment and receive *custodial care*. Buildings of Group I-1 shall be classified as one of the occupancy conditions specified in Section 308.2.1 or 308.2.2 [and shall comply with Section 420.](#) This group shall include, but not be limited to, the following:

- Alcohol and drug centers
- Assisted living *facilities*
- Congregate care *facilities*
- Group homes*
- Halfway houses
- Residential board and care *facilities*
- Social rehabilitation *facilities*

308.3.1 Occupancy conditions.

Buildings of Group I-2 shall be classified as one of the occupancy conditions specified in Section 308.3.1.1 or 308.3.1.2 [and shall comply with Section 407.](#)

308.4 Institutional Group I-3.

Institutional Group I-3 occupancy shall include buildings and structures that are inhabited by more than five *persons* who are under restraint or security. A Group I-3 *facility* is occupied by persons who are *generally incapable of self-preservation* due to security measures not under the occupants' control. This group shall include, but not be limited to, the following:

- Correctional centers
- Detention centers
- Jails
- Prerelease centers
- Prisons
- Reformatories

Buildings of Group I-3 shall be classified as one of the occupancy conditions specified in Sections 308.4.1 through 308.4.5 ~~(see Section 408.1)~~ [and shall comply with Section 408.](#)

309.1 Mercantile Group M.

Mercantile Group M occupancy includes, among others, the use of a *building* or *structure* or a portion thereof for the display and sale of merchandise, and involves stocks of goods, wares or merchandise incidental to such purposes and ~~accessible to the public~~ [where the public has access](#). Mercantile occupancies shall include, but not be limited to, the following:

- Department stores
- Drug stores
- Markets
- Greenhouses* for display and sale of plants that provide public access.
- Motor fuel-dispensing facilities*
- Retail or wholesale stores
- Sales rooms

[309.3 Motor fuel-dispensing facilities.](#)

[Motor fuel-dispensing facilities shall comply with Section 406.7.](#)

310.1 Residential Group R.

Residential Group R includes, among others, the use of a *building* or *structure*, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not regulated by the *Residential Code of New York State*. [Group R occupancies not constructed in accordance with the *International Residential Code* as permitted by Sections 310.4.1 and 310.4.2 shall comply with Section 420.](#)

310.2 Residential Group R-1.

Residential Group R-1 occupancies containing *sleeping units* [or more than two dwelling units](#) where the occupants are primarily *transient* in nature, including:

- Boarding houses (transient)* with more than 10 occupants
- Congregate living facilities (transient)* with more than 10 occupants
- Hotels (*transient*)
- Motels (*transient*)
- [Lodging houses with more than 5 guestrooms](#)

310.3 Residential Group R-2.

Residential Group R-2 occupancies containing *sleeping units* or more than two *dwelling units* where the occupants are primarily permanent in nature, including:

- Apartment houses
- Congregate living facilities* (nontransient) with more than 16 occupants
 - Boarding houses (nontransient)* Convents
 - Dormitories*
 - [Emergency services living quarters](#)
- Fraternities and sororities
- Monasteries
- Hotels (nontransient) [with more than five guest rooms](#)
- Live/work units*
- Motels (nontransient) [with more than five guest rooms](#)
- Vacation timeshare properties

310.4 Residential Group R-3.

Residential Group R-3 occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

Buildings that do not contain more than two *dwelling units*

Care facilities that provide accommodations for five or fewer persons receiving care

Congregate living facilities (nontransient) with 16 or fewer occupants

Boarding houses (nontransient) Convents

Dormitories

[Emergency services living quarters](#)

Fraternities and sororities

Monasteries

Congregate living facilities (transient) with 10 or fewer occupants

Boarding houses (transient)

Lodging houses (~~transient~~) with five or fewer *guest rooms* ~~and 10 or fewer occupants~~

[Hotels \(nontransient\) with five or fewer guest rooms](#)

[Motels \(nontransient\) with five or fewer guest rooms](#)

310.4.2 Lodging houses.

Owner-occupied *lodging houses* with five or fewer *guest rooms* ~~and 10 or fewer total occupants~~ shall be permitted to be constructed in accordance with [this code or the Residential Code of New York State](#) are protected by [an automatic sprinkler system installed in accordance with Section P2904 of the International Residential Code.](#)

311.1.2 Combustible storage.

[High-piled stock or rack storage, or *attic*, under-floor and concealed spaces used for storage of combustible materials, shall be in accordance with Section 413.](#)

311.2 Moderate-hazard storage, Group S-1.

Storage Group S-1 occupancies are buildings occupied for storage uses that are not classified as Group S-2, including, but not limited to, storage of the following:

Aerosol products, Levels 2 and 3, [aerosol cooking spray, plastic aerosol 3 \(PA3\)](#)

Beverages: over ~~16~~ [20-percent alcohol content](#)

Lithium-ion or lithium Metal batteries

Vehicle repair garages for vehicles powered by lithium-ion or lithium metal batteries

(NOTE: only the new or modified list items are shown)

311.2.1 Aircraft hangers.

[Aircraft hangars used for storage or repair shall comply with Section 412.3.](#)

311.2.2 Motor vehicle repair garages.

[Motor vehicle repair garages shall comply with Section 406.8.](#)

311.3 Low-hazard storage, Group S-2.

Storage Group S-2 occupancies include, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Group S-2 storage uses shall include, but not be limited to, storage of the following:

Beverages up to and including ~~16~~ 20-percent alcohol

[Public parking garages, open or enclosed](#)

(NOTE: only the new or modified list items are shown)

311.3.1 Public parking garages.

Public parking garages shall comply with Section 406.4 and the additional requirements of Section 406.5 for open parking garages or Section 406.6 for enclosed parking garages.

[NY] 312.1 General. Buildings and structures of an accessory character and miscellaneous structures not classified in any specific occupancy shall be constructed, equipped and maintained to conform to the requirements of this code commensurate with the fire and life hazard incidental to their occupancy. Group U shall include, but not be limited to, the following:

Agricultural buildings

Aircraft hangars, accessory to a one- or two-family residence (see Section 412.4) Barns

Carports

Communication equipment structures with a gross floor area of less than 1,500 square feet (139 m²)

Fences more than ~~6~~⁷ feet (2134 mm) in height

Grain silos, accessory to a residential occupancy

Live fire training buildings (see Section ~~430~~⁴²⁹)

Livestock shelters

Private garages

Retaining walls

Sheds

Stables

Tanks

Tower

312.2 Private garages and carports.

Private garages and carports shall comply with Section 406.3.

312.3 Residential aircraft hangars.

Aircraft hangars accessory to a one- or two-family residence shall comply with Section 412.4.

Chapter 4 Special Detailed Requirements Based on Occupancy and Use

402.6.3 ~~Children's play~~ Play structures.

~~Children's play~~ Play structures located within ~~the mall of~~ a ~~covered~~ mall building or within the perimeter line of an open mall building shall comply with Section 424. The horizontal separation between ~~children's~~ play structures, kiosks and similar structures within the mall shall be not less than 20 feet (6096 mm).

~~[F]~~ 402.7 Emergency systems.

Covered and open mall buildings, anchor buildings and associated parking garages shall be provided with emergency systems complying with Sections 402.7.1 through 402.7.5.

402.7.2 Smoke control.

~~Where a covered mall building contains an atrium,~~ Atriums connecting three or more stories in covered mall buildings shall be provided with a smoke control system ~~shall be provided~~ in accordance with Section ~~909~~ ^{404.5}.

~~Exception: A smoke control system is not required in covered mall buildings where an atrium connects only two stories.~~

[F] 402.7.2 Smoke control.

~~Where a covered mall building contains an atrium,~~ Atriums connecting three or more stories in a covered mall building shall be provided with a smoke control system ~~shall be provided~~ in accordance with ~~Section 404.5~~ Section 909.

~~Exception: A smoke control system is not required in covered mall buildings where an atrium connects only two stories.~~

[F] 402.7.5 Fire department access to equipment.

Rooms or areas containing controls for air-conditioning systems, ~~automatic fire-extinguishing systems, automatic sprinkler systems or other detection, suppression or control elements~~ or fire protection systems shall be identified for use by the fire department.

402.8.5 Distance to exits.

Within each individual tenant space in a *covered* or *open mall building*, the distance of travel from any point to an *exit* or entrance to the *mall* shall be not greater than 200 feet (60 960 mm).

The distance of travel from any point within a *mall* of a *covered mall building* to an *exit* shall be not greater than 200 feet (60 960 mm). The maximum distance of travel from any point within an *open mall* to an exit or to the perimeter line of the *open mall building* shall be not greater than 200 feet (60 960 mm).

~~403.2.2 Seismic considerations.~~

~~For seismic considerations, see Chapter 16.~~

[BS] ~~403.2.3~~ 403.2.2 Structural integrity of interior exit stairways and elevator hoistway enclosures.

For *high-rise buildings of Risk Category III or IV* in accordance with Section 1604.5, and for all buildings that are more than 420 feet (128 m) in *building height*, enclosures for *interior exit stairways* and elevator hoistway enclosures shall comply with Sections 403.2.2.1 through 403.2.2.4.

~~[BS] 403.2.2.1 Wall assembly materials—soft body impact.~~

~~The panels making up the enclosures for interior exit stairways and elevator hoistway enclosures shall meet or exceed Soft Body Impact Classification Level 2 as measured by the test method described in ASTM C1629/C1629M.~~

[BS] ~~403.2.2.2~~ 403.2.2.1 Wall assembly materials ~~hard body impact.~~

~~The panels making up the enclosures for interior exit stairways and elevator hoistway enclosures that are not exposed to the interior of the enclosures for interior exit stairways or elevator hoistway enclosure~~ Where an interior exit stairway enclosure or an elevator hoistway enclosure is constructed as an interior wall of the building, the panels applied to the exterior of the enclosure shall be in accordance with one of the following:

1. The wall assembly shall incorporate not fewer than two layers of impact-resistant ~~construction board~~ panels, each of which meets or exceeds Soft Body Impact Classification Level 2 and Hard Body Impact Classification Level 2 as measured by the test method described in ASTM C1629/C1629M.
2. The wall assembly shall incorporate not fewer than one layer of impact-resistant ~~construction material~~ panels that meet or exceed Soft Body Impact Classification Level 2 and Hard Body Impact Classification Level 3 as measured by the test method described in ASTM C1629/C1629M.
3. The wall assembly incorporates multiple layers of any material, tested in tandem, that meets or exceeds Soft Body Impact Classification Level 2 and Hard Body Impact Classification Level 3 as measured by the test method described in ASTM C1629/C1629M.

[BS] ~~403.2.2.3~~ 403.2.2.2 Concrete and masonry walls.

Concrete or masonry walls shall be deemed to satisfy the requirements of ~~Sections~~ Section 403.2.2.1 ~~and 403.2.2.2.~~

[BS] ~~403.2.2.4~~ 403.2.2.3 Other wall assemblies.

Any other wall assembly that provides impact resistance equivalent to that required by ~~Section~~s 403.2.2.1 for Soft Body Impact Classification Level 2 and ~~403.2.2.2~~ for Hard Body Impact Classification Level 3, as measured by the test method described in ASTM C1629/C1629M, shall be permitted.

[BS] 403.2.2.4 Glass walls.

Glass walls complying with the safety glazing impact requirements of CPSC 16 CFR 1201, Cat. II or ANSI Z97.1, Class A shall be deemed to satisfy the requirements of Section 403.2.2.1.

~~403.2.4~~ 403.2.3 Sprayed fire-~~resistive~~ resistant materials (SFRM).

The bond strength of the SFRM installed throughout the building shall be in accordance with Table 403.2.3.

TABLE ~~403.2.4~~ 403.2.3 MINIMUM BOND STRENGTH

Table rows not shown remain unchanged and are omitted for clarity.

[F] 403.3 Automatic sprinkler system.

Buildings and structures shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and a secondary water supply where required by Section 403.3.3.

Exception: An *automatic sprinkler system* shall not be required in spaces or areas of: telecommunications equipment buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an automatic fire detection system in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour fire barriers constructed in accordance with Section 707 or not less than 2-hour horizontal assemblies constructed in accordance with Section 711, or both.

~~1. Open parking garages in accordance with Section 406.5.~~

~~2. Telecommunications equipment buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an automatic fire detection system in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour fire barriers constructed in accordance with Section 707 or not less than 2-hour horizontal assemblies constructed in accordance with Section 711, or both.~~

[F] 403.3.1 Number of sprinkler risers and system design.

~~Each sprinkler system zone in buildings that are more than 420 feet (128 m) in building height shall be supplied by not fewer than two risers. Each riser shall supply sprinklers on alternate floors. If more than two risers are provided for a zone, sprinklers on adjacent floors shall not be supplied from the same riser.~~ The number of sprinkler risers and design shall comply with Section 403.3.1.1 or 403.3.1.2 based on building height.

403.3.1.1 Buildings 420 feet (36.5 m) or less in height.

In buildings 420 feet (128 m) or less in height, sprinkler systems shall be supplied by a single standpipe or *sprinkler express riser* within each vertical water supply zone.

403.3.1.2 Buildings over 420 feet (128 m) in height.

In buildings more than 420 feet (128 m) in height, not fewer than two standpipes or *sprinkler express risers* shall supply automatic sprinkler systems within each vertical water supply zone. Each standpipe or *sprinkler express riser* shall supply automatic sprinkler systems on alternating floors within the vertical water supply zone such that two adjacent floors are not supplied from the same riser.

[F] ~~403.3.1.1~~ 403.3.1.3 Riser location.

Standpipes or ~~Sprinkler~~-sprinkler express risers shall be placed in *interior exit stairways* and *ramps* that are remotely located in accordance with Section 1007.1.

[F] 403.3.2 Water supply to required fire pumps.

In all buildings that are more than 420 feet (128 m) in *building height* and buildings of Type IVA and IVB construction that are more than 120 feet (36 576 mm) in building height, required fire pumps shall be supplied by connections to not fewer than two water mains located in different streets. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided that the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through not fewer than one of the connections.

[F] 403.3.3 Secondary water supply.

An *automatic* secondary on-site water supply having a capacity not less than the hydraulically calculated sprinkler demand, including the hose stream requirement in accordance with Section 903.3.1.1, shall be provided for *high-rise buildings* assigned to *Seismic Design Category C, D, E or F* as determined by Section 1613. An additional fire pump shall not be required for the secondary water supply unless needed to provide the minimum design intake pressure at the

suction side of the fire pump supplying the *automatic sprinkler system*. The secondary water supply shall have a duration of not less than 30 minutes as determined by the occupancy hazard classification in accordance with Section 903.3.1.1.

[F] 403.4.5 Emergency ~~responder radio~~ communication coverage.

In-building, two-way emergency ~~Emergency~~-responder ~~radio~~-communication coverage shall be provided in accordance with Section 510 of the *International Fire Code*.

[F] 403.4.7 Smoke removal.

To facilitate smoke removal in post-fire salvage and overhaul operations, buildings and structures shall be equipped with natural or mechanical *ventilation* for removal of products of combustion in accordance with one of the following:

1. Easily identifiable, manually operable windows or panels shall be distributed around the perimeter of each floor at not more than 50-foot (15 240 mm) intervals. The area of operable windows or panels shall be not less than 40 square feet (3.7 m²) per 50 linear feet (15 240 mm) of perimeter.

Exceptions:

1. In Group R-1 occupancies, each dwelling unit, sleeping unit or suite having an *exterior wall* shall be permitted to be provided with 2 square feet (0.19 m²) of venting area in lieu of the area specified in Item 1.
2. Windows shall be permitted to be fixed provided that glazing can be cleared by fire fighters.
2. Mechanical air-handling equipment providing one exhaust air change every 15 minutes for the area involved. Return and exhaust air shall be moved directly to the outside without recirculation to other portions of the building.
3. Any other *approved* design that will produce equivalent results.

403.4.8.2 Fuel line piping protection.

Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by ~~an approved method or~~ one of the following methods:

1. A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required rating shall be reduced to 1 hour.
2. An assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, the required fire-resistance rating shall be reduced to 1 hour.
3. Other approved methods.

403.5.3 Stairway door operation.

Stairway doors other than the exit discharge doors shall be permitted to be locked from the *stairway* side. Stairway doors that are locked from the *stairway* side shall be capable of being unlocked simultaneously without unlatching ~~upon a signal from the fire command center~~ where all the following conditions occur:

1. Shall unlock individually or simultaneously upon a signal from the fire command center.
2. Shall unlock simultaneously upon activation of a fire alarm signal in an area served by the stairway.
3. Shall unlock upon failure of the power supply to the lock or the locking system.

403.5.3.1 Stairway communication system.

A telephone or other two-way communications system connected to an *approved constantly attended station* shall be provided at not less than every fifth floor in each *stairway* where the doors to the *stairway* are locked. Systems shall be listed in accordance with UL 2525 and installed in accordance with NFPA 72.

~~403.5.6 Emergency escape and rescue.~~

~~Emergency escape and rescue openings specified in Section 1031 are not required.~~

404.1 General.

~~In other than Group H occupancies, and where permitted by Section 712.1.7, the~~ The provisions of Sections 404.1 through ~~404.10~~ 404.11 shall apply to buildings containing atriums. Atriums are not permitted in buildings or structures classified as Group H. ~~containing vertical openings defined as "Atriums."~~

Exception: Vertical openings that comply with Sections 712.1.1 through 712.1.3, and Sections 712.1.9 through 712.1.14.

404.5 Smoke control.

A smoke control system shall be installed in accordance with Section 909.

Exceptions:

1. In other than Group I-2, and Group I-1, Condition 2, smoke control is not required for *atriums* that connect only two stories.
2. A smoke control system is not required for atriums connecting more than two stories when all of the following are met:
 - 2.1. Only the two lowest stories shall be permitted to be open to the atrium.
 - 2.2. All stories above the lowest two stories shall be separated from the atrium in accordance with the provisions for a shaft in Section 713.4.

404.6 Enclosure of atriums.

Atrium spaces shall be separated from adjacent spaces by a 1-hour *fire barrier* constructed in accordance with Section 707 or a *horizontal assembly* constructed in accordance with Section 711, or both.

Exceptions:

1. A *fire barrier* is not required where a glass wall forming a *smoke partition* is provided. The glass wall shall comply with all of the following:
 - 1.1. *Automatic* sprinklers are provided along both sides of the separation wall and doors, or on the room side only if there is not a walkway on the *atrium* side. The sprinklers shall be located between 4 inches and 12 inches (102 mm and 305 mm) away from the glass and at intervals along the glass not greater than 6 feet (1829 mm). The sprinkler system shall be designed so that the entire surface of the glass is wet upon activation of the sprinkler system without obstruction;
 - 1.2. The glass wall shall be installed in a gasketed frame in a manner that the framing system deflects without breaking (loading) the glass before the sprinkler system operates; and
 - 1.3. Where glass doors are provided in the glass wall, they shall be either *self-closing* or automatic-closing.
2. A *fire barrier* is not required where a glass-block wall assembly complying with Section 2110 and having a $\frac{3}{4}$ -hour *fire protection rating* is provided.
3. A *fire barrier* is not required between the *atrium* and the adjoining spaces of up to three floors of the *atrium* provided that such spaces are accounted for in the design of the smoke control system.
4. In other than Group I-2, and Group I-1, Condition 2, a ~~A~~ fire barrier is not required between the atrium and the adjoining spaces where the atrium is not required to be provided with a smoke control system.
5. In Group I-2 and Group I-1, Condition 2, a fire barrier is not required between the atrium and the adjoining spaces, other than care recipient sleeping or treatment rooms, for up to three stories of the atrium provided that such spaces are accounted for in the design of the smoke control system and do not provide access to care recipient sleeping or treatment rooms.
6. A horizontal assembly is not required between the atrium and openings for escalators complying with Section 712.1.3.
7. A horizontal assembly is not required between the atrium and openings for exit access stairways and ramps complying with Item 4 of Section 1019.3.

404.9 Exit access travel distance.

Exit access travel distance for areas open to an *atrium* shall comply with the requirements of ~~this section~~. Section 1017.

~~404.9.1 Egress not through the atrium.~~

~~Where required access to the exits is not through the atrium, exit access travel distance shall comply with Section 1017.~~

~~404.9.2 Exit access travel distance at the level of exit discharge.~~

~~Where the path of egress travel is through an *atrium* space, exit access travel distance at the level of exit discharge shall be determined in accordance with Section 1017.~~

~~404.9.3 Exit access travel distance at other than the level of exit discharge.~~

~~Where the path of egress travel is not at the level of exit discharge from the *atrium*, that portion of the total permitted exit access travel distance that occurs within the *atrium* shall be not greater than 200 feet (60 960 mm).~~

404.10 Exit stairways in an atrium.

Where an atrium contains an interior exit stairway all the following shall be met:

1. The entry to the exit stairway is the edge of the closest riser of the exit stairway.
2. The entry of the exit stairway shall have access from a minimum of two directions.
3. The distance between the entry to an exit stairway in an atrium and the entrance to a minimum of one exit stairway enclosed in accordance with Section 1023.2 shall comply with the separation required by Section 1007.1.1.
4. Exit access travel distance shall be measured to the closest riser of the exit stairway.
5. Not more than 50 percent of the exit stairways shall be located in the same atrium.
6. The discharge from the exit stairway at the level of exit discharge shall comply with Section 1028.1.

~~404.10~~ 404.11 Interior exit stairways stairway discharge.

~~Not greater than 50 percent~~ Discharge of interior exit stairways ~~are permitted to egress~~ through an *atrium* ~~on the level of exit discharge~~ shall be in accordance with Section 1028.

[NY] 406.1 General. All motor-vehicle-related occupancies shall comply with Section 406.2. Private garages and carports shall also comply with Section 406.3. Open public parking garages shall also comply with Sections 406.4 and 406.5. Enclosed public parking garages shall also comply with Sections 406.4 and 406.6. Motor fuel-dispensing facilities shall also comply with Section 406.7. Repair garages shall also comply with Section 406.8. Parking garages, as defined in Appendix C of the Property Maintenance Code of New York State, shall comply with the condition assessment requirements of Section 406.9.

406.2.1 Automatic garage door ~~openers operators~~ and vehicular gates.

Where provided, Automatic automatic garage door ~~openers operators~~ shall be *listed* and *labeled* in accordance with UL 325. Where provided, *automatic vehicular gates* shall comply with Section 3110.

406.2.4 Floor surfaces.

Floor surfaces shall be of concrete or similar approved noncombustible and nonabsorbent materials. The area of floor used for the 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. The surface of vehicle fueling pads in motor fuel-dispensing facilities shall be in accordance with Section 406.7.1.

Exceptions:

- Asphalt parking surfaces shall be permitted at ground level for public parking garages and private carports.
- ~~Floors of Group S-2 parking garages shall not be required to have a sloped surface.~~
- 2.3. Slip-resistant, nonabsorbent, *interior floor finishes* having a critical radiant flux not more than 0.45 W/cm², as determined by ASTM E648 or NFPA 253, shall be permitted in *repair garages*.

406.2.7 Electric vehicle charging stations and systems.

Where provided, electric vehicle charging ~~stations~~ systems shall be installed in accordance with NFPA 70. Electric vehicle charging system equipment shall be *listed* and labeled in accordance with UL 2202. Electric vehicle supply equipment shall be *listed* and labeled in accordance with UL 2594. Accessibility to *electric vehicle charging stations* shall be provided in accordance with ~~Chapter 11~~. Section 1107.

[NY] 406.2.7.1 Cutoff Switch. Electric vehicle charging stations and systems shall include a red external cutoff switch, a sign with directions to the breaker box to which the charger or system receives power, and a label in the breaker box identifying the breaker that cuts power to the electric vehicle charging station or system. The external cutoff switch shall be a hand-operated switch which is capable of cutting off all power and electricity to the charger or system without the need of a key or to unlock the device. For permanently installed residential electric vehicle charging stations, such cutoff switch shall be placed outside of the house or garage.

406.5.5 Area and height increases.

The allowable area and height of open parking garages shall be increased in accordance with the provisions of this section. Garages with sides open on three-fourths of the building's perimeter are permitted to be increased by 25 percent in area and one tier in height. Garages with sides open around the entire building's perimeter are permitted to be increased by 50 percent in area and one tier in height. For a side to be considered open under these provisions, the total area of openings along the side shall be not less than 50 percent of the interior area of the side at each tier and such openings shall be equally distributed along the length of the tier. For purposes of calculating the interior area of the side, the height shall not exceed 7 feet (2134 mm).

Allowable tier areas in Table 406.5.4 shall be increased for open parking garages constructed to heights less than the table maximum. The gross tier area of the garage shall not exceed that permitted for the higher structure. Not fewer than three sides of each such larger tier shall have continuous horizontal openings not less than 30 inches (762 mm) in clear height extending for not less than 80 percent of the length of the sides. All parts of such larger tier shall be not more than 200 feet (60 960 mm) horizontally from such an opening. In addition, each such opening shall face a street or yard ~~accessible~~ with access to a street with a width of not less than 30 feet (9144 mm) for the full length of the opening, and standpipes shall be provided in each such tier.

Open parking garages of Type II construction, with all sides open, shall be unlimited in allowable area where the building height does not exceed 75 feet (22 860 mm). For a side to be considered open, the total area of openings along the side shall be not less than 50 percent of the interior area of the side at each tier and such openings shall be equally distributed along the length of the tier. For purposes of calculating the interior area of the side, the height shall not exceed 7 feet (2134 mm). All portions of tiers shall be within 200 feet (60 960 mm) horizontally from such openings or other natural ventilation openings as defined in Section 406.5.2. These openings shall be permitted to be provided in courts with a minimum dimension of 20 feet (6096 mm) for the full width of the openings.

406.5.6 Fire separation distance.

Exterior walls and openings in *exterior walls* shall comply with Tables 601 and ~~602~~ 705.5. The distance to an adjacent lot line shall be determined in accordance with Table ~~602~~ 705.5 and Section 705.

406.6.4 Mechanical-access enclosed parking garages.

Mechanical-access enclosed parking garages shall be in accordance with Sections 406.6.4.1 through 406.6.4.4.

406.6.4.1 Separation.

Mechanical-access enclosed parking garages shall be separated from other occupancies and accessory uses by not less than 2-hour fire barriers constructed in accordance with Section 707 or by not less than 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

406.6.4.2 Smoke removal.

A mechanical smoke removal system, installed in accordance with Section 910.4, shall be provided for all areas containing a *mechanical-access enclosed parking garage*.

406.6.4.3 Fire control equipment room.

Fire control equipment, consisting of the *fire alarm* control unit, *mechanical ventilation* controls and an emergency shutdown switch, shall be provided in a room located where the equipment is able to be accessed by the fire service from

a secured exterior door of the building. The room shall be not less than 50 square feet (4.65 m2) in area and shall be in a location that is approved by the fire code official.

406.6.4.3.1 Emergency shutdown switch.

The mechanical parking system shall be provided with a manually activated emergency shutdown switch for use by emergency personnel. The switch shall be clearly identified and shall be in a location approved by the fire code official.

406.6.4.4 Fire department access doors. Access doors shall be provided in accordance with Section 3206.7 of the International Fire Code.

[NY] 406.9 Condition Assessments. It shall be the responsibility of the owner or operator of each parking garage, as defined in Appendix C of the Property Maintenance Code of New York State, to ensure condition assessments are performed in accordance with this section.

[NY] 406.9.1 Initial Condition Assessment. Following construction and prior to a certificate of occupancy or certificate of compliance being issued for the structure, all parking garages shall undergo an initial condition assessment in accordance with Appendix C of the Property Maintenance Code of New York State.

[NY] 406.9.2 Periodic and Additional Condition Assessments. Following the initial condition assessment of a parking garage, periodic and additional condition assessments shall be performed in accordance with Appendix C of the Property Maintenance Code of New York State.

407.2.6 Nursing home cooking facilities.

In Group I-2, Condition 1 occupancies, rooms or spaces that contain a cooking facility with domestic cooking appliances shall be permitted to be open to the corridor where all of the following criteria are met:

1. The number of care recipients housed in the smoke compartment shall not be greater than 30.
2. The number of care recipients served by the cooking facility shall not be greater than 30.
3. Not more than one cooking facility area shall be permitted in a smoke compartment.
- ~~4. The types of domestic cooking appliances permitted shall be limited to ovens, cooktops, ranges, warmers, and microwaves.~~
- ~~5.~~ 4. The corridor shall be a clearly identified space delineated by construction or floor pattern, material, or color.
- ~~6.~~ 5. The space containing the domestic cooking facility shall be arranged so as not to obstruct access to the required exit.
- ~~7. 6. Domestic cooking hoods installed and constructed in accordance with Section 505 of the International Mechanical Code shall be provided over cooktops and ranges. The cooking appliance shall comply with Section 407.2.7.~~
- ~~8. Cooktops and ranges shall be protected in accordance with Section 904.13.~~
- ~~9. A shut-off for the fuel and electrical power supply to the cooking equipment shall be provided in a location that is accessible only to staff.~~
- ~~10. A timer shall be provided that automatically deactivates the cooking appliances within a period of not more than 120 minutes.~~
- ~~11. A portable fire extinguisher shall be provided. Installation shall be in accordance with Section 906, and the extinguisher shall be located within a 30-foot (9144 mm) distance of travel from each domestic cooking appliance.~~

407.2.7 Domestic cooking appliances.

In Group I-2 occupancies, installation of cooking appliances used in domestic cooking facilities shall comply with all of the following:

1. The types of cooking appliances permitted shall be limited to ovens, cooktops, ranges, warmers and microwaves.

2. Domestic cooking hoods installed and constructed in accordance with Section 505 of the *International Mechanical Code* shall be provided over cooktops and ranges.

3. Cooktops and ranges shall be protected in accordance with Section 904.14.

4. A shut-off for the fuel and electrical power supply to the cooking equipment shall be provided in a location to which only staff has access.

5. A timer shall be provided that automatically deactivates the cooking appliances within a period of not more than 120 minutes.

6. A portable fire extinguisher shall be provided. Installation shall be in accordance with Section 906, and the extinguisher shall be located within a 30-foot (9144 mm) distance of travel from each domestic cooking appliance.

Exceptions:

1. Cooktops and ranges located within *smoke compartments* with no patient sleeping or patient care areas are not required to comply with this section.

2. Cooktops and ranges used for care recipient training or nutritional counseling are not required to comply with Item 3 of this section.

407.3.1.1 Door construction.

Doors in corridors not required to have a *fire protection rating* shall comply with the following:

1. Solid doors shall have close-fitting operational tolerances, head and jamb stops.
2. Dutch-style doors shall have an astragal, rabbet or bevel at the meeting edges of the upper and lower door sections. Both the upper and lower door sections shall have latching hardware. Dutch-style doors shall have hardware that connects the upper and lower sections to function as a single leaf.
3. To provide makeup air for exhaust systems in accordance with Section 1020.6, Exception 1, doors are permitted to have louvers or to have a clearance between the bottom of the door and the floor surface that is 2/3 inch (19.1 mm) maximum.

407.4.4 Group I-2 care suites.

Care suites in Group I-2 shall comply with Sections 407.4.4.1 through ~~407.4.4.4~~ 407.4.4.5 and either Section ~~407.4.4.5~~ 407.4.4.6 or ~~407.4.4.6~~ 407.4.4.7.

407.4.4.1 Exit access through care suites.

Exit access from all other portions of a building not classified as a *care suite* shall not pass through a *care suite*. ~~In a care suite required to have more than one exit, one exit access is permitted to pass through an adjacent care suite provided that all of the other requirements of Sections 407.4 and 1016.2 are satisfied.~~

407.4.4.3 Access to corridor.

Every care suite shall have a door leading directly to an exit access corridor or horizontal exit. Movement from habitable rooms within a care suite shall not require ~~passage through~~ more than ~~three doors and~~ 100 feet (30 480 mm) ~~distance of travel within the~~ of travel within the care suite to a door leading to the exit access corridor or horizontal exit. Where a care suite is required to have more than one exit access door by Section 407.4.4.5.2 or 407.4.4.6.2, the additional door shall lead directly to an exit access corridor, exit or an adjacent suite.

~~**Exception:** The distance of travel shall be permitted to be increased to 125 feet (38 100 mm) where an automatic smoke detection system is provided throughout the care suite and installed in accordance with NFPA 72.~~

407.4.4.4 Circulation paths within a care suite.

The circulation paths within a care suite providing the access to doors required in Section 407.4.4.3 shall have a minimum width of 36 inches (914 mm) and shall not be required to meet the requirements for a corridor or an aisle.

407.4.4.4 407.4.4.5 Doors within care suites.

Doors in *care suites* serving habitable rooms shall be permitted to comply with one of the following:

1. Manually operated horizontal sliding doors permitted in accordance with Exception 9 to Section 1010.1.2.
2. *Power-operated doors* permitted in accordance with Section 1010.1.2, Exception 7.

3. *Means of egress* doors complying with Section 1010.

~~407.4.4.5~~ [407.4.4.6](#) Care suites containing sleeping room areas.

~~407.4.4.5.1~~ [407.4.4.6.1](#) Area.

~~407.4.4.5.2~~ [407.4.4.6.2](#) Exit access.

~~407.4.4.6~~ [407.4.4.7](#) Care suites not containing sleeping rooms.

~~407.4.4.6.1~~ [407.4.4.7.1](#) Area.

~~407.4.4.6.2~~ [407.4.4.7.2](#) Exit access.

[407.6.1 Activation of automatic-closing doors.](#)

[Automatic-closing doors on hold-open devices in accordance with Section 716.2.6.6 shall also close upon activation of a fire alarm system, an automatic sprinkler system, or both. The automatic release of the hold-open device on one door shall release all such doors within the same smoke compartment.](#)

410.2.1.1 Stage height and area.

Stage areas shall be measured to include the entire performance area and adjacent backstage and support areas not separated from the performance area by fire-resistance-rated construction. *Stage* height shall be measured from the lowest point on the *stage* floor to the highest point [of the underside](#) of the roof or floor deck above the *stage*.

410.2.4 Proscenium wall.

Where the *stage* height is greater than 50 feet (15 240 mm), all portions of the *stage* shall be completely separated from the seating area by a *proscenium wall* with not less than a 2-hour *fire-resistance rating* extending continuously from the foundation to the roof.

[Exception: Where a stage is located in a building of Type I construction, the proscenium wall is permitted to extend continuously from a minimum 2-hour fire-resistance-rated floor slab of the space containing the stage to the roof or a minimum 2-hour fire-resistance-rated floor deck above.](#)

410.4.1 Separation from stage.

The *stage* shall be separated from dressing rooms, scene docks, property rooms, workshops, storerooms and compartments ~~appurtenant~~ [contiguous](#) to the *stage* and other parts of the building by *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. The *fire-resistance rating* shall be not less than 2 hours for *stage* heights greater than 50 feet (15 240 mm) and not less than 1 hour for *stage* heights of 50 feet (15 240 mm) or less.

410.4.2 Separation from each other.

Dressing rooms, scene docks, property rooms, workshops, storerooms and compartments ~~appurtenant~~ [contiguous](#) to the *stage* shall be separated from each other by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both.

410.5.3.2 Exit access travel distance.

The *exit access* travel distance shall be not greater than 300 feet (91 440 mm) for buildings without an [automatic](#) sprinkler system and 400 feet (122 mm) for buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

[F] 410.6 Automatic sprinkler system.

Stages shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1. Sprinklers shall be installed under the roof and gridiron and under all catwalks and galleries over the *stage*. Sprinklers shall be installed in dressing rooms, performer lounges, shops and storerooms accessory to such *stages*.

Exceptions:

1. Sprinklers are not required under *stage* areas less than 4 feet (1219 mm) in clear height that are utilized exclusively for storage of tables and chairs, provided that the concealed space is separated from the adjacent spaces by Type X *gypsum board* not less than $\frac{5}{8}$ -inch (15.9 mm) in thickness.
2. Sprinklers are not required for *stages* 1,000 square feet (93 m²) or less in area and 50 feet (15 240 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.

3. Sprinklers are not required within portable orchestra enclosures on *stages*.
4. Sprinklers are not required under catwalks and galleries where they are permitted to be omitted in accordance with Section 903.3.1.1.

[F] 410.7 Standpipes-

~~Standpipe systems shall be provided in accordance with Section 905.~~

SECTION 411

SPECIAL AMUSEMENT ~~BUILDINGS~~ AREAS

411.1 General.

Special amusement ~~buildings~~ areas having an occupant load of 50 or more shall comply with the requirements for the appropriate Group A occupancy and Sections 411.1 through ~~411.7~~ 411.6. Special amusement ~~buildings~~ areas having an occupant load of less than 50 shall comply with the requirements for a Group B occupancy and Sections 411.1 through ~~411.7~~ 411.6.

~~Exception~~ Exceptions:

1. Special amusement ~~buildings or portions thereof~~ areas that are without walls or a roof and constructed to prevent the accumulation of smoke ~~need are~~ are not required to comply with this section.
2. Puzzle rooms provided with a means of egress that is unlocked, readily identifiable and always available are not required to comply with this section.

~~For flammable decorative materials, see the International Fire Code.~~

[F] 411.2 Automatic ~~fire detection.~~ sprinkler system.

~~Special~~ Buildings containing special amusement ~~buildings~~ areas shall be equipped throughout with an ~~automatic fire detection-sprinkler~~ system in accordance with Section ~~907.~~ 903.3.1.1. Where the special amusement area is temporary, the sprinkler water supply shall be of an approved temporary means.

Exception: Automatic sprinklers are not required where the total floor area of a temporary special amusement area is less than 1,000 square feet (93 m²) and the exit access travel distance from any point in the special amusement area to an exit is less than 50 feet (15 240 mm).

411.3 Detection and alarm systems. ~~Automatic sprinkler system.~~

Buildings containing ~~Special-special~~ amusement areas shall be equipped throughout with an ~~automatic sprinkler system smoke detection system~~ and an emergency voice/alarm communications system in accordance with Section ~~903.3.1.1.~~ Where the special amusement building is temporary, the sprinkler water supply shall be of an approved temporary means. 907. Presignal alarms and alarm activation shall comply with Sections 411.3.1 and 411.3.2. Emergency voice/alarm communications systems shall comply with Section 411.3.3.

~~**Exception:** Automatic sprinklers are not required where the total floor area of a temporary special amusement building is less than 1,000 square feet (93 m²) and the exit access travel distance from any point to an exit is less than 50 feet (15 240 mm).~~

[F] ~~411.4~~ 411.3.1 Alarm presignal.

~~Actuation~~ Activation of a single *smoke detector*, the *automatic sprinkler system* or other automatic fire detection device shall immediately ~~sound an alarm at the building~~ initiate an audible and visible alarm at a *constantly attended location* at the special amusement area from which emergency action can be initiated including the ~~capability of manual initiation of~~ requirements in Section ~~907.2.11.~~ 411.3.2, can be initiated.

[F] 411.3.2 Alarm activation.

Activation of two or more smoke detectors, a single smoke detector equipped with an alarm verification feature, two or more other approved fire detection devices, the automatic sprinkler system, or a manual control located at the constantly attended station required by Section 411.3.1 shall automatically accomplish all of the following:

1. Illumination of the means of egress with an illumination level not less than 1 footcandle (11 lux) at the walking surface level.

2. Cessation of conflicting or confusing sounds and visual distractions.
3. Activation of approved directional exit markings.
4. Activation of a prerecorded message, audible throughout the special amusement area, instructing occupants to proceed to the nearest exit. Alarm signals used in conjunction with the prerecorded message shall produce a sound that is distinct from other sounds used during normal operation of the special amusement area.

[F] 411.4 411.3.3 Emergency voice/alarm communications system.

An emergency voice/alarm communications system ~~shall be provided in accordance with Section 907.2.12 and complying with Section 907.5.2.2, is permitted~~ shall be installed in and audible throughout *special amusement areas*. The *emergency voice/alarm communications system* is allowed to also serve as a public address system ~~and shall be audible throughout the entire special amusement building.~~

411.4 411.6 Exit marking.

Exit signs shall be installed at the required *exit* or *exit access doorways* ~~of amusement buildings~~ *serving special amusement areas* in accordance with this section and Section 1013. *Approved* directional exit markings shall be provided. Where mirrors, mazes or other designs ~~are utilized that~~ disguise the path of egress travel such that ~~they are the path of egress travel is~~ not apparent, *approved* and *listed* low-level exit signs that comply with Section 1013.5, and directional path markings *listed* in accordance with UL 1994, shall be provided and located not more than 8 inches (203 mm) above the walking surface and on or near the path of egress travel. Such markings shall become visible in an emergency. The directional exit marking shall be activated by the *automatic-fire smoke* detection system and the *automatic sprinkler* system in accordance with Section 411.3.2. 907.2.12.

411.6.1 411.4.1 Photoluminescent exit signs.

Where *photoluminescent exit signs* are installed, such signs shall be listed, and the activating light source and viewing distance shall be in accordance with the listing and markings on ~~of~~ the signs.

411.7 411.5 Interior finish.

~~The interior~~ *Interior wall and ceiling* finish *materials* in *special amusement areas* shall ~~be~~ meet the flame spread index and smoke-developed index requirements for Class A in accordance with Section 803.1.

411.6 Flammable decorative materials.

Flammable decorative materials shall comply with Section 806.

412.2.1.3 Sprayed fire-resistive ~~resistant~~ materials (SFRM).

The bond strength of the SFRM installed in airport traffic control towers shall be in accordance with Section 403.2.3 where the control cab is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

412.7.3 Means of egress.

The means of egress from heliports and helistops shall comply with the provisions of Chapter 10. Landing areas located on buildings or structures shall have two or more ~~means of egress~~ exits or access to exits. For landing areas less than 60 feet (18 288 mm) in length or less than 2,000 square feet (186 m²) in area, the second means of egress is permitted to be a fire escape, alternating tread device or ladder leading to the floor below.

[F] 414.1 General.

~~The provisions of Sections 414.1 through 414.6 shall apply to b~~ Buildings and structures occupied for the manufacturing, processing, dispensing, use or storage of *hazardous materials* shall comply with Sections 414.1 through 414.6.

Exception: Exemptions listed in Table 307.1.1 shall not be required to comply with Section 414.

[F] 414.1.2.1 Aerosol products, aerosol cooking spray products and plastic aerosol 3 products.

Level 2 and 3 aerosol products, aerosol cooking spray products and plastic aerosol 3 products shall be stored and displayed in accordance with the International Fire Code. See Section 311.2 and the International Fire Code for occupancy group requirements.

[F] 414.2.3 Number.

The maximum number of *control areas* within a building shall be in accordance with Table 414.2.2. For the purposes of determining the number of control areas within a building, each portion of a building separated by one or more fire walls complying with Section 706 shall be considered a separate building.

[F] TABLE ~~414.2.5(1)~~ [414.2.5.1](#)

MAXIMUM ALLOWABLE QUANTITY PER INDOOR AND OUTDOOR CONTROL AREA IN GROUP M AND S OCCUPANCIES OF NONFLAMMABLE SOLIDS AND NONFLAMMABLE AND NONCOMBUSTIBLE LIQUIDS ^{d, e, f}

Portions of table not shown remain unchanged.

CONDITION		MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA	
Material ^a	Class	Solids (pounds)	Liquids (gallons)
B. Physical-hazard materials—nonflammable and noncombustible solids and liquids			
1. Oxidizers ^{b, c}	4	Not Allowed	Not Allowed
	3	1,350^g 1,500^g	115 150
	2	2,250 ^h	225
	1	18,000 ^{i, j}	1,800 ^{i, j}

For SI: 1 pound = 0.454 kg, 1 gallon = 3.785 L.

- Hazard categories are as specified in the *International Fire Code*.
- Maximum allowable quantities shall be increased 100 percent in buildings that are sprinklered in accordance with Section 903.3.1.1. Where Note c also applies, the increase for both notes shall be applied accumulatively.
- Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, in accordance with the *International Fire Code*. Where Note b also applies, the increase for both notes shall be applied accumulatively.
- See Table 414.2.2 for design and number of control areas.
- Allowable quantities for other hazardous material categories shall be in accordance with Section 307.
- Maximum quantities shall be increased 100 percent in outdoor control areas.
- Maximum amounts shall be increased to 2,250 pounds where individual packages are in the original sealed containers from the manufacturer or packager and do not exceed 10 pounds each.
- Maximum amounts shall be increased to 4,500 pounds where individual packages are in the original sealed containers from the manufacturer or packager and do not exceed 10 pounds each.
- The permitted quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
- Quantities are unlimited in an outdoor control area.
- [Maximum allowable quantities of consumer products shall be increased to 10,000 pounds where individual packages are in the original, sealed containers from the manufacturer and the toxic classification is exclusively based on the LC threshold and no other hazardous materials classifications apply.](#)

[F] TABLE ~~414.2.5(2)~~ [414.2.5.2](#)

MAXIMUM ALLOWABLE QUANTITY OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN WHOLESALE AND RETAIL SALES OCCUPANCIES PER CONTROL AREA^a

Portions of table not shown remain unchanged.

[F] 414.2.5.3 Aerosol products, [aerosol cooking spray products or plastic aerosol 3 products](#).

The maximum quantity of *aerosol products*, [aerosol cooking spray products or plastic aerosol 3 products](#) in Group M occupancy retail display areas, storage areas adjacent to retail display areas and retail storage areas shall be in accordance with the *International Fire Code*.

[F] 414.2.5.4 Flammable gas.

The aggregate quantity of Category 1B flammable gas having a burning velocity of 3.9 inches per second (10 cm/s) or less stored and displayed within a single control area of a Group M occupancy or stored in a single control area of a Group S occupancy is allowed to exceed the maximum allowable quantities per control area specified in Table 307.1(1) without classifying the building or use as a Group H occupancy, provided that the materials are stored and displayed in accordance with the International Fire Code and quantities do not exceed the amounts specified in Table 414.2.5.4.

[F] TABLE 414.2.5.4

MAXIMUM ALLOWABLE QUANTITY OF LOW BURNING VELOCITY CATEGORY 1B FLAMMABLE GAS IN GROUP M AND S OCCUPANCIES PER CONTROL AREA^a

<u>CATEGORY 1B (Low BV)^d</u>	<u>MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA</u>	
	<u>Sprinklered^b</u>	<u>Nonsprinklered</u>
<u>Gaseous</u>	<u>390,000 cu ft</u>	<u>195,000 cu ft</u>
<u>Liquefied</u>	<u>40,000 lb^c</u>	<u>20,000 lb</u>

For SI: 1 pound = 0.454 kg, 1 square foot = 0.0929 m², 1 cubic foot = 0.028 m³, 1 inch per second = 2.54 cm/s.

- Control areas shall be separated from each other by not less than a 1-hour fire barrier.
- The building shall be equipped throughout with an approved automatic sprinkler system with a minimum sprinkler design density of Ordinary Hazard Group 2 in the area where flammable gases are stored or displayed.
- Where storage areas exceed 50,000 square feet in area, the maximum allowable quantities area is allowed to be increased by 2 percent for each 1,000 square feet of area in excess of 50,000 square feet, up to not more than 100 percent of the table amounts. Separation of control areas is not required. The aggregate amount shall not exceed 80,000 pounds.
- “Low BV” Category 1B flammable gas has a burning velocity of 3.9 in/s or less.

[F] TABLE 414.5.1

EXPLOSION CONTROL REQUIREMENTS^{a, h}

Portions of table not shown remain unchanged.

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems^b
HAZARD CATEGORY			

SPECIAL USES			
Acetylene generator rooms	—	Not Required	Required
<u>Electrochemical energy storage systemⁱ</u>	==	<u>Not Required</u>	<u>Required</u>
<u>Energy storage systemⁱ</u>	==	<u>Not Required</u>	<u>Required</u>
Grain processing	—	Not Required	Required
Liquefied petroleum gas-distribution facilities	—	Not Required	Required
Where explosion hazards exist ^f	Detonation	Required	Not Permitted
	Deflagration	Not Required	Required

- a. See Section 414.1.3.
- b. See the *International Fire Code*.
- c. ~~As generated during manufacturing or processing.~~ Combustible dusts where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.2.2 of the International Fire Code. See definition of "Combustible dust" in Chapter 2.
- d. Storage or use.
- e. In open use or dispensing.
- f. Rooms containing dispensing and use of hazardous materials where an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.
- g. A method of explosion control shall be provided where Class 2 water-reactive materials can form potentially explosive mixtures.
- h. Explosion venting is not required for Group H-5 fabrication areas complying with Section 415.11.1 and the International Fire Code.
- i. Where explosion control is required in Section 1207 of the International Fire Code.
- j. Does not apply to consumer fireworks, 1.4G.
- k. Not required for Category 1B Flammable Gases having a burning velocity not exceeding 3.9 inches per second (10 cm/s).

[F] 415.1 General.

Occupancies classified as Group H-1, H-2, H-3, H-4 and H-5 in accordance with Section 307 shall comply with The provisions of Sections 415.1 through 415.11 shall apply to the storage and use of hazardous materials in excess of the maximum allowable quantities per control area listed in Section 307.1.

[F] 415.6 Fire separation distance.

Group H occupancies shall be located on property in accordance with the other provisions of this chapter. In Groups H-2 and H-3, not less than 25 percent of the perimeter wall of the occupancy shall be an *exterior wall*.

Exceptions:

- ~~1. Liquid use, dispensing and mixing rooms having a floor area of not more than 500 square feet (46.5 m²) need not be located on the outer perimeter of the building where they are in accordance with the *International Fire Code* and NFPA 30.~~
- ~~2. Liquid storage rooms having a floor area of not more than 1,000 square feet (93 m²) need not be located on the outer perimeter where they are in accordance with the *International Fire Code* and NFPA 30.~~
- ~~3. Spray paint booths that comply with the *International Fire Code* need not be located on the outer perimeter.~~

[F] 415.6.1 Rooms for flammable or combustible liquid use, dispensing or mixing in open systems.

Rooms for flammable or combustible liquid use, dispensing or mixing in open systems having a floor area of not more than 500 square feet (46.5 m²) need not be located on the outer perimeter of the building where they are in accordance with the *International Fire Code* and NFPA 30.

[F] 415.6.2 Liquid storage rooms and rooms for flammable or combustible liquid use in closed systems.

Liquid storage rooms and rooms for flammable or combustible liquid use in closed systems, having a floor area of not more than 1,000 square feet (93 m²) need not be located on the outer perimeter where they are in accordance with the *International Fire Code* and NFPA 30.

[F] 415.6.3 Spray paint booths.

Spray paint booths that comply with the *International Fire Code* need not be located on the outer perimeter.

[F] ~~415.6.1~~ 415.6.4 Group H occupancy minimum fire separation distance.

Regardless of any other provisions, buildings containing Group H occupancies shall be set back to the *minimum fire separation distance* as set forth in Sections 415.6.4.1 through 415.6.4.4. Distances shall be measured from the walls

enclosing the occupancy to *lot lines*, including those on a public way. Distances to assumed *lot lines* established for the purpose of determining *exterior wall* and opening protection are not to be used to establish the minimum *fire separation distance* for buildings on sites where explosives are manufactured or used where separation is provided in accordance with the quantity distance tables specified for *explosive* materials in the *International Fire Code*.

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~415.6.1.1~~ [415.6.4.1](#) Group H-1.

[F] ~~415.6.1.2~~ [415.6.4.2](#) Group H-2.

[F] ~~415.6.1.3~~ [415.6.4.3](#) Groups H-2 and H-3.

[F] ~~415.6.1.4~~ [415.6.4.4](#) Explosive materials.

[F] ~~415.6.2~~ [415.6.5](#) Detached buildings for Group H-1, H-2 or H-3 occupancy.

The storage or use of hazardous materials in excess of those amounts ~~listed~~ [specified](#) in Table 415.6.5 shall be in accordance with the applicable provisions of Sections 415.7 and 415.8.

[F] TABLE 415.6.5

DETACHED BUILDING REQUIRED

Portions of table not shown remain unchanged.

A DETACHED BUILDING IS REQUIRED WHERE THE QUANTITY OF MATERIAL EXCEEDS THAT ~~LISTED~~ [SPECIFIED](#) HEREIN

For SI: 1 ton = 906 kg, 1 cubic foot = 0.02832 m³, 1 pound = 0.454 kg.

Footnotes a.-c. remain unchanged and are omitted for clarity.

- d. [Detached buildings are not required, for gases in gas rooms that support H-5 fabrication facilities where the gas room is separated from other areas by a fire barrier with a fire-resistance rating of not less than 2 hours and the gas is located in a gas cabinet that is internally sprinklered, equipped with continuous leak detection, automatic shutdown and is not manifolded upstream of pressure controls. Additionally, the gas supply is limited to cylinders that do not exceed 125 pounds \(57 kg\) water capacity in accordance with 49 CFR 173.192 for Hazard Zone A toxic gases.](#)
- e. [Does not apply to consumer fireworks, 1.4G.](#)

[F] 415.11.1.1 Hazardous materials.

~~Hazardous materials and hazardous production materials (HPM) shall comply with Sections 415.11.1.1.1 and 415.11.1.1.2.~~ [The aggregate quantities of hazardous materials stored and used in a single fabrication area shall not exceed the quantities set forth in Table 415.11.1.1.](#)

[Exception:](#) The quantity limitations for any hazard category in Table 415.11.1.1 shall not apply where the fabrication area contains quantities of hazardous materials not exceeding the maximum allowable quantities per control area established by Tables 307.1(1) and 307.1(2).

[F] TABLE ~~415.11.1.1.1~~ 415.11.1.1

QUANTITY LIMITS FOR HAZARDOUS MATERIALS IN A SINGLE FABRICATION AREA IN GROUP
H-5 ^a

Portions of table not shown remain unchanged.

HAZARD CATEGORY		SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP/square foot)
PHYSICAL-HAZARD MATERIALS				
Combustible liquid	II	Not Applicable	0.01 <u>0.02</u>	Not Applicable
	IIIA		0.02 <u>0.04</u>	
	IIIB		Not Limited	
Combination Class	I, II and IIIA		0.04 <u>0.08</u>	
Cryogenic gas	Flammable	Not Applicable	Not Applicable	Note d
	Oxidizing			1.25 <u>2.5</u>
Flammable liquid	IA	Not Applicable	0.0025 <u>0.005</u>	Not Applicable
	IB		0.025 <u>0.05</u>	
	IC		0.025 <u>0.05</u>	
Combination Class	IA, IB and IC		0.025 <u>0.05</u>	
Combination Class	I, II and IIIA		0.04 <u>0.08</u>	
Flammable solid		0.001 <u>0.002</u>	Not Applicable	Not Applicable
Organic peroxide	Unclassified detonable	Note b	Not Applicable <u>Note b</u>	Not Applicable
	Class I	Note b	Not Applicable <u>Note b</u>	
	Class II	0.025	Not Applicable <u>0.0025</u>	
	Class III	0.1	Not Applicable <u>0.02</u>	
	Class IV	Not Limited	Not Applicable <u>Not Limited</u>	
	Class V	Not Limited	Not Applicable <u>Not Limited</u>	
Oxidizing gas	Gaseous	Not Applicable	Not Applicable	1.25 <u>2.5</u>
	Liquefied			1.25 <u>2.5</u>
Combination of gaseous and liquefied				
Oxidizer	Class 4	Note b	Note b	Not Applicable
	Class 3	0.003 <u>0.006</u>	0.03 <u>0.06</u>	
	Class 2	0.003 <u>0.006</u>	0.03 <u>0.06</u>	
	Class 1	0.003 <u>0.006</u>	0.03 <u>0.06</u>	

Combination Class	1, 2, 3	0.003 <u>0.006</u>	0.03 <u>0.06</u>	
Pyrophoric materials		0.01 <u>Note b</u>	0.00125 <u>0.0025</u>	Notes d and e
Unstable (reactive)	Class 4	Note b	Note b	Note b
	Class 3	0.025 <u>0.05</u>	0.0025 <u>0.005</u>	Note b
	Class 2	0.1 <u>0.2</u>	0.01 <u>0.02</u>	Note b
	Class 1	Not Limited	Not Limited	Not Limited
Water reactive	Class 3	0.01^f <u>0.02^f</u>	0.00125 <u>0.0025</u>	Not Applicable
	Class 2	0.25 <u>0.5</u>	0.025 <u>0.05</u>	
	Class 1	Not Limited	Not Limited	

For SI: 1 pound = 0.454 kg, 1 pound per square foot = 4.882 kg/m², 1 gallon per square foot = 40.7 L/m², 1 cubic foot @ NTP/square foot = 0.305 m³ @ NTP/m², 1 cubic foot = 0.02832 m³.

Footnotes a.-e. remain unchanged and are omitted for clarity.

f. Quantity of Class 3 water-reactive solids in a single tool shall not exceed 1 pound.

~~[F] 415.11.1.1.2 Hazardous production materials.~~

~~The maximum quantities of hazardous production materials (HPM) stored in a single fabrication area shall not exceed the maximum allowable quantities per control area established by Table 307.1(1) and Table 307.1(2).~~

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~415.11.3.5~~ 415.11.4 Emergency alarm system.

[F] ~~415.11.3.5.1~~ 415.11.4.1 Service corridors.

[F] ~~415.11.3.5.2~~ 415.11.4.2 Corridors and interior exit stairways and ramps.

[F] ~~415.11.3.5.3~~ 415.11.4.3 Liquid storage rooms, HPM rooms and gas rooms.

[F] ~~415.11.3.5.4~~ 415.11.4.4 Alarm-initiating devices.

[F] ~~415.11.3.5.5~~ 415.11.4.5 Alarm signals.

[F] ~~415.11.4~~ 415.11.5 Storage of hazardous production materials.

[F] ~~415.11.5~~ 415.11.6 HPM rooms, gas rooms, liquid storage room construction.

HPM rooms, gas rooms and liquid storage rooms shall be constructed in accordance with Sections 415.11.6.1 through 415.11.6.9.

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~415.11.5.1~~ 415.11.6.1 HPM rooms and gas rooms.

[F] ~~415.11.5.2~~ 415.11.6.2 Liquid storage rooms.

[F] ~~415.11.5.3~~ 415.11.6.3 Floors.

[F] ~~415.11.5.4~~ 415.11.6.4 Location.

[F] ~~415.11.5.5~~ 415.11.6.5 Explosion control.

[F] ~~415.11.5.6~~ 415.11.6.6 Exits.

[F] ~~415.11.5.7~~ 415.11.6.7 Doors.

[F] ~~415.11.5.8~~ 415.11.6.8 Ventilation.

[F] ~~415.11.5.9~~ [415.11.6.9](#) Emergency alarm system.

[F] ~~415.11.6~~ [415.11.7](#) Piping and tubing.

[F] ~~415.11.6.1~~ [415.11.7.1](#) HPM having a health-hazard ranking of 3 or 4.

[F] ~~415.11.6.2~~ [415.11.7.2](#) Location in service corridors.

[F] ~~415.11.6.3~~ [415.11.7.3](#) Excess flow control.

[F] ~~415.11.6.4~~ [415.11.7.4](#) Installations in corridors and above other occupancies.

The installation of HPM piping and tubing within the space defined by the walls of corridors and the floor or roof above, or in concealed spaces above other occupancies, shall be in accordance with Sections 415.11.7.1 through 415.11.7.3 and the following conditions:

1. Automatic sprinklers shall be installed within the space unless the space is less than 6 inches (152 mm) in the least dimension.
2. *Ventilation* not less than six air changes per hour shall be provided. The space shall not be used to convey air from any other area.
3. Where the piping or tubing is used to transport HPM liquids, a receptor shall be installed below such piping or tubing. The receptor shall be designed to collect any discharge or leakage and drain it to an *approved* location. The 1-hour enclosure shall not be used as part of the receptor.
4. HPM supply piping and tubing and nonmetallic waste lines shall be separated from the corridor and from occupancies other than Group H-5 by *fire barriers* or by an approved method or assembly that has a *fire-resistance rating* of not less than 1 hour. Access openings into the enclosure shall be protected by approved fire-protection-rated assemblies.
5. [Ready access to](#) ~~Readily-accessible~~ manual or automatic remotely activated fail-safe emergency shutoff valves shall be installed on piping and tubing other than waste lines at the following locations:
 - 5.1. At branch connections into the *fabrication area*.
 - 5.2. At entries into *corridors*.

Exception: Transverse crossings of the *corridors* by supply piping that is enclosed within a ferrous pipe or tube for the width of the *corridor* need not comply with Items 1 through 5.

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~415.11.6.5~~ [415.11.7.5](#) Identification.

[F] ~~415.11.7~~ [415.11.8](#) Gas detection systems.

[F] ~~415.11.7.1~~ [415.11.8.1](#) Where required.

[F] ~~415.11.7.1.1~~ [415.11.8.1.1](#) Fabrication areas.

[F] ~~415.11.7.1.2~~ [415.11.8.1.2](#) HPM rooms.

[F] ~~415.11.7.1.3~~ [415.11.8.1.3](#) Gas cabinets, exhausted enclosures and gas rooms.

[F] ~~415.11.7.1.4~~ [415.11.8.1.4](#) Corridors.

[F] ~~415.11.7.2~~ [415.11.8.2](#) Gas detection system operation.

[F] ~~415.11.7.2.1~~ [415.11.8.2.1](#) Alarms.

[F] ~~415.11.7.2.2~~ [415.11.8.2.2](#) Shutoff of gas supply.

[F] ~~415.11.8~~ [415.11.9](#) Manual fire alarm system.

[F] ~~415.11.9~~ [415.11.10](#) Emergency control station.

[F] ~~415.11.9.1~~ [415.11.10.1](#) Location.

[F] ~~415.11.9.2~~ [415.11.10.2](#) Staffing.

[F] ~~415.11.9.3~~ [415.11.10.3](#) Signals.

[F] ~~415.11.10~~ 415.11.11 Emergency power system.

[F] ~~415.11.10.1~~ 415.11.11.1 Required electrical systems.

[F] ~~415.11.10.2~~ 415.11.11.2 Exhaust ventilation systems.

[F] ~~415.11.11~~ 415.11.12 Automatic sprinkler system protection in exhaust ducts for HPM.

[F] ~~415.11.11.1~~ 415.11.12.1 Metallic and noncombustible nonmetallic exhaust ducts.

[F] ~~415.11.11.2~~ 415.11.12.2 Combustible nonmetallic exhaust ducts.

[F] ~~415.11.11.3~~ 415.11.12.3 Automatic sprinkler locations.

Automatic sprinklers ~~Sprinkler systems~~ shall be installed at 12-foot (3658 mm) intervals in horizontal ducts and at changes in direction. In vertical ducts, sprinklers shall be installed at the top and at alternate floor levels.

SECTION 419

LIVE/WORK UNITS

NOTE SECTION 419 LIVE/WORK UNITS IS REMOVED IN ITS ENTIRETY AND RELOCATED TO SECTION 508.5

SECTION 419

ARTIFICIAL DECORATIVE VEGETATION

[F] 419.1 Artificial decorative vegetation.

Artificial decorative vegetation exceeding 6 feet (1830 mm) in height and permanently installed outdoors within 5 feet (1524 mm) of a building, or on the roof of a building, shall comply with Section 321.1 of the *International Fire Code*.

Exception: Artificial decorative vegetation located more than 30 feet (9144 mm) from the exterior wall of a building.

SECTION 420

GROUPS I-1, R-1, R-2, R-3 AND R-4

420.2 Separation walls.

Walls separating *dwelling units* in the same building, walls separating *sleeping units* in the same building, walls separating *dwelling units* from *sleeping units* in the same building, and walls separating *dwelling* or *sleeping units* from other occupancies contiguous to them in the same building shall be constructed as *fire partitions* in accordance with Section 708.

420.3 Horizontal separation.

Floor assemblies separating *dwelling units* in the same buildings, floor assemblies separating *sleeping units* in the same building, floor assemblies separating *dwelling units* from *sleeping units* in the same building and floor assemblies separating *dwelling* or *sleeping units* from other occupancies contiguous to them in the same building shall be constructed as *horizontal assemblies* in accordance with Section 711.

420.8 Group I-1 cooking facilities.

In Group I-1 occupancies, rooms or spaces that contain a cooking ~~facilities~~ facility with domestic cooking appliances shall be ~~in accordance with~~ permitted to be open to the corridor where all of the following criteria are met:

1. In Group I-1, Condition 1 occupancies, the number of care recipients served by one cooking facility shall not be greater than 30.

2. In Group I-1, Condition 2 occupancies, the number of care recipients served by one cooking facility and within the same smoke compartment shall not be greater than 30.

~~3. The types of domestic cooking appliances permitted shall be limited to ovens, cooktops, ranges, warmers and microwaves.~~

~~4.3. The space containing the domestic cooking facilities shall be arranged so as not to obstruct access to the required exit.~~

~~4. The cooking appliances shall comply with Section 420.9.~~

~~5. Domestic cooking hoods installed and constructed in accordance with Section 505 of the International Mechanical Code shall be provided over cooktops or ranges.~~

~~6. Cooktops and ranges shall be protected in accordance with Section 904.14.~~

~~7. A shutoff for the fuel and electrical supply to the cooking equipment shall be provided in a location that is accessible only to staff.~~

~~8. A timer shall be provided that automatically deactivates the cooking appliances within a period of not more than 120 minutes.~~

~~9. A portable fire extinguisher shall be provided. Installation shall be in accordance with Section 906 and the extinguisher shall be located within a 30-foot (9144 mm) distance of travel from each domestic cooking appliance.~~

~~420.8.1 Cooking facilities open to the corridor.~~

~~Cooking facilities located in a room or space open to a corridor, aisle or common space shall comply with Section 420.8.~~

420.9 Domestic cooking appliances.

In Group I-1 occupancies, installation of cooking appliance used in domestic cooking facilities shall comply with all of the following:

1. The types of cooking appliances permitted shall be limited to ovens, cooktops, ranges, warmers and microwaves.
2. Domestic cooking hoods installed and constructed in accordance with Section 505 of the International Mechanical Code shall be provided over cooktops or ranges.
3. Cooktops and ranges shall be protected in accordance with Section 904.14.
4. A shutoff for the fuel and electrical supply to the cooking equipment shall be provided in a location to which only staff has access.
5. A timer shall be provided that automatically deactivates the cooking appliances within a period of not more than 120 minutes.
6. A portable fire extinguisher shall be provided. Installation shall be in accordance with Section 906 and the extinguisher shall be located within a 30-foot (9144 mm) distance of travel from each domestic cooking appliance.

Exceptions:

1. Cooking facilities provided within care recipients' individual *dwelling units* are not required to comply with this section.
2. Cooktops and ranges used for care-recipient training or nutritional counseling are not required to comply with Item 3 of this section.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~420.9~~ 420.10 Group R cooking facilities.

~~420.10~~ 420.11 Group R-2 dormitory cooking facilities.

~~420.10.1~~ 420.11.1 Cooking appliances.

~~420.10.2~~ 420.11.2 Cooking appliances in sleeping rooms.

SECTION 422

AMBULATORY CARE FACILITIES

422.1 General.

Occupancies classified as ambulatory care facilities shall comply with the provisions of Sections 422.1 through ~~422.6~~ 422.7 and other applicable provisions of this code.

422.7 Domestic cooking.

Installation of cooking appliances used in domestic cooking facilities shall comply with all of the following:

1. The types of cooking appliances permitted are limited to ovens, cooktops, ranges, warmers and microwaves.
2. Domestic cooking hoods installed and constructed in accordance with Section 505 of the International Mechanical Code shall be provided over cooktops or ranges.
3. A shutoff for the fuel and electrical supply to the cooking equipment shall be provided in a location to which only staff has access.
4. A timer shall be provided that automatically deactivates the cooking appliances within a period of not more than 120 minutes.
5. A portable fire extinguisher shall be provided. Installation shall be in accordance with Section 906 and the extinguisher shall be located within a 30-foot (9144 mm) distance of travel from each domestic cooking appliance.

SECTION 423

STORM SHELTERS

423.1 General.

This section applies to the design and construction of storm shelters constructed as separate detached buildings or constructed as rooms or spaces within buildings for the purpose of providing protection from ~~storms that produce high winds, such as~~ tornadoes, ~~and~~ hurricanes, ~~and other severe windstorms~~ during the storm. ~~Such structures shall be designated to be hurricane shelters, tornado shelters, or combined hurricane and tornado~~ This section specifies where storm shelters are required and provides requirements for the design and construction of storm shelters. Design of facilities for use as emergency shelters after the storm are outside the scope of ICC 500 and shall comply with Table 1604.5 as a Risk Category IV Structure.

423.2 Construction.

~~In addition to other applicable requirements in this code, storm~~ Storm shelters shall be constructed in accordance with this code and ICC 500 and shall be designated as hurricane shelters, tornado shelters, or combined hurricane and tornado shelters. Buildings or structures that are also designated as emergency shelters shall also comply with Table 1604.5 as Risk Category IV structures.

Any storm shelter not required by this section shall be permitted to be constructed, provided that such structures meet the requirements of this code and ICC 500.

423.3 Occupancy classification.

The occupancy classification for a storm shelter shall be determined in accordance with this section.

423.3.1 Dedicated storm shelters.

A facility designed to be occupied solely as a storm shelter shall be classified as Group A-3 for the determination of requirements other than those covered in ICC 500.

Exceptions:

1. The occupancy category for dedicated storm shelters with a design occupant capacity of less than 50 persons as determined in accordance with ICC 500 shall be in accordance with Section 303.

2. The occupancy category for a dedicated residential *storm shelter* shall be the Group R occupancy served.

423.3.2 Storm shelters within host buildings.

Where designated *storm shelters* are constructed as a room or space within a host building that will normally be occupied for other purposes, the requirements of this code for the occupancy of the building, or the individual rooms or spaces thereof, shall apply unless otherwise required by ICC 500.

423.3-423.4 Critical emergency operations.

In areas where the shelter design wind speed for tornados in accordance with Figure 304.2(1) of ICC 500 is 250 mph, 911 call stations, emergency operation centers and fire, rescue and ambulance and police stations shall comply with Table 1604.5 as a *Risk Category IV* structure and shall be provided with a *storm shelter* constructed in accordance with ICC 500.

423.4.1 Design Occupant Capacity.

The required design occupant capacity of the storm shelter shall include the critical emergency operations on the site and shall be the total occupant load of offices and the number of beds.

Exceptions:

1. Where approved by the *building official*, the actual number of occupants for whom each occupied space, floor or building is designed, although less than that determined by occupant load calculation, shall be permitted to be used in the determination of the required design occupant capacity for the *storm shelter*.
2. Where a new *building* is being added on an existing site, and where the new *building* is not of sufficient size to accommodate the required design occupant capacity of the *storm shelter* for all of the *buildings* on the site, the *storm shelter* shall accommodate not less than the required occupant capacity of the new *building*.
3. Where approved by the *building official*, the required design occupant capacity of the shelter shall be permitted to be reduced by the design occupant capacity of any existing *storm shelters* on the site.

423.4.2 Location.

Storm shelters shall be located within the *building* they serve or shall be located where the distance of travel from not fewer than one exterior door of each *building* to a door of the shelter serving that *building* does not exceed 1,000 feet (305 m), unless otherwise *approved*.

423.4-423.5 Group E occupancies.

In areas where the shelter design wind speed for tornados is 250 mph in accordance with Figure 304.2(1) of ICC 500, all Group E occupancies with an *occupant load* of 50 or more shall have a storm shelter constructed in accordance with ICC 500.

Exceptions:

1. Group E day care facilities.
2. Group E occupancies accessory to *places of religious worship*.
3. Buildings meeting the requirements for shelter design in ICC 500.

423.4.1-423.5.1 Required Design occupant capacity.

The required design occupant capacity of the *storm shelter* shall include all of the buildings on the site and shall be the ~~greater of the following:~~

- ~~1. The total occupant load of the classrooms, vocational rooms and offices in the Group E occupancy.~~
- ~~2. The occupant load of any indoor assembly space that is associated with the Group E occupancy.~~

Exceptions:

1. Where approved by the *building official*, the actual number of occupants for whom each occupied space, floor or building is designed, although less than those determined by occupant load calculation, shall be permitted to be used in the determination of the required design occupant capacity for the *storm shelter*.
2. Where a new *building* is being added on an existing Group E site, and where the new *building* is not of sufficient size to accommodate the required design occupant capacity of the *storm shelter* for all of the *buildings* on the site, the *storm shelter* shall at a minimum accommodate the required occupant capacity for the new *building*.

3. Where approved by the *building official*, the required [design](#) occupant capacity of the shelter shall be permitted to be reduced by the [design](#) occupant capacity of any existing *storm shelters* on the site.

~~423.4.2~~ [423.5.2](#) Location.

Storm shelters shall be located within the *buildings* they serve or shall be located where the maximum distance of travel from not fewer than one exterior door of each *building* to a door of the shelter serving that *building* does not exceed 1,000 feet (305 m), unless otherwise approved.

SECTION 424

~~CHILDREN'S PLAY STRUCTURES~~

424.1 General.

~~Children's play~~ [Play](#) structures installed inside all occupancies covered by this code that exceed 10 feet (3048 mm) in height or 150 square feet (14 m²) in area shall comply with Sections 424.2 through 424.5.

424.2 Materials.

~~Children's play~~ [Play](#) structures shall be constructed of noncombustible materials or of combustible materials that comply with the following:

1. Fire-retardant-treated wood complying with Section 2303.2.
2. Light-transmitting plastics complying with Section 2606.
3. Foam plastics (including the pipe foam used in *soft-contained play equipment structures*) having a maximum heat-release rate not greater than 100 kilowatts when tested in accordance with UL 1975 or when tested in accordance with NFPA 289, using the 20 kW ignition source.
4. Aluminum composite material (ACM) meeting the requirements of Class A *interior finish* in accordance with Chapter 8 when tested as an assembly in the maximum thickness intended for use.
5. Textiles and films complying with the fire propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate, of NFPA 701.
6. Plastic materials used to construct rigid components of *soft-contained play equipment structures* (such as tubes, windows, panels, junction boxes, pipes, slides and decks) exhibiting a peak rate of heat release not exceeding 400 kW/m² when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation at a thickness of 6 mm.
7. Ball pool balls, used in *soft-contained play equipment structures*, having a maximum heat-release rate not greater than 100 kilowatts when tested in accordance with UL 1975 or when tested in accordance with NFPA 289, using the 20 kW ignition source. The minimum specimen test size shall be 36 inches by 36 inches (914 mm by 914 mm) by an average of 21 inches (533 mm) deep, and the balls shall be held in a box constructed of galvanized steel poultry netting wire mesh.
8. Foam plastics shall be covered by a fabric, coating or film meeting the fire propagation performance criteria contained in Test Method 1 or Test Method 2, as appropriate, of NFPA 701.
9. The floor covering placed under the ~~children's~~ [play structure](#) shall exhibit a Class I *interior floor finish* classification, as described in Section 804, when tested in accordance with ASTM E648 or NFPA 253.
10. [Interior finishes for structures exceeding 600 square feet \(56 m²\) in area or 10 feet \(3048 mm\) in height shall have a flame spread index not greater than that specified in Table 803.13 for the occupancy group and location designated. Interior wall and ceiling finish materials tested in accordance with NFPA 286 and meeting the acceptance criteria of Section 803.1.1.1, shall be permitted to be used where a Class A classification in accordance with ASTM E84 or UL 723 is required.](#)

[F] 424.3 Fire protection.

~~Children's play~~ [Play](#) structures shall be provided with the same level of *approved* fire suppression and detection devices required for other structures in the same occupancy.

424.4 Separation.

~~Children's play~~ Play structures shall have a horizontal separation from building walls, partitions and from elements of the means of egress of not less than 5 feet (1524 mm). ~~Children's playground~~ Play structures shall have a horizontal separation from other ~~children's play~~ structures of not less than 20 feet (6090 mm).

424.5 Area limits.

~~Children's play~~ Play structures shall be not greater than ~~300~~ 600 square feet (~~28~~ 56 m²) in area, unless a special investigation, acceptable to the *building official*, has demonstrated adequate fire safety.

424.5.1 Design.

Play structures exceeding 600 square feet (56 m²) in area or 10 feet (3048 mm) in height shall be designed in accordance with Chapter 16.

SECTION [F] 426

COMBUSTIBLE DUSTS, GRAIN PROCESSING AND STORAGE

[F] 426.1 General.

The provisions of Sections 426.1.1 through 426.1.7 shall apply to buildings in which materials that produce *combustible dusts* are stored or handled. Buildings that store or handle *combustible dusts* shall comply with the applicable provisions of the International Fire Code. Where required by the fire code official, NFPA 652 and the applicable provisions of NFPA 61, NFPA 85, NFPA 120, NFPA 484, NFPA 654, NFPA 655 and NFPA 664 ~~and the International Fire Code~~; shall apply.

[F] 427.2.2 One-hour interior room.

Where an *exterior wall* cannot be provided for the room, a 1-hour interior room ~~or enclosure~~ shall be provided and shall be a room or enclosure separated from the remainder of the building by *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, with a *fire-resistance rating* of not less than 1 hour. Openings between the room or enclosure and interior spaces shall be provided with self-closing smoke- and draft-control assemblies having a fire protection rating of not less than 1 hour. An *automatic sprinkler system* shall be installed within the room. The room shall be exhausted through a duct to the exterior. Supply and exhaust ducts shall be enclosed in a 1-hour rated *shaft enclosure* from the room to the exterior. Approved mechanical *ventilation* shall comply with the *International Mechanical Code* and be provided with a minimum rate of 1 cubic foot per minute per square foot (0.00508 m³/s/m²) of the area of the room.

[F] 428.3.9 Automatic ~~fire-extinguishing~~ sprinkler systems.

Buildings containing *laboratory suites* shall be equipped throughout with an approved ~~automatic sprinkler system~~ in accordance with Section 903.3.1.1.

SECTION 427

MEDICAL GAS SYSTEMS

[F] 427.2.2 One-hour interior room.

Where an exterior wall cannot be provided for the room, a 1-hour interior room shall be provided and shall be a room or enclosure separated from the remainder of the building by fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both, with a fire-resistance rating of not less than 1 hour. Openings between the room or enclosure and interior spaces shall be provided with self-closing smoke- and draft-control assemblies having a fire protection rating of not less than 1 hour. An automatic sprinkler system shall be installed within the room. The room shall be exhausted through a duct to the exterior. Supply and exhaust ducts shall be enclosed in a 1-hour rated shaft enclosure from the room to the exterior. Approved mechanical ventilation shall comply with the International Mechanical Code and be provided with a minimum rate of 1 cubic foot per minute per square foot (0.00508 m³/s/m²) of the area of the room.

SECTION 428 HIGHER EDUCATION LABORATORIES

[F] 428.3.9 Automatic ~~fire-extinguishing~~ sprinkler systems.

Buildings containing laboratory suites shall be equipped throughout with an ~~approved~~ automatic sprinkler system in accordance with Section 903.3.1.1.

[NY] SECTION ~~430~~ 429 LIVE FIRE TRAINING BUILDINGS.

~~430.1~~ 429.1 Live fire training buildings.

Live fire training buildings and any appurtenances connected or attached to such buildings or structures shall be designed and constructed in accordance with the applicable provisions of NFPA 1402 and with this code.

[NY] SECTION ~~429~~ 430 HEALTH CARE FACILITIES

[NY] ~~429.1~~ 430.1 General.

[NY] ~~429.2~~ 430.2 Temporary external generators, boilers and chillers.

Connections for temporary external generators, boilers and chillers shall be provided in:

1. Group I-1, I-2 and R-4, Condition 2 occupancies in accordance with Section ~~429.2.1~~ 430.2.1.
2. Hospitals in accordance with Section ~~429.2.2~~ 430.2.2.
3. Nursing homes in accordance with Section ~~429.2.3~~ 430.2.3.

[NY] ~~429.2.1~~ 430.2.1 Group I-1, I-2 and R-4, Condition 2 occupancies.

[NY] ~~429.2.2~~ 430.2.2 Hospitals.

[NY] ~~429.2.3~~ 430.2.3 Nursing homes.

Chapter 5 General Building Heights and Areas

SECTION 503 GENERAL BUILDING HEIGHT AND AREA LIMITATIONS

503.1.4 ~~Occupied~~ Occupiable roofs.

A roof level or portion thereof shall ~~not be permitted to~~ be used as an ~~occupied~~ occupiable roof ~~unless provided~~ the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the *story* immediately below the roof. The area of the ~~occupied-occupiable~~ roofs shall not be included in the *building area* as regulated by Section 506. An occupiable roof shall not be included in the building height or number of stories as regulated by Section 506, provided that the penthouses and other enclosed rooftop structures comply with Section 1511.

Exceptions:

1. The occupancy located on an ~~occupied~~ occupiable roof shall not be limited to the occupancies allowed on the *story* immediately below the roof where the building is equipped throughout with an *automatic sprinkler* system in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with ~~Section 907.5~~ Sections 907.5.2.1 and 907.5.2.3 is provided in the area of the ~~occupied~~ occupiable roof. Emergency voice/alarm communication system notification per Section 907.5.2.2 shall also be provided in the area of the occupiable roof where such system is required elsewhere in the building.
2. Assembly occupancies shall be permitted on roofs of open parking spaces of Type I or Type II construction, in accordance with the exception to Section 903.2.1.6.

503.1.4.1 Enclosures over ~~occupied~~ occupiable roof areas.

Elements or structures enclosing the ~~occupied~~ occupiable roof areas shall not extend more than 48 inches (1220 mm) above the surface of the occupied roof.

~~Exception:~~ Exceptions:

1. Penthouses constructed in accordance with Section 1511.2 and towers, domes, spires and cupolas constructed in accordance with Section 1511.5.
2. Elements or structures enclosing the occupiable roof areas where the roof deck is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

SECTION 504

BUILDING HEIGHT AND NUMBER OF STORIES

TABLE 504.3 ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE^a

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION													
	See Footnotes	Type I		Type II		Type III		Type IV			Type V			
		A	B	A	B	A	B	A	B	C	HT	A	B	
A, B, E, F, M, S, U	NSb	UL	160	65	55	65	55	65	65	65	65	50	40	
	S	UL	180	85	75	85	75	270	180	85	85	70	60	
H-1, H-2, H-3, H-5	NSc, d	UL	160	65	55	65	55	120	90	65	65	50	40	
	S													
H-4	NSc, d	UL	160	65	55	65	55	65	65	65	65	50	40	
	S	UL	180	85	75	85	75	140	100	85	85	70	60	
I-1 Condition 1, I-3	NSd, e	UL	160	65	55	65	55	65	65	65	65	50	40	
	S	UL	180	85	75	85	75	180	120	85	85	70	60	
I-1 Condition 2, I-2	NS ^{d,e,f}	UL	160	65	55	65	55	65	65	65	65	50	40	
	S	UL	180	85										
I-4	NS ^{d,g}	UL	160	65	55	55	65	55	65	65	65	50	40	
	S	UL	180	85	75	85	75	180	120	85	85	70	60	
R ^h	NS ^d	UL	160	65	55	65	55	65	65	65	65	50	40	
	S13D	60	60	60	60	60	60	60	60	60	60	50	40	
	S13R	60	60	60	60	60	60	60	60	60	60	60	60	
	S	UL	180	85	75	85	75	270	180	85	85	70	60	

504.4 Number of stories.

The maximum number of stories above grade plane of a building shall not exceed the limits specified in Table 504.4.

TABLE 504.4 ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE^{a, b}

OCCUPANCY CLASSIFICATION	TYPE OF CONSTRUCTION												
	See Footnotes	Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	UL	5	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	S	UL	6	4	3	4	3	<u>9</u>	<u>6</u>	<u>4</u>	4	3	2
A-2	NS	UL	11	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	S	UL	12	4	3	4	3	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-3	NS	UL	11	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	S	UL	12	4	3	4	3	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-4	NS	UL	11	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	2	1
	S	UL	12	4	3	4	3	<u>18</u>	<u>12</u>	<u>6</u>	4	3	2
A-5	NS	UL	UL	UL	UL	UL	UL	<u>1</u>	<u>1</u>	<u>1</u>	UL	UL	UL
	S	UL	UL	UL	UL	UL	UL	<u>UL</u>	<u>UL</u>	<u>UL</u>	UL	UL	UL
B	NS	UL	11	5	3	5	3	<u>5</u>	<u>5</u>	<u>5</u>	5	3	2
	S	UL	12	6	4	6	4	<u>18</u>	<u>12</u>	<u>9</u>	6	4	3
E	NS	UL	5	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	1	1
	S	UL	6	4	3	4	3	<u>9</u>	<u>6</u>	<u>4</u>	4	2	2
F-1	NS	UL	11	4	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	4	2	1
	S	UL	12	5	3	4	3	<u>10</u>	<u>7</u>	<u>5</u>	5	3	2
F-2	NS	UL	11	5	3	4	3	<u>5</u>	<u>5</u>	<u>5</u>	5	3	2
	S	UL	12	6	4	5	4	<u>12</u>	<u>8</u>	<u>6</u>	6	4	3
H-1	NS ^{c, d}	1	1	1	1	1	1	<u>NP</u>	<u>NP</u>	<u>NP</u>	1	1	NP
	S							<u>1</u>	<u>1</u>	<u>1</u>			
H-2	NS ^{c, d}	UL	3	2	1	2	1	<u>1</u>	<u>1</u>	<u>1</u>	2	1	1
	S							<u>2</u>	<u>2</u>	<u>2</u>			
H-3	NS ^{c, d}	UL	6	4	2	4	2	<u>3</u>	<u>3</u>	<u>3</u>	4	2	1
	S							<u>4</u>	<u>4</u>	<u>4</u>			
H-4	NS ^{c, d}	UL	7	5	3	5	3	<u>5</u>	<u>5</u>	<u>5</u>	5	3	2

	S	UL	8	6	4	6	4	<u>8</u>	<u>7</u>	<u>6</u>	6	4	3
H-5	NS ^{c, d}	4	4	3	3	3	3	<u>2</u>	<u>2</u>	<u>2</u>	3	3	2
	S							<u>3</u>	<u>3</u>	<u>3</u>			
I-1 Condition 1	NS ^{d, e}	UL	9	4	3	4	3	<u>4</u>	<u>4</u>	<u>4</u>	4	3	2
	S	UL	10	5	4	5	4	<u>10</u>	<u>7</u>	<u>5</u>	5	4	3
I-1 Condition 2	NS ^{d, e}	UL	9	4	3	4	3	<u>3</u>	<u>3</u>	<u>3</u>	4	3	2
	S	UL	10	5				<u>10</u>	<u>6</u>	<u>4</u>			
I-2	NS ^{d, f}	UL	4	2	1	1	NP	<u>NP</u>	<u>NP</u>	<u>NP</u>	1	1	NP
	S	UL	5	3				<u>7</u>	<u>5</u>	<u>1</u>			
I-3	NS ^{d, e}	UL	4	2	1	2	1	<u>2</u>	<u>2</u>	<u>2</u>	2	2	1
	S	UL	5	3	2	3	2	<u>7</u>	<u>5</u>	<u>3</u>	3	3	2
I-4	NS ^{d, g}	UL	5	3	2	3	2	<u>3</u>	<u>3</u>	<u>3</u>	3	1	1
	S	UL	6	4	3	4	3	<u>9</u>	<u>6</u>	<u>4</u>	4	2	2
M	NS	UL	11	4	2	4	2	<u>4</u>	<u>4</u>	<u>4</u>	4	3	1
	S	UL	12	5	3	5	3	<u>12</u>	<u>8</u>	<u>6</u>	5	4	2
R-1 ^h	NS ^d	UL	11	4	4	4	4	<u>4</u>	<u>4</u>	<u>4</u>	4	3	2
	S13R	4	4					<u>4</u>	<u>4</u>	<u>4</u>		4	3
	S	UL	12	5	5	5	5	<u>18</u>	<u>12</u>	<u>8</u>	5	4	3
R-2 ^h	NS ^d	UL	11	4	4	4	4	<u>4</u>	<u>4</u>	<u>4</u>	4	3	2
	S13R	4	4	4				<u>4</u>	<u>4</u>	<u>4</u>		4	3
	S	UL	12	5	5	5	5	<u>18</u>	<u>12</u>	<u>8</u>	5	4	3
R-3 ^h	NS ^d	UL	11	4	4	4	4	<u>4</u>	<u>4</u>	<u>4</u>	4	3	3
	S13D	4	4									3	3
	S13R	4	4									4	4
	S	UL	12	5	5	5	5	<u>18</u>	<u>12</u>	<u>5</u>	5	4	4
R-4 ^h	NS ^d	UL	11	4	4	4	4	<u>4</u>	<u>4</u>	<u>4</u>	4	3	2
	S13D	4	4									3	2
	S13R	4	4									4	3
	S	UL	12	5	5	5	5	<u>18</u>	<u>12</u>	<u>5</u>	5	4	3
S-1	NS	UL	11	4	2	3	2	<u>4</u>	<u>4</u>	<u>4</u>	4	3	1
	S	UL	12	5	4	4	4	<u>10</u>	<u>7</u>	<u>5</u>	5	4	2
S-2	NS	UL	11	5	3	4	3	<u>4</u>	<u>4</u>	<u>4</u>	5	4	2
	S	UL	12	6	4	5	4	<u>12</u>	<u>8</u>	<u>5</u>	6	5	3

U	NS	UL	5	4	2	3	2	4	4	4	4	2	1
	S	UL	6	5	3	4	3	9	6	5	5	3	2

Footnotes a.-h. remain unchanged and are omitted for clarity.

SECTION 505

MEZZANINES AND EQUIPMENT PLATFORMS

505.2.3 Openness.

A mezzanine shall be open and unobstructed to the room in which such mezzanine is located except for walls not more than 42 inches (1067 mm) in height, columns and posts.

Exceptions:

1. Mezzanines or portions thereof are not required to be open to the room in which the mezzanines are located, provided that the occupant load of the aggregate area of the enclosed space is not greater than 10.
2. A mezzanine having two or more exits or access to exits is not required to be open to the room in which the mezzanine is located.
3. Mezzanines or portions thereof are not required to be open to the room in which the mezzanines are located, provided that the aggregate floor area of the enclosed space is not greater than 10 percent of the mezzanine area.
4. In industrial facilities, mezzanines used for control equipment are permitted to be glazed on all sides.
5. ~~In occupancies other than Groups H and I, which are no more than two stories above grade plane and equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, a mezzanine having two or more exits or access to exits shall not be required to be open to the room in which the mezzanine is located.~~

SECTION 506

BUILDING AREA

TABLE 506.2 ALLOWABLE AREA FACTOR (A_t = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET^{a, b}

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV				Type V	
		A	B	A	B	A	B	A	B	C	HT	A	B
A-1	NS	UL	UL	15,500	8,500	14,000	8,500	45,000	30,000	18,750	15,000	11,500	5,500
	S1	UL	UL	62,000	34,000	56,000	34,000	180,000	120,000	75,000	60,000	46,000	22,000
	SM	UL	UL	46,500	25,500	42,000	25,500	135,000	90,000	56,250	45,000	34,500	16,500
A-2	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-3	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-4	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000

A-5	NS	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S1												
	SM												
B	NS	UL	UL	37,500	23,000	28,500	19,000	108,000	72,000	45,000	36,000	18,000	9,000
	S1	UL	UL	150,000	92,000	114,000	76,000	432,000	288,000	180,000	144,000	72,000	36,000
	SM	UL	UL	112,500	69,000	85,500	57,000	324,000	216,000	135,000	108,000	54,000	27,000
E	NS	UL	UL	26,500	14,500	23,500	14,500	76,500	51,000	31,875	25,500	18,500	9,500
	S1	UL	UL	106,000	58,000	94,000	58,000	306,000	204,000	127,500	102,000	74,000	38,000
	SM	UL	UL	79,500	43,500	70,500	43,500	229,500	153,000	95,625	76,500	55,500	28,500
F-1	NS	UL	UL	25,000	15,500	19,000	12,000	100,500	67,000	41,875	33,500	14,000	8,500
	S1	UL	UL	100,000	62,000	76,000	48,000	402,000	268,000	167,500	134,000	56,000	34,000
	SM	UL	UL	75,000	46,500	57,000	36,000	301,500	201,000	125,625	100,500	42,000	25,500
F-2	NS	UL	UL	37,500	23,000	28,500	18,000	151,500	101,000	63,125	50,500	21,000	13,000
	S1	UL	UL	150,000	92,000	114,000	72,000	606,000	404,000	252,500	202,000	84,000	52,000
	SM	UL	UL	112,500	69,000	85,500	54,000	454,500	303,000	189,375	151,500	63,000	39,000
H-1	NS ^c	21,000	16,500	11,000	7,000	9,500	7,000	10,500	10,500	10,500	10,500	7,500	NP
	S1												
H-2	NS ^c	21,000	16,500	11,000	7,000	9,500	7,000	10,500	10,500	10,500	10,500	7,500	3,000
	S1												
	SM												
H-3	NS ^c	UL	60,000	26,500	14,000	17,500	13,000	25,500	25,500	25,500	25,500	10,000	5,000
	S1												
	SM												
H-4	NS ^{c, d}	UL	UL	37,500	17,500	28,500	17,500	72,000	54,000	40,500	36,000	18,000	6,500
	S1	UL	UL	150,000	70,000	114,000	70,000	288,000	216,000	162,000	144,000	72,000	26,000
	SM	UL	UL	112,500	52,500	85,500	52,500	216,000	162,000	121,500	108,000	54,000	19,500
H-5	NS ^{c, d}	UL	UL	37,500	23,000	28,500	19,000	72,000	54,000	40,500	36,000	18,000	9,000
	S1	UL	UL	150,000	92,000	114,000	76,000	288,000	216,000	162,000	144,000	72,000	36,000
	SM	UL	UL	112,500	69,000	85,500	57,000	216,000	162,000	121,500	108,000	54,000	27,000
I-1	NS ^{d, e}	UL	55,000	19,000	10,000	16,500	10,000	54,000	36,000	18,000	18,000	10,500	4,500
	S1	UL	220,000	76,000	40,000	66,000	40,000	216,000	144,000	72,000	72,000	42,000	18,000
	SM	UL	165,000	57,000	30,000	49,500	30,000	162,000	108,000	54,000	54,000	31,500	13,500
I-2	NS ^{d, f}	UL	UL	15,000	11,000	12,000	NP	36,000	24,000	12,000	12,000	9,500	NP
	S1	UL	UL	60,000	44,000	48,000	NP	144,000	96,000	48,000	48,000	38,000	NP
	SM	UL	UL	45,000	33,000	36,000	NP	108,000	72,000	36,000	36,000	28,500	NP
I-3	NS ^{d, e}	UL	UL	15,000	10,000	10,500	7,500	36,000	24,000	12,000	12,000	7,500	5,000
	S1	UL	UL	45,000 60,000	40,000	42,000	30,000	144,000	96,000	48,000	48,000	30,000	20,000
	SM	UL	UL	45,000	30,000	31,500	22,500	108,000	72,000	36,000	36,000	22,500	15,000
I-4	NS ^{d, g}	UL	60,500	26,500	13,000	23,500	13,000	76,500	51,000	25,500	25,500	18,500	9,000
	S1	UL	121,000	106,000	52,000	94,000	52,000	306,000	204,000	102,000	102,000	74,000	36,000
	SM	UL	181,500	79,500	39,000	70,500	39,000	229,500	153,000	76,500	76,500	55,500	27,000
M	NS	UL	UL	21,500	12,500	18,500	12,500	61,500	41,000	26,625	20,500	14,000	9,000

	S1	UL	UL	86,000	50,000	74,000	50,000	246,000	164,000	102,500	82,000	56,000	36,000
	SM	UL	UL	64,500	37,500	55,500	37,500	184,500	123,000	76,875	61,500	42,000	27,000
R-1 ^h	NS ^d	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000
R-2 ^h	NS ^d	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000
R-3 ^h	NS ^d	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S13D												
	S13R												
	S1												
	SM												
R-4 ^h	NS ^d	UL	UL	24,000	16,000	24,000	16,000	61,500	41,000	25,625	20,500	12,000	7,000
	S13D												
	S13R												
	S1	UL	UL	96,000	64,000	96,000	64,000	246,000	164,000	102,500	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	184,500	123,000	76,875	61,500	36,000	21,000
S-1	NS	UL	48,000	26,000	17,500	26,000	17,500	76,500	51,000	31,875	25,500	14,000	9,000
	S1	UL	192,000	104,000	70,000	104,000	70,000	306,000	204,000	127,500	102,000	56,000	36,000
	SM	UL	144,000	78,000	52,500	78,000	52,500	229,500	153,000	95,625	76,500	42,000	27,000
S-2	NS	UL	79,000	39,000	26,000	39,000	26,000	115,500	77,000	48,125	38,500	21,000	13,500
	S1	UL	316,000	156,000	104,000	156,000	104,000	462,000	308,000	192,500	154,000	84,000	54,000
	SM	UL	237,000	117,000	78,000	117,000	78,000	346,500	231,000	144,375	115,500	63,000	40,500
U	NS ⁱ	UL	35,500	19,000	8,500	14,000	8,500	54,000	36,000	22,500	18,000	9,000	5,500
	S1	UL	142,000	76,000	34,000	56,000	34,000	216,000	144,000	90,000	72,000	36,000	22,000
	SM	UL	106,500	57,000	25,500	42,000	25,500	162,000	108,000	67,500	54,000	27,000	

Footnotes a-i. remain unchanged and are omitted for clarity.

506.2.1 Single-occupancy, one-story buildings.

The allowable area of each story of a single-occupancy building ~~with no more than one story above grade plane~~ shall be determined in accordance with Equation 5-1:

$$A_a = A_t + (NS \times I_f) \quad (\text{Equation 5-1})$$

where:

a = Allowable area (square feet).

t = Tabular allowable area factor (NS, S1, S13R or S13D value, as applicable) in accordance with Table 506.2.

NS = Tabular allowable area factor in accordance with Table 506.2 for nonsprinklered building (regardless of whether the building is sprinklered).

I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.

The allowable area per story of a single-occupancy building with a maximum of three stories above grade shall be determined by Equation 5-1. The total allowable area of a single-occupancy building more than three stories above grade plane shall be determined in accordance with Equation 5-2:

$$A_a = [A_t + (NS \times I_f)] \times S_a \quad (\text{Equation 5-2})$$

where:

A_a = Allowable area (square feet).

A_t = Tabular allowable area factor (NS, S13R, S13D or SM value, as applicable) in accordance with Table 506.2.

NS = Tabular allowable area factor in accordance with Table 506.2 for a nonsprinklered building (regardless of whether the building is sprinklered).

I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.

S_a = 3 where the actual number of stories above grade plane exceeds three, or

S_a = 4 where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2.1

The actual area of any individual floor shall not exceed the allowable area per Equation 5-1.

506.2.2 Mixed-occupancy, ~~one-story~~ buildings.

The allowable area of each story of a mixed-occupancy building ~~with no more than one story above grade plane~~ shall be determined in accordance with the applicable provisions of ~~Section 508.1, based on Equation 5-1 for each applicable occupancy.~~ Section 508.3.2 for nonseparated occupancies and Section 508.4.2 for separated occupancies.

For buildings with more than three stories above grade plane, the total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories, determined in accordance with Equation 5-3 based on the applicable provisions of Section 508.1, shall not exceed three.

$$A_a = [A_t + (NS \times I_f)] \quad \text{(Equation 5-3)}$$

where:

A_a = Allowable area (square feet).

A_t = Tabular allowable area factor (NS, S13R, S13D or SM value, as applicable) in accordance with Table 506.2.

NS = Tabular allowable area factor in accordance with Table 506.2 for a nonsprinklered building (regardless of whether the building is sprinklered).

I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.

Exception: For buildings designed as separated occupancies under Section 508.4 and equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2, the total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories determined in accordance with Equation 5-3 based on the applicable provisions of Section 508.1, shall not exceed four.

506.2.3 Single-occupancy, ~~multistory~~ buildings.

~~The allowable area of a single-occupancy building with more than one story above grade plane shall be determined in accordance with Equation 5-2:~~

~~(Equation 5-2)~~

$$~~A_a = [A_t + (NS \times I_f)] \times S_a~~$$

~~where:~~

~~A_a = Allowable area (square feet).~~

~~A_t = Tabular allowable area factor (NS, S13R, S13D or SM value, as applicable) in accordance with Table 506.2.~~

~~NS = Tabular allowable area factor in accordance with Table 506.2 for a nonsprinklered building (regardless of whether the building is sprinklered).~~

~~I_f = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.~~

~~S_a = Actual number of building stories above grade plane, not to exceed three. For buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2, use the actual number of building stories above grade plane, not to exceed four.~~

No individual story shall exceed the allowable area (A_a) as determined by Equation 5-2 using the value of $S_a = 1$.

506.2.4 Mixed occupancy, multistory buildings.

Each story of a mixed occupancy building with more than one story above grade plane shall individually comply with the applicable requirements of Section 508.1. For buildings with more than three stories above grade plane, the total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories, determined in accordance with Equation 5-3 based on the applicable provisions of Section 508.1, shall not exceed three.

$$A_a = [A_t + (NS \times If)]$$

(Equation 5-3)

where:

A_a = Allowable area (square feet).

A_t = Tabular allowable area factor (NS, S13R, S13D or SM value, as applicable) in accordance with Table 506.2.

NS = Tabular allowable area factor in accordance with Table 506.2 for a nonsprinklered building (regardless of whether the building is sprinklered).

If = Area factor increase due to frontage (percent) as calculated in accordance with Section 506.3.

Exception: For buildings designed as separated occupancies under Section 508.4 and equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.2, the total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories determined in accordance with Equation 5-3 based on the applicable provisions of Section 508.1, shall not exceed four.

506.2.4.1 Group H-2 or H-3 mixed occupancies.

For a building containing Group H-2 or H-3 occupancies, the allowable area shall be determined in accordance with Section 508.4.2, with the sprinkler system increase applicable only to the portions of the building not classified as Group H-2 or H-3.

506.3.2 Minimum frontage distance.

To qualify for an area factor increase based on frontage, the public way or open space adjacent to the building perimeter shall have a minimum distance (W) of 20 feet (6096 mm) measured at right angles from the building face to any of the following:

1. The closest interior lot line.
2. The entire width of a street, alley or public way.
3. The exterior face of an adjacent building on the same property.

Where the value of W is greater than 30 feet (9144 mm), a value of 30 feet (9144 mm) shall be used in calculating the building area increase based on frontage, regardless of the actual width of the public way or open space. Where the value of W varies along the perimeter of the building, the calculation performed in accordance with Equation 5-5 shall be based on the weighted average calculated in accordance with Equation 5-4.

$$W = (L_1 \times w_1 + L_2 \times w_2 + L_3 \times w_3 \dots) / F \quad \text{(Equation 5-4)}$$

where:

W (Width: weighted average) = Calculated width of public way or open space (feet).

L_n = Length of a portion of the exterior perimeter wall.

w_n = Width (≥ 20 feet) of a public way or open space associated with that portion of the exterior perimeter wall.

F = Building perimeter that fronts on a public way or open space having a width of 20 feet (6096 mm) or more.

Exception: Where a building meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot (18 288 mm) public way or yard requirement, and the value of W is greater than 30 feet (9144 mm), the value of W shall not exceed 60 feet (18 288 mm).

The frontage increase shall be based on the smallest public way or open space that is 20 feet (6096 mm) or greater, and the percentage of building perimeter having a minimum 20 feet (6096 mm) public way or open space.

506.3.3 Amount of increase.

The area factor increase based on frontage shall be determined in accordance with ~~Equation 5-5:~~ Table 506.3.3.

~~$I_f = [F/P - 0.25]W/30$~~ (Equation 5-5)

where:

~~I_f~~ = Area factor increase due to frontage.

~~F~~ = Building perimeter that fronts on a public way or open space having minimum distance of 20 feet (6096 mm).

~~P~~ = Perimeter of entire building (feet).

~~W~~ = Width of public way or open space (feet) in accordance with Section 506.3.2.

TABLE 506.3.3 FRONTAGE INCREASE FACTOR

<u>PERCENTAGE OF BUILDING PERIMETER</u>	<u>OPEN SPACE (feet)</u>			
		<u>20 to less than 25</u>	<u>25 to less than 30</u>	<u>30 or greater</u>
<u>0 to less than 25</u>		<u>0</u>	<u>0</u>	<u>0</u>
<u>25 to less than 50</u>		<u>0.17</u>	<u>0.21</u>	<u>0.25</u>
<u>50 to less than 75</u>		<u>0.33</u>	<u>0.42</u>	<u>0.50</u>
<u>75 to 100</u>		<u>0.50</u>	<u>0.63</u>	<u>0.75</u>

For SI: 1 foot = 304.8 mm.

a. Interpolation is permitted.

506.3.3.1 Section 507 buildings.

Where a building meets the requirements of Section 507, as applicable, except for compliance with the minimum 60-foot (18 288 mm) public way or yard requirement, the area factor increase based on frontage shall be determined in accordance with Table 506.3.3.1. The frontage increase shall be based on the smallest public way or open space that is 30 feet (9144 mm) or greater, and the percentage of building perimeter having a minimum 30 feet (9144 mm) public way or open space.

TABLE 506.3.3.1 SECTION 507 BUILDINGS ^a

<u>PERCENTAGE OF BUILDING PERIMETER</u>	<u>OPEN SPACE (feet)</u>					
	<u>30 to less than 35</u>	<u>35 to less than 40</u>	<u>40 to less than 45</u>	<u>45 to less than 50</u>	<u>50 to less than 55</u>	<u>55 or greater</u>
<u>0 to less than 25</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>25 to less than 50</u>	<u>0.29</u>	<u>0.33</u>	<u>0.38</u>	<u>0.42</u>	<u>0.46</u>	<u>0.50</u>
<u>50 to less than 75</u>	<u>0.58</u>	<u>0.67</u>	<u>0.75</u>	<u>0.83</u>	<u>0.92</u>	<u>1.00</u>
<u>75 to 100</u>	<u>0.88</u>	<u>1.00</u>	<u>1.13</u>	<u>1.25</u>	<u>1.38</u>	<u>1.50</u>

For SI: 1 foot = 304.8 mm.

a. Interpolation is permitted.

SECTION 507 UNLIMITED AREA BUILDINGS

507.3 Nonsprinklered, one-story buildings.

The area of a Group F-2 or S-2 building of any construction type not more than one story ~~in height~~ above grade plane shall not be limited where the building is surrounded and adjoined by *public ways* or *yards* not less than 60 feet (18 288 mm) in width.

507.8.1.1.1 ~~Liquid use, dispensing and mixing rooms.~~ Rooms for flammable or combustible liquid use, dispensing or mixing in open systems.

~~Liquid use, dispensing and mixing rooms and~~ Rooms for flammable or combustible liquid use, dispensing or mixing in open systems having a floor area of not more than 500 square feet (46.5 m²) need not be located on the outer perimeter of the building where they are in accordance with the *International Fire Code* and NFPA 30.

507.8.1.1.2 Liquid storage rooms and rooms for flammable or combustible liquid use in closed systems.

Liquid storage rooms and rooms for flammable or combustible liquid use in closed systems having a floor area of not more than 1,000 square feet (93 m²) need not be located on the outer perimeter where they are in accordance with the *International Fire Code* and NFPA 30.

SECTION 508 MIXED USE AND OCCUPANCY

508.1 General.

Each portion of a building shall be individually classified in accordance with Section 302.1. Where a building contains more than one occupancy group, the building or portion thereof shall comply with the applicable provisions of Section 508.2, 508.3, ~~or~~ 508.4 or 508.5, or a combination of these sections.

Exceptions:

1. Occupancies separated in accordance with Section 510.
2. Where required by Table 415.6.5, areas of Group H-1, H-2 and H-3 occupancies shall be located in a *detached building* or structure.
3. ~~Uses within live/work units, complying with Section 419, are not considered separate occupancies.~~

TABLE 508.4

REQUIRED SEPARATION OF OCCUPANCIES (HOURS)^f

OCCUPANCY	A, E		I-1 ^a , I-3, I-4		I-2		R ^a		F-2, S-2 ^b , U		B ^e , F-1, M, S-1		H-1		H-2		H-3, H-4		H-5	
	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS	S	NS
A, E	N	N	1	2	2	NP	1	2	N	1	1	2	NP	NP	3	4	2	3	2	NP
I-1 ^a , I-3, I-4	<u>1</u>	<u>2</u>	N	N	2	NP	1	NP	1	2	1	2	NP	NP	3	NP	2	NP	2	NP
I-2	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	N	N	2	NP	2	NP	2	NP	NP	NP	3	NP	2	NP	2	NP
R ^a	<u>1</u>	<u>2</u>	<u>1</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	N	N	1 ^c	2 ^c	1	2	NP	NP	3	NP	2	NP	2	NP
F-2, S-2 ^b , U	<u>N</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>NP</u>	<u>1^c</u>	<u>2^c</u>	N	N	1	2	NP	NP	3	4	2	3	2	NP
B ^e , F-1, M, S-1	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>2</u>	<u>NP</u>	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>	N	N	NP	NP	2	3	1	2	1	NP
H-1	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	N	NP	NP	NP	NP	NP	NP	NP
H-2	<u>3</u>	<u>4</u>	<u>3</u>	<u>NP</u>	<u>3</u>	<u>NP</u>	<u>3</u>	<u>NP</u>	<u>3</u>	<u>4</u>	<u>2</u>	<u>3</u>	<u>NP</u>	<u>NP</u>	N	NP	1	NP	1	NP
H-3, H-4	<u>2</u>	<u>3</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>NP</u>	<u>NP</u>	<u>1</u>	<u>NP</u>	1 ^d	NP	1	NP
H-5	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>2</u>	<u>NP</u>	<u>1</u>	<u>NP</u>	<u>NP</u>	<u>NP</u>	<u>1</u>	<u>NP</u>	<u>1</u>	<u>NP</u>	N	NP

S = Buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

NS = Buildings not equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

N = No separation requirement.

NP = Not Permitted.

Footnotes a, b, d, e and f remain unchanged and are omitted for clarity.

c. See Section 406.3.2 and 406.6.4

508.4.4.1 Construction.

Required separations shall be *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, so as to completely separate adjacent occupancies. Mass timber elements serving as fire barriers or horizontal assemblies to separate occupancies in Type IV-B or IV-C construction shall be separated from the interior of the building with an approved thermal barrier consisting of gypsum board that is not less than 1/2 inch (12.7 mm) in thickness 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.

Exception: The thermal barrier shall not be required on the top of horizontal assemblies serving as occupancy separations.

~~419.1~~ 508.5 General. Live/work units.

~~A live/work unit shall comply with one of the following: Sections 508.5-508.5.1 through 508.5.11. Live/work units complying with the requirements of Section 508.5.1 through 508.5.11 for the non-residential portion of the unit and that are within the scope of the International Residential Code, shall be permitted to be constructed in accordance with this code or the International Residential Code.~~

1. For a live/work unit located in a building constructed in accordance with this code, both the residential and non-residential portions of the live/work unit shall comply with Sections 508.5.1 through 508.5.11.
2. For a live/work unit located in a building constructed in accordance with the International Residential Code, the non-residential portion of the live/work unit shall comply with Sections 508.5.1 through 508.5.11, and the residential portion of the live/work unit shall be constructed in accordance with the International Residential Code and Section 508.5.7.

Exception: *Dwelling or sleeping units* that include an office that is less than 10 percent of the area of the *dwelling unit* ~~are~~ shall be permitted to be classified as *dwelling units* with accessory occupancies in accordance with Section 508.2.

~~419.1.1~~ 508.5.1 Limitations.

The following shall apply to live/work areas:

1. The *live/work unit* is permitted to be not greater than 3,000 square feet (279 m²) in area.
2. The nonresidential area is permitted to be not more than 50 percent of the area of each *live/work unit*.
3. The nonresidential area function shall be limited to the first or main floor only of the *live/work unit*.
- ~~4. Not more than five nonresidential workers or employees are allowed to occupy the nonresidential~~

~~419.2~~ 508.5.2 Occupancies.

Live/work units shall be classified as a Group R-2 occupancy. Separation requirements found in Sections 420 and 508 shall not apply within the *live/work unit* where the *live/work unit* is in compliance with Section 508.5. Nonresidential uses that would otherwise be classified as either a Group H or S occupancy shall not be permitted in a *live/work unit*.

Exception: Storage shall be permitted in the *live/work unit* provided that the aggregate area of storage in the nonresidential portion of the *live/work unit* shall be limited to 10 percent of the space dedicated to nonresidential activities.

~~419.3~~ 508.5.3 Means of egress.

Except as modified by this section, the *means of egress* components for a *live/work unit* shall be designed in accordance with Chapter 10 for the function served.

~~419.3.1~~ 508.5.4 Egress capacity.

The egress capacity for each element of the *live/work unit* shall be based on the *occupant load* for the function served in accordance with Table 1004.5.

~~419.3.2~~ 508.5.5 Spiral stairways.

Spiral stairways that conform to the requirements of Section 1011.10 shall be permitted.

~~419.4~~ 508.5.6 Vertical openings.

Floor openings between floor levels of a *live/work unit* ~~are~~ shall be permitted without enclosure.

[F] ~~419.5~~ 508.5.7 Fire protection.

~~The live *Live/work unit units in buildings* constructed in accordance with this code shall comply with be provided with a monitored fire alarm system where required by Section 907.2.9 and an automatic sprinkler system in accordance with Section 903.2.8.~~ be provided with all of the following:

1. An automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Smoke alarms in accordance with Section 907.2.11.
3. Where required by Section 907.2.9.1, a manual fire alarm system.

Live/work units in buildings constructed in accordance with the International Residential Code shall be provided with an automatic sprinkler system and smoke alarms. The automatic sprinkler system shall comply with International Residential Code Section P2904, and smoke alarms shall comply with International Residential Code Section 314.

~~419.6~~ 508.5.8 Structural.

Floors within a *live/work unit* shall be designed for the *live loads* in Table 1607.1, based on the function within the space.

~~419.7~~ 508.5.9 Accessibility.

Accessibility shall be designed in accordance with Chapter 11 for the function served.

~~419.8~~ 508.5.10 Ventilation.

The applicable *ventilation* requirements of the *International Mechanical Code* shall apply to each area within the *live/work unit* for the function within that space.

~~419.9~~ 508.5.11 Plumbing facilities.

The nonresidential area of the *live/work unit* shall be provided with minimum plumbing facilities as specified by Chapter 29, based on the function of the nonresidential area. Where the nonresidential area of the *live/work unit* is required to be accessible by Section 1108.6.2.1, the plumbing fixtures specified by Chapter 29 shall be accessible.

SECTION 509 INCIDENTAL USES

~~[NY] TABLE 509~~ TABLE 509.1 INCIDENTAL USES

Portions of table not shown remain unchanged.

ROOM OR AREA	SEPARATION AND/OR PROTECTION
In Group I-2, laundry rooms over 100 square feet	1 hour <u>and provide automatic sprinkler system</u>
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour <u>and provide automatic sprinkler system</u>
In Group I-2, physical plant maintenance shops	1 hour <u>and provide automatic sprinkler system</u>
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 <u>8.67</u> cubic feet or greater	1 hour <u>and provide automatic sprinkler system</u>
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 <u>50</u> square feet	1 hour <u>and provide automatic sprinkler system</u>
Energy storage systems having an energy capacity greater than the threshold quantity specified in Table 1206.1 of the Fire Code of New York State	2 hours

For SI: 1 square foot = 0.0929 m², 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 tts, 1 gallon = 3.785 L, 1 cubic foot = 0.0283 m³.

509.4.1.1 Type IV-B and IV-C construction.

Where Table 509.1 specifies a fire-resistance-rated separation, mass timber elements serving as fire barriers or horizontal assemblies in Type IV-B or IV-C construction shall be separated from the interior of the incidental use with an approved thermal barrier consisting of gypsum board that is not less than 1/2 inch (12.7 mm) in thickness 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.

Exception: The thermal barrier shall not be required on the top of horizontal assemblies serving as incidental use separations.

SECTION 510 SPECIAL PROVISIONS

510.2 Horizontal building separation allowance.

A building shall be considered as separate and distinct buildings for the purpose of determining area limitations, continuity of *fire walls*, limitation of number of stories and type of construction where the following conditions are met:

1. The buildings are separated with a *horizontal assembly* having a *fire-resistance rating* of not less than 3 hours. Where ~~vertical offsets are provided as part of~~ a *horizontal assembly* contains vertical offsets, the vertical offset ~~and the structure supporting the vertical offset shall be constructed as a fire barrier in accordance with Section 707 and~~ shall have a *fire-resistance rating* of not less than 3 hours.
2. The building below, including the *horizontal assembly* and any associated vertical offsets, is of Type IA construction.

3. *Shaft, stairway, ramp* and escalator enclosures through the horizontal assembly shall have not less than a 2-hour *fire-resistance rating* with opening protectives in accordance with Section 716.

Exception: Where the enclosure walls below the *horizontal assembly* have not less than a 3-hour *fire-resistance rating* with opening protectives in accordance with Section 716, the enclosure walls extending above the *horizontal assembly* shall be permitted to have a 1-hour *fire-resistance rating*, provided that the following conditions are met:

1. The building above the *horizontal assembly* is not required to be of Type I construction.
 2. The enclosure connects fewer than four stories.
 3. The enclosure opening protectives above the *horizontal assembly* have a *fire protection rating* of not less than 1 hour.
4. Interior exit stairways located within the Type IA building are permitted to be of combustible materials where the following requirements are met:
 - 4.1 The building above the Type IA building is of Type III, IV, or V construction.
 - 4.2 The stairway located in the Type IA building is enclosed by 3-hour fire-resistance-rated construction with opening protectives in accordance with Section 716.
 5. The building or buildings above the horizontal assembly shall be ~~permitted to have multiple Group A occupancy uses, each with an occupant load of less than 300, or Group B, M, R or S occupancies.~~ Group A, B, M, R or S occupancies.
 6. The building below the horizontal assembly shall be protected throughout by an approved automatic sprinkler system in accordance with Section 903.3.1.1, and shall be permitted to be any occupancy allowed by this code except Group H.
 7. The maximum *building height* in feet (mm) shall not exceed the limits set forth in Section 504.3 for the building having the smaller allowable height as measured from the *grade plane*.

510.3 Group S-2 enclosed parking garage with Group S-2 open parking garage above.

A Group S-2 enclosed parking garage with not more than one *story above grade plane* and located below a Group S-2 *open parking garage* shall be classified as a separate and distinct building for the purpose of determining the type of construction where the following conditions are met:

1. The allowable area of the building shall be such that the sum of the ratios of the actual area divided by the allowable area for each separate occupancy shall not exceed 1.
2. The Group S-2 enclosed parking garage is of Type I or II construction and is at least equal to the *fire-resistance* requirements of the Group S-2 *open parking garage*.
3. The height and the number of tiers of the Group S-2 *open parking garage* shall be limited as specified in Table 406.5.4.
4. The floor assembly separating the Group S-2 enclosed *parking garage* and Group S-2 open parking garage shall be protected as required for the floor assembly of the Group S-2 enclosed parking garage. Openings between the Group S-2 enclosed parking garage and Group S-2 *open parking garage*, except exit openings, shall not be required to be protected.
5. The Group S-2 enclosed parking garage is used exclusively for the parking or storage of private motor vehicles, but shall be permitted to contain an office, waiting room and toilet room having a total area of not more than 1,000 square feet (93 m²) and mechanical equipment rooms ~~incidental to~~ associated with the operation of the building.

510.5 Group R-1 and R-2 buildings of Type IIIA construction.

~~The height limitation for~~ For buildings of Type IIIA construction in Groups R-1 and R-2, the maximum allowable height in Table 504.3 shall be increased to six stories and 75 feet (22 860 mm) by 10 feet (3048 mm) and the maximum allowable number of stories in Table 504.4 shall be increased by one where the first-floor assembly above the *basement* has a *fire-resistance rating* of not less than 3 hours and the floor area is subdivided by 2-hour fire-resistance-rated *fire walls* into areas of not more than 3,000 square feet (279 m²).

510.8 Group B or M buildings with Group S-2 open parking garage above.

Group B or M occupancies located below a Group S-2 *open parking garage* of a lesser type of construction shall be considered as a separate and distinct building from the Group S-2 *open parking garage* for the purpose of determining the type of construction where the following conditions are met:

1. The buildings are separated with a *horizontal assembly* having a *fire-resistance rating* of not less than 2 hours.
2. The occupancies in the building below the *horizontal assembly* are limited to Groups B and M.
3. The occupancy above the *horizontal assembly* is limited to a Group S-2 *open parking garage*.
4. The building below the *horizontal assembly* is of Type IA construction.
5. **Exception:** The building below the *horizontal assembly* shall be permitted to be of Type IB or II construction, but not less than the type of construction required for the Group S-2 *open parking garage* above, where the building below is not greater than *one story* in height above *grade plane*.
6. The height and area of the building below the *horizontal assembly* does not exceed the limits set forth in Section 503.
7. The height and area of the Group S-2 *open parking garage* does not exceed the limits set forth in Section 406.5. The height, in both feet and *stories*, of the Group S-2 *open parking garage* shall be measured from *grade plane* and shall include the building below the *horizontal assembly*.
8. Exits serving the Group S-2 *open parking garage* shall discharge ~~directly~~ at grade with direct and unobstructed access to a street or *public way* and are separated from the building below the *horizontal assembly* by 2-hour *fire barriers* constructed in accordance with Section 707 or 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

Chapter 6 Types of Construction

TABLE 601

FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A	B	A	B	HT	A	B
Primary structural frame (see Section 202)	3 ^{a,b}	2 ^{a,b}	1 ^b	0	1 ^b	0	HT	1 ^b	0
Bearing walls									
Exterior ^{e,f}									
Interior	3 ^{3a}	2 ^{2a}	1 ¹	0	1 ¹	0	2 1/HT	1 ¹	0
Nonbearing walls and partitions	See Table 602								
Exterior									
Nonbearing walls and partitions Interior ^d	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary members (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	1 1/2 ^b	1 ^{b,e}	1 ^{b,e}	0 ^e	1 ^{b,e}	0	HT	1 ^{b,e}	0

<u>BUILDING ELEMENT</u>	<u>TYPE I</u>		<u>TYPE II</u>		<u>TYPE III</u>		<u>TYPE IV</u>				<u>TYPE V</u>	
	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>HT</u>	<u>A</u>	<u>B</u>
Primary structural frame ^f (see Section 202)	<u>3^{a, b}</u>	<u>2^{a, b, c}</u>	<u>1^{b, c}</u>	<u>0^c</u>	<u>1^{b, c}</u>	<u>0</u>	<u>3^a</u>	<u>2^a</u>	<u>2^a</u>	<u>HT</u>	<u>1^{b, c}</u>	<u>0</u>
Bearing walls												
Exterior ^{e, f}	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>0</u>
Interior	<u>3^a</u>	<u>2^a</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>3</u>	<u>2</u>	<u>2</u>	<u>1/HT^g</u>	<u>1</u>	<u>0</u>
Nonbearing walls and partitions												
Exterior	See Table 705.5											
Nonbearing walls and partitions												
Interior ^d	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>See Section 2304.11.2</u>	<u>0</u>	<u>0</u>
Floor construction and associated secondary structural members (see Section 202)	<u>2</u>	<u>2</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>HT</u>	<u>1</u>	<u>0</u>
Roof construction and associated secondary structural members (see Section 202)	<u>1^{1/2, b}</u>	<u>1^{b, c}</u>	<u>1^{b, c}</u>	<u>0^c</u>	<u>1^{b, c}</u>	<u>0</u>	<u>1^{1/2}</u>	<u>1</u>	<u>1</u>	<u>HT</u>	<u>1^{b, c}</u>	<u>0</u>

For SI: 1 foot = 304.8 mm.

Footnotes a. and d.-f. remain unchanged and are omitted for clarity.

- b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor or mezzanine immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.
- g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire resistance rating of not less than 1 hour.

SECTION 602 CONSTRUCTION CLASSIFICATION

TABLE 602

FIRE RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, d, g}

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H^e	OCCUPANCY GROUP F-1, M, S-1^f	OCCUPANCY GROUP A, B, E, F-2, I, Rⁱ, S-2, U^h
X < 5^b	All	3	2	1

$5 \leq X < 10$	IA Others	32	21	11
$10 \leq X < 30$	IA, IB, IB, VB Others	21-1	10-1	1 ⁶ 0-1 ⁶
$X \geq 30$	All	0	0	0

For SI: 1 foot = 304.8 mm.

- a. ~~Load-bearing exterior walls shall also comply with the fire-resistance-rating requirements of Table 601.~~
- b. ~~See Section 706.1.1 for party walls.~~
- c. ~~Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.~~
- d. ~~The fire-resistance rating of an exterior wall is determined based upon the fire-separation distance of the exterior wall and the story in which the wall is located.~~
- e. ~~For special requirements for Group H occupancies, see Section 415.6.~~
- f. ~~For special requirements for Group S aircraft hangars, see Section 412.3.1.~~
- g. ~~Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.~~
- h. ~~[NY] Reserved.~~
- i. ~~For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire-separation distance is 5 feet (1523 mm) or greater.~~

602.4 Type IV.

Type IV construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid wood, laminated wood, heavy timber (HT) or structural composite lumber (SCL) without concealed spaces. The minimum dimensions for permitted materials including solid timber, glued-laminated timber, structural composite lumber (SCL), and cross-laminated timber and details of Type IV construction shall comply with the provisions of this section and Section 2304.11. Exterior walls complying with Section 602.4.4.1 or 602.4.4.2 shall be permitted. Interior walls and partitions not less than 1-hour fire-resistance rating or heavy timber complying with Section 2304.11.2.2 shall be permitted. Type IV construction is that type of construction in which the building elements are mass timber or noncombustible materials and have fire-resistance ratings in accordance with Table 601. Mass timber elements shall meet the fire-resistance-rating requirements of this section based on either the fire-resistance rating of the noncombustible protection, the mass timber, or a combination of both and shall be determined in accordance with Section 703.2. The minimum dimensions and permitted materials for building elements shall comply with the provisions of this section and Section 2304.11. Mass timber elements of Types IV-A, IV-B and IV-C construction shall be protected with noncombustible protection applied directly to the mass timber in accordance with Sections 602.4.1 through 602.4.3. The time assigned to the noncombustible protection shall be determined in accordance with Section 703.6 and comply with Section 722.7.

Cross-laminated timber shall be labeled as conforming to ANSI/APA PRG 320 as referenced in Section 2303.1.4.

Exterior load-bearing walls and nonload-bearing walls shall be mass timber construction, or shall be of noncombustible construction.

Exception: Exterior load-bearing walls and nonload-bearing walls of Type IV-HT Construction in accordance with Section 602.4.4.

The interior building elements, including nonload-bearing walls and partitions, shall be of mass timber construction or of noncombustible construction.

Exception: Interior building elements and nonload-bearing walls and partitions of Type IV-HT construction in accordance with Section 602.4.4.

Combustible concealed spaces are not permitted except as otherwise indicated in Sections 602.4.1 through 602.4.4. Combustible stud spaces within light frame walls of Type IV-HT construction shall not be considered concealed spaces, but shall comply with Section 718.

In buildings of Type IV-A, IV-B, and IV-C construction with an occupied floor located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, up to and including 12 stories or 180 feet (54 864 mm) above *grade plane*, *mass timber* interior exit and elevator hoistway enclosures shall be protected in accordance with Section 602.4.1.2. In buildings greater than 12 stories or 180 feet (54 864 mm) above *grade plane*, interior exit and elevator hoistway enclosures shall be constructed of noncombustible materials.

602.4.1 Type IV-A.

Building elements in Type IV-A construction shall be protected in accordance with Sections 602.4.1.1 through 602.4.1.6. The required *fire-resistance rating* of noncombustible elements and protected *mass timber* elements shall be determined in accordance with Section 703.2.

602.4.1.1 Exterior protection.

The outside face of *exterior walls* of *mass timber* construction shall be protected with *noncombustible protection* with a minimum assigned time of 40 minutes, as specified in Table 722.7.1(1). Components of the *exterior wall covering* shall be of noncombustible material except *water-resistive barriers* having a peak heat release rate of less than 150kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ/kg as determined in accordance with ASTM E1354 and having a *flame spread index* of 25 or less and a *smoke-developed index* of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.1.2 Interior protection.

Interior faces of all *mass timber* elements, including the inside faces of exterior *mass timber* walls and *mass timber* roofs, shall be protected with materials complying with Section 703.3.

602.4.1.2.1 Protection time.

Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(1), but not less than 80 minutes. The use of materials and their respective protection contributions specified in Table 722.7.1(2) shall be permitted to be used for compliance with Section 722.7.1.

602.4.1.3 Floors.

The floor assembly shall contain a noncombustible material not less than 1 inch (25 mm) in thickness above the *mass timber*. Floor finishes in accordance with Section 804 shall be permitted on top of the noncombustible material. The underside of floor assemblies shall be protected in accordance with Section 602.4.1.2.

602.4.1.4 Roofs.

The *interior surfaces* of *roof assemblies* shall be protected in accordance with Section 602.4.1.2. *Roof coverings* in accordance with Chapter 15 shall be permitted on the outside surface of the *roof assembly*.

602.4.1.5 Concealed spaces.

Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the *International Mechanical Code*, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected in accordance with Section 602.4.1.2.

602.4.1.6 Shafts.

Shafts shall be permitted in accordance with Sections 713 and 718. Both the *shaft* side and room side of *mass timber* elements shall be protected in accordance with Section 602.4.1.2.

602.4.2 Type IV-B.

Building elements in Type IV-B construction shall be protected in accordance with Sections 602.4.2.1 through 602.4.2.6. The required *fire-resistance rating* of noncombustible elements or *mass timber* elements shall be determined in accordance with Section 703.2.

602.4.2.1 Exterior protection.

The outside face of *exterior walls of mass timber* construction shall be protected with *noncombustible protection* with a minimum assigned time of 40 minutes, as specified in Table 722.7.1(1). Components of the *exterior wall covering* shall be of noncombustible material except *water-resistive barriers* having a peak heat release rate of less than 150kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18MJ/kg as determined in accordance with ASTM E1354, and having a *flame spread index* of 25 or less and a *smoke-developed index* of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.2.2 Interior protection.

Interior faces of all *mass timber* elements, including the inside face of exterior *mass timber* walls and *mass timber* roofs, shall be protected, as required by this section, with materials complying with Section 703.3.

602.4.2.2.1 Protection time.

Noncombustible protection shall contribute a time equal to or greater than times assigned in Table 722.7.1(1), but not less than 80 minutes. The use of materials and their respective protection contributions specified in Table 722.7.1(2) shall be permitted to be used for compliance with Section 722.7.1.

602.4.2.2.2 Protected area.

Interior faces of mass timber elements, including the inside face of exterior mass timber walls and mass timber roofs, shall be protected in accordance with Section 602.4.2.2.1.

Exceptions: Unprotected portions of mass timber ceilings and walls complying with Section 602.4.2.2.4 and the following:

1. Unprotected portions of mass timber ceilings and walls complying with one of the following:
 - 1.1. Unprotected portions of mass timber ceilings, including attached beams, limited to an area less than or equal to 100 percent of the floor area in any dwelling unit within a story or fire area within a story.
 - 1.2. Unprotected portions of mass timber walls, including attached columns, limited to an area less than or equal to 40 percent of the floor area in any dwelling unit within a story or fire area within a story.
 - 1.3. Unprotected portions of both walls and ceilings of mass timber, including attached columns and beams, in any dwelling unit or fire area and in compliance with Section 602.4.2.2.3.
2. Mass timber columns and beams that are not an integral portion of walls or ceilings, respectively, without restriction of either aggregate area or separation from one another.

602.4.2.2.3 Mixed unprotected areas.

In each *dwelling unit* or *fire area*, where both portions of ceilings and portions of walls are unprotected, the total allowable unprotected area shall be determined in accordance with Equation 6-1.

$$(U_{tc}/U_{ac}) + (U_{tw}/U_{aw}) \leq 1$$

Equation 6-1

where:

U_{tc} = Total unprotected *mass timber* ceiling areas.

U_{ac} = Allowable unprotected *mass timber* ceiling area conforming to Exception 1.1 of Section 602.4.2.2.2.

U_{tw} = Total unprotected *mass timber* wall areas.

U_{aw} = Allowable unprotected *mass timber* wall area conforming to Exception 1.2 of Section 602.4.2.2.2.

602.4.2.2.4 Separation distance between unprotected mass timber elements.

In each *dwelling unit* or *fire area*, unprotected portions of *mass timber* walls shall be not less than 15 feet (4572 mm) from unprotected portions of other walls measured horizontally along the floor.

602.4.2.3 Floors.

The floor assembly shall contain a noncombustible material not less than 1 inch (25 mm) in thickness above the mass timber. Floor finishes in accordance with Section 804 shall be permitted on top of the noncombustible material. Except where unprotected mass timber ceilings are permitted in Section 602.4.2.2.2, the underside of floor assemblies shall be protected in accordance with Section 602.4.1.2.

602.4.2.4 Roofs.

The interior surfaces of roof assemblies shall be protected in accordance with Section 602.4.2.2 except, in nonoccupiable spaces, they shall be treated as a concealed space with no portion left unprotected. Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.

602.4.2.5 Concealed spaces.

Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the *International Mechanical Code*, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected in accordance with Section 602.4.1.2.

602.4.2.6 Shafts.

Shafts shall be permitted in accordance with Sections 713 and 718. Both the shaft side and room side of mass timber elements shall be protected in accordance with Section 602.4.1.2.

602.4.3 Type IV-C.

Building elements in Type IV-C construction shall be protected in accordance with Sections 602.4.3.1 through 602.4.3.6. The required fire-resistance rating of building elements shall be determined in accordance with Section 703.2.

602.4.3.1 Exterior protection.

The exterior side of walls of combustible construction shall be protected with noncombustible protection with a minimum assigned time of 40 minutes, as determined in Table 722.7.1(1). Components of the exterior wall covering shall be of noncombustible material except water-resistive barriers having a peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354 and having a flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

602.4.3.2 Interior protection.

Mass timber elements are permitted to be unprotected.

602.4.3.3 Floors.

Floor finishes in accordance with Section 804 shall be permitted on top of the floor construction.

602.4.3.4 Roof coverings.

Roof coverings in accordance with Chapter 15 shall be permitted on the outside surface of the roof assembly.

602.4.3.5 Concealed spaces.

Concealed spaces shall not contain combustibles other than electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the *International Mechanical Code*, and shall comply with all applicable provisions of Section 718. Combustible construction forming concealed spaces shall be protected with noncombustible protection with a minimum assigned time of 40 minutes, as specified in Table 722.7.1(1).

602.4.3.6 Shafts.

Shafts shall be permitted in accordance with Sections 713 and 718. Shafts and elevator hoistway and interior exit stairway enclosures shall be protected with noncombustible protection with a minimum assigned time of 40 minutes, as specified in Table 722.7.1(1), on both the inside of the shaft and the outside of the shaft.

602.4.4 Type IV-HT.

Type IV-HT (Heavy Timber) construction is that type of construction in which the exterior walls are of noncombustible materials and the interior building elements are of solid wood, laminated heavy timber or structural composite lumber (SCL), without concealed spaces or with concealed spaces complying with Section 602.4.4.3. The minimum dimensions for permitted materials including solid timber, glued-laminated timber, SCL and cross-laminated timber (CLT) and the details of Type IV construction shall comply with the provisions of this section and Section 2304.11. Exterior walls complying with Section 602.4.4.1 or 602.4.4.2 shall be permitted. Interior walls and partitions not less than 1-hour fire-resistance rated or heavy timber conforming with Section 2304.11.2.2 shall be permitted.

~~602.4.1~~ 602.4.4.1 Fire-retardant-treated wood in exterior walls.

Fire-retardant-treated wood framing and sheathing complying with Section 2303.2 shall be permitted within exterior wall assemblies ~~not less than 6 inches (152 mm) in thickness~~ with a 2-hour rating or less.

~~602.4.2~~ 602.4.4.2 Cross-laminated timber in exterior walls.

Cross-laminated timber (CLT) not less than 4 inches (102 mm) in thickness complying with Section 2303.1.4 shall be permitted within exterior wall assemblies ~~not less than 6 inches (152 mm) in thickness~~ with a 2-hour rating or less, ~~provided the~~ Heavy timber structural members appurtenant to the CLT exterior wall shall meet the requirements of Table 2304.11 and be fire-resistance rated as required for the exterior wall. The exterior surface of the cross-laminated timber ~~is~~ and heavy timber elements shall be protected by one of the following:

1. Fire-retardant-treated wood sheathing complying with Section 2303.2 and not less than 15/32 inch (12 mm) thick.
2. Gypsum board not less than 1/2 inch (12.7 mm) thick.
3. A noncombustible material.

602.4.4.3 Concealed spaces.

Concealed spaces shall not contain combustible materials other than *building elements* and electrical, mechanical, fire protection, or plumbing materials and equipment permitted in plenums in accordance with Section 602 of the *International Mechanical Code*. Concealed spaces shall comply with applicable provisions of Section 718. Concealed spaces shall be protected in accordance with one or more of the following:

1. The building shall be sprinklered throughout in accordance with Section 903.3.1.1 and automatic sprinklers shall also be provided in the concealed space.
2. The concealed space shall be completely filled with noncombustible insulation.
3. Combustible surfaces within the concealed space shall be fully sheathed with not less than 5/8-inch Type X gypsum board.

Exception: Concealed spaces within interior walls and partitions with a 1-hour or greater fire-resistance rating complying with Section 2304.11.2.2 shall not require additional protection.

~~602.4.3~~ 602.4.4.4 Exterior structural members.

Where a ~~horizontal~~ *fire separation distance* of 20 feet (6096 mm) or more is provided, wood columns and arches conforming to heavy timber sizes complying with Section 2304.11 shall be permitted to be used externally.

SECTION 603

COMBUSTIBLE MATERIAL IN TYPES I AND II CONSTRUCTION

603.1 Allowable materials.

Combustible materials shall be permitted in buildings of Type I or II construction in the following applications and in accordance with Sections 603.1.1 through 603.1.3:

1. Fire-retardant-treated wood complying with Section 2303.2 shall be permitted in:
 - 1.1 Nonbearing partitions where the required *fire-resistance rating* is 2 hours or less except in shaft enclosures within Group I-2 occupancies and ambulatory care facilities.
 - 1.2 Nonbearing exterior walls where fire-resistance-rated construction is not required.

1.3 Roof construction, including girders, trusses, framing and decking.

Exceptions:

1. In buildings of Type IA construction exceeding *two stories above grade plane*, *fire-retardant-treated wood* is not permitted in roof construction where the vertical distance from the upper floor to the roof is less than 20 feet (6096 mm).
2. Group I-2, roof construction containing fire-retardant-treated wood shall be covered by not less than a Class A roof covering or roof assembly, and the roof assembly shall have a fire-resistance rating where required by the construction type.

1.4. Balconies, porches, decks and exterior *stairways* not used as required exits on buildings three *stories* or less above grade plane.

02-07 Remain unchanged

8. *Trim* installed in accordance with Section ~~806.6~~ **806**.

09-10 Remain unchanged

11. Partitions dividing portions of stores, offices or similar places occupied by one tenant only and that do not establish a *corridor* serving an *occupant load* of 30 or more shall be permitted to be constructed of *fire-retardant-treated wood* complying with Section 2303.2, 1-hour fire- resistance-rated construction or of wood panels or similar light construction up to 6 feet (1829 mm) in height.

12-20 Remain unchanged

21. Sprayed fire-~~resistive~~ ~~resistant~~ materials and intumescent fire-resistive materials ~~and mastic-resistant coatings~~, determined on the basis of *fire resistance* tests in accordance with Section 703.2 and installed in accordance with Sections 1705.15 and 1705.16, respectively.

22-26 Remain unchanged

27. Wood nailers for parapet flashing and roof cants.
28. Vapor Retarders as required by Section 1404.3

603.1.2 Piping and plumbing fixtures.

The use of combustible piping materials and plumbing fixtures shall be permitted where installed in accordance with the limitations of the *International Mechanical Code* and the *International Plumbing Code*.

Chapter 7 Fire and Smoke Protection Features

SECTION 703

FIRE-RESISTANCE RATINGS AND FIRE TESTS

703.2 Fire resistance ~~ratings.~~

The *fire-resistance rating of building elements*, components or assemblies shall be determined in accordance with [Section 703.2.1 or 703.2.2 without the use of automatic sprinklers or any other fire suppression system being incorporated, or in accordance with Section 703.2.3.](#) ~~the test procedures set forth in ASTM E119 or UL 263 or in accordance with Section 703.2.2. The fire-resistance rating of penetrations and fire-resistant joint systems shall be determined in accordance Sections 714 and 715, respectively.~~

703.2.1 Tested assemblies.

[A fire-resistance rating of building elements, components or assemblies shall be determined by the test procedures set forth in ASTM E119 or UL 263. The fire-resistance rating of penetrations and fire-resistant joint systems shall be determined in accordance with Sections 714 and 715, respectively.](#)

The bodies of the following code sections are unchanged and are omitted for clarity:

~~703.2.1~~ [703.2.1.1](#) Nonsymmetrical wall construction.

~~703.2.2~~ [703.2.1.2](#) Combustible components.

~~703.2.3~~ [703.2.1.3](#) Restrained classification.

~~703.2.4~~ [703.2.1.4](#) Supplemental features.

~~703.2.5~~ [703.2.1.5](#) Exterior bearing walls.

~~703.3~~ [703.2.2](#) ~~Methods for determining fire resistance.~~ Analytical methods.

[The fire resistance of building elements, components or assemblies established by an analytical method shall be by The application of any of the methods listed in this section, shall be based on the fire exposure and acceptance criteria specified in ASTM E119 or UL 263. The required fire resistance of a building element, component or assembly shall be permitted to be established by any of the following methods or procedures:](#)

1. *Fire-resistance designs* documented in approved sources.
2. Prescriptive designs of fire-resistance-rated *building elements*, components or assemblies as prescribed in Section 721.
3. Calculations in accordance with Section 722.
4. Engineering analysis based on a comparison of *building element*, component or assemblies designs having *fire-resistance ratings* as determined by the test procedures set forth in ASTM E119 or UL 263.
5. ~~Alternative protection methods as allowed by Section 104.3.~~
6. [5.](#) Fire-resistance designs certified by an approved agency.

703.2.3 Approved alternate method.

[The fire resistance of building elements, components or assemblies not complying with Section 703.2.1 or 703.2.2 shall be permitted to be established by an alternative protection method in accordance with Section 104.11.](#)

703.4 Automatic sprinklers.

~~Under the prescriptive fire-resistance requirements of this code, the fire-resistance rating of a building element, component or assembly shall be established without the use of automatic sprinklers or any other fire suppression system being incorporated as part of the assembly tested in accordance with the fire exposure, procedures and acceptance criteria specified in ASTM E119 or UL 263. However, this section shall not prohibit or limit the duties and powers of the building official allowed by Sections 104.10 and 104.11.~~

~~703.5~~ 703.3 Noncombustibility tests.

The tests indicated in ~~Sections 703.5.1 and 703.5.2~~ Section 703.3.1 shall serve as criteria for acceptance of building materials as set forth in Sections 602.2, 602.3 and 602.4 in Types I, II, III and IV construction. The term “noncombustible” does not apply to the *flame spread* characteristics of *interior finish* or *trim* materials. A material shall not be classified as a noncombustible building construction material if it is subject to an increase in combustibility or *flame spread* beyond the limitations herein established through the effects of age, moisture or other atmospheric conditions.

~~703.5.1~~ 703.3.1 Elementary Noncombustible materials.

Materials required to be noncombustible shall be tested in accordance with ASTM E136. Alternately, materials required to be noncombustible shall be tested in accordance with ASTM E2652 using the acceptance criteria prescribed by ASTM E136.

Exception: Materials having a structural base of noncombustible material as determined in accordance with ASTM E136, or with ASTM E2652 using the acceptance criteria prescribed by ASTM E136, with a surfacing of not more than 0.125 inch (3.18 mm) in thickness having a *flame spread index* not greater than 50 when tested in accordance with ASTM E84 or UL 723 shall be acceptable as noncombustible.

~~703.5.2~~ Composite materials.

~~Materials having a structural base of noncombustible material as determined in accordance with Section 703.5.1 with a surfacing not more than 0.125 inch (3.18 mm) thick that has a *flame spread index* not greater than 50 when tested in accordance with ASTM E84 or UL 723 shall be acceptable as noncombustible materials.~~

~~703.6~~ 703.4 Fire-resistance-rated glazing.

Fire-resistance-rated glazing, when tested in accordance with ASTM E119 or UL 263 and complying with the requirements of Section 707, shall be permitted. Fire-resistance-rated glazing shall bear a *label* marked in accordance with Table 716.1(1) issued by an agency and shall be permanently identified on the glazing.

~~703.7~~ 703.5 Marking and identification.

Where there is an accessible concealed floor, floor-ceiling or *attic* space, *fire walls*, *fire barriers*, *fire partitions*, *smoke barriers* and *smoke partitions* or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling in the concealed space. Such identification shall:

1. Be located within 15 feet (4572 mm) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition.
2. Include lettering not less than 3 inches (76 mm) in height with a minimum $\frac{3}{8}$ -inch (9.5 mm) stroke in a contrasting color incorporating the suggested wording, “FIRE AND/OR SMOKE BARRIER— PROTECT ALL OPENINGS,” or other wording.

703.6 Determination of noncombustible protection time contribution.

The time, in minutes, contributed to the *fire-resistance rating* by the *noncombustible protection* of mass timber building elements, components, or assemblies, shall be established through a comparison of assemblies tested using procedures set forth in ASTM E119 or UL 263. The test assemblies shall be identical in construction, loading and materials, other than the *noncombustible protection*. The two test assemblies shall be tested to the same criteria of structural failure with the following conditions:

1. Test Assembly 1 shall be without protection.
2. Test Assembly 2 shall include the representative *noncombustible protection*. The protection shall be fully defined in terms of configuration details, attachment details, *joint sealing details*, accessories and all other relevant details.

The *noncombustible protection* time contribution shall be determined by subtracting the *fire-resistance* time, in minutes, of Test Assembly 1 from the *fire-resistance* time, in minutes, of Test Assembly 2.

703.7 Sealing of adjacent mass timber elements.

In buildings of Types IV-A, IV-B and IV-C construction, sealant or adhesive shall be provided to resist the passage of air in the following locations:

1. At abutting edges and intersections of mass timber building elements required to be fire-resistance rated.
2. At a butting intersections of mass timber building elements and building elements of other materials where both are required to be fire-resistance rated. Sealants shall meet the requirements of ASTM C920. Adhesives shall meet the requirements of ASTM D3498.

Exception: Sealants or adhesives need not be provided where they are not a required component of a tested fire-resistance-rated assembly.

SECTION 704

FIRE-RESISTANCE RATING OF STRUCTURAL MEMBERS

704.1 Requirements.

The *fire-resistance ratings* of structural members and assemblies shall comply with this section and the requirements for the type of construction as specified in Table 601. ~~The fire-resistance ratings shall be not less than the ratings required for the fire-resistance-rated assemblies supported by the structural members.~~

~~**Exception:** Fire barriers, fire partitions, smoke barriers and horizontal assemblies as provided in Sections 707.5, 708.4, 709.4 and 711.2, respectively.~~

704.1.1 Supporting construction.

The *fire-resistance ratings* of supporting structural members and assemblies shall be not less than the ratings required for the fire-resistance-rated assemblies supported by the structural members.

Exception: Structural members and assemblies that support fire barriers, fire partitions, smoke barriers and horizontal assemblies as provided in Sections 707.5, 708.4, 709.4 and 711.2, respectively.

~~**704.2 Column protection.**~~

~~Where columns are required to have protection to achieve a fire-resistance rating, the entire column shall be provided individual encasement protection by protecting it on all sides for the full column height, including connections to other structural members, with materials having the required *fire-resistance rating*. Where the column extends through a ceiling, the encasement protection shall be continuous from the top of the foundation or floor/ceiling assembly below through the ceiling space to the top of the column.~~

~~**Exception:** Columns that meet the limitations of Section 704.4.1.~~

~~**704.3**~~ **704.2 Protection of the primary structural frame other than columns.**

Members of the *primary structural frame* ~~other than columns~~ that are required to have protection to achieve a fire-resistance rating ~~and support more than two floors or one floor and roof, or support a load-bearing wall or a nonload-bearing wall more than two stories high,~~ shall be provided individual encasement protection by protecting them on all sides for the full length, including connections to other structural members, with materials having the required fire-resistance rating. Where the column extends through a ceiling, the encasement protection shall be continuous from the top of the foundation or floor/ceiling assembly below through the ceiling space to the top of the column.

~~**Exception**~~ **Exceptions:**

- Individual encasement protection on all sides shall be permitted on all exposed sides provided that the extent of protection is in accordance with the required fire-resistance rating, as determined in Section 703.
- Primary structural members other than columns that do not support more than two floors or one floor and roof, or a load-bearing wall or a nonload-bearing wall more than two stories high, are permitted to be protected by the membrane of a fire-resistance rated wall or horizontal assembly where the membrane provides the required fire resistance rating.
- Columns that meet the limitations of Section 704.3.1.

4. Members that are integral elements in walls of light-frame construction, including studs, columns, and boundary elements located entirely between the top and bottom plates or tracks, shall be permitted to be protected by the membrane of a fire-resistance rated wall assembly.

~~704.4~~ 704.3 Protection of secondary **structural members.**

Secondary structural members that are required to have protection to achieve a *fire- resistance rating* shall be protected by individual encasement protection, or by the membrane of a fire-resistance-rated wall or horizontal assembly where the membrane provides the required *fire-resistance rating*.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~704.4.1~~ 704.3.1 Light-frame construction.

~~704.4.2~~ 704.3.2 Horizontal assemblies.

~~704.5~~ 704.4 Truss protection.

~~704.6~~ 704.5 Attachments to structural members.

704.5.1 Secondary attachments to structural members.

Where primary and secondary structural steel members require fire protection, any additional structural steel members having direct connection to the *primary structural frame* or *secondary structural members* shall be protected with the same fire-resistive material and thickness as required for the structural member. The protection shall extend away from the structural member a distance of not less than 12 inches (305 mm), or shall be applied to the entire length where the attachment is less than 12 inches (305 mm) long. Where an attachment is hollow and the ends are open, the fire-resistive material and thickness shall be applied to both exterior and interior of the hollow steel attachment.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~704.7~~ 704.6 Reinforcing.

~~704.8~~ 704.7 Embedments and enclosures.

~~704.9~~ 704.8 Impact protection.

~~704.10~~ 704.9 Exterior structural members.

~~704.11~~ 704.10 Bottom flange protection.

~~704.12~~ 704.11 Seismic isolation systems.

~~704.13~~ 704.12 Sprayed fire-resistive ~~resistant~~ materials (SFRM).

Sprayed fire-~~resistant~~ resistive materials (SFRM) shall comply with Sections ~~704.13.1~~ 704.12.1 through ~~704.13.5~~ 704.12.5.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~704.13.1~~ 704.12.1 Fire-resistance rating.

~~704.13.2~~ 704.12.2 Manufacturer's installation instructions.

~~704.13.3~~ 704.12.3 Substrate condition.

~~704.13.3.1~~ 704.12.3.1 Surface conditions.

~~704.13.3.2~~ 704.12.3.2 Primers, paints and encapsulants.

~~704.13.4~~ 704.12.4 Temperature

SECTION 705
EXTERIOR WALLS

TABLE 705.2

MINIMUM DISTANCE OF PROJECTION

FIRE SEPARATION DISTANCE(FSD)(feet)	MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD
0 to less than 2	Projections not permitted
2 to less than 3	24 inches
3 to less than 5	24 inches plus 8 inches for every foot of FSD beyond 3 feet or fraction thereof <u>Two-thirds of FSD</u>
5 or greater	40 inches

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

705.2.3 ~~Combustible projections.~~ Projection protection.

~~Combustible projections extending to within 5 feet (1524 mm) of the line used to determine the fire separation distance shall be of not less than 1-hour fire-resistance-rated construction, heavy timber construction, complying with Section 2304.11, fire-retardant treated wood or as permitted by Section 705.2.3.1.~~ Projections extending to within 5 feet (1524 mm) of the line used to determine the fire separation distance shall be one of the following:

1. Noncombustible materials.
2. Combustible materials of not less than 1-hour fire-resistance-rated construction.
3. Heavy timber construction complying with Section 2304.11.
4. Fire-retardant-treated wood.
5. As permitted by Section 705.2.3.1.

Exception: Type VB construction shall be allowed for combustible projections in Group R-3 and U occupancies with a fire separation distance greater than or equal to 5 feet (1524 mm).

705.2.3.1 Balconies and similar projections.

Balconies and similar projections of combustible construction other than fire-retardant-treated wood shall be fire-resistance rated where required by Table 601 for floor construction or shall be of heavy timber construction in accordance with Section 2304.11. The aggregate length of the projections shall not exceed 50 percent of the building's perimeter on each floor.

Exceptions:

- On buildings of Types I and II construction, three stories or less above grade plane, fire-retardant-treated wood shall be permitted for balconies, porches, decks and exterior stairways not used as required exits.
- Untreated wood and plastic composites that comply with ASTM D7032 and Section 2612 are permitted for pickets, rails and similar guard components that are limited to 42 inches (1067 mm) in height.
- Balconies and similar projections on buildings of Types III, IV ~~HT~~ and V construction shall be permitted to be of Type V construction and shall not be required to have a fire-resistance rating where sprinkler protection is extended to these areas.
- Where sprinkler protection is extended to the balcony areas, the aggregate length of the balcony on each floor shall not be limited.

705.5 Fire-resistance ratings.

Exterior walls shall be fire-resistance rated in accordance with Table 601 ~~and 602 and this section~~, based on the type of construction, and Table 705.5, based on the fire separation distance. The required fire-resistance rating of exterior walls with a fire separation distance of greater than 10 feet (3048 mm) shall be rated for exposure to fire from the inside. The required fire-resistance rating of exterior walls with a fire separation distance of less than or equal to 10 feet (3048 mm) shall be rated for exposure to fire from both sides.

[NY] TABLE 705.5

FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, d, g}

<u>FIRE SEPARATION DISTANCE = X (feet)</u>	<u>TYPE OF CONSTRUCTION</u>	<u>OCCUPANCY GROUP H^e</u>	<u>OCCUPANCY GROUP F-1, M, S-1^f</u>	<u>OCCUPANCY GROUP A, B, E, F-2, I, Rⁱ, S-2, U^h</u>
<u>$X < 5^b$</u>	<u>All</u>	<u>3</u>	<u>2</u>	<u>1</u>
<u>$5 \leq X < 10$</u>	<u>IA, IVA</u>	<u>3</u>	<u>2</u>	<u>1</u>
	<u>Others</u>	<u>2</u>	<u>1</u>	<u>1</u>
<u>$10 \leq X < 30$</u>	<u>IA, IB, IVA, IVB</u>	<u>2</u>	<u>1</u>	<u>1^c</u>
	<u>IIB, VB</u>	<u>1</u>	<u>0</u>	<u>0</u>
	<u>Others</u>	<u>1</u>	<u>1</u>	<u>1^c</u>
<u>$X \geq 30$</u>	<u>All</u>	<u>0</u>	<u>0</u>	<u>0</u>

For SI: 1 foot = 304.8 mm.

- Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
- See Section 706.1.1 for party walls.
- Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
- The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
- For special requirements for Group H occupancies, see Section 415.6.
- For special requirements for Group S aircraft hangars, see Section 412.3.1.
- Where Section 705.9.1 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.
- [NY] Reserved.
- For a Group R-3 building of Type II-B or Type V-B construction, the exterior wall shall not be required to have a fire-resistance rating where the fire separation distance is 5 feet (1523 mm) or greater.

705.6 Continuity.

The fire-resistance rating of exterior walls shall extend from the top of the foundation or floor/ceiling assembly below to one of the following:

- The underside of the floor sheathing, roof sheathing, deck or slab above.
- The underside of a floor/ceiling or roof/ceiling assembly having a fire-resistance rating equal to or greater than the exterior wall and the fire separation distance is greater than 10 feet.

Parapets shall be provided as required by Section 705.12.

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~~705.6~~ 705.7 Structural stability.

~~Exterior walls shall extend to the height required by Section 705.11.~~ Interior structural elements that brace the *exterior wall* but that are not located within the plane of the *exterior wall* shall have the minimum *fire-resistance rating* required in Table 601 for that structural element. Structural elements that brace the *exterior wall* but are located outside of the *exterior wall* or within the plane of the *exterior wall* shall have the minimum *fire-resistance rating* required in Table 601 and Table 705.5 for the *exterior wall*.

705.7.1 Floor Assemblies in Type III Construction.

In Type III construction where a floor assembly supports gravity loads from an exterior wall, the fire-resistance rating of the portion of the floor assembly that supports the exterior wall shall be not less than the fire-resistance rating required for the exterior wall in Table 601. The fire-resistance rating provided by the portion of the floor assembly supporting and within the plane of the exterior wall shall be permitted to include the contribution of the ceiling membrane when considering exposure to fire from the inside. Where a floor assembly supports gravity loads from an exterior wall, the building elements of the floor construction within the plane of the exterior wall, including but not limited to rim joists, rim boards and blocking, shall be in accordance with the requirements for interior building elements of Type III construction.

The bodies of the following code sections are unchanged and are omitted for clarity:

FIGURE ~~705.7~~ 705.8 EQUIVALENT OPENING FACTOR

~~705.7~~ 705.8 Unexposed surface temperature.

~~705.8~~ 705.9 Openings

Openings in exterior walls shall comply with Sections ~~705.8.1~~ 705.9.1 through ~~705.8.6~~ 705.9.6.

[NY] TABLE ~~705.8~~ 705.9

MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION

Portions of table not shown remain unchanged.

Footnotes a.-f. and h.-k. remain unchanged and are omitted for clarity.

- g) The area of openings in an ~~open parking structure~~ open parking garage in accordance with Section 406.5 with a fire separation distance of 10 feet or greater shall not be limited.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~705.8.1~~ 705.9.1 Allowable area of openings.

~~705.8.2~~ 705.9.2 Protected openings.

~~705.8.3~~ 705.9.3 Unprotected openings.

~~705.8.4~~ 705.9.4 Mixed openings.

~~705.8.5~~ 705.9.5 Vertical separation of openings.

~~705.8.6~~ 705.9.6 Vertical exposure.

~~705.9~~ 705.10 Joints.

~~705.9.1~~ 705.10.1 Voids.

~~705.10~~ 705.11 Duct and air transfer openings.

~~705.11~~ 705.12 Parapets

~~705.11.1~~ 705.12.1 Parapet construction.

Required Parapets parapets shall have the same *fire-resistance rating* as that required for the supporting wall, and on any side adjacent to a roof surface, shall have noncombustible faces for the uppermost 18 inches (457 mm), including counterflashing and coping materials. The height of the parapet shall be not less than 30 inches (762 mm) above the point where the roof surface and the wall intersect. Where the roof slopes toward a parapet at a slope 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 *fire separation distance* where protection of wall openings is required, but the height shall be not less than 30 inches (762 mm).

SECTION 706 FIRE WALLS

706.1.1 Party walls.

Any wall located on a *lot line* between adjacent buildings, which is used or adapted for *joint* service between the two buildings, shall be constructed as a *fire wall* in accordance with Section 706. Party walls shall be constructed without openings and shall create separate buildings.

Exceptions:

1. Openings in a party wall separating an *anchor building* and a *mall* shall be in accordance with Section 402.4.2.2.1.
2. Party walls and fire ~~Fire~~ walls are not required on *lot lines* dividing a building for ownership purposes where the aggregate height and area of the portions of the building located on both sides of the *lot line* do not exceed the maximum height and area requirements of this code. For the ~~code-building~~ official's review and approval, ~~he or she~~ the official shall be provided with copies of dedicated access easements and contractual agreements that permit the *owners* of portions of the building located on either side of the *lot line* access to the other side for purposes of maintaining fire and *life safety systems* necessary for the operation of the building.

706.1.2 Deemed to comply.

Fire walls designed and constructed in accordance with NFPA 221 shall be deemed to comply with this section, subject to the limitations of Section 102.4. The required fire resistance rating shall be determined by Section 706.4.

706.2 Structural stability.

Fire walls shall be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions. ~~Fire walls designed and constructed in accordance with NFPA 221 shall be deemed to comply with this section.~~

Exception: In *Seismic Design Categories* D through F, where double *fire walls* are used in accordance with NFPA 221, floor and roof sheathing not exceeding 1/2 inch (19.05 mm) thickness shall be permitted to be continuous through the wall assemblies of *light frame construction*.

706.6 Vertical continuity.

Fire walls shall extend from the foundation to a termination point not less than 30 inches (762 mm) above both adjacent roofs.

Exceptions:

1. Stepped buildings in accordance with Section 706.6.1.
2. Two-hour fire-resistance-rated walls shall be permitted to terminate at the underside of the roof sheathing, deck or slab, provided that all of the following requirements are met:
 - 2.1. The lower *roof assembly* within 4 feet (1220 mm) of the wall has not less than a 1-hour *fire-resistance rating* and the entire length and span of supporting elements for the rated *roof assembly* has a *fire-resistance rating* of not less than 1 hour.
 - 2.2. Openings in the roof shall not be located within 4 feet (1220 mm) of the *fire wall*.

- 2.3. Each building shall be provided with not less than a Class B *roof covering*.
3. Walls shall be permitted to terminate at the underside of noncombustible roof sheathing, deck or slabs where both buildings are provided with not less than a Class B *roof covering*. Openings in the roof shall not be located within 4 feet (1220 mm) of the *fire wall*.
4. In buildings of Types III, IV and V construction, walls shall be permitted to terminate at the underside of combustible roof sheathing or decks, provided that all of the following requirements are met:
- 4.1. Roof openings are not less than 4 feet (1220 mm) from the *fire wall*.
- 4.2. The roof is covered with a minimum Class B *roof covering*.
- 4.3. The roof sheathing or deck is constructed of *fire-retardant-treated wood* for a distance of 4 feet (1220 mm) on both sides of the wall or the roof is protected with $\frac{1}{2}$ -inch (15.9 mm) Type X *gypsum board* directly beneath the underside of the roof sheathing or deck, supported by not less than 2-inch (51 mm) nominal ledgers attached to the sides of the roof framing members for a distance of not less than 4 feet (1220 mm) on both sides of the *fire wall*.
5. In buildings designed in accordance with Section 510.2, *fire walls* located above the 3-hour *horizontal assembly* required by Section 510.2, Item 1 shall be permitted to extend from the top of this *horizontal assembly*.
6. Buildings with sloped roofs in accordance with Section 706.6.2.

706.6.1 Stepped buildings.

Where a *fire wall* also serves as an *exterior wall* for a building and separates buildings having different roof levels, such wall shall terminate at a point not less than 30 inches (762 mm) above the lower roof level. ~~Provided the exterior wall for a height of 15 feet (4572 mm)~~ Exterior walls above the fire wall extending more than 30 inches (762 mm) above the lower roof is shall be of not less than 1-hour fire-resistance-rated construction from both sides with openings protected by fire assemblies having a *fire protection rating* of not less than $\frac{3}{4}$ hour. Portions of the exterior walls greater than 15 feet (4572 mm) above the lower roof shall be of nonfire-resistance-rated construction unless otherwise rated construction is required by other provisions of this code.

Exception: ~~Where the fire wall terminates at the underside of the roof sheathing, deck or slab of the lower roof, provided that:~~ A fire wall serving as part of an exterior wall that separates buildings having different roof levels shall be permitted to terminate at the underside of the roof sheathing, deck or slab of the lower roof, provided that Items 1, 2 and 3 are met. The exterior wall above the fire wall is not required to be of fire-resistance-rated construction unless required by other provisions of this code.

1. The lower roof assembly within 10 feet (3048 mm) of the *fire* wall has not less than a 1-hour *fire-resistance rating* ~~and the entire length and span of supporting elements for the rated roof assembly has a fire-resistance rating of not less than 1 hour.~~
2. The entire length and span of supporting elements for the rated roof assembly shall have a fire-resistance rating of not less than 1 hour.
- ~~2.3.~~ Openings in the lower roof shall not be located within 10 feet (3048 mm) of the fire wall .

SECTION 707 FIRE BARRIERS

707.3.11 Horizontal separation offsets.

The fire-resistance rating of a fire barrier serving as the vertical offset in a horizontal building separation shall comply with Section 510.2.

707.4 Exterior walls.

Where *exterior walls* serve as a part of a required fire-resistance-rated *shaft*, or ~~stairway separation~~ or ~~ramp~~ enclosure for a stairway, ramp or exit passageway ~~or separation~~, such walls shall comply with the requirements of Section 705 for *exterior walls* and the fire-resistance-rated enclosure or separation requirements shall not apply.

Exceptions:

1. *Exterior walls* required to be *fire-resistance rated* in accordance with Section 1021 for exterior egress balconies, Section 1023.7 for *interior exit stairways and ramps*, [Section 1024.8 for exit passageways](#) and Section 1027.6 for *exterior exit stairways and ramps*.
2. [Exterior walls required to be fire-resistance rated in accordance with Section 1207 of the International Fire Code for enclosure of energy storage systems.](#)

707.5 Continuity.

Fire barriers shall extend from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above and shall be securely attached thereto. Such *fire barriers* shall be continuous through concealed space, such as the space above a suspended ceiling. *Joints* and voids at intersections shall comply with Sections 707.8 and 707.9

Exceptions:

1. *Shaft enclosures* shall be permitted to terminate at a top enclosure complying with Section 713.12.
2. *Interior exit stairway and ramp enclosures* required by Section 1023 and *exit access stairway and ramp enclosures* required by Section 1019 shall be permitted to terminate at a top enclosure complying with Section 713.12.
3. [An exit passageway enclosure required by Section 1024.3 that does not extend to the underside of the floor or roof sheathing, slab or deck above shall be enclosed at the top with construction of the same fire-resistance rating as required for the exit passageway.](#)

707.6 Openings.

Openings in a *fire barrier* shall be protected in accordance with Section 716. Openings shall be limited to a maximum aggregate width of 25 percent of the length of the wall, and the maximum area of any single opening shall not exceed 156 square feet (15 m²). Openings in enclosures for ~~*shafts exit access stairways and ramps*~~, *interior exit stairways and ramps* and *exit passageways* shall also comply with Sections ~~713.7 1019~~, 1023.4 and 1024.5, respectively.

Exceptions:

1. Openings shall not be limited to 156 square feet (15 m²) where adjoining floor areas are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
2. Openings shall not be limited to 156 square feet (15 m²) or an aggregate width of 25 percent of the length of the wall where the opening protective is a *fire door* serving enclosures for *exit access stairways and ramps*, and *interior exit stairways and ramps*.
3. Openings shall not be limited to 156 square feet (15 m²) or an aggregate width of 25 percent of the length of the wall where the opening protective has been tested in accordance with ASTM E119 or UL 263 and has a minimum *fire-resistance rating* not less than the *fire-resistance rating* of the wall.
4. *Fire window assemblies* permitted in *atrium* separation walls shall not be limited to a maximum aggregate width of 25 percent of the length of the wall.
5. Openings shall not be limited to 156 square feet (15 m²) or an aggregate width of 25 percent of the length of the wall where the opening protective is a *fire door assembly* in a *fire barrier* separating an enclosure for *exit access stairways and ramps*, and *interior exit stairways and ramps* from an *exit passageway* in accordance with Section 1023.3.1.
6. [Openings providing entrance to an elevator car shall not be limited to 156 square feet \(15 m²\) or an aggregate width of 25 percent of the length of the wall where the opening protective is a fire door assembly in a fire barrier that is an elevator hoistway enclosure.](#)
7. [Openings shall not be limited to an aggregate width of 25 percent of the length of the wall where opening serves a shaft enclosure in accordance with Section 713.](#)
8. [Openings shall not be limited to an aggregate width of 25 percent of the length of the wall where opening serves a chute access room in accordance with Section 713.13.3 or a chute discharge room in accordance with Section 713.13.4.](#)

707.7.1 Prohibited penetrations.

Penetrations into enclosures for ~~shafts exit access stairways and ramps~~, interior exit stairways and ramps, and exit passageways shall be allowed only where permitted by Sections 713.8.1 ~~1019~~, 1023.5 and 1024.6, respectively.

707.8 Joints.

Joints made in or between fire barriers, and joints made at the intersection of fire barriers with the underside of a fire-resistance-rated floor or roof sheathing, slab or deck above, and ~~the exterior vertical wall intersection with other fire-~~ resistance-rated wall assemblies shall comply with Section 715.

707.9 Voids at intersections.

The voids created at the intersection of a fire barrier and a nonfire-resistance-rated roof assembly or a nonfire-resistance-rated exterior wall assembly shall ~~be filled. An approved material or system shall be used to fill the void, and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to retard the passage of fire and hot gases~~ comply with Section 715.

SECTION 708 FIRE PARTITIONS

708.1 General.

The following wall assemblies shall comply with this section:

1. Separation walls as required by Section 420.2 for Group I-1 and Group R occupancies.
2. Walls separating tenant spaces in *covered and open mall buildings* as required by Section 402.4.2.1.
3. *Corridor* walls as required by Section 1020.3.
4. Enclosed elevator lobby separation as required by Section 3006.3.
5. Egress balconies as required by Section 1021.2
6. Walls separating ambulatory care facilities from adjacent spaces, corridors or tenant as required by Section 422.2.
7. Walls separating dwelling and sleeping units in Groups R-1 and R-2 in accordance with Sections 907.2.8.1 and 907.2.9.1.
8. Vestibules in accordance with Section 1028.2.

708.4.1 Fire partition walls enclosing elevator lobbies.

Fire partition walls used to enclose elevator lobbies in accordance with Section 3006.3, shall form an enclosure that terminates at a fire barrier or fire partition having a level of fire-resistance- rating not less than 1 hour, or an outside wall.

~~708.4.1~~ 708.4.2 Supporting construction.

The supporting construction for a fire partition shall have a fire-resistance rating that is equal to or greater than the required fire-resistance rating of the supported fire partition.

Exception: In buildings of Types IIB, IIIB and VB construction, the supporting construction requirement shall not apply to fire partitions separating tenant spaces in covered and open mall buildings, fire partitions separating dwelling units, fire partitions separating sleeping units, and fire partitions serving as corridor walls, fire partitions separating ambulatory care facilities from adjacent spaces or corridors, fire partitions separating dwelling and sleeping units from Group R-1 and R-2 occupancies and fire partitions separating vestibules from the level of exit discharge.

708.4.2 708.4.3 Fireblocks and draftstops in combustible construction.

In combustible construction where *fire partitions* do not extend to the underside of the floor or roof sheathing, deck or slab above, the space above and along the line of the *fire partition* shall be provided with one of the following:

1. Fireblocking up to the underside of the floor or roof sheathing, deck or slab above using materials complying with Section 718.2.1.
2. ~~Draftstopping~~ Draftstops up to the underside of the floor or roof sheathing, deck or slab above using materials complying with Section 718.3.1 for floors or Section 718.4.1 for attics.

Exceptions:

1. Buildings equipped with an *automatic sprinkler system* installed throughout in accordance with Section 903.3.1.1, or in accordance with Section 903.3.1.2 provided that protection is provided in the space between the top of the *fire partition* and underside of the floor or roof sheathing, deck or slab above as required for systems complying with Section 903.3.1.1.
2. Where *corridor walls* provide a *sleeping unit* or *dwelling unit* separation, ~~draftstopping~~ draftstops shall only be required above one of the *corridor walls*.
3. In Group R-2 occupancies with fewer than four *dwelling units*, *fireblocking* and ~~draftstopping~~ draftstops shall not be required.
4. In Group R-2 occupancies up to and including four *stories* in height in buildings not exceeding 60 feet (18 288 mm) in height above *grade plane*, the *attic* space shall be subdivided by *draftstops* into areas not exceeding 3,000 square feet (279 m²) or above every two *dwelling units*, whichever is smaller.
5. In Group R-3 occupancies with fewer than three *dwelling units*, *fireblocking* and ~~draftstopping~~ draftstops shall not be required in floor assemblies.

709.4.1 Smoke-barrier walls assemblies separating smoke compartments.

Smoke-barrier ~~walls~~ assemblies used to separate *smoke compartments* shall form an effective membrane enclosure that is continuous from an outside wall or smoke barrier wall to an outside wall or another smoke barrier wall and to the horizontal assemblies.

709.4.2 Smoke-barrier walls enclosing areas of refuge or elevator lobbies.

Smoke-barrier walls used to enclose *areas of refuge* in accordance with Section 1009.6.4, or to enclose elevator lobbies in accordance with Section 405.4.3, 3007.6.2, or 3008.6.2, shall form an effective membrane enclosure that terminates at a *fire barrier wall* having a ~~level of fire protection~~ resistance rating not less than 1 hour, another *smoke barrier wall* or an outside wall. A smoke and draft control door assembly as specified in Section 716.2.2.1.1 shall not be required at each elevator hoistway door ~~opening~~ where protected by an elevator lobby, at each exit door opening into a protected lobby or at each exit doorway between an *area of refuge* and the exit enclosure.

709.5 Openings.

Openings in a *smoke barrier* shall be protected in accordance with Section 716.

Exceptions:

1. In Group I-1, Condition 2, Group I-2 and *ambulatory care facilities*, where a pair of opposite-swinging doors are installed across a corridor in accordance with Section 709.5.1, the doors shall not be required to be protected in accordance with Section 716. The doors shall be close fitting within operational tolerances, and shall not have a center mullion or undercuts in excess of 3/4 inch (19.1 mm), louvers or grilles. The doors shall have head and jamb stops, and astragals or rabbets at meeting edges. Positive latching devices are not required. ~~Where permitted by the door manufacturer's listing, positive latching devices are not required.~~ Factory-applied or field-applied protective plates are not required to be labeled.
2. In Group I-1, Condition 2, Group I-2 and *ambulatory care facilities*, special purpose horizontal sliding, accordion or folding doors installed in accordance with Section 1010.3.3 and protected in accordance with Section 716.

710.4 Continuity.

Smoke partitions shall extend from the top of the foundation or floor below to the underside of the floor or roof sheathing, deck or slab above or to the underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke.

Exception: In Group I-2, a lay-in ceiling system shall be considered capable of limiting the transfer of smoke where the ceiling tiles that weigh a minimum of one pound per square foot and where the HVAC system is fully ducted in accordance with Section 603 of the International Mechanical Code.

710.4.1 Smoke partition walls enclosing elevator lobbies.

Smoke partition walls used to enclose elevator lobbies in accordance with Section 3006.3 shall form an enclosure that terminates at a fire barrier having a fire-resistance rating of not less than 1 hour, another smoke partition or an outside wall.

710.5 Openings.

Openings in smoke partitions shall comply with Sections 710.5.1 ~~and 710.5.2~~ through 710.5.3.

710.5.2.1 Louvers.

Doors in *smoke partitions* shall not include louvers.

Exception: Where permitted in accordance with Section 407.3.1.1.

710.5.3 Pass-through openings in Group I-2, Condition 2.

Where pass-through openings are provided in smoke partitions in Group I-2, Condition 2 occupancies, such openings shall comply with the following:

1. The smoke compartment in which the pass-through openings occur does not contain a patient care suite or sleeping room.
2. Pass-through openings are installed in a wall, door or vision panel that is not required to have a fire-resistance rating.
3. The top of the pass-through opening is located a maximum of 48 inches (1219 mm) above the floor.
4. The aggregate area of all such pass-through openings within a single room shall not exceed 80 square inches (0.05 m²).

712.1.3.2 Automatic shutters.

Protection of the vertical opening by listed or approved shutters at every penetrated floor shall be permitted in accordance with ~~this section. The shutters shall be of noncombustible construction and have a fire-resistance rating of not less than 1.5 hours. The shutter shall be so constructed as to close immediately upon the actuation of a smoke detector installed in accordance with Section 907.3.1 and shall completely shut off the well opening. Escalators shall cease operation when the shutter begins to close. The shutter shall operate at a speed of not more than 30 feet per minute (152.4 mm/s) and shall be equipped with a sensitive leading edge to arrest its progress where in contact with any obstacle, and to continue its progress on release therefrom.~~ all of the following:

1. The shutter shall be installed in accordance with the manufacturer's instructions.
2. The shutter shall be of noncombustible construction and have a fire-resistance rating of not less than 1.5 hours.
3. The shutter shall close immediately upon the actuation of a smoke detector installed in accordance with Section 907.3.
4. The shutter shall completely close off the vertical opening.
5. Escalators shall cease operation when the shutter begins to close.
6. The shutter shall operate at a speed of not more than 30 feet per minute (152.4 mm/s).
7. The shutter shall be equipped with a sensing leading edge to stop closure where in contact with any obstacle, and continue to close when the obstacle is cleared.

712.1.5.2 Joints in or between nonfire-resistance-rated floor assemblies.

Joints in or between floor assemblies without a required fire-resistance rating shall be permitted where they comply with one of the following:

1. The joint shall be concealed within the cavity of a wall.
2. The joint shall be located above a ceiling.
3. The joint shall be sealed, treated or covered with an approved material or system to resist the free passage of flame and the products of combustion.

Exception: Joints meeting one of the exceptions specified in Section ~~715.1~~ 715.3.

712.1.7 Atriums.

~~In other than Group H occupancies, atriums complying with Section 404 shall be permitted.~~ Atriums complying with Section 404 that connect two or more stories in Group I-2 or occupancies or three or more stories in other occupancies shall be permitted.

Exceptions:

1. Atriums shall not be permitted within Group H occupancies.
2. Balconies or stories within Groups A-1, A-4 and A-5 and mezzanines that comply with Section 505 shall not be considered a story as it applies to this section.

SECTION 713 SHAFT ENCLOSURES

713.4 Fire-resistance rating.

Shaft enclosures shall have a *fire-resistance rating* of not less than 2 hours where connecting four *stories* or more, and not less than 1 hour where connecting less than four *stories*. The number of *stories* connected by the *shaft enclosure* shall include any *basements* but not any *mezzanines*. Shaft enclosures shall have a *fire-resistance rating* not less than the floor assembly penetrated, but need not exceed 2 hours. Shaft enclosures shall meet the requirements of Section 703.2.1.1.

Exception: Shafts permitted to have their having a reduced fire-resistance rating reduced in high-rise buildings in accordance with Section 403.2.1.2.

713.8 Penetrations.

Penetrations in a *shaft enclosure* shall be protected in accordance with Section 714 as required for *fire barriers* or horizontal assemblies or both. Structural elements, such as beams or joists, where protected in accordance with Section 714 shall be permitted to penetrate a *shaft enclosure*.

713.11 Enclosure at the bottom.

Shafts that do not extend to the bottom of the building or structure shall comply with one of the following:

1. Be enclosed at the lowest level with construction of the same *fire-resistance rating* as the *lowest floor* through which the *shaft* passes, but not less than the rating required for the *shaft enclosure*.
2. Terminate in a room having a use related to the purpose of the *shaft*. The room shall be separated from the remainder of the building by *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. The *fire-resistance rating* and opening protectives shall be not less than the protection required for the *shaft enclosure*.
3. Be protected by *approved fire dampers* installed in accordance with their listing at the *lowest floor* level within the *shaft enclosure*.

Exceptions:

1. The fire-resistance-rated room separation is not required, provided that the only openings in or penetrations of the *shaft enclosure* to the interior of the building occur at the bottom. The bottom of the *shaft* shall be closed off around the penetrating items with materials permitted by Section 718.3.1 for ~~draftstopping~~ draftstops, or the room shall be provided with an *approved automatic sprinkler system*.

2. A *shaft enclosure* containing a waste or linen chute shall not be used for any other purpose and shall discharge in a room protected in accordance with Section 713.13.4.
3. The fire-resistance-rated room separation and the protection at the bottom of the *shaft* are not required provided that there are no combustibles in the *shaft* and there are no openings or other penetrations through the *shaft enclosure* to the interior of the building.

713.12. Enclosure at top-

~~A shaft enclosure that does not extend to the underside of the roof sheathing, deck or slab of the building shall be enclosed at the top with construction of the same fire-resistance rating as the topmost floor penetrated by the shaft, but not less than the fire-resistance rating required for the shaft enclosure.~~ The top of shaft enclosures shall comply with one of the following:

1. Extend to the underside of the roof sheathing, deck or slab of the building, and the roof assembly shall comply with the requirements for the type of construction as specified in Table 601.
2. Terminate below the roof assembly and be enclosed at the top with construction of the same fire-resistance rating as the topmost floor penetrated by the shaft, but not less than the fire-resistance rating required for the shaft enclosure.
3. Extend past the roof assembly and comply with the requirements of Section 1511.

713.12.1 Penthouse mechanical rooms.

A fire/smoke damper shall not be required at the penetration of the rooftop structure where shaft enclosures extend up through the roof assembly into a rooftop structure conforming to Section 1511. Ductwork in the shaft shall be connected directly to HVAC equipment.

713.13. Waste, recycling and linen chutes and incinerator rooms.

Waste, recycling and linen chutes shall comply with the provisions of NFPA 82, Chapter 6 and shall meet the requirements of Sections 712 and 713.13.1 through 713.13.6. Incinerator rooms shall meet the provisions of Sections 713.13.4 and 713.13.5.

Exception: Chutes serving and contained within a single *dwelling unit*.

713.13.1. Waste, recycling and linen chute enclosures.

A *shaft enclosure* containing a recycling, waste or linen chute shall not be used for any other purpose and shall be enclosed in accordance with Section 713.4. A *shaft enclosure* shall be permitted to contain recycling and waste chutes. Openings into the *shaft*, from access rooms and discharge rooms, shall be protected in accordance with this section and Section 716. Openings into chutes shall not be located in *corridors*. Doors into chutes shall be *self-closing*. Discharge doors shall be self- or automatic-closing upon the actuation of a smoke detector in accordance with Section 716.2.6.6, except that heat-activated closing devices shall be permitted between the *shaft* and the discharge room.

713.13.3. Chute access rooms.

Access openings for waste, recycling or linen chutes shall be located in rooms or compartments enclosed by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. Openings into the access rooms shall be protected by opening protectives having a *fire protection rating* of not less than $\frac{3}{4}$ hour. Doors shall be self- or automatic-closing upon the detection of smoke in accordance with Section 716.2.6.6. The room or compartment shall be configured to allow the access door to the room or compartment to close and latch with the access panel to the ~~refuse or laundry~~ chute in any position.

713.13.4 Chute discharge room.

Waste, recycling or linen chutes shall discharge into an enclosed room separated by *fire barriers* with a *fire-resistance rating* not less than the required fire rating of the *shaft enclosure* and constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. Openings into the discharge room from the remainder of the building shall be protected by opening protectives having a *fire protection rating* ~~equal to~~ based on the protection required for fire rating of the *shaft enclosure* in accordance with Tables 716.1(2) and 716.1(3). Doors shall be self- or automatic-closing upon the detection of smoke in accordance with Section 716.2.6.6. Waste chutes shall not terminate in an incinerator room. Waste and linen rooms that are not provided with chutes need only comply with Table 509.1.

713.14 Elevator, dumbwaiter and other hoistways.

~~Elevator, dumbwaiter and other hoistway enclosures shall be constructed in accordance with Sections 712 and~~ A hoistway for elevators, dumbwaiters and other vertical devices shall comply with Section 712. Where the hoistway is required to be enclosed, it shall be constructed as a shaft enclosure in accordance with Section 713, and Chapter 30.

SECTION 714 PENETRATIONS

714.3 ~~Installation details.~~ Sleeves.

Where sleeves are used, they shall be securely fastened to the assembly penetrated and installed in accordance with manufacturer's installation instructions. Where listed systems are used, the sleeve shall be installed in accordance with the listing criteria for the system. The space between the item contained in the sleeve and the sleeve itself and any space between the sleeve and the assembly penetrated shall be protected in accordance with this section. Insulation and coverings on or in the penetrating item shall not penetrate the assembly unless the specific material used has been tested as part of the assembly in accordance with this section.

714.5.1 Through penetrations.

Through penetrations of horizontal assemblies shall comply with Section 714.5.1.1 or 714.5.1.2.

Exceptions:

1. Penetrations by steel, ferrous or copper conduits, pipes, tubes or vents or concrete or masonry items through a single fire-resistance-rated floor assembly where the *annular space* is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste when subjected to ASTM E119 or UL 263 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the *fire-resistance rating* of the construction penetrated. Penetrating items with a maximum 6-inch (152 mm) nominal diameter shall not be limited to the penetration of a single fire-resistance-rated floor assembly, provided that the aggregate area of the openings through the assembly does not exceed 144 square inches (92 900 mm²) in any 100 square feet (9.3 m²) of floor area.
2. Penetrations in a single concrete floor by steel, ferrous or copper conduits, pipes, tubes or vents with a maximum 6-inch (152 mm) nominal diameter, provided that the concrete, grout or *mortar* is installed the full thickness of the floor or the thickness required to maintain the *fire-resistance rating*. The penetrating items shall not be limited to the penetration of a single concrete floor, provided that the area of the opening through each floor does not exceed 144 square inches (92 900 mm²).
3. Penetrations by *listed* electrical boxes of any material, provided that such boxes have been tested for use in fire-resistance-rated assemblies and installed in accordance with the instructions included in the listing.
4. Penetrations of concrete floors or ramps within parking garages or structures constructed in accordance with Sections 406.5 and 406.6 where the areas above and below the penetrations are parking areas.

714.5.2 Membrane penetrations.

Penetrations of membranes that are part of a *horizontal assembly* shall comply with Section 714.5.1.1 or 714.5.1.2. Where floor/ceiling assemblies are required to have a *fire-resistance rating*, recessed fixtures shall be installed such that the required *fire resistance* will not be reduced.

Exceptions:

1. *Membrane penetrations* by steel, ferrous or copper conduits, pipes, tubes or vents, or concrete or masonry items where the *annular space* is protected either in accordance with Section 714.5.1 or to prevent the free passage of flame and the products of combustion. The aggregate area of the openings through the membrane shall not exceed 100 square inches (64 500 mm²) in any 100 square feet (9.3 m²) of ceiling area in assemblies tested without penetrations.
2. Ceiling *membrane penetrations* of maximum 2-hour *horizontal assemblies* by steel electrical boxes that do not exceed 16 square inches (10 323 mm²) in area, provided that the aggregate area of such penetrations does not exceed 100 square inches (64 500 mm²) in any 100 square feet (9.29 m²) of

ceiling area, and the *annular space* between the ceiling membrane and the box does not exceed $\frac{1}{8}$ inch (3.2 mm).

3. *Membrane penetrations* by electrical boxes of any size or type, that have been *listed* as part of an opening protective material system for use in *horizontal assemblies* and are installed in accordance with the instructions included in the listing.
4. *Membrane penetrations* by *listed* electrical boxes of any material, provided that such 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 ceiling membrane and the box shall not exceed $\frac{1}{8}$ inch (3.2 mm) unless *listed* otherwise.
5. The *annular space* created by the penetration of a fire sprinkler, provided that it is covered by a metal escutcheon plate.
6. Noncombustible items that are cast into concrete *building elements* and that do not penetrate both top and bottom surfaces of the element.
7. The ceiling membrane of ~~1-and~~ a maximum 2-hour fire-resistance-rated *horizontal assembly* is permitted to be interrupted with the double wood top plate of a wall assembly that is sheathed with Type X *gypsum wallboard*, provided that all penetrating items through the double top plates are protected in accordance with Section 714.5.1.1 or 714.5.1.2 and the ceiling membrane is tight to the top plates.
8. *Ceiling membrane penetrations* by listed luminaires (light fixtures) or by luminaires protected with *listed* materials, which have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing.

SECTION 715

~~FIRE-RESISTANT JOINT SYSTEMS~~ JOINTS AND VOIDS

715.1 General.

~~Joints installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved fire-resistant joint system designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the wall, floor or roof in or between which the system is installed. Fire-resistant joint systems shall be tested in accordance with Section 715.3.~~

Exception: ~~Fire-resistant joint systems shall not be required for joints in all of the following locations:~~

- ~~1. Floors within a single dwelling unit.~~
- ~~2. Floors where the joint is protected by a shaft enclosure in accordance with Section 713.~~
- ~~3. Floors within atriums where the space adjacent to the atrium is included in the volume of the atrium for smoke control purposes.~~
- ~~4. Floors within malls.~~
- ~~5. Floors and ramps within parking garages or structures constructed in accordance with Sections 406.5 and 406.6.~~
- ~~6. Mezzanine floors.~~
- ~~7. Walls that are permitted to have unprotected openings.~~
- ~~8. Roofs where openings are permitted.~~
- ~~9. Control joints not exceeding a maximum width of 0.625 inch (15.9 mm) and tested in accordance with ASTM E119 or UL-263.~~
- ~~10. The intersection of exterior curtain wall assemblies and the roof slab or roof deck.~~

The provisions of this section shall govern the materials and methods of construction used to protect joints and voids in or between horizontal and vertical assemblies.

715.1.1 Curtain wall assembly.

~~The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be protected in accordance with Section 715.4.~~

715.2 Installation.

~~A fire-resistant joint system shall be securely installed in accordance with the manufacturer's installation instructions and the listing criteria in or on the joint for its entire length so as not to impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases.~~ Systems or materials protecting joints and voids shall be installed in accordance with Sections 715.2.1 and 715.2.2.

715.2.1 List system installation.

Listed fire-resistant joint systems, perimeter fire containment systems and continuity head-of-wall systems shall be securely installed in accordance with the manufacturer's installation instructions and the listing criteria in or on the joint or void for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases.

715.2.2 Approved materials installation.

Approved materials protecting voids shall be securely installed in accordance with the manufacturer's installation instructions in or on the void for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and to resist the passage of fire and hot gases.

715.3 Fire-resistance-rated assembly intersections.

Joints installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved fire-resistant joint system designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the wall, floor or roof in or between which the system is installed.

Exception: Fire-resistant joint systems shall not be required for joints in the following locations:

1. Floors within a single dwelling unit.
2. Floors where the joint is protected by a shaft enclosure in accordance with Section 713.
3. Floors within atriums where the space adjacent to the atrium is included in the volume of the atrium for smoke control purposes.
4. Floors within malls.
5. Floors and ramps within parking garages or structures constructed in accordance with Sections 406.5 and 406.6.
6. Mezzanine floors.
7. Walls that are permitted to have unprotected openings.
8. Roofs where openings are permitted.
9. Control joints not exceeding a maximum width of 0.625 inch (15.9 mm) and tested in accordance with ASTM E119 or UL 263.
10. The intersection of exterior curtain wall assemblies and the roof slab or roof deck.

715.4 Exterior curtain wall/fire-resistance-rated floor intersections.

~~Where fire-resistance-rated floor or floor/ceiling assemblies are required, voids~~ Voids created at the intersection of ~~the~~ exterior curtain wall assemblies and ~~such floor~~ fire-resistance-rated floor or floor/ceiling assemblies shall be ~~sealed~~ protected with an *approved* perimeter fire containment system to prevent the interior spread of fire. Such systems shall ~~be~~ securely installed and tested in accordance with ASTM E2307 to provide an *F rating* for a time period not less than the *fire-resistance rating* of the floor or floor/ceiling assembly. ~~Height and fire-resistance requirements for curtain wall spandrels shall comply with Section 705.8.5.~~

Exception: ~~Voids created at the intersection of the exterior curtain wall assemblies and such floor assemblies where the vision glass extends to the finished floor level shall be permitted to be sealed with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature~~

~~fire conditions under a minimum positive pressure differential of 0.01 inch (0.254 mm) of water column (2.5 Pa) for the time period not less than the fire-resistance rating of the floor assembly.~~

Exception: An approved perimeter fire containment system shall not be required for voids in the following locations:

1. Floors within a single dwelling unit.
2. Floors and ramps within parking garages or structures constructed in accordance with Sections 406.5 and 406.6.
3. Mezzanine floors.

715.4.1 Fire test criteria.

Perimeter fire containment systems shall be tested in accordance with the requirements of ASTM E2307.

Exception: Voids created at the intersection of the exterior curtain wall assemblies and floor assemblies where the vision glass extends to the finished floor level shall be permitted to be protected with an approved material to prevent the interior spread of fire. Such material shall be securely installed and capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 time-temperature fire conditions under a minimum positive pressure differential of 0.01 inch of water (2.49 Pa) for the time period not less than the fire-resistance rating of the floor assembly.

~~715.4.1~~ 715.5 **Exterior curtain wall/nonfire-resistance-rated floor assembly intersections.**

Voids created at the intersection of exterior curtain wall assemblies and nonfire-resistance-rated floor or floor/ceiling assemblies shall be ~~sealed~~ filled with an *approved* material or system to retard the interior spread of fire and hot gases ~~between stories.~~

Exception: Approved material or system to retard the interior spread of fire and hot gases shall not be required for voids in the following locations:

1. Floors within a single dwelling unit.
2. Floors and ramps within parking garages or structures constructed in accordance with Sections 406.5 and 406.6.
3. Mezzanine floors.

715.6 Fire barrier/nonfire-resistance-rated roof assembly intersections.

Voids created at the intersection of a fire barrier and the underside of a nonfire-resistance-rated roof sheathing, slab or deck above shall be filled by an approved material or system to retard the passage of fire and hot gases, or shall be protected by an approved continuity head-of-wall system tested in accordance with ASTM E2837 to provide an F rating/T rating for a time period not less than the required fire-resistance rating of the fire barrier in which it is installed.

~~715.4.2~~ 715.7 **Exterior ~~curtain~~ wall/vertical fire barrier intersections.**

Voids created at the intersection of nonfire-resistance-rated exterior ~~curtain~~ wall assemblies and vertical fire barriers shall be filled. ~~An~~ with an approved material or system ~~shall be used to fill the void and shall be securely installed in or on the intersection for its entire length so as not to dislodge, loosen or otherwise impair its ability to accommodate expected building movements and~~ to retard the ~~passage~~ interior spread of fire and hot gases.

~~715.5~~ 715.8 **~~Spandrel wall.~~ Curtain wall spandrels.**

Height and *fire-resistance* requirements for curtain wall spandrels shall comply with Section 705.8.5. Where Section 705.8.5 does not require ~~a~~ fire-resistance-rated ~~spandrel wall~~ curtain wall spandrels, the requirements of Sections 715.4 and 715.5 shall still apply to the intersection between the ~~spandrel~~ curtain wall spandrels and the floor.

~~715.8~~ 715.9 **~~Fire-resistant joint systems~~ Joints and voids in smoke barriers.**

Fire-resistant joint systems protecting joints in smoke barriers, and ~~joints~~ perimeter fire containment systems protecting voids at the intersection of a horizontal *smoke barrier* and an exterior curtain wall, shall be tested in accordance with the requirements of UL 2079 for air leakage. The L rating of the joint system shall not exceed 5 cubic feet per minute per linear foot (0.00775 m³/s m) of joint at 0.30 inch (74.7 Pa) of water for both the ambient temperature and elevated temperature tests.

SECTION 716
OPENING PROTECTIVES

TABLE 716.1(2) OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

Portions of table not shown remain unchanged.

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE ^a	FIRE-RATED GLAZING MARKING G DOOR VISION PANEL ^{b,c}	MINIMUM SIDELIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING SIDE-LIGHT/TRANSOM PANEL		
					Fire protection	Fire resistance	Fire protection	Fire resistance	
Fire walls and fire barriers having a required fire-resistance rating greater than 1 hour	4	3	See Note a	D-H-W-240	Not Permitted	4	Not Permitted	W-240	
	3	3^d	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180	
Double fire walls constructed in accordance with NFPA 221	Single-wall assembly rating (hours)^e	Each wall of the double-wall assembly (hours)^f	=						
	4	3	3	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	3	2	1½	100 sq. in.	≤ 100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	2	Not Permitted	W-120
	2	1	1	100 sq. in.	≤ 100 sq. in. = D-H-60 > 100 sq. in. = D-H-W-60	Not Permitted	1	Not Permitted	W-60
Enclosures for shafts, interior exit	2	1½	100 sq. in.^b	≤100 sq. in. = D-H-90	Not Permitted	2	Not Permitted	W-120	

stairways and interior exit ramps.				> 100 sq. in.= D-H-T-W-90				
Horizontal exits in fire walls ^g	4	3	100 sq. in.	≤100 sq. in. = D-H-180 > 100 sq. in.=D-H-W-240	Not Permitted	4	Not Permitted	W-240
	3	3^d	100 sq. in.	≤100 sq. in. = D-H-180 > 100 sq. in.=D-H-W-180	Not Permitted	3	Not Permitted	W-180
					Fire protection			
Other fire barriers	1	3/4	Maximum size tested	D-H	3/4^h		D-H^h	
Other fire partitions	1	3/4ⁱ	Maximum size tested	D-H-45	3/4		D-H-45	
	0.5	¹ / ₃	Maximum size tested	D-H-20	¹ / ₃		D-H-20	
Exterior walls	2	1 1/2	Maximum size tested	D-H 90 or D-H-W-90	1 1/2^h	2	D-H-OH-90^h	W-120
					Fire protection			
	1	3/4	Maximum size tested	D-H-45	3/4^h		D-H-45^h	

For SI: 1 square inch = 645.2 mm.

- a. ~~Two doors, each with a fire protection rating of 1 1/2 hours, installed on opposite sides of the same opening in a fire wall, shall be deemed equivalent in fire protection rating to one 3-hour fire door.~~ Fire-resistance-rated glazing tested to ASTM E119 in accordance with Section 716.1.2.3 shall be permitted, in the maximum size tested.
- b. ~~Fire-resistance-rated glazing tested to ASTM E119 in accordance with Section 716.1.2.3 shall be permitted, in the maximum size tested.~~ Under the column heading "Fire-rated glazing marking door vision panel," W refers to the fire-resistance rating of the glazing, not the frame.
- c. ~~Under the column heading "Fire-rated glazing marking door vision panel," W refers to the fire-resistance rating of the glazing, not the frame.~~ See Section 716.1.2.2.1 and Table 716.1(1) for additional permitted markings.
- d. ~~See Section 716.2.5.1.2.1.~~ Two doors, each with a fire protection rating of 1 1/2 hours, installed on opposite sides of the same opening in a fire wall, shall be deemed equivalent in fire protection rating to one 3-hour fire door.
- e. ~~See Section 716.1.2.2.1 and Table 716.1(1) for additional permitted markings.~~ As required in Section 706.4.
- f. As allowed in Section 4.6 of NFPA 221.
- g. See Section 716.2.5.1.2.
- h. Fire-protection-rated glazing is not permitted for fire barriers required by Section 1207 of the International Fire Code to enclose energy storage systems. Fire-resistance-rated glazing assemblies tested to ASTM E119 or UL 263, as specified in Section 716.1.2.3, shall be permitted.
- i. Two doors, each with a fire rating of 20 minutes, installed on opposite sides of the same opening in a fire partition, shall be deemed equivalent in fire protection rating to one 45-minute fire door.

TABLE 716.1(3) FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS

Portions of table not shown remain unchanged.

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (hours)	FIRE-RATED GLAZING MARKING
<u>Atrium separations (Section 707.3.6).</u> <u>Incidental use areas (Section 707.3.7).^c</u> <u>Mixed occupancy separations (Section 707.3.9)</u>	<u>1</u>	<u>3/4</u>	<u>OH-45 or W-60</u>

Footnotes a. and b. remain unchanged and are omitted for clarity.

1. Fire-protection-rated glazing is not permitted for fire barriers required by Section 1207 of the International Fire Code to enclose energy storage systems. Fire-resistance-rated glazing assemblies tested to ASTM E119 or UL 263, as specified in Section 716.1.2.3, shall be permitted.

716.1.1 Alternative methods for determining fire protection ratings.

The application of any of the alternative methods specified in this section shall be based on the fire exposure and acceptance criteria specified in NFPA 252, NFPA 257, UL 9, UL 10B or UL 10C. The required ~~fire-resistance~~ fire protection rating of an opening protective shall be permitted to be established by any of the following methods or procedures:

1. Designs documented in *approved* sources.
- ~~2. Calculations performed in an approved manner.~~

2. Engineering analysis based on a comparison of opening protective designs having *fire protection ratings* as determined by the test procedures set forth in NFPA 252, NFPA 257, UL 9, UL 10B or UL 10C.

3. Alternative protection methods as allowed by Section 104.2.3.

716.2.2.1.1 Smoke and draft control.

The air leakage rate of the door assembly shall not exceed 3.0 cubic feet per minute per square foot ($0.01524 \text{ m}^3/\text{s} \times \text{m}^2$) of door opening at 0.10 inch (24.9 Pa) of water for both the ambient temperature and elevated temperature tests. Louvers shall be prohibited. Terminated stops shall be prohibited on doors required by Section 405.4.3 to comply with Section 716.2.2.1 and prohibited on doors required by Item 3 of Section 3006.3, or Section 3007.6.3 or 3008.6.3 to comply with this section.

Exception: Elevator hoistway door openings protected in accordance with Section 3006.3.

716.2.5.4.1 Energy storage system separation.

Fire-protection-rated glazing shall not be permitted in fire door frames with transom lights and sidelights in fire barriers required by Section 1207 of the International Fire Code to enclose energy storage systems.

716.2.6 Fire door hardware and ~~losures~~ closers.

Fire door hardware and ~~losures~~ closers shall be installed on fire door assemblies in accordance with the requirements of this section.

716.2.6.1 Door closing.

Fire doors shall be latching and self- or automatic-closing in accordance with this section.

Exceptions:

1. Fire doors located in common walls separating dwelling units or sleeping units in Group R-1 shall be permitted without automatic- or self-closing devices.
2. The elevator car doors and the associated elevator hoistway ~~enclosure~~ doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I emergency recall operation.
3. Fire doors required solely for compliance with ICC 500 shall not be required to be self-closing or automatic-closing.

716.3.2.1.1.1 Energy storage system separation.

Fire-protection-rated glazing is not permitted for use in fire window assemblies in fire barriers required by Section 1207 of the International Fire Code to enclose energy storage systems.

716.4 Fire protective curtain assembly.

Approved fire protective curtain assemblies shall be constructed of any materials or assembly of component materials tested without hose stream in accordance with UL 10D, and shall comply with the Sections 716.4.1 through 716.4.3

716.4.1 Label.

Fire protective curtain assemblies used as opening protectives in fire-rated walls and smoke partitions shall be labeled in accordance with Section 716.2.9.

716.4.2 Smoke and draft control.

Fire protective curtain assemblies used to protect openings where smoke and draft control assemblies are required shall comply with Section 716.2.1.4.

716.4.3 Installation.

Fire protective curtain assemblies shall be installed in accordance with NFPA 80.

SECTION 717

DUCTS AND AIR TRANSFER OPENINGS

717.2 Installation.

Fire dampers, smoke dampers, combination fire/smoke dampers and ceiling radiation dampers located within air distribution and smoke control systems shall be installed in accordance with ~~the requirements of this section,~~ the manufacturer's instructions, ~~and the dampers' listing~~ and Sections 717.2.1 through 717.2.4.

717.2.3 Static dampers.

Fire dampers and ceiling radiation dampers that are listed for use in static systems shall only be installed in heating, ventilation and air-conditioning systems that are automatically shut down in the event of a fire.

717.2.4 Mechanical, electrical and plumbing controls.

Mechanical, electrical and plumbing controls shall not be installed in air duct systems.

Exception: Controls where the wiring is directly associated with the air distribution system. The wiring shall comply with the requirements of Section 602 of the International Mechanical Code and be as short as practicable.

717.2.4.1 Controls not permitted to be installed through dampers.

Mechanical, electrical and plumbing controls shall not be installed through fire dampers, smoke dampers, combination fire/smoke dampers or ceiling radiation dampers unless otherwise permitted by the manufacturer and the listing.

717.3.1 Damper testing.

Dampers shall be listed and labeled in accordance with the standards in this section.

1. *Fire dampers* shall comply with the requirements of UL 555. ~~Only fire dampers labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire.~~
2. *Smoke dampers* shall comply with the requirements of UL 555S.
3. *Combination fire/smoke dampers* shall comply with the requirements of both UL 555 and UL 555S.
4. *Ceiling radiation dampers* shall comply with the requirements of UL 555C or shall be tested as part of a fire-resistance-rated floor/ceiling or roof/ceiling assembly in accordance with ASTM E119 or UL 263. ~~Only ceiling radiation dampers labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire.~~
5. *Corridor dampers* shall comply with requirements of both UL 555 and UL 555S. *Corridor dampers* shall demonstrate acceptable closure performance when subjected to 150 feet per minute (0.76 mps) velocity across the face of the *damper* during the UL 555 fire exposure test.

717.3.3.1 Fire damper actuation ~~device.~~

~~The fire damper actuation device~~ Primary heat responsive devices used to actuate *fire dampers* shall meet one of the following requirements:

1. The operating temperature shall be approximately 50°F (10°C) above the normal temperature within the duct system, but not less than 160°F (71°C).
2. The operating temperature shall be not more than 350°F (177°C) where located in a smoke control system complying with Section 909.

717.3.3.3 Combination fire/smoke damper actuation.

Combination fire/smoke damper actuation shall be in accordance with Sections 717.3.3.1 and 717.3.3.2. Combination fire/smoke dampers installed in smoke control system shaft penetrations shall not be activated by local area smoke detection unless it is secondary to the smoke ~~management~~ control system controls.

717.4 Access and identification.

~~Fire and smoke dampers shall be provided with an approved means of access that is large enough to permit inspection and maintenance of the damper and its operating parts. The access shall not affect the integrity of fire-resistance-rated assemblies. The access openings shall not reduce the fire-resistance rating of the assembly. Access points shall be~~

~~permanently identified on the exterior by a label having letters not less than 1/2 inch (12.7 mm) in height reading: FIRE/SMOKE DAMPER, SMOKE DAMPER or FIRE DAMPER. Access doors in ducts shall be tight fitting and suitable for the required duct construction.~~ Access and identification of fire and smoke dampers shall comply with Sections 717.4.1 through 717.4.2.

717.4.1 Access.

Fire and smoke dampers shall be provided with an approved means of access that is large enough to permit inspection and maintenance of the damper and its operating parts. Dampers equipped with fusible links, internal operators, or both shall be provided with an access door that is not less than 12 inches (305 mm) square or provided with a removable duct section.

717.4.1.1 Access openings.

The access shall not affect the integrity of fire-resistance-rated assemblies. The access openings shall not reduce the fire-resistance rating of the assembly. Access doors in ducts shall be tight fitting and suitable for the required duct construction.

717.4.1.2 Restricted access.

Where space constraints or physical barriers restrict access to a damper for periodic inspection and testing, the damper shall be a single- or multi-blade type damper and shall comply with the remote inspection requirements of NFPA 80 or NFPA 105.

717.4.2 Identification.

Access points shall be permanently identified on the exterior by a label having letters not less than 1/2 inch (12.7 mm) in height reading: "FIRE/SMOKE DAMPER," "SMOKE DAMPER" or "FIRE DAMPER."

717.5.2 Fire barriers.

Ducts and air transfer openings of *fire barriers* shall be protected with *listed fire dampers* installed in accordance with their listing. Ducts and air transfer openings shall not penetrate enclosures for *interior exit stairways* and *ramps* and *exit passageways*, except as permitted by Sections 1023.5 and 1024.6, respectively.

Exceptions: *Fire dampers* are not required at penetrations of *fire barriers* where any of the following apply:

1. Penetrations are tested in accordance with ASTM E119 or UL 263 as part of the fire-resistance-rated assembly.
2. Ducts are used as part of an *approved* smoke control system in accordance with Section 909 and where the use of a *fire damper* would interfere with the operation of a smoke control system.
3. Such walls are penetrated by fully ducted HVAC systems, have a required *fire-resistance rating* of 1 hour or less, are in areas of other than Group H and are in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2. For the purposes of this exception, a fully ducted HVAC system shall be a duct system for conveying supply, return or exhaust air as part of the structure's HVAC system. Such a duct system shall be constructed of sheet steel not less than No. 26 gage thickness and shall be continuous from the air- handling appliance or equipment to the air outlet and inlet terminals. Nonmetal flexible air connectors shall be permitted in the following locations:
 - 3.1. At the duct connection to the air handling unit or equipment located within the mechanical room in accordance with Section 603.9 of the International Mechanical Code.
 - 3.2. From an overhead metal duct to a ceiling diffuser within the same room in accordance with Section 603.6.2 of the International Mechanical Code.

717.5.3 Shaft enclosures.

Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with *listed* fire and *smoke dampers* installed in accordance with their listing.

Exceptions:

1. *Fire dampers* are not required at penetrations of *shafts* where any of the following criteria are met:
 - 1.1. Steel exhaust subducts having a wall thickness of not less than 0.0187 inch (0.4712 mm) are extended not less than 22 inches (559 mm) vertically in exhaust *shafts*, ~~provided that there is a continuous~~

~~airflow upward to the outside, and an exhaust fan is installed at the upper terminus of the shaft that is powered continuously in accordance with Section 909.11, so as to maintain a continuous upward airflow to the outdoors.~~

- 1.2. Penetrations are tested in accordance with ASTM E119 or UL 263 as part of the fire-resistance-rated assembly.
 - 1.3. Ducts are used as part of an *approved* smoke control system designed and installed in accordance with Section 909 and where the *fire damper* will interfere with the operation of the smoke control system.
 - 1.4. The penetrations are in parking garage exhaust or supply *shafts* that are separated from other building *shafts* by not less than 2-hour fire-resistance-rated construction.
2. In Group B and R occupancies equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, *smoke dampers* are not required at penetrations of *shafts* where all of the following criteria are met:
- 2.1. Kitchen, clothes dryer, bathroom and toilet room exhaust openings are installed with steel exhaust subducts, having a ~~minimum~~ wall thickness of not less than 0.0187 inch (0.4712 mm) ~~(No. 26 gage)~~.
 - 2.2. The subducts extend not less than 22 inches (559 mm) vertically.
 - 2.3. An exhaust fan is installed at the upper terminus of the *shaft* that is powered continuously in accordance with the provisions of Section 909.11, so as to maintain a continuous upward airflow to the ~~outside~~ outdoors.
3. *Smoke dampers* are not required at penetration of exhaust or supply *shafts* in parking garages that are separated from other building *shafts* by not less than 2-hour fire-resistance-rated construction.
4. *Smoke dampers* are not required at penetrations of *shafts* where ducts are used as part of an *approved* mechanical smoke control system designed in accordance with Section 909 and where the *smoke damper* will interfere with the operation of the smoke control system.
5. *Fire dampers* and *combination fire/smoke dampers* are not required in kitchen and clothes dryer exhaust systems where *dampers* are prohibited by the *International Mechanical Code*.

717.5.3.1 Continuous upward airflow.

Fire dampers and smoke dampers shall not be installed in shafts that are required to maintain a continuous upward airflow path where closure of the damper would result in the loss of the airflow.

717.6.1 Through penetrations.

~~In occupancies other than Groups I-2 and I-3, a~~ A duct constructed of approved materials in accordance with the International Mechanical Code that penetrates a fire-resistance-rated floor/ceiling assembly that connects not more than two stories is permitted without shaft enclosure protection, provided that a listed fire damper is installed at the floor line or the duct is protected in accordance with Section 714.5. For air transfer openings, see Section 712.1.9.

Exception: In occupancies other than Group I-2 and I-3, a ~~A~~ duct is permitted to penetrate three floors or less without a *fire damper* at each floor, provided that such duct meets all of the following requirements:

1. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel having a minimum wall thickness of 0.0187 inches (0.4712 mm) (No. 26 gage).
2. The duct shall open into only one *dwelling unit sleeping unit* and the duct system shall be continuous from the unit to the exterior of the building.
3. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (0.065 m²) in any 100 square feet (9.3 m²) of floor area.
4. The *annular space* around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 or UL 263 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the *fire-resistance rating* of the construction penetrated.

5. Grille openings located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with a *listed ceiling radiation damper* installed in accordance with Section 717.6.2.1.

717.6.2.1.1 Dynamic systems.

Only ceiling radiation dampers labeled for use in dynamic systems shall be installed in heating, ventilation and air-conditioning systems designed to operate with fans on during a fire.

717.6.2.1.2 Static systems.

Static ceiling radiation dampers shall be provided with systems that are not designed to operate during a fire.

Exceptions:

1. Where a static ceiling radiation damper is installed at the opening of a duct, a smoke detector shall be installed inside the duct or outside the duct with sampling tubes protruding into the duct. The detector or tubes in the duct shall be within 5 feet (1524 mm) of the damper. Air outlets and inlets shall not be located between the detector or tubes and the damper. The detector shall be listed for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, dampers shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.
2. Where a static ceiling radiation damper is installed in a ceiling, the ceiling radiation damper shall be permitted to be controlled by a smoke detection system installed in the same room or area as the ceiling radiation damper.
3. A static ceiling radiation damper shall be permitted to be installed in a room where an occupant sensor is provided within the room that will shut down the system.

SECTION 718 CONCEALED SPACES

718.1 General.

Fireblocking and ~~draftstopping~~ draftstops shall be installed in combustible concealed locations in accordance with this section. Fireblocking shall comply with Section 718.2. ~~Draftstopping~~ draftstops in floor/ceiling spaces and attic spaces shall comply with Sections 718.3 and 718.4, respectively. The permitted use of combustible materials in concealed spaces of buildings of Type I or II construction shall be limited to the applications indicated in Section 718.5.

718.2.1 Fireblocking materials.

Fireblocking shall consist of the following materials:

1. Two-inch (51 mm) nominal lumber.
2. Two thicknesses of 1-inch (25 mm) nominal lumber with broken lap joints.
3. One thickness of 0.719-inch (18.3 mm) wood structural panels with joints backed by 0.719-inch (18.3 mm) wood structural panels.
4. One thickness of 0.75-inch (19.1 mm) particleboard with joints backed by 0.75-inch (19 mm) particleboard.
5. One-half-inch (12.7 mm) gypsum board.
6. One-fourth-inch (6.4 mm) cement-based millboard.
7. Batts or blankets of mineral wool, mineral fiber or other approved materials installed in such a manner as to be securely retained in place.
8. Cellulose insulation ~~installed as tested for the specific application.~~ 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.
9. Mass timber complying with Section 2304.11.
10. One thickness of 19/32-inch (15.1 mm) fire-retardant-treated wood structural panel complying with IBC Section 2303.2.

718.3 **Draftstopping** Draftstops in floors.

Draftstopping Draftstops shall be installed to subdivide floor/ceiling assemblies where required by Section ~~708.4.2~~ 708.4.3. In other than Group R occupancies, **draftstopping** draftstops shall be installed to subdivide combustible floor/ceiling assemblies so that horizontal floor areas do not exceed 1,000 square feet (93 m²).

Exception: Buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

718.3.1 **Draftstopping** Draftstops materials.

Draftstopping Draftstops materials shall be not less than 1/2-inch (12.7 mm) *gypsum board*, 3/8-inch (9.5 mm) *wood structural panel*, 3/8-inch (9.5 mm) *particleboard*, 1-inch (25-mm) nominal lumber, cement *fiberboard*, batts or blankets of mineral wool or glass fiber, or other *approved* materials adequately supported. The integrity of *draftstops* shall be maintained.

718.4 **Draftstopping** Draftstops in attics.

Draftstopping Draftstops shall be installed to subdivide *attic* spaces where required by Section 708.4.2. In other than Group R, **draftstopping** draftstops shall be installed to subdivide combustible *attic* spaces and combustible concealed roof spaces such that any horizontal area does not exceed 3,000 square feet (279 m²). *Ventilation* of concealed roof spaces shall be maintained in accordance with Section 1202.2.1.

Exception: Buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

718.4.1 **Draftstopping** Draftstops materials.

Materials utilized for **draftstopping** draftstops of *attic* spaces shall comply with Section 718.3.1.

TABLE 721.1(2)

RATED FIRE-RESISTANCE PERIODS FOR VARIOUS WALLS AND PARTITIONS ^{a,o,p}

Portions of table not shown remain unchanged.

MATERIAL	ITEM NUMBER	CONSTRUCTION	MINIMUM FINISHED THICKNESS FACE-TO-FACE ^b (inches)			
			4 hours	3 hours	2 hours	1 hour
10. Hollow (studless) gypsum wallboard partition	10-1.1	One full-length layer of 5/8" Type X gypsum wallboard ^e attached to both sides of wood or metal top and bottom runners laminated to each side of 1" × 6" full-length gypsum coreboard ribs spaced 2" on center with approved laminating compound. Ribs centered at vertical joints of face plies and joints staggered 24" in opposing faces. Ribs may <u>shall be permitted to</u> be recessed 6" from the top and bottom.	—	—	—	2 1/4 ^d
	10-1.2	1" regular gypsum V-edge full-length backing board attached to both sides of wood or metal top and bottom runners with nails or 1 5/8" drywall screws at 24" on center. Minimum width of runners 1 5/8". Face layer of 1/2" regular full-length gypsum wallboard laminated to outer faces of backing board with approved laminating compound.	—	—	4 5/8 ^d	—

15. Exterior or interior walls	15-1.8 ^{l,m}	2" × 6" wood studs 16" on center. The exterior face has a layer of ⁵ / ₈ " Type X gypsum sheathing placed vertically with 6d box nails 8" on center at joints and 12" on center elsewhere. An approved building paper is next applied, followed by 1 ¹ / ₂ " by No. 17 gage self-furred exterior lath attached with 8d by 2 ¹ / ₂ "-long galvanized roofing nails spaced 6" on center along each stud. Cement plaster consisting of a ¹ / ₂ " scratch coat and a ¹ / ₂ " brown coat is then applied. The plaster may <u>shall be permitted to</u> be placed by machine. The scratch coat is mixed in the proportion of 1:4 by weight, plastic cement to sand. The brown coat is mixed in the proportion of 1:5 by weight, plastic cement to sand. The interior is covered with ³ / ₈ " gypsum lath with 1" hexagonal mesh of No. 20-gage woven wire lath furred out ⁵ / ₁₆ " and 1" perlite or vermiculite gypsum plaster. Lath nailed with 1 ¹ / ₈ " by No. 13 gage by ¹⁹ / ₆₄ " head plasterboard glued nails spaced 5" on center. Mesh attached by 1 ³ / ₄ " by No.12 gage by ³ / ₈ " head nails with ³ / ₈ " furrings, spaced 8" on center. The plaster mix shall not exceed 100 pounds of gypsum to 2 ¹ / ₂ cubic feet of aggregate.	-	-	8 ³ / ₈	-
16. Exterior walls rated for fire resistance from the inside only in accordance with Section 705.5	16-1.4 ^q	<u>2" × 6" wood studs at 24" centers with double top plates, single bottom plates; interior side covered with 5/8" Type X gypsum wallboard, 4' wide, applied vertically with all joints over framing or blocking and fastened with 2 1/4" Type S drywall screws spaced 7" on center. Joints covered with tape and joint compound. Exterior covered with 15/32" wood structural panels, applied vertically with edges over framing or blocking and fastened with 6d common nails (bright) at 12" on center in the field and 6" on center on panel edges. R-19 fiberglass insulation installed in stud cavity. Rating established from the gypsum-covered side only.</u>	=	=	=	<u>6¹⁹/₃₂</u>

For SI: 1 inch = 25.4 mm, 1 square inch = 645.2 mm², 1 cubic foot = 0.0283 m³.

Footnotes a.-p. remain unchanged and are omitted for clarity.

q. ~~The design stress of studs shall be equal to not more than 100 percent of the allowable F_ve calculated in accordance with Section 2306.~~ The studs in this assembly can be designed without fire-related capacity reductions.

TABLE 721.1(3) MINIMUM PROTECTION FOR FLOOR AND ROOF SYSTEM ^{a,q}

Portions of table not shown remain unchanged.

FLOOR OR ROOF CONSTRUCTION	ITEM NUMBER	CEILING CONSTRUCTION	THICKNESS OF FLOOR OR ROOF SLAB (inches)				MINIMUM THICKNESS OF CEILING (inches)			
			4	3	2	1	4	3	2	1
			hours	hours	hours	hour	hours	hours	hours	hour
5. Reinforced concrete	5-1.1	Slab with suspended ceiling of vermiculite gypsum plaster over metal lath attached to 3/4" cold-rolled channels spaced 12" on center. Ceiling located 6" minimum below joists.	3	2	-	-	1	3/4	-	-
	5-2.1	3/8" <u>5/8"</u> Type X gypsum wallboardc attached to 0.018 inch (No.25 carbon sheet steel gage) by 7/8" deep by 25/8" hat-shaped galvanized steel channels with 1"-long No. 6 screws. The channels are spaced 24" on center, span 35" and are supported along their length at 35" intervals by 0.033" (No. 21 galvanized sheet gage) galvanized steel flat strap hangers	-	-	2 1/2	-	-	-	5/8	-

		having formed edges that engage the lips of the channel. The strap hangers are attached to the side of the concrete joists with 5/32" by 11/4"-long power-driven fasteners. The wallboard is installed with the long dimension perpendicular to the channels. End joints occur on channels and supplementary channels are installed parallel to the main channels, 12" each side, at end joint occurrences. The finished ceiling is located approximately 12" below the soffit of the floor slab.								
<u>31. Wood I-joist (minimum I-joist depth 9 1/4" with a minimum flange thickness of 1 1/2" and a minimum flange cross-sectional area of 2.25 square inches; minimum web thickness of 3/8") @ 24" o.c.</u>	<u>=</u> <u>31-1.1</u>	<u>Two layers of 1/2" Type C gypsum wallboard applied with the long dimension perpendicular to the I-joists with end joints staggered. The base layer is fastened with 1" Type S drywall screws spaced 12" o.c. and the face layer is fastened with 15/8" Type S drywall screws spaced 12" o.c. in the field and 8" o.c. on the edges. Face layer edge joints shall not occur on the same I-joist as base layer end joints and edge joints shall be offset 24" from base layer joints. End joints centered on bottom flange of I-joists and offset a minimum of 48" from those of base layer. Face layer to also be attached to base layer with 1 1/2" Type G drywall screws spaced 8" o.c. with a 4" stagger, placed 6" from face layer end joints. Face layer wallboard joints taped and covered with joint compound. Screw heads covered with joint compound.</u>	<u>=</u>	<u>=</u>	<u>Varies</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>	<u>=</u>

Footnotes a.-q. remain unchanged and are omitted for clarity.

SECTION 722 CALCULATED FIRE RESISTANCE

722.1 General.

The provisions of this section contain procedures by which the *fire resistance* of specific materials or combinations of materials is established by calculations. These procedures apply only to the information contained in this section and shall not be otherwise used. The calculated *fire resistance* of ~~concrete, concrete masonry and clay masonry assemblies shall be permitted in accordance with ACI 216.1/TMS 0216. The calculated fire resistance of steel assemblies shall be permitted in accordance with Chapter 5 of ASCE 29. The calculated fire resistance of exposed wood members and wood decking shall~~

~~be permitted in accordance with Chapter 16 of ANSI/AWC National Design Specification for Wood Construction (NDS).~~
specific materials or combinations of materials shall be established by one of the following:

1. Concrete, concrete masonry and clay masonry assemblies shall be permitted in accordance with ACI 216.1/TMS 0216.
2. Precast and precast, prestressed concrete assemblies shall be permitted in accordance with PCI 124.
3. Steel assemblies shall be permitted in accordance with Chapter 5 of ASCE 29.
4. Exposed wood members and wood decking shall be permitted in accordance with Chapter 16 of ANSI/AWC NDS.

722.2.1.4 Concrete ~~W~~walls with gypsum wallboard or plaster finishes.

The fire-resistance rating of cast-in-place or precast concrete walls with finishes of gypsum wallboard or plaster applied to one or both sides shall be permitted to be calculated in accordance with the provisions of this section.

TABLE 722.2.1.4(1)

MULTIPLYING FACTOR FOR FINISHES ON NONFIRE-EXPOSED SIDE OF CONCRETE OR CONCRETE MASONRY WALL

Portions of table not shown remain unchanged.

Footnotes a. remains unchanged and is omitted for clarity.

TABLE 722.2.1.4(2)

TIME ASSIGNED TO FINISH MATERIALS ON FIRE-EXPOSED SIDE OF WALL^a

Portions of table not shown remain unchanged.

FINISH DESCRIPTION	TIME ^b (minutes)
Portland cement-sand plaster applied directly to concrete masonry	See Note a <u>c</u>

For SI: 1 inch = 25.4 mm.

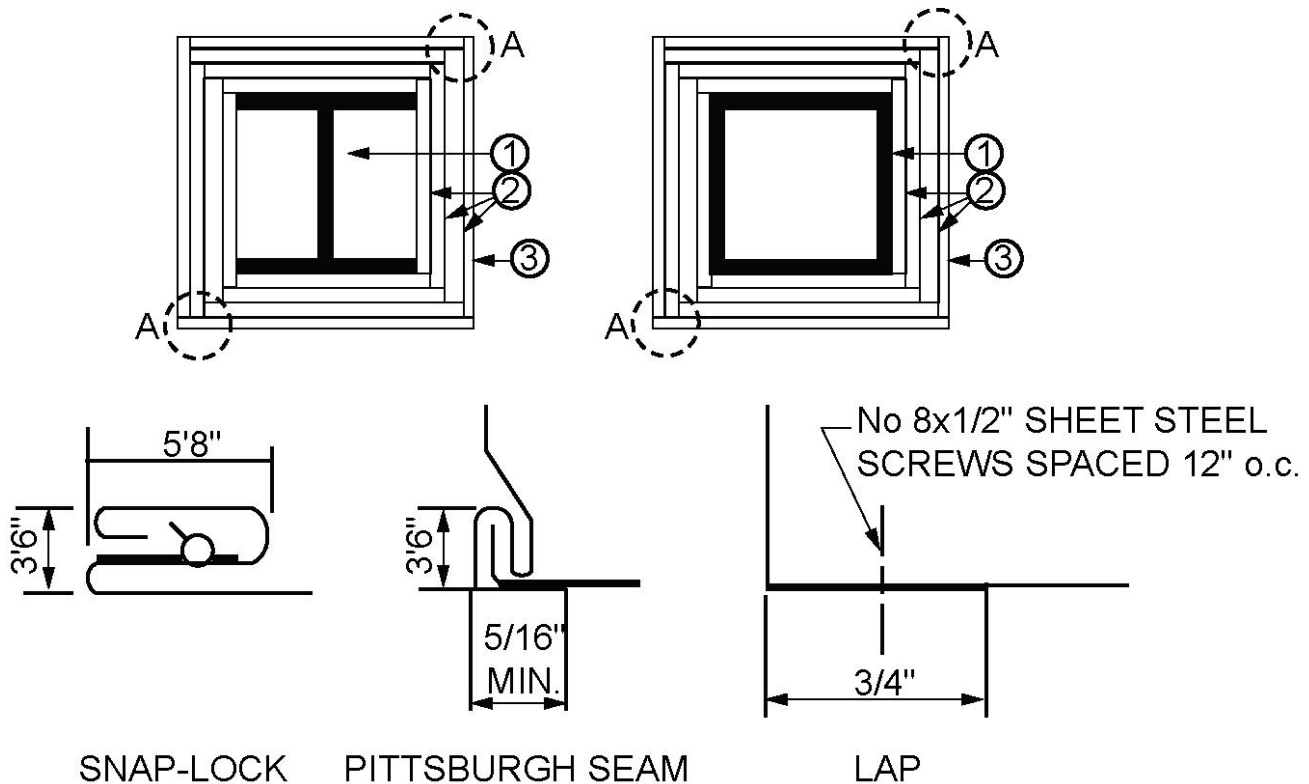
- ~~The actual thickness of Portland cement sand plaster, provided that it is 5/8 inch or less in thickness, shall be permitted to be included in determining the equivalent thickness of the masonry for use in Table 722.3.2. This table applies to precast concrete, cast-in-place concrete, or masonry walls.~~
- The time assigned is not a finish rating.
- The actual thickness of Portland cement-sand plaster, provided that it is 5/8 inch or less in thickness, shall be permitted to be included in determining the equivalent thickness of the masonry for use in Table 722.3.2.

722.2.2.1.4 Flat plate concrete slabs with uniformly spaced hollow voids.

Table 722.2.2.1 shall be used to determine the 1- and 2-hour fire-resistance ratings for flat plate concrete slabs with uniformly spaced hollow voids. The equivalent thickness of the slab shall be determined by dividing the net concrete volume of the slab by the floor area. The net concrete volume of the slab shall be equal to the volume of concrete of a solid slab minus the average concrete volume displaced by the hollow voids.

722.2.3.1 Slab cover.

The minimum thickness of concrete cover to the positive moment reinforcement shall comply with Table 722.2.3(1) for reinforced concrete and Table 722.2.3(2) for prestressed concrete. These tables are applicable for solid or hollow-core one-way or two-way slabs with flat undersurfaces. These tables are applicable to slabs that are either cast in place or precast. For precast prestressed concrete not covered elsewhere, the procedures contained in ~~PCI-MNL~~ PCI 124 shall be acceptable.



CORNER JOINT DETAILS (A)

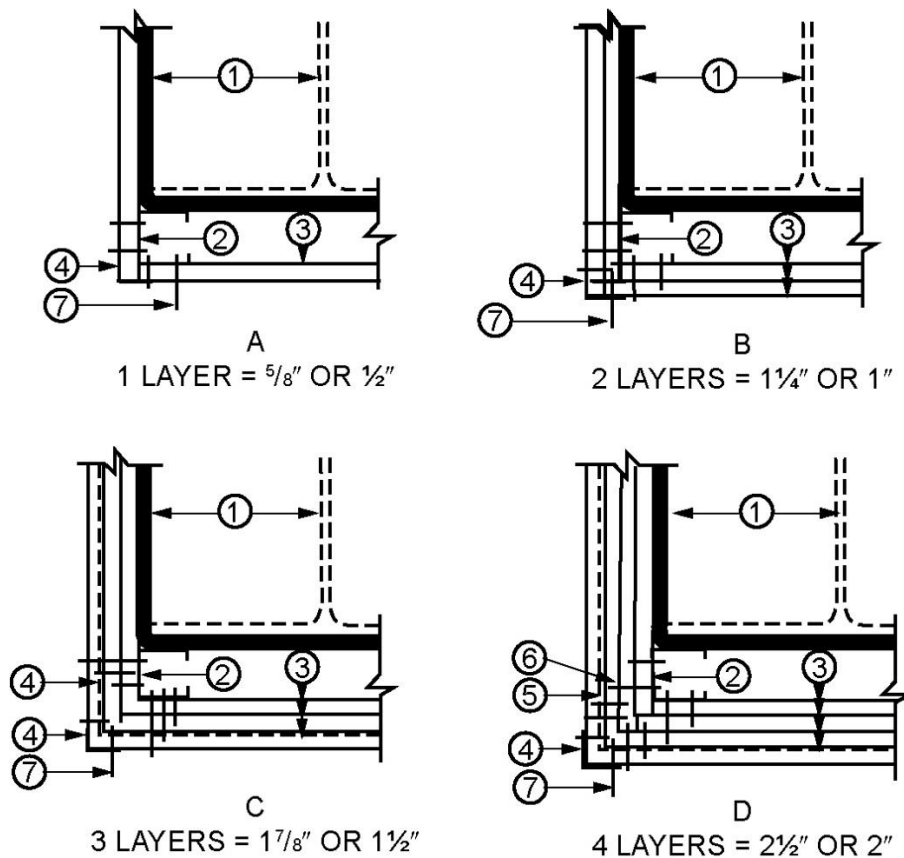
For SI: 1 inch = 25.4 mm, 1 foot = 305 mm.

Footnotes 1 and 3 remain unchanged and are omitted for clarity.

2. Type X ~~gypsum board or~~ gypsum panel products in accordance with ASTM C1177, C1178, C1278, C1396 or C1658. The total thickness of ~~gypsum board or~~ gypsum panel products calculated as h in Section 722.5.1.2 shall be applied vertically to an individual column using one of the following methods:
 1. As a single layer without horizontal joints.
 2. As multiple layers with horizontal joints not permitted in any layer.
 3. As multiple layers with horizontal joints staggered not less than 12 inches vertically between layers and not less than 8 feet vertically in any single layer. The total required thickness of ~~gypsum board or~~ gypsum panel products shall be determined on the basis of the specified fire-resistance rating and the weight-to-heated-perimeter ratio (W/D) of the column. For fire-resistance ratings of 2 hours or less, one of the required layers of ~~gypsum board or~~ gypsum panel product ~~may~~ shall be permitted to be applied to the exterior of the sheet steel column covers with 1-inch long Type S screws spaced 1 inch from the wallboard edge and 8 inches on center. For such installations, 0.0149-inch minimum thickness galvanized steel corner beads with 1 / -inch legs shall be attached to the wallboard with Type S screws spaced 12 inches on center.

FIGURE 722.5.1(2)

GYPSUM-PROTECTED STRUCTURAL STEEL COLUMNS WITH SHEET STEEL COLUMN COVERS



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm.

Footnotes 1, 2, 5, and 6 remain unchanged and are omitted for clarity.

3. Type X ~~gypsum board or~~ gypsum panel products in accordance with ASTM C1177, C1178, C1278, C1396 or C1658. The total thickness of ~~gypsum board or~~ gypsum panel products calculated as h in Section 722.5.1.2 shall be applied vertically to an individual column using one of the following methods:
 1. As a single layer without horizontal joints.
 2. As multiple layers with horizontal joints not permitted in any layer.
 3. As multiple layers with horizontal joints staggered not less than 12 inches vertically between layers and not less than 8 feet vertically in any single layer. The total required thickness of ~~gypsum board or~~ gypsum panel products shall be determined on the basis of the specified fire- resistance rating and the weight-to-heated-perimeter ratio (W/D) of the column.
4. Galvanized 0.0149-inch minimum thickness steel corner beads with $1\frac{1}{2}$ - inch legs attached to the ~~gypsum board or~~ gypsum panel products with 1-inch-long Type S screws spaced 12 inches on center.
7. Type S screws, 1 inch long, shall be used for attaching the first layer of ~~gypsum board or~~ gypsum panel product to the steel studs and the third layer to the sheet metal angles at 24 inches on center. Type S screws $1\frac{3}{4}$ inches long shall be used for attaching the second layer of gypsum board or gypsum panel product to the steel studs and the fourth layer to the sheet metal angles at 12 inches on center. Type S screws $2\frac{1}{4}$ inches long shall be used for attaching the third layer of ~~gypsum board or~~ gypsum panel product to the steel studs at 12 inches on center.

FIGURE 722.5.1(3)

GYPSUM-PROTECTED STRUCTURAL STEEL COLUMNS WITH STEEL STUD/SCREW ATTACHMENT SYSTEM

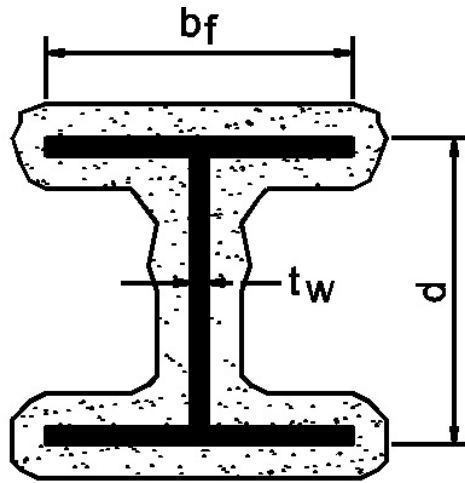


FIGURE 722.5.1(5)

WIDE FLANGE STRUCTURAL STEEL COLUMNS WITH SPRAYED FIRE-~~RESISTIVE~~ ~~RESISTANT~~ MATERIALS

722.5.1.1 General.

These procedures establish a basis for determining the fire resistance of column assemblies as a function of the thickness of fire-resistant material and, the weight, W , and heated perimeter, D , of structural steel columns. As used in these sections, W is the average weight of a structural steel column in pounds per linear foot. The heated perimeter, D , is the inside perimeter of the fire-~~resistant~~-~~resistive~~ material in inches as illustrated in Figure 722.5.1(1).

722.5.1.2.1 Attachment.

The ~~gypsum board or~~ gypsum panel products shall be supported as illustrated in either Figure 722.5.1(2) for fire-resistance ratings of 4 hours or less, or Figure 722.5.1(3) for fire-resistance ratings of 3 hours or less.

722.5.1.3 Sprayed fire-~~resistive~~ ~~resistant~~ materials (SFRM).

The fire resistance of wide-flange structural steel columns protected with sprayed fire-~~resistive~~ ~~resistant~~ materials (SFRM), as illustrated in Figure 722.5.1(5), shall be permitted to be determined from the following expression:

$$R = [C_1(W / D) + C_2] h$$

(Equation 7-13)

where:

R = Fire resistance (minutes).

h = Thickness of SFRM ~~sprayed fire-resistant material~~ (inches).

D = Heated perimeter of the structural steel column (inches).

C_1 and C_2 = Material-dependent constants.

W = Weight of structural steel columns (pounds per linear foot).

The fire resistance of structural steel columns protected with intumescent or mastic fire-~~resistive~~ ~~fire-resistant~~ coatings shall be determined on the basis of fire-resistance tests in accordance with Section 703.2.

722.5.1.3.2 Identification.

Sprayed fire-~~resistive~~ ~~resistant~~ materials shall be identified by density and thickness required for a given fire-resistance rating.

722.5.2.2 Sprayed fire-~~resistive~~ ~~fire-resistant~~ materials (SFRM).

The provisions in this section apply to structural steel beams and girders protected with sprayed fire-~~resistive~~ ~~fire-resistant~~ materials (SFRM). Larger or smaller beam and girder shapes shall be permitted to be substituted for beams specified in approved unrestrained or restrained fire-resistance-rated assemblies, provided that the thickness of the ~~fire-resistant~~ SFRM material is adjusted in accordance with the following expression:

$$h_2 = h_1 [W_1 / D_1 + 0.60] / [(W_2 / D_2) + 0.60]$$

(Equation 7-17)

where:

h = Thickness of ~~sprayed fire-resistant~~ SFRM material in inches.

W = Weight of the structural steel beam or girder in pounds per linear foot.

D = Heated perimeter of the structural steel beam in inches.

Subscript 1 refers to the beam and ~~fire-resistant material~~ SFRM thickness in the *approved* assembly.

Subscript 2 refers to the substitute beam or girder and the required thickness of **SFRM fire-resistant material**.

The fire resistance of structural steel beams and girders protected with intumescent ~~or mastic fire-resistive~~ fire-resistant ~~fire-resistant~~ coatings ~~materials~~ shall be determined on the basis of fire-resistance tests in accordance with Section 703.2.

722.5.2.3 Structural steel trusses.

The *fire resistance* of structural steel trusses protected with fire-resistant materials sprayed to each of the individual truss elements shall be permitted to be determined in accordance with this section. The thickness of the fire-resistant material shall be determined in accordance with Section 722.5.1.3. The weight-to-heated-perimeter ratio (W/D) of truss elements that can be simultaneously exposed to fire on all sides shall be determined on the same basis as columns, as specified in Section 722.5.1.1. The weight-to-heated-perimeter ratio (W/D) of truss elements that directly support floor or roof assembly shall be determined on the same basis as beams and girders, as specified in Section 722.5.2.1.

The *fire resistance* of structural steel trusses protected with intumescent fire-resistive materials ~~or mastic fire-resistant coatings~~ shall be determined on the basis of *fire resistance* tests in accordance with Section 703.2.

TABLE 722.6.2(1)

TIME ASSIGNED TO WALLBOARD MEMBRANES ON WOOD FRAME ^{a, b, c, d}

Portions of table not shown remain unchanged.

Footnotes a.-e. remain unchanged and are omitted for clarity.

TABLE 722.6.2(3)

MEMBRANE^a ON EXTERIOR FACE OF WOOD STUD WALLS

SHEATHING	PAPER	EXTERIOR FINISH
5/8-inch T & G lumber 5/16-inch exterior glue <i>wood structural panel</i> 1/2-inch gypsum wallboard 5/8-inch gypsum wallboard 1/2-inch fiberboard	Sheathing paper	Lumber siding Wood shingles and shakes 1/4-inch <i>fiber-cement</i> lap, panel or shingle siding 1/4-inch <i>wood structural panels</i>-exterior type 1/4-inch hardboard Insulated Vinyl Siding Metal siding Polypropylene Siding Stucco on metal lath Masonry veneer Vinyl siding
None	—	3/8-inch exterior-grade <i>wood structural panels</i>

For SI: 1 inch = 25.4 mm.

a. Any combination of sheathing, paper and exterior finish is permitted.

722.6.2.4 Floors and roofs.

In the case of a floor or roof, the standard test provides only for testing for fire exposure from below. Except as noted in Section ~~703.3~~ [703.2.3](#), Item 5, floor or roof assemblies of wood framing shall have an upper membrane consisting of a subfloor and finished floor conforming to Table 722.6.2(4) or any other membrane that has a contribution to fire resistance of not less than 15 minutes in Table 722.6.2(1).

TABLE 722.6.2(5)

TIME ASSIGNED FOR ADDITIONAL PROTECTION

DESCRIPTION OF ADDITIONAL PROTECTION	FIRE RESISTANCE (minutes)
Add to the fire-resistance rating of wood stud walls if the spaces between the studs are completely filled with glass fiber <u>or</u> mineral wool batts weighing not less than 2 pounds per cubic foot (0.6 pound per square foot of wall surface) or rockwool or slag material wool batts weighing not less than 3.3 pounds per cubic foot (1 pound per square foot of wall surface) , or cellulose insulation having a nominal density not less than 2.6 pounds per cubic foot.	15

For SI: 1 pound/cubic foot = 16.0185 kg/m³.

722.7 Fire-resistance rating for mass timber.

The required fire resistance of mass timber elements in Section 602.4 shall be determined in accordance with Section 703.2. The fire-resistance rating of building elements shall be as required in Tables 601 and 705.5 and as specified elsewhere in this code. The fire-resistance rating of the mass timber elements shall consist of the fire resistance of the unprotected element added to the protection time of the noncombustible protection.

722.7.1 Minimum required protection.

Where required by Sections 602.4.1 through 602.4.3, noncombustible protection shall be provided for mass timber building elements in accordance with Table 722.7.1(1). The rating, in minutes, contributed by the noncombustible protection of mass timber building elements, components or assemblies, shall be established in accordance with Section 703.6. The protection contributions indicated in Table 722.7.1(2) shall be deemed to comply with this requirement where installed and fastened in accordance with Section 722.7.2.

TABLE 722.7.1(1) PROTECTION REQUIRED FROM NONCOMBUSTIBLE COVERING MATERIAL

<u>REQUIRED FIRE-RESISTANCE RATING OF BUILDING ELEMENT PER TABLE 601 AND TABLE 705.5 (hours)</u>	<u>MINIMUM PROTECTION REQUIRED FROM NONCOMBUSTIBLE PROTECTION (minutes)</u>
<u>1</u>	<u>40</u>
<u>2</u>	<u>80</u>
<u>3 or more</u>	<u>120</u>

TABLE 722.7.1(2) PROTECTION PROVIDED BY NONCOMBUSTIBLE COVERING MATERIAL

<u>NONCOMBUSTIBLE PROTECTION</u>	<u>PROTECTION CONTRIBUTION (minutes)</u>
<u>1/2-inch Type X gypsum board</u>	<u>25</u>
<u>5/8-inch Type X gypsum board</u>	<u>40</u>

722.7.2 Installation of gypsum board *noncombustible protection*.

Gypsum board complying with Table 722.7.1(2) shall be installed in accordance with this section.

722.7.2.1 Interior surfaces.

Layers of Type X gypsum board serving as noncombustible protection for interior surfaces of wall and ceiling assemblies determined in accordance with Table 722.7.1(1) shall be installed in accordance with the following:

1. Each layer shall be attached with Type S drywall screws of sufficient length to penetrate the mass timber at least 1 inch (25 mm) when driven flush with the paper surface of the gypsum board.

Exception: The third layer, where determined necessary by Section 722.7, shall be permitted to be attached with 1-inch (25 mm) No. 6 Type S drywall screws to furring channels in accordance with AISI S220.

2. Screws for attaching the base layer shall be 12 inches (305 mm) on center in both directions.
3. Screws for each layer after the base layer shall be 12 inches (305 mm) on center in both directions and offset from the screws of the previous layers by 4 inches (102 mm) in both directions.
4. All panel edges of any layer shall be offset 18 inches (457 mm) from those of the previous layer.
5. All panel edges shall be attached with screws sized and offset as in Items 1 through 4 and placed at least 1 inch (25 mm) but not more than 2 inches (51 mm) from the panel edge.
6. All panels installed at wall-to-ceiling intersections shall be installed such that ceiling panels are installed first and the wall panels are installed after the ceiling panel has been installed and is fitted tight to the ceiling panel. Where multiple layers are required, each layer shall repeat this process.
7. All panels installed at a wall-to-wall intersection shall be installed such that the panels covering an exterior wall or a wall with a greater fire-resistance rating shall be installed first and the panels covering the other wall shall be fitted tight to the panel covering the first wall. Where multiple layers are required, each layer shall repeat this process.
8. Panel edges of the face layer shall be taped and finished with joint compound. Fastener heads shall be covered with joint compound.
9. Panel edges protecting mass timber elements adjacent to unprotected mass timber elements in accordance with Section 602.4.2.2 shall be covered with 1¹/₄-inch (32 mm) metal corner bead and finished with joint compound.

722.7.2.2 Exterior surfaces.

Layers of Type X gypsum board serving as noncombustible protection for the outside of the exterior mass timber walls determined in accordance with Table 722.7.1(1) shall be fastened 12 inches (305 mm) on center each way and 6 inches (152 mm) on center at all joints or ends. All panel edges shall be attached with fasteners located at least 1 inch (25 mm) but not more than 2 inches (51 mm) from the panel edge. Fasteners shall comply with one of the following:

1. Galvanized nails of minimum 12 gage with a ⁷/₁₆-inch (11 mm) head of sufficient length to penetrate the mass timber a minimum of 1 inch (25 mm).
2. Screws that comply with ASTM C1002 (Type S, W or G) of sufficient length to penetrate the mass timber a minimum of 1 inch (25 mm).

Chapter 8 Interior Finishes

SECTION 802

GENERAL

802.7 Foam plastics.

Foam plastics shall not be used as interior finish except as provided in Section 803.4. Foam plastics shall not be used as interior trim except as provided in Section ~~806.5~~ [806.6.1](#) or 2604.2. This section shall apply both to exposed foam plastics and to foam plastics used in conjunction with a textile or vinyl facing or cover.

SECTION 803

WALL AND CEILING FINISHES

803.10 Site-fabricated stretch systems.

Where used as interior wall or interior ceiling finish materials, *site-fabricated stretch systems* containing all three components described in the definition in Chapter 2 shall be tested in the manner intended for use, and shall comply with the requirements of Section 803.1.1 or [with the requirements of Class A in accordance with](#) Section 803.1.2. If the materials are tested in accordance with ASTM E84 or UL 723, specimen preparation and mounting shall be in accordance with ASTM E2573.

803.13 Interior finish requirements based on occupancy.

Interior wall and ceiling finish shall have a [classification such that the flame spread index and smoke developed index values are not higher than those corresponding to the classification](#) ~~flame-spread-index not greater than that~~ specified in Table 803.13 for the group and location designated. *Interior wall and ceiling finish* materials tested in accordance with NFPA 286 and meeting the acceptance criteria of Section 803.1.1.1, shall be permitted to be used where a Class A classification in accordance with ASTM E84 or UL 723 is required.

SECTION 806

DECORATIVE MATERIALS AND TRIM

~~[F] 806.5 Foam plastic.~~

~~Foam plastic used as trim in any occupancy shall comply with Section 2604.2.~~

[F] ~~806.6~~ [806.5](#) Pyroxylin plastic.

Imitation leather or other material consisting of or coated with a pyroxylin or similarly hazardous base shall not be used in Group A occupancies.

[F] ~~806.7~~ [806.6](#) Interior trim.

Material, other than foam plastic used as interior *trim*, shall have a minimum Class C *flame spread* and *smoke- developed index* when tested in accordance with ASTM E84 or UL 723, as described in Section 803.1.2. Combustible *trim*, excluding handrails and guardrails, shall not exceed 10 percent of the specific wall or ceiling area to which it is attached.

[806.6.1 Foam plastic.](#)

[Foam plastic used as interior trim in any occupancy shall comply with Section 2604.2.](#)

[F] ~~806.8~~ [806.7](#) Interior floor-wall base.

Interior floor-wall base that is 6 inches (152 mm) or less in height shall be tested in accordance with Section 804.2 and shall be not less than Class II. Where a Class I floor finish is required, the floor-wall base shall be Class I.

Exception: Interior *trim* materials that comply with Section 806.7.

[\[F\] 806.9 Combustible lockers.](#)

[Where lockers constructed of combustible materials are used, the lockers shall be considered to be interior finish and shall comply with Section 803.](#)

Exception: Lockers constructed entirely of wood and noncombustible materials shall be permitted to be used wherever interior finish materials are required to meet a Class C classification in accordance with Section 803.1.2.

Chapter 9 Fire Protection and Life Safety Systems

SECTION 901

GENERAL

901.1 Scope.

The provisions of this chapter shall specify where fire protection and *life safety systems* are required and shall apply to the design, installation and operation of *fire protection and life safety systems*.

901.2 Fire protection systems.

Fire protection and life safety systems shall be installed, repaired, operated and maintained in accordance with this code and the *International Fire Code*.

Any *fire protection or life safety system* for which an exception or reduction to the provisions of this code has been granted shall be considered to be a required system.

Exception: Any *fire protection or life safety system* or portion thereof 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.

901.4 Threads.

Threads provided for fire department connections to automatic sprinkler systems, *standpipes*, yard hydrants or any other fire hose connection shall be compatible with the connections used by the local fire department.

~~[F] 901.6.2 Integrated testing.~~

~~Where two or more fire protection or life safety systems are interconnected, the intended response of subordinate fire protection and life safety systems shall be verified when required testing of the initiating system is conducted. In addition, integrated testing shall be performed in accordance with Sections 901.6.2.1 and 901.6.2.2.~~

~~[F] 901.6.2.1 High-rise buildings.~~

~~For high-rise buildings, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.~~

~~[F] 901.6.2.2 Smoke control systems.~~

~~Where a fire alarm system is integrated with a smoke control system as outlined in Section 909, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.~~

901.6.2 ~~901.6.3~~ Fire alarm systems.

Fire alarm systems required by the provisions of Section 907.2 of this code and Sections 907.2 and 907.9 of the *International Fire Code* shall be monitored by an *approved* supervising station in accordance with Section 907.6.6 of this code.

Exceptions:

1. Single- and multiple-station smoke alarms required by Section 907.2.11.
2. Smoke detectors in Group I-3 occupancies.

3. Supervisory service is not required for *automatic sprinkler systems* in one- and two-family dwellings.

901.6.3 901.6.4 Group H.

Supervision and monitoring of emergency alarm, detection and automatic fire-extinguishing systems in Group H occupancies shall be in accordance with the *International Fire Code*.

SECTION 903 AUTOMATIC SPRINKLER SYSTEMS

[F] 903.1.1 Alternative protection.

Alternative automatic fire-extinguishing systems complying with Section 904 shall be permitted instead of automatic sprinkler [system](#) protection where recognized by the applicable standard and approved by the fire code official.

903.2 Where required.

Approved *automatic sprinkler systems* in new buildings and structures shall be provided in the locations described in Sections 903.2.1 through 903.2.12.

Exception: Spaces or areas in telecommunications *buildings* used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries [not required to have an automatic sprinkler system by Section 1207 of the International Fire Code for energy storage systems](#) and standby engines, provided that those spaces or areas are equipped throughout with an *automatic smoke detection system* in accordance with Section 907.2 and are separated from the remainder of the *building* by not less than 1-hour fire barriers constructed in accordance with Section 707 or not less than 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

[903.2.2 Group B.](#)

[An automatic sprinkler system shall be provided for Group B occupancies as required in Sections 903.2.2.1 and 903.2.2.2.](#)

[F] [903.2.2.1](#) ~~903.2.2~~ Ambulatory care facilities.

An *automatic sprinkler system* shall be installed throughout the entire floor containing an *ambulatory care facility* where either of the following conditions exist at any time:

1. Four or more care recipients are *incapable of self-preservation*.
2. One or more care recipients that are *incapable of self-preservation* are located at other than the *level of exit discharge* serving such a facility.

In buildings where ambulatory care is provided on levels other than the level of exit discharge, an automatic sprinkler system shall be installed throughout the entire floor as well as all floors below where such care is provided, and all floors between the level of ambulatory care and the nearest level of exit discharge, the level of exit discharge, and all floors below the level of exit discharge.

Exception: Floors classified as an open parking garage are not required to be sprinklered.

[903.2.2.2 Laboratories involving testing, research and development.](#)

[An automatic sprinkler system shall be installed throughout the fire areas utilized for the research and development or testing of lithium-ion or lithium metal batteries.](#)

[F] 903.2.4 Group F-1.

An automatic sprinkler system shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 fire area exceeds 12,000 square feet (1115 m).
2. A Group F-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group F-1 fire areas on all floors, including any *mezzanines*, exceeds 24,000 square feet (2230 m).

~~4. A Group F-1 occupancy used for the manufacture of upholstered furniture or mattresses exceeds 2,500 square feet (232 m2).~~

4. A Group F-1 occupancy used to manufacture lithium-ion or lithium metal batteries.

5. A Group F-1 occupancy used to manufacture vehicles, energy storage system or equipment containing lithium-ion or lithium metal batteries.

[F] 903.2.4.2 Group F-1 distilled spirits.

An automatic sprinkler system shall be provided throughout a Group F-1 fire area used for the manufacture of distilled spirits.

[F] 903.2.4.3 Group F-1 upholstered furniture or mattresses.

An automatic sprinkler system shall be provided throughout a Group F-1 fire area that exceeds 2,500 square feet (232 m²) used for the manufacture of upholstered furniture or mattresses.

[F] 903.2.5.2 Group H-5 occupancies.

An automatic sprinkler system shall be installed throughout buildings containing Group H-5 occupancies. The design of the automatic sprinkler system shall be not less than that required by this code for the occupancy hazard classifications in accordance with Table 903.2.5.2.

Where the design area of the automatic sprinkler system consists of a corridor protected by one row of sprinklers, the maximum number of sprinklers required to be calculated is 13.

TABLE 903.2.5.2

GROUP H-5 AUTOMATIC SPRINKLER SYSTEM DESIGN CRITERIA

Portions of table not shown remain unchanged.

[F] 903.2.7 Group M.

An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy where one of the following conditions exists:

1. A Group M fire area exceeds 12,000 square feet (1115 m).
2. A Group M fire area is located more than three stories above grade plane.
3. The combined area of all Group M fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m).
- ~~4. A Group M occupancy used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).~~

[F] 903.2.7.2 Group M upholstered furniture or mattresses.

An automatic sprinkler system shall be provided throughout a Group M fire area where the area used for the display and sale of upholstered furniture or mattresses exceeds 5,000 square feet (464 m²).

[F] 903.2.7.3 Lithium-ion or lithium metal battery storage.

An automatic sprinkler system shall be provided in a room or space within a Group M occupancy where required for the storage of lithium-ion or lithium metal batteries by Section 320 of the International Fire Code or Chapter 32 of the International Fire Code.

~~**[F] 903.2.8.3 Group R-4, Condition 2.**~~

~~An automatic sprinkler system installed in accordance with Section 903.3.1.2 shall be permitted in Group R-4, Condition 2 occupancies.~~

[F] ~~903.2.8.4~~ 903.2.8.3 Care facilities.

[F] 903.2.9 Group S-1.

An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 *fire area* exceeds 12,000 square feet (1115 m).
2. A Group S-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group S-1 *fire areas* on all floors, including any *mezzanines*, exceeds 24,000 square feet (2230 m).
4. A Group S-1 *fire area* used for the storage of commercial motor vehicles where the fire area exceeds 5,000 square feet (464 m).
5. ~~A Group S-1 occupancy used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).~~
5. A Group S-1 fire area used for the storage of lithium-ion or lithium metal powered vehicles where the fire area exceeds 500 square feet (46.4 m²).

[F] 903.2.9.1 Repair garages.

An automatic sprinkler system shall be provided throughout all buildings used as repair garages in accordance with Section 406, as shown:

1. Buildings having two or more stories above grade plane, including basements, with a fire area containing a repair garage exceeding 10,000 square feet (929 m²).
2. Buildings not more than one story above grade plane, with a fire area containing a repair garage exceeding 12,000 square feet (1115 m²).
3. Buildings with repair garages servicing vehicles parked in basements.
4. A Group S-1 fire area used for the repair of commercial motor vehicles where the fire area exceeds 5,000 square feet (464 m²).
5. A Group S-1 fire area used for the storage of lithium-ion or lithium metal powered vehicles where the fire area exceeds 500 square feet (46.4 m²).

[F] 903.2.9.3 Group S-1 Distilled spirits or wine.

An automatic sprinkler system shall be provided throughout a Group S-1 fire area used for the bulk storage of distilled spirits or wine.

[F] 903.2.9.4 Group S-1 upholstered furniture and mattresses.

An automatic sprinkler system shall be provided throughout a Group S-1 fire area where the area used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m²).

Exception: Self-service storage facilities not greater than one story above grade plane where all storage spaces can be accessed directly from the exterior.

[F] 903.2.10 Group S-2 ~~enclosed~~ parking garages.

An automatic sprinkler system shall be provided throughout buildings classified as ~~enclosed~~ parking garages ~~in accordance with Section 406.6~~ where ~~either~~ any of the following conditions exists:

1. Where the fire area of the enclosed parking garage in accordance with Section 406.6 exceeds 12,000 square feet (1115 m²).
2. Where the enclosed parking garage in accordance with Section 406.6 is located beneath other groups.

Exception: Enclosed parking garages located beneath Group R-3 occupancies.

3. Where the fire area of the open parking garage in accordance with Section 406.5 exceeds 48,000 square feet (4460 m²).

[F] 903.2.10.2 Mechanical-access enclosed parking garages.

An approved automatic sprinkler system shall be provided throughout buildings used for the storage of motor vehicles in a mechanical-access enclosed parking garage. The portion of the building that contains the mechanical-access enclosed parking garage shall be protected with a specially engineered automatic sprinkler system.

[F] 903.2.11.3 Buildings 55 feet or more in height.

An automatic sprinkler system shall be installed throughout buildings that have one or more stories with an occupant load of 30 or more located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access, measured to the finished floor.

Exceptions:

- ~~1. Open parking structures.~~
- ~~2. Occupancies in Group F-2.~~

[F] 903.2.11.6 Other required ~~suppression~~ fire protection systems.

In addition to the requirements of Section 903.2, the provisions indicated in Table 903.2.11.6 require the installation of a fire ~~suppression~~ protection system for certain buildings and areas.

[F] TABLE 903.2.11.6

ADDITIONAL REQUIRED ~~SUPPRESSION~~ PROTECTION SYSTEMS

Portions of table not shown remain unchanged.

SECTION	SUBJECT
419.5	Live/work units
424.3	Children's p Play structures
508.5.7	Live/work units
IFC	<u>Automatic</u> S prinkler system requirements as set forth in Section 903.2.11.6 of the International Fire Code

[F] 903.3.1 Standards.

Automatic ~~s~~prinkler systems shall be designed and installed in accordance with Section 903.3.1.1 unless otherwise permitted by Sections 903.3.1.2 and 903.3.1.3 and other chapters of this code, as applicable.

[F] 903.3.1.1.1 Exempt locations.

Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an *approved* automatic fire detection system in accordance with Section 907.2 that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from a room merely because it is damp, of *fire-resistance-rated* construction or contains electrical equipment.

- ~~1. A room where the application of water, or flame and water, constitutes a serious life or fire hazard.~~
- ~~2. 1.~~ A room or space where sprinklers constitute a serious life or fire hazard ~~are considered undesirable~~ because of the nature of the contents and constitutes a serious life or fire hazard, where *approved* by the *fire code official*.
- ~~3. 2.~~ Generator and transformer rooms separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a *fire-resistance rating* of not less than 2 hours.
- ~~4. 3.~~ Rooms or areas that are of noncombustible construction with wholly noncombustible contents.
- ~~5. 4.~~ Fire service access elevator machine rooms and machinery spaces.
- ~~6. 5.~~ Machine rooms, machinery spaces, control rooms and control spaces associated with occupant evacuation elevators designed in accordance with Section 3008.

[F] 903.3.1.1.3 Lithium-ion or lithium metal batteries.

Where *automatic sprinkler systems* are required by this code for areas containing lithium-ion or lithium metal batteries, the design of the system shall be based upon a series of fire tests conducted or witnessed and reported by an *approved testing laboratory* involving test scenarios that address the range of variables associated with the intended arrangement of the hazards to be protected.

[F] 903.3.1.2 NFPA 13R sprinkler systems.

Automatic sprinkler systems in Group R occupancies ~~up to and including four stories in height in buildings not exceeding 60 feet (18 288 mm) in height above grade plane~~ shall be permitted to be installed throughout in accordance with NFPA 13R where the Group R occupancy meets all of the following conditions:

1. Four stories or fewer above *grade plane*.
2. For other than Group R-2 occupancies, the floor level of the highest story is 30 feet (10668 mm) or less above the lowest level of fire department vehicle access.

For Group R-2 occupancies, the roof assembly is less than 45 feet (13716 mm) above the lowest level of fire department vehicle access. The height of the roof assembly shall be determined by measuring the distance from the lowest required fire vehicle access road surface adjacent to the building to the eave of the highest pitched roof, the intersection of the highest roof to the exterior wall, or the top of the highest parapet, whichever yields the greatest distance.

3. The floor level of the lowest story is 30 feet (9144 mm) or less below the lowest level of fire department vehicle access.

The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 shall be measured from ~~the horizontal assembly creating separate buildings~~ *grade plane*.

[F] 903.3.1.2.2 ~~Open-ended corridors.~~ Corridors and balconies in the means of egress.

Sprinkler protection shall be provided in ~~open-ended corridors and associated exterior stairways and ramps as specified in Section 1027.6, Exception 3.~~ corridors and for balconies in the means of egress where any of the following conditions apply:

1. Corridors with combustible floor or walls.
2. Corridors with an interior change of direction exceeding 45 degrees (0.79 rad).
3. Corridors that are less than 50 percent open to the outside atmosphere at the ends.
4. Open-ended corridors and associated exterior *stairways* and *ramps* as specified in Section 1027.6, Exception 3.
5. Egress balconies not complying with Sections 1021.2 and 1021.3.

[F] 903.3.1.2.3 Attics.

Attic protection shall be provided as follows:

1. *Attics* that are used or intended for living purposes or storage shall be protected by an *automatic sprinkler system*.
2. Where fuel-fired equipment is installed in an unsprinklered *attic*, not fewer than one quick-response intermediate temperature sprinkler shall be installed above the equipment.
3. Where located in a building of Type III, Type IV or Type V construction designed in accordance with Section 510.2 or 510.4, attics not required by Item 1 to have sprinklers shall comply with one of the following if the roof assembly is located more than 55 feet (16 764 mm) above the lowest level of ~~required~~ fire department vehicle access needed to meet the provisions in Section 503.
 - 3.1. Provide *automatic sprinkler system* protection.
 - 3.2. Construct the *attic* using noncombustible materials.
 - 3.3. Construct the *attic* using *fire-retardant-treated wood* complying with Section 2303.2.
 - 3.4. Fill the *attic* with noncombustible insulation.

The height of the roof assembly shall be determined by measuring the distance from the lowest required fire vehicle access road surface adjacent to the building to the eave of the highest pitched roof, the intersection of the highest roof to the exterior wall, or the top of the highest parapet, whichever yields the greatest distance. For the purpose of this measurement, required fire vehicle access roads shall include only those roads that are necessary for compliance with Section 503 of the *International Fire Code*:

4. Group R-4, Condition 2 occupancy *attics* not required by Item 1 to have sprinklers shall comply with one of the following:

- 4.1. Provide *automatic sprinkler system* protection.
- 4.2. Provide a heat detection system throughout the *attic* that is arranged to activate the building fire alarm system.
- 4.3. Construct the *attic* using noncombustible materials.
- 4.4. Construct the *attic* using *fire-retardant-treated wood* complying with Section 2303.2.
- 4.5. Fill the *attic* with noncombustible insulation.

[F] 903.3.2 Quick-response and residential sprinklers.

Where *automatic sprinkler systems* are required by this code, quick-response or residential automatic sprinklers shall be installed in all of the following areas in accordance with Section 903.3.1 and their listings:

1. Throughout all spaces within a *smoke compartment* containing care recipient *sleeping units* in Group I-2 in accordance with this code.
2. Throughout all spaces within a *smoke compartment* containing gas fireplace appliances and decorative gas appliances in Group I-2.
- ~~2~~ 3. Throughout all spaces within a *smoke compartment* containing treatment rooms in *ambulatory care facilities*.
- ~~3~~ 4. *Dwelling units* and *sleeping units* in Group I-1 and R occupancies.
- ~~4~~ 5. Light-hazard occupancies as defined in NFPA 13.

[F] 903.3.9 High-rise building floor control valves.

Approved supervised indicating control valves shall be provided at the point of connection to the riser on each floor in high-rise buildings.

903.4 Sprinkler system supervision and alarms.

Automatic sprinkler system supervision and alarms shall comply with Sections 903.4.1 through 903.4.3.

[F] ~~903.4~~ 903.4.1 Electronic supervision ~~Sprinkler system supervision and alarms.~~

Valves controlling the water supply for *automatic sprinkler systems*, pumps, tanks, water levels and temperatures, critical air pressures, and waterflow switches on all automatic sprinkler systems shall be electrically supervised by a *listed* fire alarm control unit.

Exceptions:

1. *Automatic sprinkler systems* protecting one- and two-family *dwelling*s.
2. Limited area sprinkler systems in accordance with Section 903.3.8, provided that backflow prevention device test valves located in limited area sprinkler system supply piping shall be locked in the open position unless supplying an occupancy required to be equipped with a fire alarm system, in which case the backflow preventer valves shall be electrically supervised by a tamper switch installed in accordance with NFPA 72 and separately annunciated.
3. *Automatic sprinkler systems* installed in accordance with NFPA 13R where a common supply main is used to supply both domestic water and the *automatic sprinkler system*, and a separate shutoff valve for the *automatic sprinkler system* is not provided.
4. Jockey pump control valves that are sealed or locked in the open position.

5. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.
8. Underground key or hub gate valves in roadway boxes.

[F] 903.4.1 903.4.2 Monitoring.

Alarm, supervisory and trouble signals shall be distinctly different and shall be automatically transmitted to an *approved* supervising station or, where *approved* by the *fire code official*, shall sound an audible signal at a constantly attended location.

Exceptions:

- ~~1. Underground key or hub valves in roadway boxes provided by the municipality or public utility are not required to be monitored.~~
- ~~2. Backflow prevention device test valves located in limited area sprinkler system supply piping shall be locked in the open position. In occupancies required to be equipped with a fire alarm system, the backflow preventer valves shall be electrically supervised by a tamper switch installed in accordance with NFPA 72 and separately annunciated.~~

[F] ~~903.4.2~~ 903.4.3 Alarms.

An *approved* audible and visual sprinkler waterflow alarm device, located on the exterior of the building in an *approved* location, shall be connected to each *automatic sprinkler system*. Such sprinkler waterflow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Where a water flow switch is required by Section 903.4.1 to be electrically supervised, such sprinkler waterflow alarm devices shall be powered by a fire alarm control unit or, where provided, a fire alarm system. Where a fire alarm system is provided ~~installed~~, actuation of the automatic sprinkler system shall actuate the building fire alarm system.

Exception: Automatic sprinkler systems protecting one- and two-family dwellings.

[F] 903.5 Inspection, Testing and maintenance.

Automatic Sprinkler systems shall be inspected, tested, and maintained in accordance with the *International Fire Code*.

SECTION 904

ALTERNATIVE AUTOMATIC FIRE-EXTINGUISHING SYSTEMS

[F] 904.12 Hybrid Fire Extinguishing Systems.

Hybrid Fire Extinguishing Systems shall be designed, installed, maintained, periodically inspected, and tested in accordance with NFPA 770. Records of inspection and testing shall be maintained.

[F] 904.14 Aerosol fire-extinguishing systems.

Aerosol fire-extinguishing systems shall be installed, maintained, periodically inspected, tested ~~and maintained~~ in accordance with ~~Sections 901 and 904.4~~, NFPA 2010, and ~~in accordance with~~ their listing.

Such devices and appurtenances shall be listed and installed in compliance with manufacturer's instructions.

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~904.13~~ 904.14 Commercial cooking systems.

[F] ~~904.13.1~~ [904.14.1](#) Manual system operation.

A manual actuation device shall be located at or near a means of egress from the cooking area not less than 10 feet (3048 mm) and not more than 20 feet (6096 mm) from the kitchen exhaust system. The manual actuation device shall be installed not more than 48 inches (1200 mm) or less than 42 inches (1067 mm) above the floor and shall clearly identify the hazard protected. The manual actuation shall require a maximum force of 40 pounds (178 N) and a maximum movement of 14 inches (356 mm) to actuate the fire suppression system.

Exceptions:

1. *Automatic sprinkler systems* shall not be required to be equipped with manual actuation means.
2. [Where locating the manual actuation device between 10 feet \(3048 mm\) to 20 feet \(6096 mm\) from the cooking area is not feasible, the fire code official is permitted to accept a location at or near a means of egress from the cooking area, where the manual actuation device is unobstructed and in view from the means of egress.](#)

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~904.13.2~~ [904.14.2](#) System interconnection.

[F] ~~904.13.3~~ [904.14.3](#) Carbon dioxide systems.

[F] ~~904.13.3.1~~ [904.14.3.1](#) Ventilation system.

[F] ~~904.13.4~~ [904.14.4](#) Special provisions for automatic sprinkler systems.

[F] ~~904.13.4.1~~ [904.14.4.1](#) Listed sprinklers.

[F] ~~904.13~~ [904.15](#) Domestic cooking ~~systems~~ [facilities](#).

Cooktops and ranges installed in the following occupancies shall be protected in accordance with Section ~~904.14.1~~ [904.15.1](#):

1. In Group I-1 occupancies where domestic cooking facilities are installed in accordance with Section 420.9.
2. In Group I-2, ~~Condition 1~~ occupancies where domestic cooking facilities are installed in accordance with Section 407.2.7.
3. In Group R-2 college *dormitories* where domestic cooking facilities are installed in accordance with Section 420.11.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~[F] ~~904.13.1~~ [904.15.1](#) Protection from fire.~~

~~[F] ~~904.13.1.1~~ [904.15.1.1](#) Automatic fire-extinguishing system.~~

~~[F] ~~904.13.1.2~~ [904.15.1.2](#) Ignition prevention.~~

SECTION 905

STANDPIPE SYSTEMS

[F] 905.3 Required installations.

Standpipe systems shall be installed where required by Sections 905.3.1 through 905.3.8. Standpipe systems are allowed to be combined with *automatic sprinkler systems*.

Exceptions:

1. [Standpipe systems are not required in Group R-2 townhouses.](#)
2. [Standpipe systems are not required in Group R-3 occupancies.](#)

[F] 905.3.1 Height.

Class III standpipe systems shall be installed throughout buildings where any of the following conditions exist:

1. Four or more stories are above or below *grade plane*.
2. The floor level of the highest *story* is located more than 30 feet (9144 mm) above the lowest level of fire department vehicle access.
3. The floor level of the lowest *story* is located more than 30 feet (9144 mm) below the highest level of fire department vehicle access.

Exceptions:

1. Class I standpipes are allowed in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
2. Class I standpipes are allowed in Group B and E occupancies.
3. Class I ~~manual~~ standpipes are allowed in ~~open~~ parking garages ~~where the highest floor is located not more than 150 feet (45 720 mm) above the lowest level of fire department vehicle access.~~
4. ~~Class I manual dry standpipes are allowed in open parking garages that are subject to freezing temperatures., provided that the hose connections are located as required for Class II standpipes in accordance with Section 905.5~~
- 5-4. Class I standpipes are allowed in basements equipped throughout with an *automatic sprinkler system*.
- 6-5. Class I standpipes are allowed in buildings where occupant-use hose lines will not be utilized by trained personnel or the fire department.
- 7-6. In determining the lowest level of fire department vehicle access, it shall not be required to consider either of the following:
 - 76.1. Recessed loading docks for four vehicles or less.
 - 76.2. Conditions where topography makes access from the fire department vehicle to the building impractical or impossible.

[F] 905.3.4 Stages.

~~Stages greater than 1,000 square feet in area (93 m²) shall be equipped with a Class III wet standpipe system with 1 1/2-inch and 2 1/2-inch (38 mm and 64 mm) hose connections on each side of the stage.~~

~~Exception: Where the building or area is equipped throughout with an automatic sprinkler system, a 1 1/2-inch (38 mm) hose connection shall be installed in accordance with NFPA 13 or in accordance with NFPA 14 for Class II or III standpipes.~~

[F] 905.3.4.1 Hose and cabinet.

~~The 1 1/2-inch (38 mm) hose connections shall be equipped with sufficient lengths of 1 1/2-inch (38 mm) hose to provide fire protection for the stage area. Hose connections shall be equipped with an approved adjustable fog nozzle and be mounted in a cabinet or on a rack.~~

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] 905.3.5 [905.3.4](#) Underground buildings.

[F] 905.3.6 [905.3.5](#) Helistops and heliports.

[F] 905.3.7 [905.3.6](#) Marinas and boatyards.

[F] ~~905.3.8~~ 905.3.7 Rooftop gardens and Vegetative roof and landscaped roofs-standpipe systems.

Buildings or structures that have rooftop gardens or landscaped roofs [or vegetative roofs](#) and that are equipped with a standpipe system shall have the standpipe system extended to the roof level on which the rooftop garden or landscaped roof [or vegetative roof](#) is located.

[F] 905.4 Location of Class I standpipe hose connections.

Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required interior exit stairway [or exterior exit stairway](#), a hose connection shall be provided for each story above and below grade plane. Hose connections shall be located at the main floor landing unless otherwise approved by the fire code official.

Exception: A single hose connection shall be permitted to be installed in the open corridor or open breezeway between open stairs that are not greater than 75 feet (22 860 mm) apart.

2. On each side of the wall adjacent to the exit opening of a horizontal exit.

Exception: Where floor areas adjacent to a horizontal exit are reachable from an interior exit stairway [or exterior exit stairway](#) hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the horizontal exit.

3. In every exit passageway, at the entrance from the exit passageway to other areas of a building.

Exception: Where floor areas adjacent to an exit passageway are reachable from an interior exit stairway [or exterior exit stairway](#) hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the exit passageway to other areas of the building.

4. In covered mall buildings, adjacent to each exterior public entrance to the mall and adjacent to each entrance from an exit passageway or exit corridor to the mall. In open mall buildings, adjacent to each public entrance to the mall at the perimeter line and adjacent to each entrance from an exit passageway or exit corridor to the mall.
5. Where the roof has a slope less than 4 units vertical in 12 units horizontal (33.3-percent slope), a hose connection shall be located to serve the roof or at the highest landing of an interior exit stairway with access to the roof provided in accordance with Section 1011.12.
6. Where the most remote portion of a nonsprinklered floor or story is more than 150 feet (45 720 mm) from a hose connection or the most remote portion of a sprinklered floor or story is more than 200 feet (60 960 mm) from a hose connection, the fire code official is authorized to require that additional hose connections be provided in approved locations.

[F] 905.5.1 Groups A-1 and A-2.

In Group A-1 and A-2 occupancies with *occupant loads* of more than 1,000, hose connections shall be located on each side of any stage, on each side of the rear of the auditorium; [and](#) on each side of the balcony. ~~and on each tier of dressing rooms.~~

[F] 905.9 Valve supervision.

Valves controlling water supplies shall be supervised in the open position so that a change in the normal position of the valve will generate a supervisory signal at the supervising station required by Section 903.4. Where a fire alarm system is provided, a signal shall be transmitted to the control unit.

Exceptions:

1. Valves to underground key or hub valves in roadway boxes ~~provided by the municipality or public utility~~ do not require supervision.
2. Valves locked in the normal position and inspected as provided in this code in buildings not equipped with a fire alarm system.

[F] 905.11 Locking standpipe outlet caps.

The fire code official is authorized to require locking caps on the outlets [on dry standpipes](#) where the responding fire department carries key wrenches for the removal that are compatible with locking FDC connection caps.

[F] 906.1 Where required.

Portable fire extinguishers shall be installed in all of the following locations:

1. In Group A, B, E, F, H, I, M, R-1, R-2, R-4 and S occupancies.

Exceptions:

1. In Group R-2 occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each dwelling unit is provided with a portable fire extinguisher having a minimum rating of 1-A:10-B:C.
2. In Group E occupancies, portable fire extinguishers shall be required only in locations specified in Items 2 through 6 where each classroom is provided with a portable fire extinguisher having a minimum rating of 2-A:20-B:C.
3. In storage areas of Group S Occupancies where forklift, powered industrial truck or powered cart operators are the primary occupants, fixed extinguishers, as specified in NFPA 10, shall not be required where in accordance with all of the following:
 - 3.1. Use of vehicle-mounted extinguishers shall be approved by the fire code official.
 - 3.2. Each vehicle shall be equipped with a 10-pound, 40A:80B:C extinguisher affixed to the vehicle using a mounting bracket approved by the extinguisher manufacturer or the fire code official for vehicular use.
 - 3.3. Not less than two spare extinguishers of equal or greater rating shall be available on site to replace a discharged extinguisher.
 - 3.4. Vehicle operators shall be trained in the proper operation, use and inspection of extinguishers.
 - 3.5. Inspections of vehicle-mounted extinguishers shall be performed daily.
2. Within 30 feet (9144 mm) distance of travel from commercial cooking equipment and from domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college *dormitory* occupancies.
3. In areas where flammable or *combustible liquids* are stored, used or dispensed.
4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1 of the *International Fire Code*.
5. Where required by the *International Fire Code* sections indicated in Table 906.1.
6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the fire code official.

Exception: Portable fire extinguishers are not required at normally unmanned Group U occupancy buildings or structures where a portable fire extinguisher suitable to the hazard of the location is provided on the vehicle of visiting personnel.

TABLE 906.1 [F] TABLE 906.1

ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS IN THE INTERNATIONAL FIRE CODE

Portions of table not shown remain unchanged.

IFC SECTION	SUBJECT
1204.10	Portable Generators
3104.12 3108.9	Tents and membrane structures
3315.1 3306.5	Buildings under construction or demolition
3317.3 3305.10.2	Roofing operations
5707.5.4	On-demand mobile fueling

SECTION 907

FIRE ALARM AND DETECTION SYSTEMS

[F] 907.2.1 Group A.

A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group A occupancies where the occupant load due to the assembly occupancy is 300 or more, or where the Group A *occupant load* is more than 100 persons above or below the *lowest level of exit discharge*. Group A occupancies not separated from one another in accordance with Section 707.3.10 shall be considered as a single occupancy for the purposes of applying this section. Portions of Group E occupancies occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.

Exceptions:

1. Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.
2. Manual fire alarm boxes and the associated occupant notification system or emergency voice/alarm communication system are not required for Group A-5 outdoor bleacher-type seating having an occupant load of greater than or equal to 300 and less than 15,000 occupants, provided that all of the following are met:
 - 2.1. A public address system with standby power is provided.
 - 2.2. Enclosed spaces attached to or within 5 feet (1524 mm) of the outdoor bleacher-type seating compose, in the aggregate, a maximum of 10 percent of the overall area of the outdoor bleacher-type seating or 1,000 square feet (92.9 m²), whichever is less.
 - 2.3. Enclosed accessory spaces under or attached to the outdoor bleacher-type seating shall be separated from the bleacher-type seating in accordance with Section 1030.1.1.1.
 - 2.4. All means of egress from the bleacher-type seating are open to the outside.
3. Manual fire alarm boxes and the associated occupant notification system or emergency voice/alarm communication system are not required for temporary Group A-5 outdoor bleacher-type seating, provided that all of the following are met:
 - 3.1. There are no enclosed spaces under or attached to the outdoor bleacher-type seating.
 - 3.2. The bleacher-type seating is erected for a period of less than 180 days.
 - 3.3. Evacuation of the bleacher-type seating is included in an approved fire safety plan.

[F] 907.2.2 Group B.

A manual fire alarm system, which activates the occupant notification system in accordance with Section 907.5, shall be installed in Group B occupancies where one of the following conditions exists:

1. The combined Group B *occupant load* of all floors is 500 or more.
2. The Group B *occupant load* is more than 100 persons above or below the *lowest level of exit discharge*.
3. The fire area contains an ambulatory care facility.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.2.2 Laboratories involving research and development or testing.

A fire alarm system activated by an air-sampling-type smoke detection system or a radiant-energy-sensing detection system shall be installed throughout the entire fire area utilized for the research and development or testing of lithium-ion or lithium metal batteries.

[F] 907.2.3 Group E.

A manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communication system meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall be installed in Group E occupancies. Where *automatic sprinkler systems* or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

Exceptions:

1. A manual fire alarm system ~~is~~ shall not ~~be~~ required in Group E occupancies with an *occupant load* of 50 or less.
2. Emergency voice/alarm communication systems meeting the requirements of Section 907.5.2.2 and installed in accordance with Section 907.6 shall not be required in Group E occupancies with *occupant loads* of 100 or less, provided that activation of the manual fire alarm system initiates an *approved* occupant notification signal in accordance with Section 907.5.
3. Manual fire alarm boxes ~~are~~ shall not ~~be~~ required in Group E occupancies where all of the following apply:
 - 3.1. Interior *corridors* are protected by smoke detectors.
 - 3.2. Auditoriums, cafeterias, gymnasiums and similar areas are protected by *heat detectors* or other *approved* detection devices.
 - 3.3. Shops and laboratories involving dusts or vapors are protected by *heat detectors* or other *approved* detection devices.
 - 3.4. Manual activation is provided from a normally occupied location.
4. Manual fire alarm boxes shall not be required in Group E occupancies where all of the following apply:
 - 4.1. The building is equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1.
 - 4.2. The emergency voice/alarm communication system will activate on sprinkler waterflow.
 - 4.3. Manual activation is provided from a normally occupied location.

[F] 907.2.4.1 Manufacturing involving lithium-ion or lithium metal batteries.

A fire alarm system activated by an air-sampling-type smoke detection system or a radiant-energy-sensing detection system shall be installed throughout the entire fire area where lithium-ion or lithium metal batteries are manufactured; and where the manufacturer of vehicles, energy storage systems or equipment containing lithium-ion or lithium metal batteries when the batteries are installed as part of the manufacturing process.

[F] 907.2.7 Group M.

~~A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group M occupancies where one of the following conditions exists:~~

- ~~1. The combined Group M occupant load of all floors is 500 or more persons.~~
- ~~2. The Group M occupant load is more than 100 persons above or below the lowest level of exit discharge.~~

Exceptions:

- ~~1. A manual fire alarm system is not required in covered or open mall buildings complying with Section 402.~~
- ~~2. Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 and the occupant notification appliances will automatically activate throughout the notification zones upon sprinkler water flow.~~

A fire alarm system shall be required in a Group M occupancy in accordance with Sections 907.2.7.1 and 907.2.7.2.

[F] 907.2.7.1 Occupant ~~notification~~ load.

~~During times that the building is occupied, the initiation of a signal from a manual fire alarm box or from a waterflow switch shall not be required to activate the alarm notification appliances when an alarm signal is activated at a constantly attended location from which evacuation instructions shall be initiated over an emergency voice/alarm communication system installed in accordance with Section 907.5.2.2.~~

A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group M occupancies where one of the following conditions exists:

1. The combined Group M occupant load of all floors is 500 or more persons.
2. The Group M occupant load is more than 100 persons above or below the lowest level of exit discharge.

Exceptions:

1. A manual fire alarm system is not required in covered or open mall buildings complying with Section 402.
2. Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 and the occupant notification appliances will automatically activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.7.1.1 Occupant notification.

During times that the building is occupied, the initiation of a signal from a manual fire alarm box or from a waterflow switch shall not be required to activate the alarm notification appliances when an alarm signal is activated at a constantly attended location from which evacuation instructions shall be initiated over an emergency voice/alarm communication system installed in accordance with Section 907.5.2.2.

[F] 907.2.7.2 Storage of lithium-ion or lithium metal batteries.

A fire alarm system activated by an air sampling-type smoke detection system or a radiant energy-sensing detection system shall be installed in a room or space within a Group M occupancy where required for the storage of lithium-ion or lithium metal batteries by Section 320 of the *International Fire Code*.

[F] 907.2.10 Group S.

A fire alarm system shall be in a Group S occupancy as required by Sections 907.2.10.1 and 907.2.10.2.

[F] ~~907.2.10~~ 907.2.10.1 ~~Group S~~ Public- and self-storage occupancies.

A manual fire alarm system that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group S public-and self-storage occupancies three stories or greater in height for interior corridors and interior common areas. Visible notification appliances are not required within storage units.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.10.2 Storage of lithium-ion or lithium metal batteries.

A fire alarm system activated by an air sampling-type smoke detection system or a radiant energy-sensing detection system shall be installed throughout the entire fire area where required for the storage of lithium-ion batteries or lithium metal batteries By Section 321of the *International Fire Code*.

[F] ~~907.2.10~~ 907.2.11 Single- and multiple-station smoke alarms.

Listed single- and multiple-station smoke alarms complying with UL 217 shall be installed in accordance with Sections 907.2.~~.10.11~~.1 through 907.2.~~.10.11~~.7, and NFPA 72- and the manufacturer's instructions.

[NY] 907.2.11.1 Group R-1.

Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In sleeping areas.
2. In every room in the path of the means of egress from the sleeping area to the door leading from the sleeping unit.
3. In each story within the sleeping unit, including basements. For sleeping 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. In every common use space and public-use area shared by two or more dwelling units.

[NY] 907.2.11.2 Groups R-2, R-3, R-4 and I-1.

Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, R-4 and I-1 regardless of occupant load at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
2. In each room used for sleeping purposes.

3. In each story within a dwelling unit, including basements but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. In every common use space and public-use area shared by two or more dwelling units.

[F] ~~907.2.10.3~~ 907.2.11.3 Installation near cooking appliances.

Smoke alarms shall ~~not~~ be installed ~~a minimum of~~ not less than 10 ft. (~~3.0 m~~ 3048 mm) horizontally from a permanently installed cooking appliance. ~~in the following locations unless this would prevent placement of a smoke alarm in a location required by Section 907.2.11.1 or 907.2.11.2:~~

Exception: Smoke alarms shall be permitted to be installed not less than 6 ft. (1.8 m) horizontally from a permanently installed cooking appliance where necessary to comply with Section 907.2.11.1 or 907.2.11.2.

- ~~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 (1829 mm) horizontally from a permanently installed cooking appliance.~~

[NY] ~~907.2.10.8~~ 907.2.11.8 Portable smoke alarms in Group R-1 occupancies and Group R-3 lodging houses. In addition to but not in limitation of any other requirement of this code, portable smoke alarms of both audible and visual design shall be provided in all buildings of Group R-1 occupancies and Group R-3 lodging houses. The number of smoke alarms available shall be 3 percent of the number of sleeping units with a minimum of one operational smoke alarm per building. Proprietors shall post conspicuously a sign, with letters at least 3 inches (76 mm) in height, at the main desk or other similar station advising of the availability of such smoke alarms. Such smoke alarms shall be in conformity with NFPA 72.

Exception: Portable smoke alarms shall not be required where any of the following applies:

1. Where audible/visual smoke alarms are hard wired.
2. Where audible/visual smoke alarms are incorporated into a fire alarm system such that visual notification is activated by the system.

[F] ~~907.2.11~~ 907.2.12 Special amusement ~~buildings~~ areas.

~~An automatic smoke detection system~~ Fire detection and alarm systems shall be provided in *special amusement areas* buildings in accordance with Sections ~~907.2.11.1 through 907.2.11.3.~~ 411.3.

[F] ~~907.2.11.1 Alarm.~~

~~Activation of any single smoke detector, the automatic sprinkler system or any other automatic fire detection device shall immediately activate an audible and visible alarm at the building at a constantly attended location from which emergency action can be initiated, including the capability of manual initiation of requirements in Section 907.2.11.2.~~

[F] ~~907.2.11.2 System response.~~

~~The activation of two or more smoke detectors, a single smoke detector equipped with an alarm verification feature, the automatic sprinkler system or other approved fire detection device shall automatically do all of the following:~~

- ~~1.—Cause illumination of the means of egress with light of not less than 1 footcandle (11 lux) at the walking surface level.~~
- ~~2.—Stop any conflicting or confusing sounds and visual distractions.~~
- ~~3.—Activate an approved directional exit marking that will become apparent in an emergency.~~
- ~~4.—Activate a prerecorded message, audible throughout the special amusement building, instructing patrons to proceed to the nearest exit. Alarm signals used in conjunction with the prerecorded message shall produce a sound that is distinctive from other sounds used during normal operation.~~

~~[F] 907.2.11.3 Emergency voice/alarm communication system.~~

~~An emergency voice/alarm communication system, which is allowed to serve as a public address system, shall be installed in accordance with Section 907.5.2.2 and be audible throughout the entire special amusement building.~~

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~907.2.12~~ [907.2.13](#) High-rise buildings.

[F] ~~907.2.12.1~~ [907.2.13.1](#) Automatic smoke detection.

[F] ~~907.2.12.1.1~~ [907.13.1.1](#) Area smoke detection.

[F] ~~907.2.12.1.2~~ [907.13.1.2](#) Duct smoke detection.

[F] ~~907.2.12.2~~ [907.2.13.2](#) Fire department communication system.

Where a wired communication system is *approved* in lieu of an [in-building two-way](#) emergency responder ~~radio~~ [communication](#) coverage system in accordance with Section 510 of the *International Fire Code*, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a *fire command center* complying with Section 911, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, *areas of refuge* and inside *interior exit stairways*. The fire department communication device shall be provided at each floor level within the *interior exit stairway*.

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~907.2.12.3~~ [907.2.13.3](#) Multiple-channel voice evacuation.

[F] ~~907.2.13~~ [907.2.14](#) Atriums connecting more than two stories.

[F] ~~907.2.14~~ [907.2.15](#) High-piled combustible storage areas.

[F] ~~907.2.15~~ [907.2.16](#) Aerosol storage uses.

Aerosol product rooms and general-purpose warehouses containing aerosol products [or aerosol cooking spray products or plastic aerosol 3 products](#) shall be provided with an approved manual fire alarm system where required by the International Fire Code.

The bodies of the following code sections are unchanged and are omitted for clarity:

[F] ~~907.2.16~~ [907.2.17](#) Lumber, wood structural panel and veneer mills.

[F] ~~907.2.17~~ [907.2.18](#) Underground buildings with smoke control systems.

[F] ~~907.2.17.1~~ [907.2.18.1](#) Smoke detectors.

[F] ~~907.2.17.2~~ [907.2.18.2](#) Alarm required.

[F] ~~907.2.18~~ [907.2.19](#) Deep underground buildings.

[F] ~~907.2.19~~ [907.2.20](#) Covered and open mall buildings.

[F] ~~907.2.20~~ [907.2.21](#) Residential aircraft hangars.

[F] ~~907.2.21~~ [907.2.22](#) Airport traffic control towers.

[F] ~~907.2.21.1~~ [907.2.22.1](#) Airport traffic control towers with multiple exits and automatic sprinklers.

[F] ~~907.2.21.2~~ [907.2.22.2](#) Other airport traffic control towers.

~~[NY] 907.2.22 Battery rooms.~~

~~An automatic smoke detection system shall be installed in areas containing stationary energy storage systems as required in Section 1206 of the Fire Code of New York State.~~

~~[NY] 907.2.23 Capacitor~~E**nergy storage systems.**

An automatic smoke detection system or radiant-energy detection system shall be installed in rooms, areas and walk-in units containing ~~capacitor~~-energy storage systems as required by Section ~~1206 of the Fire Code of New York State~~ 1207.5.4 of the International Fire Code.

[F] 907.4 Initiating devices.

Where ~~manual or automatic alarm initiation is required as part of a fire alarm system, the initiating~~ a fire alarm system is required by another section of this code, occupant notification in accordance with Section 907.5 shall be initiated by one or more of the following. Initiating devices shall be installed in accordance with Sections 907.4.1 through 907.4.3.1.

1. Manual fire alarm boxes.
2. Automatic fire detectors.
3. Automatic sprinkler system waterflow devices.
4. Automatic fire-extinguishing systems.

[F] 907.4.2.4 Signs.

Where fire alarm systems are not monitored by ~~a~~an approved supervising station in accordance with Section 907.6.6, an approved permanent sign shall be installed adjacent to each manual fire alarm box that reads: WHEN ALARM SOUNDS CALL FIRE DEPARTMENT.

Exception: Where the manufacturer has permanently provided this information on the manual fire alarm box.

[F] 907.5 Occupant notification ~~systems~~.

~~A fire alarm system shall annunciate at the fire alarm control unit and shall initiate occupant notification upon activation. Occupant notification by fire alarms shall be~~ in accordance with Sections 907.5.1 through 907.5.2.3.3. ~~Where a fire alarm system is required by another section of this code, it shall be activated by:~~ Occupant notification by smoke alarms in Group R-1 and R-2 occupancies shall comply with Section 907.5.2.1.3.2.

- ~~1. Automatic fire detectors.~~
- ~~2. Automatic sprinkler system waterflow devices.~~
- ~~3. Manual fire alarm boxes.~~
- ~~4. Automatic fire-extinguishing systems.~~

Exception: ~~Where notification systems are allowed elsewhere in Section 907 to annunciate at a constantly attended location.~~

907.5.1 Alarm activation and annunciation.

Upon activation, fire alarm systems shall initiate occupant notification and shall annunciate at the fire alarm control unit, or where allowed elsewhere by Section 907, at a constantly attended location.

[F] ~~907.5.1~~ 907.5.1.1 Presignal feature.

A presignal feature shall ~~not be installed unless provided only where approved by the fire code official. Where a presignal feature is provided, a signal~~ approved. The presignal shall be annunciated at an approved, a constantly attended location, approved by the fire code official, so that occupant notification can be activated having the capability to activate the occupant notification system in the event of fire or other emergency.

[F] 907.5.2.1 Audible alarms.

Audible alarm notification appliances shall be provided and emit a distinctive sound that is not to be used for any purpose other than that of a fire alarm.

Exceptions:

1. Audible alarm notification appliances are not required in critical care areas of Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
2. A visible *alarm notification appliance* installed in a nurses' control station or other continuously attended staff location in a Group I-2, Condition 2 suite shall be an acceptable alternative to the installation of audible alarm notification appliances throughout a suite or unit in Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
3. Where provided, audible notification appliances located in each enclosed occupant evacuation elevator lobby in accordance with Section 3008.9.1 shall be connected to a separate notification zone for manual paging only.

[F] 907.5.2.1.2 Maximum sound pressure.

The ~~maximum total~~ sound pressure level ~~for audible alarm produced by combining the ambient sound pressure level with all audible~~ notification appliances operating shall ~~be not exceed~~ 110 dBA at the minimum hearing distance from the audible appliance. Where the average ambient noise is greater than ~~95-105~~ dBA, visible alarm notification appliances shall be provided in accordance with NFPA 72 and audible alarm notification appliances shall not be required.

[F] 907.5.2.1.3 Audible alarm signal frequency in Group R-1, R-2 and I-1 sleeping rooms.

Audible alarm signal frequency in Group R-1, R-2, and I-1 occupancies shall be in accordance with Sections 907.5.2.1.3.1 and 907.5.2.1.3.2.

[F] 907.5.2.1.3.1 Fire alarm system audible signal.

In sleeping rooms of Group R-1, R-2 and I-1 occupancies, the audible alarm signal activated by a fire alarm system shall be a 520-Hz low-frequency signal complying with NFPA 72.

[F] 907.5.2.1.3.2 Smoke alarm signal in sleeping rooms.

In sleeping rooms of Group R-1, R-2 and I-1 occupancies that are required by Section 907.2.8 or 907.2.9 to have a fire alarm system, the audible alarm signal activated by single- or multiple-station smoke alarms in the dwelling unit or sleeping unit shall be a 520-Hz signal complying with NFPA 72. Where a sleeping room smoke alarm is unable to produce a 520-Hz signal, the 520-Hz alarm signal shall be provided by a listed notification appliance or a smoke detector with an integral 520-Hz sounder.

[F] 907.5.2.2.5 Standby ~~Emergency~~ power.

Emergency voice/alarm communications systems shall be provided with ~~emergency-standby~~ power in accordance with Section 2702 1203. ~~The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.~~

[F] 907.5.2.3 Visible alarms.

Visible alarm notification appliances shall be provided in accordance with Sections 907.5.2.3.1 through 907.5.2.3.3.

Exceptions:

1. Visible alarm notification appliances are not required in *alterations*, except where an existing fire alarm system is upgraded or replaced, or a new fire alarm system is installed.
2. Visible alarm notification appliances shall not be required in *exits* as defined in Chapter 2.
3. Visible alarm notification appliances shall not be required in elevator cars.
4. Visual alarm notification appliances are not required in critical care areas of Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
5. A visible alarm notification appliance installed in a nurses' control station or other continuously attended staff location in a Group I-2, Condition 2 suite shall be an acceptable alternative to the installation of visible

alarm notification appliances throughout the suite or unit in Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.

[F] 907.5.2.3.3 Group R-2.

In Group R-2 occupancies required by Section 907 to have a fire alarm system, each *story* that contains *dwelling units* and *sleeping units* shall be provided with the capability to support future visible alarm notification appliances in accordance with Chapter ~~10-11~~ of ICC A117.1. Such capability shall accommodate wired or wireless equipment. ~~The future capability shall include one of the following:~~

- ~~1. The interconnection of the building fire alarm system with the unit smoke alarms.~~
- ~~2. The replacement of audible appliances with combination audible/visible appliances.~~
- ~~3. The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.~~

[F] 907.5.2.3.3.1 Wired equipment.

Where wired equipment is used to comply with the future capability required by Section 907.5.2.3.3, the system shall include one of the following capabilities:

1. The replacement of audible appliances with combination audible/visible appliances or additional visible notification appliances.
2. The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.
3. For wired equipment, the fire alarm power supply and circuits shall have not less than 5-percent excess capacity to accommodate the future addition of visible alarm notification appliances, and a single access point to such circuits shall be available on every story. Such circuits shall not be required to be extended beyond a single access point on a story. The fire alarm system shop drawings required by Section 907.1.2 shall include the power supply and circuit documentation to accommodate the future addition of visible notification appliances.

[F] 907.6.4.2 High-rise buildings.

In high-rise buildings, a separate zone by floor shall be provided for each of the following types of alarm-initiating devices where provided:

1. Smoke detectors.
2. Sprinkler waterflow devices.
3. Manual fire alarm boxes.
4. Other *approved* types of automatic fire ~~detection devices or suppression~~ protection systems.

[F] 907.6.6.1 ~~Automatic telephone dialing devices.~~ Transmission of alarm signals.

~~Automatic telephone dialing devices used to transmit an emergency alarm shall not be connected to any fire department telephone number unless approved by the fire chief.~~ Transmission of alarm signals to a supervising station shall be in accordance with NFPA 72.

[F] 907.6.6.2 MIY Monitoring.

Direct transmission of alarms associated with monitor it yourself (MIY) transmitters to a public safety answering point (PSAP) shall not be permitted unless approved by the fire code official.

SECTION 908 EMERGENCY ALARM SYSTEMS

[F] 908.3 Fire alarm system interface.

Where an emergency alarm system is interfaced with a building's fire alarm system, the signal produced at the fire alarm control unit shall be a supervisory signal.

SECTION 909

SMOKE CONTROL SYSTEMS

[F] 909.6.1 Minimum pressure difference.

The pressure difference across a *smoke barrier* used to separate smoke zones shall be not less than 0.05-inch water gage (0.0124 kPa) in ~~fully sprinklered~~ buildings equipped throughout with automatic sprinkler systems.

In buildings permitted to ~~be other than fully sprinklered~~ not be equipped throughout with automatic sprinkler systems, the smoke control system shall be designed to achieve pressure differences not less than two times the maximum calculated pressure difference produced by the design fire.

[F] 909.17 System response time.

Smoke-control system activation shall be initiated immediately after receipt of an appropriate automatic or manual activation command. Smoke control systems shall activate individual components (such as *dampers* and fans) in the sequence necessary to prevent physical damage to the fans, dampers, ducts and other equipment. For purposes of smoke control, the fire fighter's control panel response time shall be the same for automatic or manual smoke control action initiated from any other building control point. The total response time, including that necessary for detection, shutdown of operating equipment and smoke control system startup, shall allow for full operational mode to be achieved before the conditions in the space exceed the design smoke condition. Upon receipt of an alarm condition at the fire alarm control panel, fans, dampers and automatic doors shall have achieved their proper operating state and the final status shall be indicated at the smoke control panel within 90 seconds. The system response time for each component and their sequential relationships shall be detailed in the required rational analysis and verification of their installed condition reported in the required final report.

[F] 909.18.3 Dampers

Dampers shall be tested for function in their installed condition in accordance with NFPA 80 and NFPA 105.

909.20 Smokeproof enclosures.

Where required by Section 1023.12, a *smokeproof enclosure* shall be constructed in accordance with this section. A *smokeproof enclosure* shall consist of an *interior exit stairway* or *ramp* that is enclosed in accordance with the applicable provisions of Section 1023 and an open exterior balcony, ~~ventilated vestibule~~ or pressurized stair and pressurized entrance vestibule meeting the requirements of this section. Where access to the roof is required by the *International Fire Code*, such access shall be from the *smokeproof enclosure* where a *smokeproof enclosure* is required.

909.20.1 Access.

Access to the *stairway* or *ramp* shall be by way of a vestibule or an open exterior balcony. The minimum dimension of the vestibule shall be not less than the required clear width of the *corridor* leading to the vestibule but shall not have a width of less than 44 inches (1118 mm) and shall not have a length of less than 72 inches (1829 mm) in the direction of egress travel into the stairway, measured in a straight line between the centerline of the doorways into the vestibule and stairway.

~~909.20.4 Mechanical ventilation alternative.~~

~~The provisions of Sections 909.20.4.1 through 909.20.4.4 shall apply to ventilation of smokeproof enclosures by mechanical means.~~

~~909.20.4.1 Vestibule doors.~~

~~The door assembly from the building into the vestibule shall be a fire door assembly complying with Section 716.2.2.1. The door assembly from the vestibule to the stairway or ramp shall not have less than a 20-minute fire protection rating and shall meet the requirements for a smoke door assembly in accordance with Section 716.2.2.1. The door shall be installed in accordance with NFPA 105.~~

~~909.20.4.2 Vestibule ventilation.~~

~~The vestibule shall be supplied with not less than one air change per minute and the exhaust shall be not less than 150 percent of supply. Supply air shall enter and exhaust air shall discharge from the vestibule through separate, tightly constructed ducts used only for that purpose. Supply air shall enter the vestibule within 6 inches (152 mm) of the floor level. The top of the exhaust register shall be located at the top of the smoke trap but not more than 6 inches (152 mm) down from the top of the trap, and shall be entirely within the smoke trap area. Doors in the open position shall not~~

~~obstruct duct openings. Duct openings with controlling dampers are permitted where necessary to meet the design requirements, but dampers are not otherwise required.~~

~~909.20.4.2.1 Engineered ventilation system.~~

~~Where a specially engineered system is used, the system shall exhaust a quantity of air equal to not less than 90 air changes per hour from any vestibule in emergency operation mode and shall be sized to handle three vestibules simultaneously. Smoke detectors shall be located at the floor side entrance to each vestibule and shall activate the system for the affected vestibule. Smoke detectors shall be installed in accordance with Section 907.3.~~

~~909.20.4.3 Smoke trap.~~

~~The vestibule ceiling shall be not less than 20 inches (508 mm) higher than the door opening into the vestibule to serve as a smoke and heat trap and to provide an upward moving air column. The height shall not be decreased unless approved and justified by design and test.~~

~~909.20.4.4 Stairway or ramp shaft air movement system.~~

~~The stairway or ramp shaft shall be provided with a dampered relief opening and supplied with sufficient air to maintain a minimum positive pressure of 0.10 inch of water (25 Pa) in the shaft relative to the vestibule with all doors closed.~~

~~909.20.5~~ 909.20.4 Stairway and ramp pressurization alternative.

Where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the vestibule is not required, provided that each interior exit stairway or ramp is pressurized to not less than 0.10 inch of water (25 Pa) and not more than 0.35 inches of water (87 Pa) in the shaft relative to the building measured with all interior exit stairway and ramp doors closed under maximum anticipated conditions of stack effect and wind effect.

909.20.5 Pressurized stair and vestibule alternative.

The provisions of Sections 909.20.5.1 through 909.20.5.3 shall apply to smokeproof enclosures using a pressurized stair and pressurized entrance vestibule.

909.20.5.1 Vestibule doors.

The door assembly from the building into the vestibule shall be a fire door assembly complying with Section 716.2.2.1. The door assembly from the vestibule to the stairway shall have not less than a 20-minute fire protection rating and meet the requirements for a smoke door assembly in accordance with Section 716.2.2.1. The door shall be installed in accordance with NFPA 105.

909.20.5.2 Pressure difference.

The stair enclosure shall be pressurized to not less than 0.05 inch of water gage (12.44 Pa) positive pressure relative to the vestibule with all stairway doors closed under the maximum anticipated stack pressures. The vestibule, with doors closed, shall have not less than 0.05 inch of water gage (12.44 Pa) positive pressure relative to the fire floor. The pressure difference across doors shall not exceed 30 pounds (133-N) maximum force to begin opening the door.

909.20.5.3 Dampered relief opening.

A controlled relief vent having the capacity to discharge not less than 2,500 cubic feet per minute (1180 L/s) of air at the design pressure difference shall be located in the upper portion of the pressurized exit enclosure.

909.20.5.4 Smoke detection.

The fan system shall be equipped with a smoke detector that will automatically shut down the fan system when smoke is detected within the system.

~~909.20.7~~ 909.20.6 Ventilating equipment.

The activation of ventilating equipment required by the alternatives in Sections 909.20.4, ~~and~~ 909.20.5 ~~and 909.20.6~~ shall be by smoke detectors installed at each floor level at an *approved* location at the entrance to the *smokeproof enclosure*. When the closing device for the *stairway* and *ramp shaft* and vestibule doors is activated by smoke detection or power failure, the mechanical equipment shall activate and operate at the required performance levels. Smoke detectors shall be installed in accordance with Section 907.3.

909.21 Elevator hoistway pressurization alternative.

Where elevator hoistway pressurization is provided in lieu of required enclosed elevator lobbies, the pressurization system shall comply with Sections 909.21.1 through 909.21.11. The design shall consider the interaction effects of the operation of multiple smoke control systems for all design scenarios in accordance with Section 909.4.7. All components/systems associated with the means of mitigating adverse interaction shall comply with the applicable Sections of 909.

909.21.6 Activation of pressurization system.

The elevator pressurization system shall be activated upon activation of either the building fire alarm system or the elevator lobby smoke detectors. ~~Where both a building fire alarm system and elevator lobby smoke detectors are present, each shall be independently capable of activating the pressurization system.~~

SECTION 910

SMOKE AND HEAT REMOVAL

910.2.1 Group F-1 or S-1.

Smoke and heat vents installed in accordance with Section 910.3 or a mechanical smoke removal system installed in accordance with Section 910.4 shall be installed in buildings and portions thereof used as a Group F-1 or S-1 occupancy having more than 50,000 square feet (4645 m²) of ~~undivided~~ area undivided by draft curtains 4 feet (1.8 m) or greater in depth or walls constructed in accordance with Sections 706, 707, 708, 709, or 710. In occupied portions of a building equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 where the upper surface of the story is not a roof assembly, a mechanical smoke removal system in accordance with Section 910.4 shall be installed.

Exception: Group S-1 aircraft repair hangars.

[F] 910.3.4 Vent operation.

Smoke and heat vents shall be capable of being operated by approved automatic and manual means.

[F] 910.3.5 Fusible link temperature rating.

Where vents are installed in areas provided with automatic fire sprinklers and the vents operate by fusible link, the fusible link shall have a temperature rating of 360°F (182°C).

SECTION 911

FIRE COMMAND CENTER

[F] 911.1 General.

Where required by other sections of this code, ~~and~~ in buildings classified as high-rise buildings by this code and in all F-1 and S-1 occupancies with a building footprint of over 500,000 square feet (46 452 m²), a fire command center for fire department operations shall be provided and shall comply with Sections 911.1.1 through 911.1.7.

[F] 911.1.1 Location and access.

The location and ~~accessibility of~~ access to the fire command center shall be *approved* by the *fire code official*.

[F] 911.1.3 Size.

The fire command center shall be not less than 0.015 percent of the total building area of the facility served or 200 square feet (19 m²) in area, whichever is greater, with a minimum dimension of 0.7 times the square root of the room area or 10 feet (3048 mm), whichever is greater. Where a fire command is required for Group F-1 and S-1 occupancies with a building footprint greater than 500,000 square feet (46 452 m²) in area, the fire command center shall have a minimum size of 96 square feet (9 m²) with a minimum dimension of 8 feet (2348 mm) where approved by the fire code official.

[F] 911.1.6 Required features.

The fire command center shall comply with NFPA 72 and shall contain all of the following features:

1. The emergency voice/alarm communication system control unit.
2. The fire department communications system.

3. Fire detection and alarm system annunciator.
4. Annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air distribution systems.
6. The firefighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Controls for unlocking interior exit stairway doors simultaneously.
8. Sprinkler valve and waterflow detector display panels.
9. Emergency and standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. Fire pump status indicators.
12. Schematic building plans indicating the typical floor plan and detailing the building core, means of egress, fire protection systems, firefighter air replenishment system, firefighting equipment and fire department access and the location of fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions.
13. An approved Building Information Card that contains, but is not limited to, the following information:
 - 13.1 General building information that includes: property name, address, the number of floors in the building above and below grade, use and occupancy classification (for mixed uses, identify the different types of occupancies on each floor), and the estimated building population during the day, night and weekend.
 - 13.2 Building emergency contact information that includes: a list of the building's emergency contacts including but not limited to building manager and building engineer and their respective work phone number, cell phone number, e-mail address.
 - 13.3 Building construction information that includes: the type of building construction including but not limited to floors, walls, columns, and roof assembly.
 - 13.4 Exit access and exit stairway information that includes: number of exit access and exit stairways in the building, each exit access and exit stairway designation and floors served, location where each exit access and exit stairway discharges, interior exit stairways that are pressurized, exit stairways provided with emergency lighting, each exit stairway that allows reentry, exit stairways providing roof access; elevator information that includes: number of elevator banks, elevator bank designation, elevator car numbers and respective floors that they serve; location of elevator machine rooms, control rooms and control spaces; location of sky lobby, location of freight elevator banks.
 - 13.5 Building services and system information that includes: location of mechanical rooms, location of building management system, location and capacity of all fuel oil tanks, location of emergency generator, location of natural gas service.
 - 13.6 Fire protection system information that includes: location of standpipes, location of fire pump room, location of fire department connections, floors protected by automatic sprinklers, location of different types of automatic sprinkler systems installed including, but not limited to, dry, wet and pre-action.
 - 13.7 Hazardous material information that includes: location of hazardous material, quantity of hazardous material.
14. Work table.
15. Generator supervision devices, manual start and transfer features.
16. Public address system, where specifically required by other sections of this code.
17. Elevator fire recall switch in accordance with ASME A17.1/CSA B44.
18. Elevator emergency or standby power selector switch(es), ~~where emergency or standby power is provided. in~~ accordance with ASME A17.1/CSA B44.

[F] 911.1.7 Fire command center identification.

The fire command center shall be identified by a permanent easily visible sign reading "FIRE COMMAND CENTER" located on the door to the fire command center.

SECTION 912 FIRE DEPARTMENT CONNECTIONS

[F] 912.5 Signs.

A metal sign ~~with raised letters not less than 1 inch (25 mm) in size~~ shall be mounted on all fire department connections serving automatic sprinklers, standpipes or fire pump connections. Such signs shall read: "AUTOMATIC SPRINKLERS," ~~or~~ "STANDPIPES," ~~or~~ "TEST CONNECTION," "STANDPIPE AND AUTOSPKR or AUTOSPK AND STANDPIPE," or a combination thereof as applicable. ~~Where the fire department connection does not serve the entire building, a sign shall be provided indicating the portions of the building served.~~

[F] 912.5.1 Lettering.

Each fire department connection (FDC) shall be designated by a sign with raised letters at least 1 inch (25.4mm) in height. For manual standpipe systems, the sign shall also indicate that the system is manual and that it is either wet or dry.

[F] 912.5.2 Serving multiple buildings.

Where a fire department connection (FDC) services multiple buildings, structures or locations, a sign shall be provided indicating the building, structures or locations served. Where the FDC does not serve the entire building, a sign shall be provided indicating the portions of the building served.

[F] 912.5.3 Multiple or combined systems.

Where combination or multiple systems types are supplied by the fire department connection, the sign or combination of signs shall indicate both designated services.

[F] 912.5.4 Indication of pressure.

The sign also shall indicate the pressure required at the outlets to deliver the standpipe system demand.

Exception: The requirements of section 912.5.4 shall not be required Where the pressure required is 150 psi (10.3 bar) or less.

SECTION 913 FIRE PUMPS

[F] 913.1 General.

Where provided, fire pumps for fire protection systems shall be installed in accordance with this section and NFPA 20.

Exception: Pumps for automatic sprinkler systems installed in accordance with Section 903.3.1.3, or Section P2904 of the *International Residential Code*.

[F] 913.2.2 Circuits supplying fire pumps.

Cables used for survivability of circuits supplying fire pumps shall be protected using one of the following methods:

1. Cables used for survivability of required critical circuits shall be *listed* in accordance with UL 2196 and shall have a *fire-resistance rating* of not less than 1 hour.
2. *Electrical circuit protective systems* shall have a *fire-resistance rating* of not less than 1 hour. *Electrical circuit protective systems* shall be installed in accordance with their listing requirements.
3. Construction having a *fire-resistance rating* of not less than 1 hour.
4. The cable or raceway is encased in a minimum of 2 inches (51 mm) of concrete.

Exception: This section shall not apply to cables, or portions of cables, located within a fire pump room or generator room which is separated from the remainder of the occupancy with *fire-resistance-rated* construction.

SECTION 914

EMERGENCY RESPONDER SAFETY FEATURES

[F] 914.1.1 Exterior access to shaftways.

Outside openings ~~accessible~~ with access to the fire department and that open directly on a hoistway or shaftway communicating between two or more floors in a building shall be plainly marked with the word “SHAFTWAY” in red letters not less than 6 inches (152 mm) high on a white background. Such warning signs shall be placed so as to be readily discernible from the outside of the building.

SECTION 917

MASS NOTIFICATION SYSTEMS

[F] 917.2 Group E occupancies.

Prior to construction of a new building containing a Group E occupancy requiring a fire alarm system and having an occupant load of 500 or more, a mass notification risk analysis shall be conducted in accordance with NFPA 72. Where the risk analysis determines a need for mass notification, an approved mass notification system shall be provided in accordance with the findings of the risk analysis.

SECTION 918

EMERGENCY RESPONDER ~~RADIO~~ COMMUNICATION COVERAGE.

[F] 918.1 General.

In-building two-way emergency responder radio communication coverage enhancement systems shall be provided in all new buildings in accordance with Section 510 of the International Fire Code.

Chapter 10 Means of Egress

SECTION 1003

GENERAL MEANS OF EGRESS

1003.3.1 Headroom.

Protruding objects are permitted to extend below the minimum ceiling height required by Section 1003.2 where a minimum headroom of 80 inches (2032 mm) is provided over any circulation paths, including walks, corridors, aisles and passageways. Not more than 50 percent of the ceiling area of a *means of egress* shall be reduced in height by protruding objects.

Exception: ~~Door closers and stops shall not reduce headroom to less than 78 inches (1981 mm).~~ Door closers, overhead door stops, frame stops, power door operators, and electromagnetic door locks shall be permitted to project into the door opening height not lower than 78 inches (1980 mm) minimum above the floor.

A barrier shall be provided where the vertical clearance above a *circulation path* is less than 80 inches (2032 mm) high above the finished floor. The leading edge of such a barrier shall be located 27 inches (686 mm) maximum above the finished floor.

1003.5 Elevation change.

Where changes in elevation of less than 12 inches (305 mm) exist in the means of egress, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (5-percent slope), ramps complying with Section 1012 shall be used. Where the difference in elevation is 6 inches (152 mm) or less, the ramp shall be equipped with either handrails or floor finish materials that contrast with adjacent floor finish materials.

Exceptions:

- ~~A single step with a maximum riser height of 7 inches (178 mm) is permitted for buildings with occupancies in Groups F, H, R-2, R-3, S and U at exterior doors not required to be accessible by Chapter 11.~~ Steps at exterior doors complying with Section 1010.1.4.

2. A stair with a single riser or with two risers and a tread is permitted at locations not required to be accessible by Chapter 11 where the risers and treads comply with Section 1011.5, the minimum depth of the tread is 13 inches (330 mm) and not less than one handrail complying with Section 1014 is provided within 30 inches (762 mm) of the centerline of the normal path of egress travel on the stair.

Throughout a story in a Group I-2 occupancy, any change in elevation in portions of the means of egress that serve nonambulatory persons shall be by means of a ramp or sloped walkway.

TABLE 1004.5
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

Portions of table not shown remain unchanged.

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR ^a
Industrial areas	100 gross
Information technology equipment facilities	300 gross
Institutional areas	

1004.7 Outdoor areas.

Yards, patios, ~~occupied~~ [occupiable](#) roofs, courts and similar outdoor areas accessible to and usable by the building occupants shall be provided with means of egress as required by this chapter. The occupant load of such outdoor areas shall be assigned by the building official in accordance with the anticipated use. Where outdoor areas are to be used by persons in addition to the occupants of the building, and the path of egress travel from the outdoor areas passes through the building, means of egress requirements for the building shall be based on the sum of the occupant loads of the building plus the outdoor areas.

Exceptions:

1. Outdoor areas used exclusively for service of the building need only have one means of egress.
2. Both outdoor areas associated with Group R-3 and individual dwelling units of Group R-2.

1004.8 Concentrated business use areas.

The *occupant load* factor for concentrated business use shall be applied to telephone call centers, trading floors, electronic data ~~entry processing~~ centers and similar business use areas with a higher density of occupants than would normally be expected in a typical business occupancy environment. Where approved by the *building official*, the *occupant load* for concentrated business use areas shall be the actual *occupant load*, but not less than one occupant per 50 square feet (4.65 m²) of gross occupiable floor space.

SECTION 1006

NUMBER OF EXITS AND EXIT ACCESS DOORWAYS

1006.1 General.

The number of exits or exit access doorways required within the means of egress system shall comply with the provisions of Section 1006.2 for spaces, including mezzanines, and Section 1006.3 for stories or ~~occupied~~ [occupiable](#) roofs.

1006.2.1 Egress based on occupant load and common path of egress travel distance.

Two exits or exit access doorways from any space shall be provided where the design occupant load or the common path of egress travel distance exceeds the values listed in Table 1006.2.1. The cumulative occupant load from adjacent rooms, areas or spaces shall be determined in accordance with Section 1004.2.

Exceptions:

1. The number of exits from foyers, lobbies, vestibules or similar spaces need not be based on cumulative occupant loads for areas discharging through such spaces, but the capacity of the exits from such spaces shall be based on applicable cumulative occupant loads.
2. Care suites in Group I-2 occupancies complying with Section 407.4.
3. [Unoccupied mechanical rooms and penthouses are not required to comply with the common path of egress travel distance measurement.](#)

TABLE 1006.2.1

SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

Portions of table not shown remain unchanged.

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Automatic Sprinkler System (feet)		With Automatic Sprinkler System (feet)
		Occupant Load		
		OL ≤ 30	OL > 30	

Footnotes a.-g. remain unchanged and are omitted for clarity.

1006.2.2 Egress based on use.

The numbers, [configuration and types of components](#) of exits or access to exits shall be provided in the uses described in Sections 1006.2.2.1 through 1006.2.2.6.

1006.2.2.2 Refrigeration machinery rooms.

Machinery rooms larger than 1,000 square feet (93 m²) shall have not less than two *exits* or exit access doorways. Where two *exit access doorways* are required, one such doorway is permitted to be served by a fixed ladder or an *alternating tread device*. *Exit access doorways* shall be separated by a horizontal distance equal to one-half the maximum horizontal dimension of the room.

Exit access travel distance shall be determined as specified in Section 1017.1, but all portions of a refrigeration machinery room shall be within 150 feet (45 720 mm) of an exit or exit access doorway where such rooms are not protected by an approved automatic sprinkler system. Egress is allowed through adjoining refrigeration machinery rooms or adjoining refrigerated rooms or spaces.

~~All portions of machinery rooms shall be within 150 feet (45 720 mm) of an exit or exit access doorway. An increase in exit access travel distance is permitted in accordance with Section 1017.1.~~

Exit and exit access doorways shall swing in the direction of egress travel and shall be equipped with panic hardware, regardless of the *occupant load* served. Exit and exit access doorways shall be tight fitting and self-closing.

1006.2.2.4 Group I-4 means of egress.

~~Group I-4 facilities, rooms or spaces where care is provided for more than 10 children that are 21/2 years of age or less, shall have access to not less than two exits or exit access doorways.~~

1006.2.2.4 Electrical rooms.

The location and number of exit or exit access doorways shall be provided for electrical rooms in accordance with Section 110.26 of NFPA 70 for electrical equipment rated 1,000 volts or less, and Section 110.33 of NFPA 70 for electrical equipment rated over 1,000 volts. Panic hardware shall be provided where required in accordance with Section 1010.2.9.2.

1006.3 Egress from stories or ~~occupied~~ occupiable roofs.

~~The means of egress system serving any story or occupied roof shall be provided with the~~ All spaces located on a story or occupiable roof shall have access to the required number of separate and distinct exits or access to exits based on the aggregate occupant load served in accordance with this section. ~~Where stairways serve more than one story, only the occupant load of each story considered individually shall be used in calculating the required number of exits or access to exits serving that story.~~

1006.3.1 Occupant load.

Where stairways serve more than one story, or more than one story and an occupiable roof, only the occupant load of each story or occupiable roof, considered individually, shall be used when calculating the required number of exits or access to exits serving that story.

~~1006.3.1~~ 1006.3.2 Adjacent story. Path of egress travel.

The path of egress travel to an exit shall not pass through more than one adjacent story.

Exception: The path of egress travel to an exit shall be permitted to pass through more than one adjacent story in any of the following:

1. In Group R-1, R-2 or R-3 occupancies, *exit access stairways* and *ramps* connecting four stories or less serving and contained within an individual dwelling unit, sleeping unit or live/work unit.
2. *Exit access stairways* serving and contained within a Group R-3 congregate residence or a Group R-4 facility.
3. *Exit access stairways* and *ramps* within an atrium complying with Section 404.
4. *Exit access stairways* and *ramps* in open parking garages that serve only the parking garage.
5. *Exit access stairways* and *ramps* serving smoke-protected assembly seating and open-air assembly seating complying with the exit access travel distance requirements of Section 1030.7.
6. *Exit access stairways* and *ramps* between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, *places of religious worship*, auditoriums and sports facilities.
7. *Exterior exit access stairways* and *ramps* between occupiable roofs.

~~1006.3.2~~ 1006.3.3 Egress based on occupant load.

Each *story* and ~~occupied~~ occupiable roof shall have the minimum number of separate and distinct *exits*, or access to *exits*, as specified in Table 1006.3.3. A single *exit* or access to a single *exit* shall be permitted in accordance with Section 1006.3.4. The required number of *exits*, or *exit access stairways* or *ramps* providing access to *exits*, from any *story* or ~~occupied~~ occupiable roof shall be maintained until arrival at the *exit discharge* or a *public way*.

~~TABLE 1006.3.2~~ TABLE 1006.3.3

MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS PER STORY OR OCCUPIABLE ROOF

OCCUPANT LOAD PER STORY <u>OR</u> <u>OCCUPIABLE ROOF</u>	MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS FROM <u>PER STORY OR OCCUPIABLE ROOF</u>
1-500	2
501-1,000	3
More than 1,000	4

~~1006.3.3~~ 1006.3.4 Single exits.

A single *exit* or access to a single *exit* shall be permitted from any *story* or ~~occupied~~ occupiable roof where one of the following conditions exists:

1. The *occupant load*, number of *dwelling units* and ~~common path of egress~~ exit access travel distance do not exceed the values in Table 1006.3.4(1) or 1006.3.4(2).
2. Rooms, areas and spaces complying with Section 1006.2.1 with *exits* that discharge directly to the exterior at the *level of exit discharge*, are permitted to have one *exit* or access to a single *exit*.
3. Parking garages where vehicles are mechanically parked shall be permitted to have one *exit* or access to a single *exit*.
4. Group R-3 and R-4 occupancies shall be permitted to have one *exit* or access to a single *exit*.
5. Individual single-story or multistory *dwelling units* shall be permitted to have a single *exit* or access to a single *exit* from the *dwelling unit* provided that both of the following criteria are met:
 - 5.1 The *dwelling unit* complies with Section 1006.2.1 as a space with one *means of egress*.
 - 5.2 Either the exit from the *dwelling unit* discharges directly to the exterior at the *level of exit discharge*, or the *exit access* outside the *dwelling unit's* entrance door provides access to not less than two *approved* independent *exits*.

~~TABLE 1006.3.3(1)~~ TABLE 1006.3.4(1)

STORIES AND OCCUPIABLE ROOFS WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY <u>OR OCCUPIABLE ROOF</u>	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM COMMON PATH OF EGRESS <u>EXIT ACCESS</u> TRAVEL DISTANCE
Basement, first, second or third story above grade plane <u>and occupiable roofs over the first or second story above grade plane</u>	R-2 ^{a, b, c}	4 dwelling units	125 feet
Fourth story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

NA = Not Applicable.

a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1031.

b. This table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, use Table 1006.3.4(2).

c. [This table is for occupied roofs accessed through and serving individual dwelling units in Group R-2 occupancies. For Group R-2 occupancies with occupied roofs that are not access through and serving individual units, use Table 1006.3.4\(2\).](#)

~~TABLE 1006.3.3(2)~~ [TABLE 1006.3.4\(2\)](#)

STORIES [AND OCCUPIABLE ROOFS](#) WITH ONE EXIT OR ACCESS TO ONE EXIT FOR OTHER OCCUPANCIES

STORY AND OCCUPIABLE ROOF	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY AND OCCUPIABLE ROOF	MAXIMUM COMMON PATH-OF-EGRESS EXIT ACCESS TRAVEL DISTANCE (feet)
First story above or below grade plane and occupiable roofs over the first story above grade plane	A, B ^b , E, F ^b , M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R- 1, R-2 ^{a, c}	10	75
	Sb, d	29	75
Second story above grade plane	B, F, M, S ^d	29	75
Third story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

NA = Not Applicable.

a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with *emergency escape and rescue openings* in accordance with Section 1031.

b. Group B, F and S occupancies in buildings equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 [or an occupiable roof of such buildings](#) shall have a maximum *exit access* travel distance of 100 feet.

c. This table is used for R-2 occupancies consisting of *sleeping units*. For R-2 occupancies consisting of *dwelling units*, use Table 1006.3.4(1).

d. The length of *exit access* travel distance in a Group S-2 *open parking garage* shall be not more than 100 feet.

SECTION 1008

MEANS OF EGRESS ILLUMINATION

1008.1 Means of egress illumination.

Illumination shall be provided in the *means of egress* in accordance with Section 1008.2. ~~Under-emergency power~~ [In the event of power supply failure](#), *means of egress* illumination shall comply with Section 1008.3.

1008.2 Illumination required.

The *means of egress* serving a room or space shall be illuminated at all times that the room or space is occupied.

Exceptions:

1. Occupancies in Group U.
2. [Self-service storage units 400 ft \(37.16 m\) or less in area and accessed directly from the exterior of the building.](#)
3. ~~2.~~ Aisle accessways in Group A.
4. ~~3.~~ Dwelling units and sleeping units in Groups R-1, R-2 and R-3.
5. ~~4.~~ Sleeping units of Group I occupancies.

1008.2.1 Illumination level under normal power.

The *means of egress* illumination level shall be not less than 1 footcandle (11 lux) at the walking surface. [Along exit access stairways, exit stairways and at their required landings, the illumination level shall not be less than 10 footcandles \(108 lux\) at the walking surface when the stairway is in use.](#)

Exception: For auditoriums, theaters, concert or opera halls and similar assembly occupancies, the illumination at the walking surface is permitted to be reduced during performances by one of the following methods provided that the required illumination is automatically restored upon activation of a premises' *fire alarm system*:

1. Externally illuminated walking surfaces shall be permitted to be illuminated to not less than 0.2 footcandle (2.15 lux).
2. Steps, landings and the sides of *ramps* shall be permitted to be marked with *self-luminous* materials in accordance with Sections 1025.2.1, 1025.2.2 and 1025.2.4 by systems *listed* in accordance with UL 1994.

~~1008.3~~ [1008.2.4](#) ~~Emergency power~~ **Power** for illumination.

The power supply for *means of egress* illumination shall normally be provided by the premises' electrical supply.

~~1008.3.1 General.~~

~~In the event of power supply failure in rooms and spaces that require two or more exits or access to exits, an emergency electrical system shall automatically illuminate all of the following areas:~~

- ~~1.—Aisles.~~
- ~~2.—Corridors.~~
- ~~3.—Exit access stairways and ramps.~~

~~1008.3.2 Buildings.~~

~~In the event of power supply failure in buildings that require two or more exits or access to exits, an emergency electrical system shall automatically illuminate all of the following areas:~~

- ~~1.—Interior exit access stairways and ramps.~~
- ~~2.—Interior and exterior exit stairways and ramps.~~
- ~~3.—Exit passageways.~~
- ~~4.—Vestibules and areas on the level of discharge used for exit discharge in accordance with Section 1028.2.~~
- ~~5.—Exterior landings as required by Section 1010.1.5 for exit doorways that lead directly to the exit discharge.~~

~~1008.3.3 Rooms and spaces.~~

~~In the event of power supply failure, an emergency electrical system shall automatically illuminate all of the following areas:~~

- ~~1.—Electrical equipment rooms.~~
- ~~2.—Fire command centers.~~

~~3. Fire pump rooms.~~

~~4. Generator rooms.~~

~~5. Public restrooms with an area greater than 300 square feet (27.87 m²).~~

1008.3 Illumination required by an emergency electrical system.

An emergency electrical system shall be provided to automatically illuminate the following areas in the event of a power supply failure:

1. In rooms or spaces that require two or more exits or access to exits:
 - 1.1. Aisles.
 - 1.2. Corridors.
 - 1.3. Exit access stairways and ramps.
2. In buildings that require two or more exits or access to exits:
 - 2.1. Interior exit access stairways and ramps.
 - 2.2. Interior and exterior exit stairways and ramps.
 - 2.3. Exit passageways
 - 2.4. Vestibules and areas on the level of discharge used for exit discharge in accordance with Section 1028.2.
 - 2.5. Exterior landings as required by Section 1010.1.5 for exit doorways that lead directly to the exit discharge.
3. In other rooms and spaces:
 - 3.1. Electrical equipment rooms.
 - 3.2. Fire command centers.
 - 3.3. Fire pump rooms.
 - 3.4. Generator rooms.
 - 3.5. Public restrooms with an area greater than 300 square feet (27.87 m²).

1008.3.4 1008.3.1 Duration.

The emergency power system shall provide power for a duration of not less than 90 minutes and shall consist of storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 2702.

1008.3.5 1008.3.2 Illumination level under emergency power.

Emergency lighting facilities shall be arranged to provide initial illumination that is not less than an average of 1 footcandle (11 lux) and a minimum at any point of 0.1 footcandle (1 lux) measured along the path of egress at floor level. Illumination levels shall be permitted to decline to 0.6 footcandle (6 lux) average and a minimum at any point of 0.06 footcandle (0.6 lux) at the end of the emergency lighting time duration. A maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded. In Group I-2 occupancies, failure of a single lamp in a luminaire shall not reduce the illumination level to less than 0.2 footcandle (2.2 lux).

SECTION 1009

ACCESSIBLE MEANS OF EGRESS

1009.2.1 Elevators required.

In buildings where a required accessible floor ~~or occupied roof~~ is four or more stories above or below a *level of exit discharge* or where an accessible occupiable roof is above a story that is three or more stories above the level of exit discharge, not less than one required *accessible means of egress* shall ~~be~~ include an elevator complying with Section 1009.4.

Exceptions:

1. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required as part of the accessible means of egress on floors provided with a *horizontal exit* and located at or above the *levels of exit discharge*.
2. In buildings equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required as part of an accessible means of egress on floors or occupiable roofs provided with a *ramp* conforming to the provisions of Section 1012.

1009.2.2 Doors.

Where doors are part of an accessible route to provide access to an exit, area of refuge or exterior area of assisted rescue, maneuvering clearances shall be provided at such doors as required by ICC A117.1 in the direction of egress.

Where doors lead to an area of refuge or exterior area for assisted rescue and re-entry to the floor is possible, maneuvering shall be provided on both sides of the door.

Exception: Maneuvering clearances are not required at the exit stairways for levels above and below the level of exit discharge where the exit enclosure does not include an area of refuge.

1009.6.2 Stairway or elevator access.

Every required *area of refuge* shall have *direct access* to a *stairway* complying with Sections 1009.3 and 1023 or an elevator complying with Section 1009.4.

Exception: An interior area of refuge at the level of exit discharge that provides direct access to an exterior exit door.

1009.6.3 Size.

Each area of refuge shall be sized to accommodate one wheelchair space of 30 inches by 48 52 inches (762 mm by 1219 1320 mm) for each 200 occupants or portion thereof, based on the occupant load of the area of refuge and areas served by the area of refuge. Such wheelchair spaces shall not reduce the means of egress minimum width or required capacity. Access to any of the required wheelchair spaces in an area of refuge shall not be obstructed by more than one adjoining wheelchair space.

1009.8.1 System requirements.

Two-way communication systems shall provide communication between each required location and the *fire command center* or a central control point location *approved* by the fire department. Where the central control point is not a *constantly attended location*, ~~a the~~ two-way communication system shall have timed, automatic telephone dial-out capability ~~to a monitoring location that provides two-way communication with an approved supervising station or emergency services. 9-1-1.~~ The two-way communication system shall include both audible and visible signals. Systems shall be listed in accordance with UL 2525 and installed in accordance with NFPA 72.

1009.11 Instructions.

In *areas of refuge*, ~~and~~ exterior areas for assisted rescue, and locations required to provide two-way communications systems complying with Section 1009.8, instructions on the use of the area under emergency conditions shall be posted. Signage shall comply with the ICC A117.1 requirements for visual characters. The instructions shall include all of the following:

1. Persons able to use the *exit stairway* do so as soon as possible, unless they are assisting others.
2. Information on planned availability of assistance in the use of *stairs* or supervised operation of elevators and how to summon such assistance.
3. Directions for use of the two-way communication system where provided.

SECTION 1010

DOORS, GATES AND TURNSTILES

1010.1 ~~Doors~~ General.

~~Means~~ Doors in the means of egress shall comply with the requirements of Sections 1010.1.1 through 1010.3.4. Exterior exit doors shall ~~meet~~ also comply with the requirements of ~~this section. Doors serving~~ Section 1022.2. Gates in the means

~~of egress shall comply with the requirements of Sections 1010.4 and 1010.4.1. Turnstiles in the means of egress-system shall meet comply with the requirements of this-section and Section 1022.2. Doors Sections 1010.5 through 1010.5.4.~~

Doors, gates and turnstiles provided for egress purposes in numbers greater than required by this code shall ~~meet~~ comply with the requirements of this section.

Doors in the Means means of egress ~~doors~~ shall be readily distinguishable from the adjacent construction and finishes such that the doors are easily recognizable as doors. Mirrors or similar reflecting materials shall not be used on *means of egress doors*. *Means of egress doors* shall not be concealed by curtains, drapes, decorations or similar materials.

1010.1.1 Size of doors.

The required capacity of each door opening shall be sufficient for the *occupant load* thereof and shall provide a minimum clear opening width of 32 inches (813 mm). The clear opening width of doorways with swinging doors shall be measured between the face of the door and the frame stop, with the door open 90 degrees (1.57 rad). Where this section requires a minimum clear opening width of 32 inches (813 mm) and a door opening includes two door leaves without a mullion, one leaf shall provide a minimum clear opening width of 32 inches (813 mm). In Group I-2, doors serving as means of egress doors where used for the movement of beds shall provide a minimum clear opening width of 41½ inches (1054 mm). The ~~maximum width of a swinging door leaf shall be 48 inches (1219 mm) nominal. The~~ minimum clear opening height of doors shall be not less than 80 inches (2032 mm).

Exceptions:

1. In Group R-2 and R-3 *dwelling and sleeping units* that are not required to be an *Accessible unit, Type A unit or Type B unit*, the minimum width shall not apply to door openings that are not part of the required *means of egress*.
2. In Group I-3, door openings to resident *sleeping units* that are not required to be an *Accessible unit* shall have a minimum clear opening width of 28 inches (711 mm).
3. Door openings to storage closets less than 10 square feet (0.93 m²) in area shall not be limited by the minimum clear opening width.
- ~~4. The maximum width of door leaves in revolving doors that comply with Section 1010.3.1 shall not be limited.~~
- ~~5. The maximum width of door leaves in power-operated doors that comply with Section 1010.3.2 shall not be limited.~~
4. Door openings within a *dwelling unit or sleeping unit* shall have a minimum clear opening height of 78 inches (1981 mm).
5. In *dwelling and sleeping units* that are not required to be *Accessible, Type A or Type B units*, exterior door openings other than the required *exit door* shall have a minimum clear opening height of 76 inches (1930 mm).
6. In Groups I-1, R-2, R-3 and R-4, in *dwelling and sleeping units* that are not required to be *Accessible, Type A or Type B units*, the minimum clear opening widths shall not apply to interior egress doors.
7. Door openings required to be *accessible* within *Type B units* intended for user passage shall have a minimum clear opening width of 31.75 inches (806 mm).
- ~~8. Doors to walk-in freezers and coolers less than 1,000 square feet (93 m²) in area shall have a maximum width of 60 inches (1524 mm) nominal.~~
- ~~9. The minimum clear opening width shall not apply to doors for nonaccessible shower or sauna compartments. Doors serving nonaccessible single-user shower or sauna compartments, toilet stalls compartments or dressing, fitting or changing rooms compartments that are not required to be accessible shall have a minimum clear opening width of 20 inches (508 mm).~~
8. Doors serving sauna compartments, toilet compartments or dressing, fitting or changing compartments that are not required to be accessible shall have a minimum clear opening width of 20 inches (508 mm).
9. Doors serving shower compartments shall comply with Section 421.4.2 of the International Plumbing Code.
- ~~10. The minimum clear opening width shall not apply to the doors for nonaccessible toilet stalls.~~

1010.1.1.1 Projections into clear ~~width~~ opening.

There shall not be projections into the required clear opening width lower than 34 inches (864 mm) above the floor or ground. Projections into the clear opening width between 34 inches (864 mm) and 80 inches (2032 mm) above the floor or ground shall not exceed 4 inches (102 mm).

Exception: Door closers, overhead door stops, frame stops, power door operators, and electromagnetic door stops shall ~~be permitted to project into the door opening height not lower than~~ be 78 inches (1980 mm) ~~minimum~~ above the floor.

1010.1.2 Door swing Egress door types.

Egress doors shall be of the ~~pivoted or~~ side-hinged swinging type door, pivoted door, or balanced door types.

Exceptions:

1. *Private garages*, office areas, factory and storage areas with an *occupant load* of 10 or less.
2. Group I-3 occupancies used as a place of detention.
3. Critical or intensive care patient rooms within suites of health care facilities.
4. Doors within or serving a single *dwelling unit* in Groups R-2 and R-3.
5. In other than Group H occupancies, revolving doors complying with Section 1010.3.1.
6. In other than Group H occupancies, special purpose horizontal sliding, accordion or folding door assemblies complying with Section 1010.3.3.
7. *Power-operated* doors in accordance with Section 1010.3.2.
8. Doors serving a bathroom within an individual *dwelling unit or sleeping unit* in Group R-1.
9. In other than Group H occupancies, manually operated horizontal sliding doors are permitted in a *means of egress* from spaces with an *occupant load* of 10 or less.

1010.1.2.1 Direction of swing.

~~Pivot or side~~ Side-hinged swinging doors, pivoted doors and balanced doors shall swing in the direction of egress travel where serving a room or area containing an occupant load of 50 or more persons or a Group H occupancy.

1010.1.3 Door opening force

~~The force for pushing or pulling open interior swinging egress doors, other than fire doors, shall not exceed 5 pounds (22 N). These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. For other swinging doors, as well as sliding and folding doors, the door latch shall release when subjected to a 15-pound (67 N) force. The door shall be set in motion when subjected to a 30-pound (133 N) force. The door shall swing to a full open position when subjected to a 15-pound (67 N) force.~~

1010.1.3 Forces to unlatch and open doors.

The forces to unlatch doors shall comply with the following:

1. Where door hardware operates by push or pull, the operational force to unlatch the door shall not exceed 15 pounds (67 N).
2. Where door hardware operates by rotation, the operational force to unlatch the door shall not exceed 28 inch-pounds (315 N-cm).

The force to open doors shall comply with the following:

1. For interior swinging egress doors that are manually operated, other than doors required to be fire rated, the force for pushing or pulling open the door shall not exceed 5 pounds (22 N).
2. For other swinging doors, sliding doors or folding doors, and doors required to be fire rated, the door shall require not more than a 30-pound (133 N) force to be set in motion and shall move to a full-open position when subjected to not more than a 15-pound (67 N) force.

1010.1.3.2 Manual horizontal sliding doors.

Where a manual horizontal sliding door is required to latch, the latch or other mechanism shall prevent the door from rebounding into a partially open position when the door is closed.

~~1010.1.5~~ 1010.1.4 Floor elevation.

There shall be a floor or landing on each side of a door. Such floor or landing shall be at the same elevation on each side of the door. Landings shall be level except for exterior landings, which are permitted to have a slope not to exceed 0.25 unit vertical in 12 units horizontal (2-percent slope).

Exceptions:

- ~~1. Doors~~ At doors serving individual dwelling units or sleeping units in Groups R-2 and R-3 ~~where the following apply: 1.1~~ Aa door is permitted to open at the top step of an interior flight of stairs, provided that the door does not swing over the top step.
- ~~1. Screen doors and storm doors are permitted to swing over stairs or landings.~~
- ~~2. Exterior doors as provided for in Section 1003.5, Exception 1, and Section 1022.2, which are not on an accessible route.~~
2. At exterior doors serving Groups F, H, R-2 and S and where such doors are not part of an accessible route, the landing at an exterior door shall not be more than 7 inches (178 mm) below the landing on the egress side of the door, provided the door, other than an exterior storm or screen door, does not swing over the landing.
- ~~3. In Group R-3 occupancies~~ At exterior doors serving Group U and individual dwelling units and sleeping units in Group R-2 and R-3, and where such units are not required to be Accessible units, Type A units or Type B units, the landing at an exterior doorway shall be not more than 7¾ inches (197 mm) below the landing on the top egress side of the ~~threshold, provided the door, other than an exterior door. Such doors, including~~ storm or screen door, ~~does not shall be permitted to~~ swing over ~~the either~~ landing.
4. Variations in elevation due to differences in finish materials, but not more than ½ inch (12.7 mm).
5. Exterior decks, patios or balconies that are part of Type B dwelling units or sleeping units, that have impervious surfaces and that are not more than 4 inches (102 mm) below the finished floor level of the adjacent interior space of the dwelling unit or sleeping unit.
6. Doors serving equipment spaces not required to be accessible in accordance with Section 1103.2.9 and serving an occupant load of five or less shall be permitted to have a landing on one side to be not more than 7 inches (178 mm) above or below the landing on the egress side of the door.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1010.1.6~~ 1010.1.5 Landings at doors.

~~1010.1.7~~ 1010.1.6 Thresholds.

~~1010.1.8~~ 1010.1.7 Door arrangement.

~~1010.1.9~~ 1010.2 Door operations.

~~1010.1.9.6~~ 1010.2.1 Unlatching.

The unlatching of any door or leaf for egress shall require not ~~require~~ more than one ~~operation~~ motion in a single linear or rotational direction to release all latching and all locking devices. Manual bolts are not permitted.

Exceptions:

1. Places of detention or restraint.
- ~~2. Where manually operated bolt locks are permitted by Section 1010.2.5.~~
- ~~3. Doors with automatic flush bolts as permitted by Section 1010.2.4, Item 4.~~
2. Doors with manual bolts, automatic flush bolts and constant latching bolts as permitted by Section 1010.2.4, Item 4.
3. Doors from individual dwelling units and sleeping units of Group R occupancies as permitted by Section 1010.2.4, Item 4-5.

~~1010.1.9.1~~ 1010.2.2 Hardware.

Door handles, pulls, latches, locks and other operating devices on doors required to be accessible by Chapter 11 shall not require tight grasping, tight pinching or twisting of the wrist to operate.

[NY] ~~1010.1.9.2~~ 1010.2.3 Hardware height.

Door handles, pulls, latches, locks and other operating devices shall be installed 34 inches (864 mm) minimum and 48 inches (1219 mm) maximum above the finished floor. ~~Locks used only for security purposes and not used for normal operation are permitted at any height.~~

Exceptions: ~~Exception:~~

~~Access doors or gates in barrier walls and fences protecting pools, spas and hot tubs shall be permitted to have operable parts of the latch release on self-latching devices at 54 inches (1370 mm) maximum above the finished floor or ground, provided that the self-latching devices are not also self-locking devices operated by means of a key, electronic opener or integral combination lock.~~

1. Locks used only for security purposes and not used for normal operation are permitted at any height.

~~1010.1.9.4~~ 1010.2.4 Locks and latches.

Locks and latches shall be permitted to prevent operation of doors where any of the following exist:

1. Places of detention or restraint.

2. In Group I-1, Condition 2 and Group I-2 occupancies where the clinical needs of persons receiving care require containment or where persons receiving care pose a security threat, provided that all clinical staff can readily unlock doors at all times, and all such locks are keyed to keys carried by all clinical staff at all times or all clinical staff have the codes or other means necessary to operate the locks at all times.

~~2.3.~~ In buildings in occupancy Group A having an *occupant load* of 300 or less, Groups B, F, M and S, and in *places of religious worship*, the main door or doors are permitted to be equipped with key-operated locking devices from the egress side provided:

~~2.1.3.1.~~ The doors are the main exterior doors to the building, or the doors are the main doors to the tenant space.

~~2.2.3.2.~~ The locking device is readily distinguishable as locked.

~~2.3.3.3.~~ A readily visible durable sign is posted on the egress side on or adjacent to the door stating: THIS DOOR TO REMAIN UNLOCKED WHEN THIS SPACE IS OCCUPIED. The sign shall be in letters 1 inch (25 mm) high on a contrasting background.

3.4. The use of the key-operated locking device is revocable by the *building official* for due cause.

~~3.4. Where egress doors are used in pairs, approved automatic flush bolts shall be permitted to be used, provided that the door leaf having the automatic flush bolts does not have a doorknob or surface-mounted hardware. Manual bolts, automatic flush bolts, and constant latching bolts on the inactive leaf of a pair of doors in accordance with Table 1010.2.4, provided the inactive leaf does not have a doorknob, panic hardware, or similar operating hardware.~~

~~4.5. Doors from individual dwelling or sleeping units of Group R occupancies having an occupant load of 10 or less are permitted to be equipped with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool. Single exit doors complying with Section 1006.2.1 or 1006.3.4 from individual dwelling or sleeping units of Group R occupancies and equipped with a night latch, dead bolt or security chain that requires a second releasing motion, provided that such devices are openable from the inside without the use of a key or tool.~~

~~5.6.~~ Fire doors after the minimum elevated temperature has disabled the unlatching mechanism in accordance with *listed fire door* test procedures.

~~6. 7.~~ Doors serving roofs not intended to be occupied shall be permitted to be locked preventing entry to the building from the roof.

8. Other than egress courts, where occupants must egress from an exterior space through the building for means of egress, exit access doors shall be permitted to be equipped with an approved locking device where installed and operated in accordance with all of the following:

8.1. The maximum occupant load shall be posted where required by Section 1004.9. Such signage shall be permanently affixed inside the building and shall be posted in a conspicuous space near all the exit access doorways.

8.2. A weatherproof telephone or two-way communication system installed in accordance with Sections 1009.8.1 and 1009.8.2 shall be located adjacent to not less than one required exit access door on the exterior side.

8.3. The egress door locking device is readily distinguishable as locked and shall be a key-operated locking device.

8.4. A clear window or glazed door opening, not less than 5 square feet (0.46 m²) in area, shall be provided at each exit access door to determine if there are occupants using the outdoor area.

8.5. A readily visible, durable sign shall be posted on the interior side on or adjacent to each locked required exit access door serving the exterior area stating, "THIS DOOR TO REMAIN UNLOCKED WHEN THE OUTDOOR AREA IS OCCUPIED." The letters on the sign shall be not less than 1 inch (25.4 mm) high on a contrasting background.

8.6. The *occupant load* of the occupied exterior area shall not exceed 300 occupants in accordance with Section 1004.

9. Locking devices are permitted on doors to balconies, decks or other exterior spaces serving individual dwelling or sleeping units.

10. Locking devices are permitted on doors to balconies, decks or other exterior spaces of 250 square feet (23.23 m²) or less serving a private office space.

TABLE 1010.2.4

MANUAL BOLTS, AUTOMATIC FLUSH BOLTS AND CONSTANT LATCHING BOLTS ON THE INACTIVE LEAF OF A PAIR OF DOORS

<u>APPLICATION WITH A PAIR OF DOORS WITH AN ACTIVE LEAF AND AN INACTIVE LEAF</u>	<u>THE PAIR OF DOORS IS REQUIRED TO COMPLY WITH SECTION 716</u>	<u>PERMITTED USES OF MANUAL BOLTS, AUTOMATIC FLUSH BOLTS AND CONSTANT LATCHING BOLTS ON THE INACTIVE LEAF OF A PAIR OF DOORS.</u>		
		<u>Surface- or flush-mounted manual bolts</u>	<u>Automatic flush bolts</u>	<u>Constant latching bolts</u>
<u>Group B, F or S occupancies with occupant load less than 50.</u>	<u>No</u>	<u>P</u>	<u>P</u>	<u>P</u>
	<u>Yes</u>	<u>NP</u>	<u>NP^b</u>	<u>P</u>
<u>Group B, F or S occupancies where the building is equipped with an automatic sprinkler system in accordance with Section 903.3.1.1 and the inactive leaf is not needed to meet egress capacity requirements.</u>	<u>No</u>	<u>P</u>	<u>P</u>	<u>P</u>
	<u>Yes</u>	<u>NP</u>	<u>NP^b</u>	<u>P</u>
<u>Group I-2 patient care and sleeping rooms where inactive leaf is not needed to meet egress capacity requirements.</u>	<u>No</u>	<u>NP</u>	<u>NP^b</u>	<u>P</u>
	<u>Yes</u>	<u>NP</u>	<u>NP^b</u>	<u>P</u>
<u>Any occupancy where panic hardware is not required, egress doors are used in pairs, and where both leaves are required to meet egress capacity requirements.</u>	<u>No</u>	<u>NP</u>	<u>P</u>	<u>NP</u>
	<u>Yes</u>	<u>NP</u>	<u>NP^b</u>	<u>NP</u>
<u>Storage or equipment rooms where the inactive leaf is not needed to meet egress capacity requirements.</u>	<u>No</u>	<u>P^a</u>	<u>P</u>	<u>P</u>
	<u>Yes</u>	<u>P^a</u>	<u>P</u>	<u>P</u>

P - Permitted; NP - Not permitted.

- a. Not permitted on corridor doors in Group I-2 occupancies where corridor doors are required to be positive latching.
- b. Permitted where both doors are self-closing or automatic-closing and are provided with a coordinator that causes the inactive leaf to be closed prior to the active leaf.

~~1010.1.9.5 Bolt locks.~~

~~Manually operated flush bolts or surface bolts are not permitted.~~

~~Exceptions:~~

- ~~1. On doors not required for egress in individual dwelling units or sleeping units.~~
- ~~2. Where a pair of doors serves a storage or equipment room, manually operated edge or surface mounted bolts are permitted on the inactive leaf.~~
- ~~3. Where a pair of doors serves an occupant load of less than 50 persons in a Group B, F or S occupancy, manually operated edge or surface mounted bolts are permitted on the inactive leaf. The inactive leaf shall not contain doorknobs, panic bars or similar operating hardware.~~
- ~~4. Where a pair of doors serves an occupant load of less than 50 persons in a Group B, F or S occupancy, manually operated edge or surface mounted bolts are permitted on the inactive leaf provided that such inactive leaf is not needed to meet egress capacity requirements and the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. The inactive leaf shall not contain doorknobs, panic bars or similar operating hardware.~~
- ~~5. Where a pair of doors serves patient care rooms in Group I-2 occupancies, self latching edge or surface mounted bolts are permitted on the inactive leaf provided that the inactive leaf is not needed to meet egress capacity requirements and the inactive leaf shall not contain doorknobs, panic bars or similar operating hardware.~~

~~1010.1.9.6.1~~ 1010.2.5 Closet doors.

Closet doors that latch in the closed position shall be openable from inside the closet.

~~1010.1.9.12~~ 1010.2.6 Stairway doors.

Interior *stairway* means of egress doors shall be openable from both sides without the use of a key or special knowledge or effort.

Exceptions:

1. Stairway discharge doors shall be openable from the egress side and shall only be locked from the opposite side.
2. This section shall not apply to doors arranged in accordance with Section 403.5.3.
3. Stairway exit doors ~~are permitted to~~ shall not be locked from the side opposite the egress side, provided that they are openable from the egress side and capable of being unlocked simultaneously without unlatching ~~upon~~ by any of the following methods:
 - 3.1. Shall be capable of being unlocked individually or simultaneously upon a ~~A~~ signal from the fire command center, ~~if~~ where present, or a signal by emergency personnel from a single location inside the main entrance to the building.
 - 3.2. Shall unlock simultaneously upon activation of a fire alarm signal when a fire alarm system is present in an area served by the stairway.
 - 3.3. Shal unlock upon failure of the power supply to the electric lock or the locking system.
4. Stairway exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group B, F, M and S occupancies where the only interior access to the tenant space is from a single exit stairway where permitted in Section 1006.3.4.

5. ~~Stairway~~ exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group R-2 occupancies where the only interior access to the *dwelling unit* is from a single exit *stairway* where permitted in Section 1006.3.4.

~~1010.1.4.4~~ 1010.2.7 Locking arrangements in educational occupancies.

In Group E ~~and~~ occupancies, Group B educational occupancies and Group I-4 occupancies, egress doors from classrooms, offices and other occupied rooms ~~shall be permitted to be provided~~ with locking arrangements designed to keep intruders from entering the room ~~where~~ shall comply with all of the following conditions ~~are met~~:

1. The door shall be capable of being unlocked from outside the room with a key or other *approved* means.
2. The door shall be openable from within the room in accordance with Section 1010.2.
3. Modifications shall not be made to listed *panic hardware*, *fire door* hardware or door closers.

4. Modifications to fire door assemblies shall be in accordance with NFPA 80.

Remote locking or unlocking of doors from an approved location shall be permitted in addition to the unlocking operation in Item 1.

~~1010.1.4.4.1 Remote operation of locks.~~

~~Remote operation of locks complying with Section 1010.1.4.4 shall be permitted.~~

~~1010.1.10~~ 1010.2.8 Panic and fire exit hardware.

Swinging doors serving a Group H occupancy and swinging doors serving rooms or spaces with an *occupant load* of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock other than *panic hardware* or *fire exit hardware*.

Exceptions:

1. A main exit of a Group A occupancy shall be permitted to have locking devices in accordance with Section 1010.2.4, Item ~~2-3~~.
2. Doors provided with *panic hardware* or *fire exit hardware* and serving a Group A or E occupancy shall be permitted to be electrically locked in accordance with Section 1010.2.11 ~~or 1010.2.12~~.
3. Exit access doors serving occupied exterior areas shall be permitted to be locked in accordance with Section 1010.2.4, Item 8.
4. Courtrooms shall be permitted to be locked in accordance with Section 1010.2.13, Item 3.

~~Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet (1829 mm) wide, and that contain overcurrent devices, switching devices or control devices with exit or exit access doors, shall be equipped with panic hardware or fire exit hardware. The doors shall swing in the direction of egress travel.~~

1010.2.8.1 Refrigeration machinery room.

Refrigeration machinery rooms larger than 1,000 square feet (93 m²) shall have not less than two exit or exit access doorways that swing in the direction of egress travel and shall be equipped with *panic hardware* or *fire exit hardware*.

1010.2.8.2 Rooms with electrical equipment.

Exit or exit access doors serving transformer vaults, rooms designated for batteries or energy storage systems, or modular *data centers* shall be equipped with *panic hardware* or *fire exit hardware*. Rooms containing electrical equipment rated 800 amperes or more that contain overcurrent devices, switching devices or control devices and where the exit or exit access door is less than 25 feet (7620 mm) from the equipment working space as required by NFPA 70, such doors shall not be provided with a latch or lock other than *panic hardware* or *fire exit hardware*. The doors shall swing in the direction of egress travel.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1010.1.10.1~~ 1010.2.8.3 Installation.

~~1010.1.10.2~~ 1010.2.8.4 Balanced doors.

~~1010.1.9.3~~ 1010.2.9 Monitored or recorded egress, and access control systems.

Where electrical systems that monitor or record egress activity are incorporated, or where the door has an access control system, the locking system on the egress side of the door shall comply with Section ~~1010.1.9.7, 1010.1.9.8, 1010.1.9.9, 1010.1.9.10, or 1010.1.9.11,~~ 1010.2.12, 1010.2.13, 1010.2.14 or 1010.2.15 or shall be readily openable from the egress side without the use of a key or special knowledge or effort.

~~1010.1.9.10~~ 1010.2.10 Door hardware release of electrically locked egress doors.

Door hardware release ~~of electric~~ electrical locking systems shall be permitted on doors in the *means of egress* in any occupancy except Group H where installed and operated in accordance with all of the following:

1. The door hardware that is affixed to the door leaf has an obvious method of operation that is readily operated under all lighting conditions.
2. The door hardware is capable of being operated with one hand and shall comply with Section 1010.2.1.
3. Operation of the door hardware directly interrupts the power to the electric lock and unlocks the door immediately.
4. Loss of power to the electrical locking system automatically unlocks the ~~door~~ electric lock.
5. Where *panic* or *fire exit hardware* is required by Section 1010.2.9, operation of the *panic* or *fire exit hardware* also releases the electric lock.
6. The electromechanical or electromagnetic locking device ~~system-units~~ shall be *listed* in accordance with either UL 294 or UL1034.

~~1010.1.9.9~~ 1010.2.11 Sensor release of electrically locked egress doors.

Sensor release ~~of electric~~ electrical locking systems shall be permitted on doors located in the *means of egress* in any occupancy except Group H where installed and operated in accordance with all of the following criteria:

1. The sensor shall be installed on the egress side, arranged to detect an occupant approaching the doors, and shall cause the electrical locking system to unlock the electric lock.
2. ~~The electric locks shall be arranged to unlock by a signal from or loss of power to the sensor. Upon a signal from a sensor or loss of power to the sensor, the electrical locking system shall unlock the electric lock.~~
3. Loss of power to the electric lock or electrical locking system shall automatically unlock the electric locks.
4. The doors shall be arranged to unlock the electric lock from a manual unlocking device located 40 inches to 48 inches (1016 mm to 1219 mm) vertically above the floor and within 5 feet (1524 mm) of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads "PUSH TO EXIT." When operated, the manual unlocking device shall result in direct interruption of power to the electric lock—*independent of other electronics*—and the electric lock shall remain unlocked for not less than 30 seconds.
5. Activation of the building *fire alarm system*, where provided, shall automatically unlock the electric lock, and the electric lock shall remain unlocked until the *fire alarm system* has been reset.
6. Activation of the building *automatic sprinkler system* or fire detection system, where provided, shall automatically unlock the electric lock. The electric lock shall remain unlocked until the *fire alarm system* has been reset.
7. Emergency lighting shall be provided on the egress side of the door.
8. The ~~door locking system-units~~ electromechanical or electromagnetic locking device shall be *listed* in accordance with either UL 294 or UL 1034.

~~1010.1.9.8~~ 1010.2.12 Delayed egress.

Delayed egress electrical locking systems shall be permitted ~~to be installed~~ on doors in the means of egress serving the following occupancies in *buildings* that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved automatic smoke or heat detection system* installed in accordance with Section 907.

1. Group B, F, I, M, R, S and U occupancies.
2. Group E classrooms with an occupant load of less than 50.

3. In courtrooms in Group A-3 and B occupancies, delayed egress electrical locking systems shall be permitted to be installed on exit or exit access doors, other than the main exit or exit access door, in buildings that are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

~~Exception: Delayed egress locking systems shall be permitted to be installed on exit or exit access doors, other than the main exit or exit access door, serving a courtroom in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.~~

~~1010.1.9.8.1~~ 1010.2.12.1 Delayed egress locking system.

The delayed egress electrical locking system shall be installed and operated in accordance with all of the following:

1. The delay ~~electronics~~ of the delayed egress electrical locking system shall deactivate upon actuation of the *automatic sprinkler system* or *automatic fire detection system*, allowing immediate free egress.
2. The delay ~~electronics~~ of the delayed egress electrical locking system shall deactivate upon loss of power ~~controlling to the lock~~ electrical locking system or electrical ~~lock mechanism~~, allowing immediate free egress.
3. The delay of the delayed egress electrical locking system shall have the capability of being deactivated at the *fire command center* and other *approved* locations.
4. An attempt to egress shall initiate an irreversible process that shall allow such egress in not more than 15 seconds when a physical effort to exit is applied to the egress side door hardware for not more than 3 seconds. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the delay ~~electronics have~~ has been deactivated, rearming the delay electronics shall be by manual means only.

Exception: Where *approved*, a delay of not more than 30 seconds is permitted on a delayed egress door.

5. The egress path from any point shall not pass through more than one delayed egress locking system.

Exceptions:

1. In Group I-1, Condition 2, Group I-2 or I-3 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided that the combined delay does not exceed 30 seconds.
 2. In Group I-1, Condition 1 or Group I-4 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided the combined delay does not exceed 30 seconds and the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
6. A sign shall be provided on the door and shall be located above and within 12 inches (305 mm) of the door exit hardware.

Exception: Where *approved*, in Group I occupancies, the installation of a sign is not required where care recipients who because of clinical needs require restraint or containment as part of the function of the treatment area.

6.1 For doors that swing in the direction of egress, the sign shall read, "PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS."

6.2 For doors that swing in the opposite direction of egress, the sign shall read, "PULL UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS."

6.3 The sign shall comply with the visual character requirements in ICC A117.1.

7. Emergency lighting shall be provided on the egress side of the door.

8. The ~~delayed egress locking system units~~ electro-mechanical or electromagnetic locking device shall be *listed* in accordance with either UL 294 or UL 1034.

~~1010.1.9.7~~ 1010.2.13 Controlled egress doors in Groups I-1 and I-2.

~~Electric~~ Controlled egress electrical locking systems, ~~including electro-mechanical locking systems and electromagnetic locking systems,~~ where egress is controlled by authorized personnel, shall be permitted ~~to be locked on doors~~ in the *means of egress* in Group I-1 or I-2 occupancies where the clinical needs of persons receiving care require their containment. Controlled egress doors shall be permitted in such occupancies where the building is equipped throughout with an

automatic sprinkler system in accordance with Section 903.3.1.1 or an *approved automatic smoke or heat detection* system installed in accordance with Section 907, provided that the doors are installed and operate in accordance with all of the following:

1. The door's *electric* locks shall unlock on actuation of the *automatic sprinkler system* or *automatic fire smoke detection system allowing immediate free egress*.
2. The door's *electric* locks shall unlock on loss of power *controlling to* the *lock electrical locking system* or *to the electric lock mechanism allowing immediate free egress*.
3. The ~~door~~ *electrical* locking system shall be installed to have the capability of *being unlocked unlocking the electric locks* by a switch located at the *fire command center*, a nursing station or other *approved* location. The switch shall directly break power to the *electric* lock.
4. A building occupant shall not be required to pass through more than one door equipped with a controlled egress locking system before entering an *exit*.
5. The procedures for unlocking the doors shall be described and *approved* as part of the emergency planning and preparedness required by Chapter 4 of the International Fire Code.
6. All clinical staff shall have the keys, codes or other means necessary to operate the *controlled egress electrical* locking systems.
7. Emergency lighting shall be provided at the door.
8. The ~~door locking system units~~ *electro-mechanical or electromagnetic locking device* shall be *listed* in accordance with *either* UL 294 *or* UL 1034.

Exceptions:

1. Items 1 through 4 shall not apply to doors to areas occupied by persons who, because of clinical needs, require restraint or containment as part of the function of a psychiatric *or cognitive treatment area*.
2. Items 1 through 4 shall not apply to doors to areas where a *listed* egress control system is utilized to reduce the risk of child abduction from nursery and obstetric areas of a Group I-2 *hospital*.

1010.2.14 Elevator lobby exit access doors.

Electrically locked exit access doors providing egress from elevator lobbies shall meet the following conditions:

1. For all occupants of the floor, the path of exit access travel to not less than two exits is not required to pass through the elevator lobby.
2. The building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, and a fire alarm system in accordance with Section 907. Elevator lobbies shall be provided with an automatic smoke detection system in accordance with Section 907.
3. Upon activation of the building fire alarm system by means other than a manual fire alarm box shall automatically unlock the electric locks providing exit access from the elevator lobbies, and the electric locks shall remain unlocked until the fire alarm system is reset.
4. The electric locks shall unlock on loss of power to the electric locks or electrical locking system.
5. The electric locks shall have the capability of being unlocked by a switch located at the fire command center, security station or other approved location.
6. A two-way communication system complying with Sections 1009.8.1 and 1009.8.2, shall be located in the elevator lobby adjacent to the electrically locked exit access door and connected to an approved constantly attended station. This constantly attended station shall have the capability of unlocking the electric locks of the elevator lobby exit access doors.
7. Emergency lighting shall be provided in the elevator lobby on both sides of the electrically locked door.
8. The electromechanical or electromagnetic locking device shall be listed in accordance with either UL 294 or UL 1034.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1010.1.9.11~~ **1010.2.15** Locking arrangements in buildings within correctional facilities.

~~1010.1.4~~ **1010.3** Special doors.

~~1010.1.4.1~~ 1010.3.1 Revolving doors.

Revolving doors shall comply with the following:

1. Revolving doors shall comply with BHMA A156.27 and shall be installed in accordance with the manufacturer's instructions.
2. Each revolving door shall be capable of *breakout* in accordance with BHMA A156.27 and shall provide an aggregate width of not less than 36 inches (914 mm).
3. A revolving door shall not be located within 10 feet (3048 mm) of the foot or top of *stairways* or escalators. A dispersal area shall be provided between the *stairways* or escalators and the revolving doors.
4. The revolutions per minute (rpm) for a revolving door shall not exceed the maximum rpm as specified in BHMA A156.27. Manual revolving doors shall comply with Table 1010.3.1(1). Automatic or *power-operated* revolving doors shall comply with Table 1010.3.1(2).
5. An emergency stop switch shall be provided near each entry point of power or automatic operated revolving doors within 48 inches (1219 mm) of the door and between ~~24~~ 34 inches (~~610~~ 864 mm) and 48 inches (1219 mm) above the floor. The activation area of the emergency stop switch button shall be not less than 1 inch (25 mm) in diameter and shall be red.
6. Each revolving door shall have a side-hinged swinging door that complies with Section 1010.1 in the same wall and within 10 feet (3048 mm) of the revolving door.
7. Revolving doors shall not be part of an *accessible route* required by Section 1009 and Chapter 11.

TABLE ~~1010.1.4.1(1)~~ 1010.3.1(1)

MAXIMUM DOOR SPEED MANUAL REVOLVING DOORS

Portions of table not shown remain unchanged.

TABLE ~~1010.1.4.1~~ 1010.3.1(2)

MAXIMUM DOOR SPEED AUTOMATIC OR POWER-OPERATED REVOLVING DOORS

Portions of table not shown remain unchanged.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1010.1.4.1.1~~ 1010.3.1.1 Egress component.

~~1010.1.4.1.2~~ 1010.3.1.2 Other than egress component.

~~1010.1.4.2~~ 1010.3.2 Power-operated doors.

~~1010.1.4.3~~ 1010.3.3 Special purpose horizontal sliding, accordion or folding doors.

In other than Group H occupancies, special purpose horizontal sliding, accordion or folding door assemblies permitted to be a component of a *means of egress* in accordance with Exception 6 to Section 1010.1.2 shall comply with all of the following criteria:

1. The doors shall be power operated and shall be capable of being operated manually in the event of power failure.
2. The doors shall be openable by a simple method ~~from both sides~~ without special knowledge ~~or effort~~ or effort from the egress side or sides.
3. The force required to operate the door shall not exceed 30 pounds (133 N) to set the door in motion and 15 pounds (67 N) to close the door or open it to the minimum required width.

4. The door shall be openable with a force not to exceed 15 pounds (67 N) when a force of 250 pounds (1100 N) is applied perpendicular to the door adjacent to the operating device.
5. The door assembly shall comply with the applicable *fire protection rating* and, where rated, shall be *self-closing* or automatic closing by smoke detection in accordance with Section 716.2.6.6, shall be installed in accordance with NFPA 80 and shall comply with Section 716.
6. The door assembly shall have an integrated standby power supply.
7. The door assembly power supply shall be electrically supervised.
8. The door shall open to the minimum required width within 10 seconds after activation of the operating device

~~1010.1.4.5~~ **1010.3.4 Security grilles.**

In Groups B, F, M and S, horizontal sliding or vertical security grilles are permitted at the main exit and shall be openable from the inside without the use of a key or special knowledge or effort during periods that the space is occupied. The grilles shall remain secured in the full-open position during the period of occupancy by the general public. Where two or more ~~means of egress~~ exits or access to exits are required, not more than one-half of the *exits* or *exit access doorways* shall be equipped with horizontal sliding or vertical security grilles.

~~1010.2~~ **1010.4 Gates.**

Gates serving the *means of egress* system shall comply with the requirements of this section. Gates used as a component in a *means of egress* shall conform to the applicable requirements for doors.

~~**Exception:** Horizontal sliding or swinging gates exceeding the 4-foot (1219 mm) maximum leaf width limitation are permitted in fences and walls surrounding a stadium.~~

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1010.2.1~~ **1010.4.1 Stadiums.**

~~1010.3~~ **1010.5 Turnstiles and similar devices.**

~~1010.3.1~~ **1010.5.1 Capacity.**

~~1010.3.1.1~~ **1010.5.1.1 Clear width.**

~~1010.3.2~~ **1010.5.2 Security access turnstiles.**

Security access turnstiles that inhibit travel in the direction of egress utilizing a physical barrier shall be permitted to be considered as a component of the *means of egress*, provided that all of the following criteria are met:

1. The *building* is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 903.3.1.1.
2. Each security access turnstile lane configuration has a minimum clear passage width of 22 inches (559 mm).
3. Any security access turnstile lane configuration providing a clear passage width of less than 32 inches (810 mm) shall be credited with a maximum egress capacity of 50 persons.
4. Any security access turnstile lane configuration providing a clear passage width of 32 inches (810 mm) or more shall be credited with a maximum egress capacity as calculated in accordance with Section 1005.
5. Each secured physical barrier shall automatically retract or swing to an unobstructed open position in the direction of egress, under each of the following conditions:
 - 5.1. Upon loss of power to the turnstile or any part of the access control system that secures the physical barrier.
 - 5.2. Upon actuation of a clearly identified manual release device with ready access that results in direct interruption of power to each secured physical barrier, after which such barriers remain in the open position for not less than 30 seconds. The manual release device shall be positioned at one of the following locations:
 - 5.2.1. On the egress side of each security access turnstile lane.

5.2.2. At an approved location where it can be actuated by an employee assigned to the area at all times that the building is occupied.

5.3. Upon actuation of the building fire alarm system, if provided, after which the physical barrier remains in the open position until the fire alarm system is manually reset.

Exception: Actuation of a *manual fire alarm box*.

5.4. Upon actuation of the *building automatic sprinkler system* or fire detection system, after which the physical barrier remains in the open position until the *fire alarm system* is manually reset.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1010.3.3~~ [1010.5.3](#) High turnstile.

~~1010.3.4~~ [1010.5.4](#) Additional door.

SECTION 1011 STAIRWAYS

1011.2 Width and capacity.

The required capacity of *stairways* shall be determined as specified in Section 1005.1, but the minimum width shall be not less than 44 inches (1118 mm). ~~See Section 1009.3 for accessible means of egress stairways.~~ [The minimum width for stairways that serve as part of the accessible means of egress shall comply with Section 1009.3.](#)

Exceptions:

1. *Stairways* serving an *occupant load* of less than 50 shall have a width of not less than 36 inches (914 mm).
2. *Spiral stairways* as provided for in Section 1011.10.
3. Where an incline platform lift or *stairway chairlift* is installed on *stairways* serving occupancies in Group R-3, or within *dwelling units* in occupancies in Group R-2, a clear passage width not less than 20 inches (508 mm) shall be provided. Where the seat and platform can be folded when not in use, the distance shall be measured from the folded position.

1011.3 Headroom.

Stairways shall have a headroom clearance of not less than 80 inches (2032 mm) measured vertically from a line connecting ~~the edge of~~ the *nosings*. Such headroom shall be continuous above the *stairway* to the point where the line intersects the landing below, one tread depth beyond the bottom riser. The minimum clearance shall be maintained the full width of the *stairway* and landing.

Exceptions:

1. *Spiral stairways* complying with Section 1011.10 are permitted a 78-inch (1981 mm) headroom clearance.
2. In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies; and in Group U occupancies that are accessory to a Group R-3 occupancy or accessory to individual *dwelling units* in Group R-2 occupancies; 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 be allowed to project horizontally into the required headroom not more than 4³/₄ inches (121 mm).

1011.5.2 Riser height and tread depth.

Stair riser heights shall be 7 inches (178 mm) maximum and 4 inches (102 mm) minimum. The riser height shall be measured vertically between the *nosings* of adjacent treads [or between the stairway landing and the adjacent tread.](#) Rectangular tread depths shall be 11 inches (279 mm) minimum measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's *nosing*. *Winder* treads shall have a minimum tread depth of 11 inches (279 mm) between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline and a minimum tread depth of 10 inches (254 mm) within the clear width of the stair.

Exceptions:

1. *Spiral stairways* in accordance with Section 1011.10.
2. *Stairways* connecting stepped *aisles* to cross *aisles* or concourses shall be permitted to use the riser/tread dimension in Section 1030.14.2.
3. In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies not required by Chapter 11 to be Accessible or Type A dwelling or sleeping units; and in Group U occupancies that are accessory to a Group R-3 occupancy or accessory to individual *dwelling units* in Group R-2 occupancies; the maximum riser height shall be 7³/₄ inches (197 mm); the minimum tread depth shall be 10 inches (254 mm); the minimum *winder* tread depth at the walkline shall be 10 inches (254 mm); and the minimum *winder* tread depth shall be 6 inches (152 mm). A *nosing* projection not less than ³/₄ inch (19.1 mm) but not more than 1¹/₄ inches (32 mm) shall be provided on *stairways* with solid risers where the tread depth is less than 11 inches (279 mm).
4. See Section 503.1 of the International Existing Building Code for the replacement of existing *stairways*.
5. In Group I-3 facilities, *stairways* providing access to guard towers, observation stations and control rooms, not more than 250 square feet (23 m²) in area, shall be permitted to have a maximum riser height of 8 inches (203 mm) and a minimum tread depth of 9 inches (229 mm).

1011.5.4.1 Nonuniform height risers.

Where the bottom or top riser adjoins a sloping *public way*, walkway or driveway having an established grade and serving as a landing, the bottom or top riser is permitted to be reduced along the slope to less than 4 inches (102 mm) in height, with the variation in height of the bottom or top riser not to exceed one unit vertical in 12 units horizontal (8-percent slope) of *stair* width. The *nosings* ~~or leading edges of treads~~ at such nonuniform height risers shall have a distinctive marking stripe, different from any other *nosing* marking provided on the *stair flight*. The distinctive marking stripe shall be visible in descent of the *stair* ~~and shall have a slip-resistant surface~~. Marking stripes shall have a width of not less than 1 inch (25 mm) but not more than 2 inches (51 mm).

1011.5.5.1 Nosing projection size.

The ~~leading edge (nosings) of treads~~ nosings shall project not more than 1¹/₄ inches (32 mm) beyond the tread below.

Exception: When solid risers are not required, the nosing projection is permitted to exceed the maximum projection.

1011.5.5.2 Nosing projection uniformity.

Nosing projections ~~of the leading edges~~ shall be of uniform size, including the projections of the ~~nosing's leading edge~~ nosings of the floor or landing at the top of a *flight*.

1011.6 Stairway landings.

There shall be a floor or landing at the top and bottom of each *stairway*. The width of landings, measured perpendicularly to the direction of travel, shall be not less than the width of *stairways* served. Every landing shall have a minimum depth, measured parallel to the direction of travel, equal to the width of the *stairway* or 48 inches (1219 mm), whichever is less. Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into the required width of a landing. Where wheelchair spaces are required on the *stairway* landing in accordance with Section 1009.6.3, the *wheelchair space* shall not be located in the required width of the landing and doors shall not swing over the *wheelchair spaces*.

Exceptions:

1. Where *stairways* connect stepped *aisles* to cross *aisles* or concourses, *stairway* landings are not required at the transition between *stairways* and stepped *aisles* constructed in accordance with Section 1030.
2. Where curved stairways of constant radius have intermediate landings, the landing depth shall be measured horizontally between the intersection of the walkline of the lower flight at the landing nosing and the intersection of the walkline of the upper flight at the nosing of the lowest tread of the upper flight.
3. Where a landing turns 90 degrees (1.57 rad) or more, the minimum landing depth in accordance with this section shall not be required where the landing provided is not less than that described by an arc with a radius equal to the width of the flight served.

1011.7 Stairway construction.

Stairways shall be built of materials consistent with the types permitted for the type of construction of the *building*, ~~except that wood handrails shall be permitted for all types of construction.~~

Exceptions:

1. [Wood handrails shall be permitted in all types of construction.](#)
2. [Interior exit stairways in accordance with Section 510.2.](#)

1011.11 Handrails.

Flights of stairways shall have *handrails* on each side and shall comply with Section 1014. Where glass is used to provide the *handrail*, the *handrail* shall comply with Section 2407.

Exceptions:

1. *Flights of stairways* within *dwelling units* and *flights of spiral stairways* are permitted to have a *handrail* on one side only.
2. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require *handrails*.
3. In Group R-3 occupancies, a change in elevation consisting of a single riser at an entrance or egress door does not require *handrails*.
4. Changes in room elevations of three or fewer risers within *dwelling units* and *sleeping units* in Groups R-2 and R-3 do not require *handrails*.
5. [Where a platform lift is in a stationary position and the floor of the platform lift serves as the upper landing of a stairway, handrails shall not be required on the stairway, provided that all of the following criteria are met:](#)

[5.1 The stairway contains not more than two risers.](#)

[5.2 A handhold, positioned horizontally or vertically, is located on one side of the stairway adjacent to the top landing.](#)

[5.3 The handhold is located not less than 34 inches \(864 mm\) and not more than 42 inches \(1067 mm\) above the bottom landing of the stairway.](#)

[5.4 The handhold gripping surface complies with Section 1014.3 and is not less than 4.5 inches \(114 mm\) in length.](#)

1011.12 Stairway to roof.

In *buildings* four or more stories above grade plane, one *stairway* shall extend to the roof surface unless the roof has a slope steeper than four units vertical in 12 units horizontal (33-percent slope).

Exception: Other than where required by Section 1011.12.1, in *buildings* without an ~~occupied~~ [occupiable](#) roof access to the roof from the top story shall be permitted to be by an *alternating tread device*, a ship's ladder or a permanent ladder.

1011.12.2 Roof access.

Where a *stairway* is provided to a roof, access to the roof shall be provided through a *penthouse* complying with Section 1511.2

Exception: In *buildings* without an ~~occupied~~ [occupiable](#) roof, access to the roof shall be permitted to be a roof hatch or trap door not less than 16 square feet (1.5 m²) in area and having a minimum dimension of 2 feet (610 mm).

1011.14 Alternating tread devices.

Alternating tread devices are limited to an element of a *means of egress* in buildings of Groups F, H and S from a *mezzanine* not more than 250 square feet (23 m²) in area and that serves not more than five occupants; in *buildings* of Group I-3 from a guard tower, observation station or control room not more than 250 square feet (23 m²) in area and for access to ~~unoccupied~~ [unoccupiable](#) roofs. *Alternating tread devices* used as a *means of egress* shall not have a rise greater than 20 feet (6096 mm) between floor levels or landings.

1011.15 Ship's ladders.

Ship's ladders are permitted to be used in Group I-3 as a component of a *means of egress* to and from control rooms or elevated facility observation stations not more than 250 square feet (23 m²) with not more than three occupants and for access to ~~unoccupied~~ unoccupiable roofs. The minimum clear width at and below the *handrails* shall be 20 inches (508 mm). Ship's ladders shall be designed for the live loads indicated in Section 1607.17.

1011.16 Ladders.

Permanent ladders shall not serve as a part of the *means of egress* from occupied spaces within a *building*. Permanent ladders shall be constructed in accordance with Section 306.5 of the *International Mechanical Code* and designed for the live loads indicated in Section 1607.17. Permanent ladders shall be permitted to provide access to the following areas:

1. Spaces frequented only by personnel for maintenance, repair or monitoring of equipment.
2. Nonoccupiable spaces accessed only by catwalks, crawl spaces, freight elevators or very narrow passageways.
3. Raised areas used primarily for purposes of security, life safety or fire safety including, but not limited to, observation galleries, prison guard towers, fire towers or lifeguard stands.
4. Elevated levels in Group U not open to the general public.
5. ~~Nonoccupied~~ Nonoccupiable roofs that are not required to have stairway access in accordance with Section 1011.12.1.
6. Where permitted to access equipment and appliances in accordance with Section 306.5 of the *International Mechanical Code*.

SECTION 1013 EXIT SIGNS

1013.2 Low-level exit signs in Group R-1.

Where exit signs are required in Group R-1 occupancies by Section 1013.1, additional low-level exit signs shall be provided in all areas serving guest rooms in Group R-1 occupancies and shall comply with Section 1013.5.

The bottom of the sign shall be not less than 10 inches (254 mm) nor more than 18 inches (455 mm) above the floor level. The sign shall be flush mounted to the door or wall. Where mounted on the wall, the edge of the sign shall be within 4 inches (102 mm) of the door frame on the latch side.

Exception: Low-level exit signs are not required in Group R-1 occupancies when the building is equipped throughout with an automatic sprinkler system installed in accordance with Sections 903.3.1.1 or 903.3.1.2

1013.4 Raised character and braille exit signs.

~~A sign stating EXIT in visual characters, raised characters and braille and complying with ICC A117.1 shall be provided adjacent to each door to~~ Where exit signs are provided at an area of refuge, providing direct access to a stairway, an exterior area for assisted rescue, an exit stairway or ramp, an exit passageway, a horizontal exit and the exit discharge, a sign stating "EXIT" in visual characters, raised characters and braille and complying with ICC A117.1 shall be provided.

1013.5.1 Photoluminescent exit signs. Photoluminescent exit signs shall be provided with an illumination source to charge the exit sign in accordance with the manufacturer's instructions.

SECTION 1014 HANDRAILS

1014.2 Height.

Handrail height, measured from a line connecting ~~above stair tread~~ the nosings of flights of stairs or finish surface of ramp slope, shall be uniform, not less than 34 inches (864 mm) and not more than 38 inches (965 mm). Handrail height of alternating tread devices and ships ladders, measured from a line connecting ~~above tread~~ the nosings, shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

Exceptions:

1. Where *handrail* fittings or bendings are used to provide continuous transition between *flights*, the fittings or bendings shall be permitted to exceed the maximum height.
2. In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies; and in Group U occupancies that are associated with a Group R-3 occupancy or associated with individual *dwelling units* in Group R-2 occupancies; where *handrail* fittings or bendings are used to provide continuous transition between flights, transition at *winder* treads, transition from *handrail* to guard, or where used at the start of a *flight*, the *handrail* height at the fittings or bendings shall be permitted to exceed the maximum height.
3. *Handrails* on top of a *guard* where permitted along stepped *aisles* and ramped *aisles* in accordance with Section 1030.16.

1014.3 Lateral location.

Handrails located outward from the edge of the walking surface of flights of stairways, ramps, stepped aisles and ramped aisles shall be located 6 inches (152.4 mm) or less measured horizontally from the edge of the walking surface. Handrails projecting into the width of the walking surface shall comply with Section 1014.9.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1014.3~~ 1014.4 Handrail graspability.

~~1014.3.1~~ 1014.4.1 Type I.

~~1014.3.2~~ 1014.4.2 Type II.

~~1014.4~~ 1014.5 Continuity.

Handrail gripping surfaces shall be continuous, without interruption by newel posts or other obstructions.

Exceptions:

1. ~~*Handrails w*~~Within a *dwelling units*, are permitted, that is not an Accessible unit or Type A unit, the continuity of handrail gripping surfaces is allowed to be interrupted by a newel post at a turn or landing.
2. Within a *dwelling unit*, the use of a volute, turnout, starting easing or starting newel is allowed over the lowest tread.
3. Handrail brackets or balusters attached to the bottom surface of the *handrail* that do not project horizontally beyond the sides of the *handrail* within 1½ inches (38 mm) of the bottom of the *handrail* shall not be considered obstructions. For each ½ inch (12.7 mm) of additional *handrail* perimeter dimension above 4 inches (102 mm), the vertical clearance dimension of 1½ inches (38 mm) shall be permitted to be reduced by ⅛ inch (3.2 mm).
4. Where *handrails* are provided along walking surfaces with slopes not steeper than 1:20, the bottoms of the *handrail* gripping surfaces shall be permitted to be obstructed along their entire length where they are integral to crash rails or bumper *guards*.
5. *Handrails* serving stepped *aisles* or ramped *aisles* are permitted to be discontinuous in accordance with Section 1030.16.1.

~~1014.5~~ 1014.6 Fittings.

Handrails shall not rotate within their fittings.

~~1014.6~~ 1014.7 Handrail extensions.

Handrails shall return to a wall, *guard* or the walking surface or shall be continuous to the *handrail* of an adjacent *flight of stairs* or *ramp* run. Where *handrails* are not continuous between flights, the *handrails* shall extend horizontally not less than 12 inches (305 mm) beyond the top ~~riser~~ landing nosing and continue to slope for the depth of one tread beyond the bottom ~~riser~~ tread nosing. At *ramps* where *handrails* are not continuous between runs, the *handrails* shall extend horizontally above the landing 12 inches (305 mm) minimum beyond the top and bottom of *ramp* runs. The extensions of

handrails shall be in the same direction of the flights of *stairs* at *stairways* and the *ramp* runs at *ramps* and shall extend the required minimum length before any change in direction or decrease in the clearance required by Section 1014.5 or 1014.8.

Exceptions:

1. *Handrails* within a *dwelling unit* that is not required to be *accessible* need extend only from the top riser to the bottom riser.
2. *Handrails* serving *aisles* in rooms or spaces used for assembly purposes are permitted to comply with the *handrail* extensions in accordance with Section 1030.16.
3. *Handrails* for *alternating tread devices* and ships ladders are permitted to terminate at a location vertically above the top and bottom risers. *Handrails* for *alternating tread devices* are not required to be continuous between flights or to extend beyond the top or bottom risers.

~~1014.7~~ **1014.8 Clearance.**

Clear space between a *handrail* and a wall or other surface shall be not less than 1½ inches (38 mm). A *handrail* and a wall or other surface adjacent to the *handrail* shall be free of any sharp or abrasive elements.

Exceptions:

1. A decrease in the clearance due to the curvature or angle of handrail returns shall be allowed.
2. Mounting flanges, no more than 1/2" (12.7 mm) thick at the returned ends of handrails shall be allowed.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1014.8~~ **1014.9 Projections**

~~1014.11~~ **1014.10 Intermediate handrails.**

**SECTION 1015
GUARDS**

1015.2 Where required.

Guards shall be located along open-sided walking surfaces, ~~including~~ such as *mezzanines*, equipment platforms, *aisles*, *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-, ~~and at the perimeter of occupiable roofs.~~ *Guards* shall be adequate in strength and attachment in accordance with Section 1607.9.

Exceptions: *Guards* are not required for the following locations:

1. On the loading side of loading docks or piers.
2. On the audience side of *stages* and raised *platforms*, including *stairs* leading up to the *stage* and raised *platforms*.
3. On raised *stage* and *platform* floor areas, such as runways, *ramps* and side *stages* used for entertainment or presentations.
4. At vertical openings in the performance area of *stages* and *platforms*.
5. At elevated walking surfaces appurtenant to *stages* and *platforms* for access to and utilization of special lighting or equipment.
6. Along vehicle service pits not accessible to the public.
7. In assembly seating areas at cross *aisles* in accordance with Section 1030.17.2.
8. On the loading side of station platforms on fixed guideway transit or passenger rail systems.
9. Portions of an occupiable roof located less than 30 inches measured vertically to adjacent unoccupied roof areas where approved guards are present at the perimeter of the roof.
10. At portions of an occupiable roof where an approved barrier is provided.

1015.3 Height.

Required *guards* shall be not less than 42 inches (1067 mm) high, measured vertically as follows:

1. From the adjacent walking surfaces.
2. On *stairways* and stepped *aisles*, from the line connecting the ~~leading edges of the tread~~ *nosings*.
3. On *ramps* and ramped *aisles*, from the *ramp* surface at the guard.

Exceptions:

1. For occupancies in Group R-3 not more than three stories above grade in height and within individual *dwelling units* in occupancies in Group R-2 not more than three stories above grade in height with separate *means of egress*, required *guards* shall be not less than 36 inches (914 mm) in height measured vertically above the adjacent walking surfaces.
2. For occupancies in Group R-2 and R-3, within the interior conditioned space of individual *dwelling units*, where the open-sided walking surface is located not more than 25 feet (7.62 meters) measured vertically to the floor or walking surface below, required *guards* shall not be less than 36 inches (914 mm) in height measured vertically above the adjacent walking surface.
3. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, *guards* on the open sides of *stairs* shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the *nosings*. ~~leading edges of the treads.~~
4. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-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) measured vertically from a line connecting the *nosings*. ~~leading edges of the treads.~~
5. The *guard* height in assembly seating areas shall comply with Section 1030.17 as applicable.
6. Along *alternating tread devices* and ships ladders, *guards* where the top rail serves as a *handrail* shall have height not less than 30 inches (762 mm) and not more than 34 inches (864 mm), measured vertically from a line connecting the leading edge of the *treads*. ~~device tread nosing.~~
7. In Group F occupancies where *exit access stairways* serve fewer than three stories and such *stairways* are not open to the public, and where the top of the *guard* also serves as a *handrail*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the *nosings*. ~~leading edges of the treads.~~

1015.7 Roof access.

Guards shall be provided where the roof hatch opening is located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The guard shall extend not less than 30 inches (762 mm) beyond each end of the hatch parallel to the roof edge. The *guard* shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter.

Exception: *Guards* are not required where personal fall arrest anchorage connector devices that comply with ANSI/ASSE Z 359.1 are installed.

1015.8 Window openings.

Windows in Group R-2 and R-3 *buildings* including *dwelling units*, where the ~~top of the sill~~ bottom of the clear opening of an operable window ~~opening~~ is located less than 36 inches (914 mm) above the finished floor and more than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the *building*, shall comply with one of the following:

1. Where the bottom of the clear opening of the window is located more than 72 inches (1829 mm) and less than 75 feet (22 860 mm) above the finished grade or other surface below on the exterior of the building, the window shall comply with one of the following:
 - 1.1. ~~Operable windows where the top of the sill of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F2006.~~

- 1.1. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position, provided the opening is not required for emergency escape or rescue.
- 1.2. Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.
- 1.3. Operable windows where the openings ~~that~~ are provided with window opening control devices that comply with Section ASTM F2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1031.3.1 for emergency escape and rescue openings.
2. Where the bottom of the clear opening of the window is located 75 feet (22 860 mm) or more above from the finished grade or other surface below on the exterior of the building, the window shall comply with one of the following:
 - 2.1. Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.
 - 2.2. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
 - 2.3. Window fall prevention devices that comply with ASTM F2006.

~~1015.8.1 Window opening control devices.~~

~~Window opening control devices shall comply with F2090—17. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1031.3.1.~~

SECTION 1016 EXIT ACCESS

1016.2 Egress through intervening spaces.

Egress through intervening spaces shall comply with this section.

1. *Exit access* through an enclosed elevator lobby is permitted. Where access to two or more exits or exit access doorways is required in Section 1006.2.1, access ~~Access~~ to not less than one of the required exits shall be provided without travel through the enclosed elevator lobbies required by Section 3006. Where the path of *exit access* travel passes through an enclosed elevator lobby, the level of protection required for the enclosed elevator lobby is not required to be extended to the *exit* unless direct access to an *exit* is required by other sections of this code.
2. In other than Group H occupancies, e~~E~~gress from a room or space is allowed to pass through adjoining or intervening rooms or areas, except where provided that such adjoining rooms or areas and the area served are accessory to one or the other, ~~are not a Group H occupancy~~ and provide a discernible path of egress travel to an exit.

Exception: ~~Means of egress are not prohibited through adjoining or intervening rooms or spaces in a Group H, S or F occupancy where the adjoining or intervening rooms or spaces are the same or a lesser hazard occupancy group.~~

3. In Group H occupancies, egress from a room or space is allowed to pass through adjoining or intervening rooms or areas provided that such adjoining rooms or areas are the same or lesser hazard occupancy group and provide a discernible path of egress travel to an exit.
4. An *exit access* shall not pass through a room that can be locked to prevent egress.
Exception: An electrically locked exit access door providing egress from an elevator lobby shall be permitted in accordance with Section 1010.2.14.
5. *Means of egress* from *dwelling units* or sleeping areas shall not lead through other sleeping areas, toilet rooms or bathrooms.

6. Egress shall not pass through kitchens, storage rooms, closets or spaces used for similar purposes.

Exceptions:

1. *Means of egress* are not prohibited through a kitchen area serving adjoining rooms constituting part of the same *dwelling unit* or sleeping unit.
2. *Means of egress* are not prohibited through stockrooms in Group M occupancies where all of the following are met:
 - 2.1. The stock is of the same hazard classification as that found in the main retail area.
 - 2.2. Not more than 50 percent of the *exit access* is through the stockroom.
 - 2.3. The stockroom is not subject to locking from the egress side.
 - 2.4. There is a demarcated, minimum 44-inch-wide (1118 mm) *aisle* defined by full- or partial-height fixed walls or similar construction that will maintain the required width and lead directly from the retail area to the exit without obstructions.

SECTION 1017

EXIT ACCESS TRAVEL DISTANCE

TABLE 1017.2

EXIT ACCESS TRAVEL DISTANCE ^a

Portions of table not shown remain unchanged.

OCCUPANCY	WITHOUT AUTOMATIC SPRINKLER SYSTEM (feet)	WITH AUTOMATIC SPRINKLER SYSTEM (feet)
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For SI: 1 foot = 304.8 mm.

Footnotes b.-e. remain unchanged and are omitted for clarity.

a. See the following sections for modifications to exit access travel distance requirements:

Section 402.8: For the distance limitation in malls Section 407.4: For the distance limitation in Group I-2.

Sections 408.6.1 and 408.8.1: For the distance limitations in Group I-3. Section 411.2: For the distance limitation in special amusement areas. Section 412.6: For the distance limitations in aircraft manufacturing facilities.

Section 411.2: For the distance limitation in special amusement [areas](#).

Section 1006.2.2.2: For the distance limitation in refrigeration machinery rooms. Section 1006.2.2.3: For the distance limitation in refrigerated rooms and spaces. Section 1006.3.4: For buildings with one exit.

Section 1017.2.2: For increased distance limitation in Groups F-1 and S-1.

[Section 1017.2.3: For increased distance limitation in Group H-5](#)

Section 1030.7: For increased limitation in assembly seating. Section 3103.4: For temporary structures.

Section 3104.9: For pedestrian walkways.

[1017.2.3 Group H-5 Increase.](#)

[The maximum *exit access* travel distance shall be 300 feet \(91 m\) in the *fabrication areas* of Group H-5 occupancies where all of the following conditions are met:](#)

- [1. The width of the *fabrication area* is 300 feet \(91 m\) or greater.](#)
- [2. The area of the *fabrication area* is 220,000 sq. ft. \(18,600 m²\) or greater.](#)
- [3. The height of the *fabrication area*, measured between the raised metal floor and the clean filter ceiling, is 16 feet \(48768 mm\) or greater.](#)
- [4. The supply ventilation rate is 20 cfm/sq. ft. or greater and shall remain operational.](#)

1017.3 Measurement.

Exit access travel distance shall be measured from the most remote point of each room, area or space along the natural and unobstructed path of horizontal and vertical egress travel to the entrance to an *exit*. Where more than one exit is required, exit access travel distance shall be measured to the nearest exit.

Exceptions:

1. In *open parking garages*, *exit access* travel distance is permitted to be measured to the closest riser of an *exit access stairway* or the closest slope of an *exit access ramp*.
2. In *smoke protected seating and open-air assembly seating*, exit access travel distance shall be measured in accordance with Section 1030.7.

1017.3.2 Atriums.

Exit access travel distance for areas open to an *atrium* shall comply with the requirements of Sections 1017.3.2.1 through 1017.3.2.3.

1017.3.2.1 Egress not through the atrium.

Where required access to the exits is not through the *atrium*, exit access travel distance shall comply with Section 1017.2.

1017.3.2.2 Exit access travel distance at the level of exit discharge.

Where the path of egress travel is through an *atrium* space, exit access travel distance at the *level of exit discharge* shall be determined in accordance with Section 1017.2.

1017.3.2.3 Exit access travel distance at other than the level of exit discharge.

Where the path of egress travel is not at the *level of exit discharge* from the *atrium*, that portion of the total permitted exit access travel distance that occurs within the *atrium* shall be not greater than 200 feet (60 960 mm).

SECTION 1019

EXIT ACCESS STAIRWAYS AND RAMPS

1019.3 Occupancies other than Groups I-2 and I-3.

In other than Group I-2 and I-3 occupancies, floor openings containing *exit access stairways* or *ramps* ~~that do not comply with one of the conditions listed in this section shall~~ be enclosed with a *shaft enclosure* constructed in accordance with Section 713.

Exceptions:

1. *Exit access stairways* and *ramps* within a two-story opening complying with Section 712.1.9, ~~that serve or atmospherically communicate between only two adjacent stories. Such interconnected stories shall not be open to other stories.~~
2. In Group R-1, R-2 or R-3 occupancies, *exit access stairways* and *ramps* connecting four stories or less serving and contained within an individual *dwelling unit* or *sleeping unit* or *live/work unit*.
3. *Exit access stairways* serving and contained within a Group R-3 congregate residence or a Group R-4 facility are not required to be enclosed.
4. *Exit access stairways* and *ramps* in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the stairway or *ramp* and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Group B and M occupancies, this provision is limited to openings that do not connect more than four stories.
5. *Exit access stairways* and *ramps* within an *atrium* complying with the provisions of Section 404.
6. *Exit access stairways* and *ramps* in open parking garages that serve only the parking garage.
7. *Exit access stairways* and *ramps* serving smoke-protected or *open-air assembly seating* complying with the exit access travel distance requirements of Section 1030.7.

8. *Exit access stairways and ramps between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.*
9. [Exterior exit access stairways or ramps between occupiable roofs.](#)

SECTION 1020 CORRIDORS

[1020.1 General.](#)

[Corridors serving as an exit access component in a means of egress system shall comply with the requirements of Sections 1020.2 through 1020.7.](#)

~~1020.1~~ [1020.2 Construction.](#)

Corridors shall be fire-resistance rated in accordance with Table 1020.2. The *corridor walls* required to be fire-resistance rated shall comply with Section 708 for *fire partitions*.

TABLE 1020.2

CORRIDOR FIRE-RESISTANCE RATING

Portions of table not shown remain unchanged.

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without <u>automatic</u> sprinkler system	With <u>automatic</u> sprinkler system

Footnotes a.-d. remain unchanged and are omitted for clarity.

1020.2.1 Hoistway **opening** protection.

[Elevator hoistway doors in elevators hoistway enclosures required to be fire resistance rated shall be protected in accordance with Section 716.](#) Elevator hoistway **doors openings** shall [also](#) be protected in accordance with Section [3006.2](#) ~~3006.2.1~~.

~~1020.4~~ [1020.5 Dead ends.](#)

Where more than one *exit* or *exit access doorway* is required, the *exit access* shall be arranged such that dead-end corridors do not exceed 20 feet (6096 mm) in length.

Exceptions:

1. In Group I-3, Condition 2, 3 or 4, occupancies, the dead end in a *corridor* shall not exceed 50 feet (15 240 mm).
2. In occupancies in Groups B, E, F, I-1, M, R-1, R-2, S and U, where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, the length of the dead-end *corridors* shall not exceed 50 feet (15 240 mm).
3. A dead-end *corridor* shall not be limited in length where the length of the dead-end *corridor* is less than 2.5 times the least width of the dead-end *corridor*.
4. [In Group I-2, Condition 2 occupancies, the length of dead-end corridors that do not serve patient rooms or patient treatment spaces shall not exceed 30 feet \(9144 mm\).](#)

~~1020.5~~ [1020.6 Air movement in corridors.](#)

Corridors shall not serve as supply, return, exhaust, relief or ventilation air ducts.

Exceptions:

1. Use of a *corridor* as a source of makeup air for exhaust systems in rooms that open directly onto such corridors, including toilet rooms, bathrooms, dressing rooms, smoking lounges and janitor

closets, shall be permitted, provided that each such *corridor* is directly supplied with outdoor air at a rate greater than the rate of makeup air taken from the *corridor*.

2. Where located within a *dwelling unit*, the use of *corridors* for conveying return air shall not be prohibited.

3. Where located within tenant spaces of 1,000 square feet (93 m²) or less in area, utilization of *corridors* for conveying return air is permitted.

4. ~~Incidental air movement from pressurized rooms within health care facilities, provided that the corridor is not the primary source of supply or return to the room.~~ Transfer air movement required to maintain the pressurization difference within health care facilities in accordance with ASHRAE 170.

SECTION 1023

INTERIOR EXIT STAIRWAYS AND RAMPS

1023.2 Construction.

Enclosures for interior exit stairways and ramps shall be constructed as fire barriers in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both. Interior exit stairway and ramp enclosures shall have a fire-resistance rating of not less than 2 hours where connecting four stories or more and not less than 1 hour where connecting less than four stories. The number of stories connected by the interior exit stairways or ramps shall include any basements, but not any mezzanines. Enclosures for interior ~~Interior~~ *exit stairways and ramps* shall have a *fire-resistance rating* not less than the floor assembly penetrated, but need not exceed 2 hours.

Exceptions:

1. *Interior exit stairways and ramps* in Group I-3 occupancies in accordance with the provisions of Section 408.3.8.
2. *Interior exit stairways* within an *atrium* enclosed in accordance with Section 404.6.
3. *Interior exit stairways in accordance with Section 510.2.*

1023.5 Penetrations.

Penetrations into or through *interior exit stairways and ramps* are prohibited except for the following:

1. Equipment and ductwork necessary for independent ventilation or pressurization.
2. *Fire protection systems.*
3. Security systems.
4. Two-way communication systems.
5. Electrical raceway for fire department communication systems.
6. Electrical raceway serving the *interior exit stairway and ramp* and terminating at a steel box not exceeding 16 square inches (0.010 m²).
7. Structural elements, such as beams or joists supporting the interior exit stairway and ramp or enclosure.
8. Structural elements, such as beams or joists, supporting a roof at the top of the interior exit stairway or ramp.

Such penetrations shall be protected in accordance with Section 714. There shall not be penetrations or communication openings, whether protected or not, between adjacent interior exit *stairways and ramps*.

Exception: *Membrane penetrations* shall be permitted on the outside of the *interior exit stairway and ramp*. Such penetrations shall be protected in accordance with Section 714.4.2.

1023.7 Interior exit stairway and ramp exterior walls.

Exterior walls of the *interior exit stairway or ramp* shall comply with the requirements of Section 705 for *exterior walls*. Where nonrated walls or unprotected openings enclose the exterior of the *stairway or ramps* and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), building construction within 10 feet of the exterior walls of the interior exit stairway or ramp shall comply with Section 1023.7.1 and 1023.7.2. ~~the building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall have a fire-resistance rating of not less than 1 hour. Openings within such exterior walls shall be protected by opening protectives~~

~~having a fire protection rating of not less than $\frac{3}{4}$ hour. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the topmost landing of the stairway or ramp, or to the roof line, whichever is lower.~~

1023.7.1 Building exterior walls.

Building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening in an interior exit stairway or ramp shall have a fire-resistance rating of not less than 1 hour. Openings within such exterior walls shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the topmost landing of the stairway or ramp, or to the roof line, whichever is lower.

1023.7.2 Roof assemblies.

Where the interior exit stairway or ramp extends above an adjacent roof of the same building, the adjacent roof assembly shall have a fire-resistance rating of not less than 1 hour and openings shall be protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hour. The fire-resistance rating and opening protection shall extend horizontally not less than 10 feet (3048 mm) from the exterior wall of the stairway or ramp, or to the perimeter of the adjacent roof, whichever is less.

Exceptions:

1. The roof assembly need not be rated and openings in the roof need not be protected where they are adjacent to the penthouse of the stairway or ramp, unless otherwise required by this code.
2. The adjacent roof assembly need not be rated and adjacent openings in the roof need not be protected where the exterior wall of the stairway or ramp has a fire-resistance rating of 1 hour and openings are protected by opening protectives having a fire protection rating of not less than $\frac{3}{4}$ hours, extending a minimum of 10 feet (3048 mm) above the roof.

1023.8 Discharge identification. Barrier at level of exit discharge.

An interior exit stairway and ramp shall not continue below its level of exit discharge unless an approved barrier is provided at the level of exit discharge to prevent persons from unintentionally continuing into levels below. Directional exit signs shall be provided as specified in Section 1013.

1023.9 Stairway identification signs.

A sign shall be provided at each floor landing in an interior exit stairway and ramp connecting more than three stories designating the floor level, the terminus of the top and bottom of the interior exit stairway and ramp and the identification of the stairway or ramp. The signage shall state the story of and direction to the exit discharge, and the availability of roof access from the interior exit stairway and ramp for the fire department. The bottom of the sign shall be located not less than 5 feet (1524 mm) above the floor landing in a position that is readily visible when the doors are in the open and closed positions. ~~In addition to the stairway identification sign, a floor level sign in visual characters, raised characters and braille complying with ICC A117.1 shall be located at each floor level landing adjacent to the door leading from the interior exit stairway and ramp into the corridor to identify the floor level.~~

1023.11 Tactile floor-level signs.

Where floor level signs are provided in interior exit stairways and ramps, a floor-level sign identifying the floor level in visual characters, raised characters and braille complying with ICC A117.1 shall be located at each floor-level landing adjacent to the door leading from the interior exit stairway and ramp into the corridor.

SECTION 1024 EXIT PASSAGEWAYS

1024.1 Exit passageways General.

Exit passageways serving as an exit component in a means of egress system shall comply with the requirements of this section. An exit passageway shall not be used for any purpose other than as a means of egress and a circulation path.

1024.6 Penetrations.

Penetrations into or through an exit passageway are prohibited except for the following:

1. Equipment and ductwork necessary for independent ventilation or pressurization.

2. Fire protection systems.
3. Security systems.
4. Two-way communication systems.
5. Electrical raceway for fire department communication.
6. Electrical raceway serving the *exit passageway* and terminating at a steel box not exceeding 16 square inches (0.010 m²).
7. Structural elements, such as beams and joists, supporting a floor or roof at the top of the *exit passageway*.

Such penetrations shall be protected in accordance with Section 714. There shall not be penetrations or communicating openings, whether protected or not, between adjacent exit passageways.

Exception: *Membrane penetrations* shall be permitted on the outside of the *exit passageway*. Such penetrations shall be protected in accordance with Section 714.4.2.

1024.8 Exit passageway exterior walls.

Exterior walls of the *exit passageway* shall comply with Section 705. Where nonrated walls or unprotected openings enclose the exterior of the *exit passageway* and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees (3.14 rad), the building exterior walls within 10 feet (3048 mm) horizontally of a nonrated wall or unprotected opening shall have a fire-resistance rating of not less than 1 hour. Openings within such exterior walls shall be protected by opening protectives having a fire protection rating of not less than ³/₄ hour. This construction shall extend vertically from the ground to a point 10 feet (3048 mm) above the floor of the *exit passageway*, or to the roof line, whichever is lower.

1024.9 Standpipes.

Standpipes and standpipe hose connections shall be provided where required by Sections 905.3 and 905.4.

SECTION 1026 HORIZONTAL EXITS

1026.1 Horizontal exits General.

Horizontal exits serving as an exit in a *means of egress* system shall comply with the requirements of this section. A horizontal exit shall not serve as the only exit from a portion of a *building*, and where two or more exits are required, not more than one-half of the total number of exits or total exit minimum width or required capacity shall be horizontal exits.

Exceptions:

1. Horizontal exits are permitted to comprise two-thirds of the required exits from any *building* or floor area for occupancies in Group I-2.
2. Horizontal exits are permitted to comprise 100 percent of the exits required for occupancies in Group I-3. Not less than 6 square feet (0.6 m²) of accessible space per occupant shall be provided on each side of the horizontal exit for the total number of people in adjoining compartments.

1026.4.1 Capacity.

The capacity of the refuge area shall be computed based on a *net floor area* allowance of 3 square feet (0.2787 m²) for each occupant to be accommodated therein. Where the *horizontal exit* also forms a *smoke compartment*, the capacity of the refuge area for Group I-1, I-2 and I-3 occupancies and ~~Group B~~ ambulatory care facilities shall comply with Sections 407.5.3, 408.6.2, 420.6.1 and 422.3.2 as applicable.

SECTION 1027 EXTERIOR EXIT STAIRWAYS AND RAMPS

1027.1 Exterior exit stairways and ramps General.

Exterior exit stairways and ramps serving as an ~~element of~~ exit component in a ~~required~~ *means of egress system* shall comply with the requirements of this section.

1027.2 Use in a means of egress.

Exterior exit stairways shall not be used as an element of a required *means of egress* for Group I-2 occupancies. For occupancies in other than Group I-2, *exterior exit stairways* and *ramps* shall ~~be permitted~~ not be used as an element of a required *means of egress* for buildings ~~not~~ exceeding six stories above grade plane or that are ~~not~~ *high-rise buildings*.

SECTION 1028 EXIT DISCHARGE

1028.1 General.

The exit discharge shall comply with Sections 1028 and 1029 and the applicable requirements of Sections 1003 through 1015.

SECTION 1029 EGRESS COURTS

~~1028.4~~ 1029.1 Egress courts General.

Egress courts serving as ~~a portion of the~~ an *exit discharge component* in the *means of egress* system shall comply with the requirements ~~of Sections 1028.4.1 and 1028.4.2~~ in this section.

~~1028.4.1~~ 1029.2 Width or capacity.

The required capacity of egress courts shall be determined as specified in Section 1005.1, but the minimum width shall be not less than 44 inches (1118 mm), except as specified herein. *Egress courts* serving Group R-3 and U occupancies shall be not less than 36 inches (914 mm) in width. The required capacity and width of egress courts shall be unobstructed to a height of 7 feet (2134 mm).

The width of the egress court shall be not less than the required capacity.

Exception: Encroachments complying with Section 1005.7.

~~1028.4.2~~ 1029.3 Construction and openings.

Where an *egress court* serving a building or portion thereof is less than 10 feet (3048 mm) in width, the *egress court* walls shall have not less than 1-hour *fire-resistance-rated* construction for a distance of 10 feet (3048 mm) above the floor of the *egress court*. Openings within such walls shall be protected by opening protectives having a *fire protection rating* of not less than $\frac{3}{4}$ hour.

Exceptions:

1. *Egress courts* serving an occupant load of less than 10.
2. *Egress courts* serving Group R-3.
3. *Egress courts*, located at grade, which provide direct and unobstructed access to a public way through two or more independent paths. The minimum width provided along each path shall be based on the required width or the required capacity, whichever is greater, and shall be maintained along each path.

SECTION ~~1029~~ 1030 ASSEMBLY

~~1029.6.2~~ 1030.6.2 Smoke-protected assembly seating.

The required capacity in inches (mm) of the *aisle* for *smoke-protected assembly seating* shall be not less than the *occupant load* served by the egress element multiplied by the appropriate factor in Table 1030.6.2. The total number of seats specified shall be those within the space exposed to the same smoke-protected environment. Interpolation is permitted between the specific values shown. A life safety evaluation, complying with NFPA 101, shall be done for a facility utilizing the reduced width requirements of Table 1030.6.2 for *smoke-protected assembly seating*.

Exception: ~~For open-air assembly seating with an occupant load not greater than 18,000, the required capacity in inches (mm) shall be determined using the factors in Section 1030.6.3.~~

~~1029.6.2.3~~ [1030.6.2.3](#) Automatic sprinklers.

Enclosed areas with walls and ceilings in *buildings* or *structures* containing *smoke-protected assembly seating* shall be protected with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1.

Exceptions:

1. The floor area used for contests, performances or entertainment provided that the roof construction is more than 50 feet (15 240 mm) above the floor level and the use is restricted to low fire hazard uses.
2. Press boxes and storage facilities less than 1,000 square feet (93 m²) in area.
3. ~~Outdoor seating facilities~~ [Open-air assembly seating facilities](#) where seating and the *means of egress* in the seating area are essentially open to the outside.

~~1029.8~~ [1030.8](#) Common path of egress travel.

The *common path of egress travel* [for a room or space used for assembly purposes having fixed seating](#) shall not exceed 30 feet (9144 mm) from any seat to a point where an occupant has a choice of two paths of egress travel to two *exits*.

Exceptions:

1. For areas serving less than 50 occupants, the *common path of egress travel* shall not exceed 75 feet (22 860 mm).
2. For *smoke-protected* or *open-air assembly seating*, the *common path of egress travel* shall not exceed 50 feet (15 240 mm).

~~1029.9.5~~ [1030.9.5](#) Dead-end aisles.

Each end of an *aisle* shall be continuous to a cross *aisle*, foyer, doorway, vomitory, concourse or *stairway* in accordance with Section 1030.9.7 having access to an *exit*.

Exceptions:

1. Dead-end *aisles* shall be not greater than 20 feet (6096 mm) in length.
2. Dead-end *aisles* longer than ~~16 rows~~ [20 feet \(6096 mm\)](#) are permitted where seats beyond the ~~16th row~~ [20 feet \(6096 mm\)](#) dead-end *aisle* are not more than 24 seats from another *aisle*, measured along a row of seats having a minimum clear width of 12 inches (305 mm) plus 0.6 inch (15.2 mm) for each additional seat above seven in the row where seats have backrests or beyond 10 where seats are without backrests in the row.
3. [Dead-end aisles serving fewer than 50 seats shall be permitted in accordance with Section 1030.8.](#)
4. For *smoke-protected* or *open-air assembly seating*, dead-end vertical *aisles* of 21 or fewer rows.
5. For *smoke-protected* or *open-air assembly seating*, a longer dead-end *aisle* is permitted where seats beyond the 21-row dead-end *aisle* [where such rows](#) are not more than 40 seats from another *aisle*, measured along a row of seats having an *aisle* accessway with a minimum clear width of 12 inches (305 mm) plus 0.3 inch (7.6 mm) for each additional seat above seven in the row where seats have backrests or beyond 10 where seats are without backrests in the row.

~~TABLE 1029.13.2.1~~ [TABLE 1030.13.2.1](#)

SMOKE-PROTECTED OR OPEN-AIR ASSEMBLY AISLE ACCESSWAYS

NUMBER OF SEATS IN THE SMOKE-PROTECTED OR OPEN-AIR ASSEMBLY SEATING	MAXIMUM NUMBER OF SEATS PER ROW PERMITTED TO HAVE A MINIMUM 12-INCH CLEAR WIDTH AISLE ACCESSWAY			
	Aisle or doorway at both ends of row		Aisle or doorway at one end of row only	
	Seats with backrests	Seats without backrests	Seats with backrests	Seats without backrests
Less than 4,000	14	21	7	10
4,000 to 6,999	15	22	7	10
7,000 to 9,999	16	23	8	11
10,000 to 12,999	17	24	8	11
13,000 to 15,999	18	25	9	12
16,000 to 18,999	19	26	9	12
19,000 to 21,999	20	27	10	13
22,000 and greater	21	28	11	14

~~1029.16~~ [1030.16](#) Handrails.

Ramped *aisles* having a slope exceeding one unit vertical in 15 units horizontal (6.7-percent slope) and stepped *aisles* shall be provided with *handrails* in compliance with Section 1014 located either at one or both sides of the *aisle* or within the *aisle* width. [Where stepped aisles have seating on one side and the aisle width is 74 inches \(1880 mm\) or greater, two handrails are required. Where two handrails are required, one of the handrails shall be within 30 inches \(762 mm\) horizontally of the side of the tiered floor adjacent to the stepped aisle.](#)

Exceptions:

1. *Handrails* are not required for ramped *aisles* with seating on both sides.
2. *Handrails* are not required where, at the side of the *aisle*, there is a *guard* with a top surface that complies with the graspability requirements of *handrails* in accordance with Section ~~1014.3~~ [1014.4](#).
3. *Handrail* extensions are not required at the top and bottom of stepped *aisles* and ramped *aisles* to permit crossovers within the *aisles*.

~~1029.16.1~~ [1030.16.1](#) Discontinuous [mid-aisle](#) handrails.

Where there is seating on both sides of the *aisle*, the mid-aisle *handrails* shall be discontinuous. ~~With~~ [Where a stepped aisle is required to have two handrails, the mid-aisle handrails shall be discontinuous.](#) Gaps or breaks [shall be provided](#) at intervals not exceeding five rows to facilitate access to seating and to permit crossing from one side of the *aisle* to the other. These gaps or breaks shall have a clear width of not less than 22 inches (559 mm) and not greater than 36 inches (914 mm), measured horizontally, and the mid-aisle *handrail* shall have rounded terminations or bends.

~~1029.16.2~~ [1030.16.2](#) Handrail termination.

Handrails located on the side of stepped *aisles* shall return to a wall, *guard* or the walking surface or shall be continuous to the *handrail* of an adjacent stepped *aisle* flight.

~~1029.16.3~~ 1030.16.3 Mid-aisle termination.

Mid-aisle *handrails* shall not extend beyond the lowest riser and shall terminate within 18 inches (381 mm), measured horizontally, from the lowest riser. *Handrail* extensions are not required.

Exception: Mid-aisle *handrails* shall be permitted to extend beyond the lowest riser where the *handrail* extensions do not obstruct the width of the cross *aisle*.

SECTION ~~1030~~ 1031

EMERGENCY ESCAPE AND RESCUE

1031.1 General.

Emergency escape and rescue openings shall comply with the requirements of this section.

~~1030.1~~ 1031.2 General Where required.

In addition to the *means of egress* required by this chapter, *emergency escape and rescue openings* shall be provided in the following occupancies:

1. Group R-2 occupancies located in stories with only one *exit* or *access* to only one *exit* as permitted by Tables 1006.3.4(1) and 1006.3.4(2).
2. Group R-3 and R-4 occupancies.

Basements and sleeping rooms below the fourth *story above grade plane* shall have not fewer than one ~~exterior~~ *emergency escape and rescue opening* in accordance with this section. Where *basements* contain one or more sleeping rooms, an emergency escape and rescue ~~openings~~ opening shall be required in each sleeping room, but shall not be required in adjoining areas of the *basement*. Such openings shall open directly into a *public way* or to a *yard* or *court* that opens to a *public way*, or to an egress balcony that leads to a public way.

Exceptions:

1. *Basements* with a ceiling height of less than 80 inches (2032 mm) shall not be required to have *emergency escape and rescue openings*.
2. *Emergency escape and rescue openings* are not required from *basements* or sleeping rooms that have an *exit* door or *exit access* door that opens directly into a *public way* or to a *yard*, *court* or exterior ~~exit~~ *egress* balcony that ~~opens~~ that leads to a *public way*.
3. *Basements* without *habitable spaces* and having not more than 200 square feet (18.6 m²) in floor area shall not be required to have *emergency escape and rescue openings*.
4. Storm shelters are not required to comply with this section where the shelter is constructed in accordance with ICC 500.
- ~~4.~~ 5. Within individual *dwelling* and *sleeping units* in Groups R-2 and R-3, where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3, *sleeping rooms* in *basements* shall not be required to have *emergency escape and rescue openings* provided that the *basement* has one of the following:

~~4.1.~~ 5.1. One *means of egress* and one *emergency escape and rescue opening*.

~~4.2.~~ 5.2. Two *means of egress*.

1031.3 Emergency escape and rescue openings.

Emergency escape and rescue openings shall comply with Sections 1031.3.1 through 1031.3.3.

~~1030.2~~ 1031.3.1 Minimum size.

Emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.53 m²).

Exception: The minimum net clear opening for grade-floor *emergency escape and rescue openings* shall be 5 square feet (0.46 m²).

~~1030.2.1~~ 1031.3.2 Minimum dimensions.

The minimum net clear opening height dimension shall be 24 inches (610 mm). The minimum net clear opening width dimension shall be 20 inches (508 mm). The net clear opening dimensions shall be the result of normal operation of the opening.

~~1030.3~~ 1031.3.3 Maximum height from floor.

Emergency escape and rescue openings shall have the bottom of the clear opening not greater than 44 inches (1118 mm) measured from the floor.

1031.4 Emergency escape and rescue doors. Where a door is provided as the required *emergency escape and rescue opening*, it shall be a swinging door or a sliding door.

~~1030.4~~ 1031.5 Window-Area wells.

An *emergency escape and rescue opening* with ~~a finished sill height~~ the bottom of the clear opening below the adjacent ~~grade ground level~~ shall be provided with ~~a window~~ an area well in accordance with Sections 1031.5.1 ~~and through~~ 1031.5.3.

~~1030.4.1~~ 1031.5.1 Minimum size.

The minimum horizontal area of the ~~window~~ area well shall be 9 square feet (0.84 m²), with ~~a minimum dimension of 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 1031.5.2 shall be permitted to encroach not more than 6 inches (152 mm) into the required dimensions of the area well.

~~1030.4.2~~ 1031.5.2 Ladders or steps.

~~Window-Area~~ wells with a vertical depth of more than 44 inches (1118 mm) shall be equipped with an *approved* permanently affixed ladder or steps. ~~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 (o.c.) vertically for the full height of the window well. The ladder or steps shall not encroach into the required dimensions of the window well by more than 6 inches (152 mm).~~ The ladder or steps shall not be obstructed by the *emergency escape and rescue opening* when the window or door is in the open position. Ladders or steps required by this section ~~are exempt from the stairway requirements of~~ shall not be required to comply with Section 1011.

1031.5.2.1 Ladders.

Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least 3 inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center (o.c.) vertically for the full height of the area well.

1031.5.2.2 Steps.

Steps shall have an inside width of not less than 12 inches (305 mm), shall have treads greater than 5 inches (127 mm) in depth and a riser height not greater than 18 inches (457 mm) for the full height of the area well.

1031.5.3 Drainage.

Area wells shall be designed for proper drainage by connecting to the building's foundation drainage system required by Section 1805.

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, in accordance with Section 1803.5.1.

~~1030.5~~ 1031.6 Bars, grilles, covers and screens.

~~Bars-Where~~ bars, grilles, covers, screens or similar devices are ~~permitted to be~~ placed over *emergency escape and rescue openings*, ~~bulkhead enclosures or window-area~~ wells that serve such openings, ~~provided that~~ the minimum net clear opening size ~~complies shall comply~~ with Sections 1031.3 and 1031.5. ~~and such~~ Such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the *emergency escape and rescue opening*. ~~Where such bars, grilles, covers, screens or similar devices are installed in~~

~~existing buildings, they shall not reduce the net clear opening of the emergency escape and rescue opening and smoke alarms shall be installed in accordance with Section 907.2.11 regardless of the valuation of the alteration.~~

Chapter 11 Accessibility

SECTION 1103

SCOPING REQUIREMENTS

1103.2.11 Residential Group R-1 or R-3.

Buildings of Group R-1 containing not more than five dwelling units and sleeping units in aggregate for rent or hire that are also occupied as the residence of the proprietor are not required to comply with this chapter. Buildings of Group R-3 congregate living facilities (transient) or boarding houses (transient) containing not more than five sleeping units for rent or hire that are also occupied as the residence of the proprietor are not required to comply with this chapter.

[NY] 1103.2.13 Detention and correctional facilities.

In detention and correctional *facilities*, *common use* areas that are used only by ~~inmates or detainees~~ incarcerated or detained individuals and security personnel, and that do not serve holding cells or housing cells required to be *Accessible units*, are not required to comply with this chapter.

SECTION 1104

ACCESSIBLE ROUTE

1104.4 Multistory buildings and facilities.

At least one *accessible route* shall connect each accessible *story*, *mezzanine* and *occupied roofs* in multilevel *buildings* and *facilities*.

Exceptions:

1. An *accessible route* is not required to *stories*, *mezzanines* and ~~occupied~~ occupiable *roofs* that have an aggregate area of not more than 3,000 square feet (278.7 m²) and are located above and below accessible levels. This exception shall not apply to:
 - 1.1. Multiple tenant *facilities* of Group M ~~occupied~~ occupancies containing five or more tenant spaces used for the sales or rental of goods and where at least one such tenant space is located on a floor level above or below the accessible levels.
 - 1.2. *Stories* or *mezzanines* containing offices of health care providers (Group B or I).
 - 1.3. Passenger transportation *facilities* and airports (Group A-3 or B).
 - 1.4. Government *buildings*.
 - 1.5. Structures with four or more dwelling units.
2. *Stories*, *mezzanines* or ~~occupied~~ occupiable *roofs* that do not contain accessible elements or other spaces as determined by Section 1108 or 1109 are not required to be served by an *accessible route* from an accessible level.
3. In air traffic control towers, an *accessible route* is not required to serve the cab and the floor immediately below the cab.
4. Where a two-story *building* or *facility* has one *story* or *mezzanine* with an *occupant load* of five or fewer *persons* that does not contain *public use* space, that *story* or *mezzanine* shall not be required to be connected by an *accessible route* to the *story* above or below.

1104.5 Location.

Accessible routes shall ~~coincide with or be located in the same area as a general circulation path. Where the circulation path is interior, the accessible route shall be interior. Where only one accessible route is provided, the accessible route shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.~~ comply with all of the following:

1. Accessible routes shall coincide with or be located in the same area as a general circulation path.
2. Where the circulation path is interior to the building, the accessible route shall be interior to the building.
3. Where only one accessible route is provided, the accessible route shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.

Exceptions:

1. Accessible routes from parking garages contained within and serving *Type B* units are not required to be interior.
2. A single accessible route is permitted to pass through a kitchen or storage room in an *Accessible unit*, *Type A* unit or *Type B* unit.

SECTION 1105

ACCESSIBLE ENTRANCES

1105.1 Public entrances.

In addition to accessible entrances required by Sections ~~1105.1.4~~ 1105.1.2 through ~~1105.1.7~~ 1105.1.8, at least 60 percent of all *public entrances* shall be accessible.

Exceptions:

1. An *accessible entrance* is not required to areas not required to be *accessible*.
2. Loading and *service entrances* that are not the only entrance to a tenant space.

1105.1.1 Power-operated doors at public entrances.

In facilities with the occupancies and building occupant loads greater than indicated in Table 1105.1.1, each *public entrance* required to be accessible shall have a *minimum* of one door be a power-operated door or a *low-energy power-operated door*. Where the accessible *public entrance* includes doors in series, such as a vestibule, a minimum of one set of two doors in series shall meet the requirements of this section.

Exceptions:

1. For the purpose of determining power-operated door requirements, a tenant space with its own exterior public entrance shall be considered a separate *facility* and building.
2. The requirements of this section are not applicable to mixed-use facilities where the total building occupant load for the occupancies listed in Table 1105.1.1 is calculated as the sum of the ratios of the actual occupant load of each occupancy divided by the building occupant load threshold of each occupancy and the sum of the ratios is less than 1.

TABLE 1105.1.1
PUBLIC ENTRANCE WITH POWER-OPERATED DOOR

<u>OCCUPANCY</u>	<u>BUILDING OCCUPANT LOAD GREATER THAN</u>
<u>A-1, A-2, A-3, A-4</u>	<u>300</u>
<u>B, M, R-1</u>	<u>500</u>

[NY] 1105.1.5 Entrances for ~~inmates or detainees~~ incarcerated or detained individuals.

Where entrances used only by ~~inmates or detainees~~ incarcerated or detained individuals and security personnel are provided at judicial *facilities*, detention *facilities* or correctional *facilities*, at least one such entrance shall be accessible.

SECTION 1106

PARKING AND PASSENGER LOADING FACILITIES

1106.1 General.

Parking shall comply with Sections 1106.2 through 1106.8. Passenger loading zones shall comply with Section 1106.9.

[NY] TABLE ~~1106.1~~ 1106.2 ACCESSIBLE PARKING SPACES

TOTAL PARKING SPACES PROVIDED IN PARKING FACILITIES	REQUIRED MINIMUM NUMBER OF ACCESSIBLE SPACES
1 to 25 <u>20</u>	1
26 <u>21</u> to 50 <u>40</u>	2
51 <u>41</u> to 75 <u>60</u>	3
76 <u>61</u> to 100 <u>80</u>	4
101 <u>81</u> to 150 <u>100</u>	5
151 <u>101</u> to 200 <u>120</u>	6
201 <u>121</u> to 300 <u>140</u>	7
301 <u>141</u> to 400 <u>160</u>	8
401 <u>161</u> to 500 <u>180</u>	9
<u>181 to 500</u>	<u>10</u>
501 to 1,000	2% of total
1,001 and over	20, plus one for each 100, or fraction thereof, over 1,000

[NY] ~~1106.1.1~~ 1106.2.1 Access aisles.

Accessible parking spaces shall be in conformance with ICC A117.1 except that spaces shall be provided with access aisles at least 8 feet (2440 mm) in width. Each access aisle shall be provided with a sign, in accordance with Section 1111.5.

1106.3 Groups ~~I-1, R-1~~, R-2, R-3 and R-4.

Accessible parking spaces shall be provided in Group ~~I-1, R-1~~, R-2, R-3 and R-4 occupancies in accordance with the greatest number of parking spaces of any of the following: ~~Items 1 through 4 as applicable.~~

1. In Group R-2, R-3 and R-4 occupancies that are required to have *Accessible, Type A* or *Type B dwelling units* or *sleeping units*, at least 2 percent, but not less than one, of each type of parking space provided shall be accessible.
- ~~2. In Group I-1 and R-1 occupancies, accessible parking shall be provided in accordance with Table 1106.2.~~
2. Where at least one parking space is provided for each *dwelling unit* or *sleeping unit*, at least one *accessible* parking space shall be provided for each *Accessible* and *Type A* unit.
- ~~3. Where parking is provided within or beneath a building, accessible parking spaces shall be provided within or beneath the building.~~

1106.7.1 Parking located beneath a building.

Where parking is provided beneath a *building*, accessible parking spaces shall be provided beneath the *building*.

1106.8 Parking meters and pay stations.

Where parking meters and pay stations serve accessible parking spaces, such parking meters and pay stations shall be accessible.

SECTION 1107 MOTOR-VEHICLE-RELATED FACILITIES

1107.1 General.

Electrical vehicle charging stations shall comply with Section 1107.2. Fuel-dispensing systems shall comply with Section 1107.3.

1107.2 Electrical vehicle charging stations.

Electrical vehicle charging stations shall comply with Sections 1107.2.1 and 1107.2.2.

Exceptions:

1. Electrical vehicle charging stations provided to serve Group R-3 and R-4 occupancies are not required to comply with this section.
2. Electric vehicle charging stations used exclusively by buses, trucks, other delivery vehicles, law enforcement vehicles, and motor pools are not required to comply with this section.

1107.2.1 Number of accessible vehicle spaces.

Not less than 5 percent of vehicle spaces on the site served by electrical vehicle charging systems, but not fewer than one for each type of electric vehicle charging system, shall be accessible.

1107.2.2 Vehicle space size.

Accessible vehicle spaces shall comply with the requirements for a van accessible parking space that is 132 inches (3350 mm) minimum in width with an adjoining access aisle that is 60 inches (1525 mm) minimum in width.

~~1109.14~~ 1107.3 Fuel-dispensing systems.

Fuel-dispensing systems shall be accessible.

SECTION ~~1107~~ 1108 DWELLING UNITS AND SLEEPING UNITS

[NY] ~~1107.2.1~~ 1108.2.1 Type B unit doors.

Clear width and maneuvering clearances required by Sections 404.2.2 and 404.2.3 of ICC A117.1 shall be provided at the primary entrance door to the *dwelling unit* or *sleeping unit* and at all other doors within the *dwelling unit* or *sleeping unit* meant for human passage.

Exception: Maneuvering clearances shall not be required at doors of a room containing only a lavatory and a water closet, provided the room does not contain the only lavatory or water closet on the *accessible* level of the unit.

[NY] ~~1107.2.2~~ 1108.2.2 Type B unit toilet and bathing facilities.

At least one toilet and bathing facility in the *dwelling unit* or *sleeping unit* shall be constructed in accordance with the toilet and bathing facilities requirements of Section 1003.11 of ICC A117.1 (Type A Unit Toilet and Bathing Facilities).

1108.3 Accessible spaces.

Rooms and spaces available to the general public or available for use by residents and serving *Accessible units*, *Type A units* or *Type B units* shall be *accessible*. *Accessible* spaces shall include, but are not limited to, toilet and bathing rooms, kitchen, living and dining areas and any exterior spaces, including patios, terraces and balconies.

Exceptions:

1. *Stories* and *mezzanines* exempted by Section 1108.4.

2. Recreational *facilities* in accordance with Section 1111.2.
3. Exterior decks, patios or balconies that are part of *Type B units* and have impervious surfaces, and that are not more than 4 inches (102 mm) below the finished floor level of the adjacent interior space of the unit.

~~1107.5.1.1~~ **1108.5.1.1 Accessible units.**

In Group I-1, Condition 1, at least 4 percent, but not less than one, of the *dwelling units* and *sleeping units* shall be *Accessible units*. ~~In Group I-1, Condition 2, at least 10 percent, but not less than one, of the dwelling units and sleeping units shall be Accessible units.~~ Accessible dwelling units and sleeping units shall be dispersed among the various classes of units.

Exceptions:

1. Water closets shall not be required to comply with ICC A117.1 where such water closets comply with Section 1110.2.2, in not more than 50 percent of the Accessible units.
2. Roll-in-type showers shall not be required to comply with ICC A117.1 where roll-in-type showers comply with Section 1110.2.3, in not more than 50 percent of the Accessible units.

1108.5.1.2 Accessible units in Group I-1, Condition 2.

In Group I-1, Condition 2, at least 10 percent, but not less than one, of the dwelling units and sleeping units shall be Accessible units. Accessible dwelling units and sleeping units shall be dispersed among the various classes of units.

Exceptions:

1. Water closets shall not be required to comply with ICC A117.1 where such water closets comply with Section 1110.2.2, in not more than 50 percent of the Accessible units .
2. Roll-in-type showers shall not be required to comply with ICC A117.1 where roll-in-type showers comply with Section 1110.2.3, in not more than 50 percent of the Accessible units .

~~1107.5.2~~ **1108.5.2 Group I-2 nursing homes.**

Accessible units and *Type B units* shall be provided in *nursing homes* of Group I-2, Condition 1 occupancies in accordance with Sections ~~1107.5.2.1~~ **1108.5.2.1** and ~~1107.5.2.2~~ **1108.5.2.2**.

~~1107.5.2.1~~ **1108.5.2.1 Accessible units.**

At least 50 percent but not less than one of each type of the *dwelling units* and *sleeping units* shall be *Accessible units*.

Exceptions:

1. Water closets shall not be required to comply with ICC A117.1 where such water closets comply with Section 1110.2.2, in not more than 90 percent of the Accessible units.
2. Roll-in-type showers shall not be required to comply with ICC A117.1 where roll-in-type showers comply with Section 1110.2.3, in not more than 90 percent of the Accessible units.

~~1107.5.4~~ **1108.5.4 Group I-2 rehabilitation facilities.**

In *hospitals* and *rehabilitation facilities* of Group I-2 occupancies that specialize in treating conditions that affect mobility, or units within either that specialize in treating conditions that affect mobility, 100 percent of the *dwelling units* and *sleeping units* shall be *Accessible units*.

Exceptions:

1. Water closets shall not be required to comply with ICC A117.1 where such water closets comply with Section 1110.2.2, in not more than 50 percent of Accessible units.
2. Roll-in-type showers shall not be required to comply with ICC A117.1 where roll-in-type showers comply with Section 1110.2.3, in not more than 50 percent of Accessible units .

1108.6.1.1 Accessible units.

Accessible dwelling units and *sleeping units* shall be provided in accordance with Table 1108.6.1.1. On a multiple-building site, where structures contain more than 50 *dwelling units* or *sleeping units*, the number of *Accessible units* shall be determined per structure. On a multiple-building site, where structures contain 50 or fewer *dwelling units* or *sleeping units*

units, all dwelling units and sleeping units on a site shall be considered to determine the total number of Accessible units. Accessible units shall be dispersed among the various classes of units.

Exception.

1. Where all dwelling units and sleeping units contain showers and none contain bath tubs, the total number of required Accessible units specified by Table 1108.6.1.1 shall be permitted to provide standard or alternate roll-in type showers with seats.
2. Where Exception 1 is applicable, transfer showers shall be permitted to be substituted for all but the minimum required number of roll-in showers.

TABLE 1108.6.1.1 ACCESSIBLE DWELLING UNITS AND SLEEPING UNITS

TOTAL NUMBER OF UNITS PROVIDED	MINIMUM REQUIRED NUMBER OF ACCESSIBLE UNITS WITHOUT ROLL-IN SHOWERS	MINIMUM REQUIRED NUMBER OF ACCESSIBLE UNITS WITH ROLL-IN SHOWERS	TOTAL NUMBER OF REQUIRED ACCESSIBLE UNITS
1 to 25	1	0	1
26 to 50	2	0	2
51 to 75	3	1	4
76 to 100	4	1	5
101 to 150	5	2	7
151 to 200	6	2	8
201 to 300	7	3	10
301 to 400	8	4	12
401 to 500	9	4	13
501 to 1,000	2% of total	1% of total	3% of total
Over 1,000	20, plus 1 for each 100, or fraction thereof, over 1,000	10 plus 1 for each 100, or fraction thereof, over 1,000	30 plus 2 for each 100, or fraction thereof, over 1,000

1108.6.2.1 Live/work units.

In *live/work units* constructed in accordance with Section ~~419-508.5~~, the nonresidential portion is required to be accessible. In a *structure* where there are four or more *live/work units* intended to be occupied as a *residence*, the residential portion of the *live/work unit* shall be a *Type B unit*.

Exception: The number of Type B units is permitted to be reduced in accordance with Section 1108.7.

[NY] ~~1107.6.2.2.1~~ 1108.6.2.2.1 ~~Reserved.~~ Type A units.

In Group R-2 occupancies containing more than 20 dwelling units or sleeping units, at least 20 percent but not less than one of the units shall be a Type A unit. All Group R-2 units on a site shall be considered to determine the total number of units and the required number of Type A units. Type A units shall be dispersed among the various classes of units. Where two or more Type A units are provided, at least 5 percent but not less than one Type A unit shall include a bathroom with a roll-in shower complying with ICC A117.1 for Type A units.

Exceptions:

1. The number of Type A units is permitted to be reduced in accordance with Section 1108.7.
2. Existing structures on a site shall not contribute to the total number of units on a site.

1108.6.3 Group R-3.

~~In Group R-3 occupancies where there are four or more dwelling units or sleeping units intended to be occupied as a residence in a single structure, every dwelling unit and sleeping unit intended to be occupied as a residence shall be a Type B unit.~~ Accessible units and Type B units shall be provided in Group R-3 occupancies in accordance with Sections 1108.6.3.1 and 1108.6.3.2. Bedrooms within *congregate living facilities, dormitories, sororities, fraternities, and boarding houses* shall be counted as *sleeping units* for the purpose of determining the number of units.

~~**Exception:** The number of Type B units is permitted to be reduced in accordance with Section 1108.7.~~

1108.6.3.1 Accessible units.

In Group R-3 *congregate living facilities (transient)* or *boarding houses (transient)* Accessible sleeping units shall be provided in accordance with Table 1107.6.1.1.

Exceptions:

1. The residence of a proprietor is not required to be an Accessible unit or to be counted towards the total number of units.
2. Facilities as described in Section 1103.2.11 are not required to provide Accessible units.

1108.6.3.2 Type B units.

In structures with four or more sleeping units intended to be occupied as a residence, every sleeping unit intended to be occupied as a residence shall be a Type B unit.

Exception: The number of Type B units is permitted to be reduced in accordance with Section 1108.7.

~~[NY]~~ ~~1107.6.4~~ 1108.6.4 Group R-4.

Accessible units and Type B units shall be provided in Group R-4 occupancies in accordance with Sections ~~1107.6.4.1~~ 1108.6.4.1 and ~~1107.6.4.2~~ 1108.6.4.2. Bedrooms in Group R-4 *facilities* shall be counted as *sleeping units* for the purpose of determining the number of units.

1108.7 General exceptions.

Where specifically permitted by Section 1108.5 or 1108.6, the required number of Type A units ~~and Type B units~~ is permitted to be reduced in accordance with ~~Sections 1108.7.1 through~~ Section 1108.7.5 and the required number of Type B units is permitted to be reduced in accordance with Sections 1108.7.1 through 1108.7.5.

1108.7.1 Structures without elevator service.

Where elevator service is not provided in a structure, only the *dwelling units* and *sleeping units* that are located on *stories* indicated in Sections 1108.7.1.1 and 1108.7.1.2 are required to be ~~Type A units and Type B units, respectively.~~ ~~The number of Type A units shall be determined in accordance with Section 1108.6.2.2.1.~~

~~1107.7.5~~ 1108.7.5 ~~Design flood elevation~~ Flood hazard areas.

~~The required number of Type A units and Type B units shall not apply to a site where the~~ shall not be required for buildings without elevator service that are located in flood hazard areas as established in Section 1612.3, where the minimum required elevation of the lowest floor or the lowest horizontal structural building members of nonelevator buildings are at or above the design flood elevation resulting supporting horizontal structural member, as applicable, results in all of the following:

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).
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 (15 240 mm).

Where such arrival points are not within 50 feet (15 240 mm) of the primary entrances, the closest arrival points shall be used.

SECTION ~~1108~~ 1109 SPECIAL OCCUPANCIES

~~1108.2~~ 1109.2 Assembly area seating.

A building, room or space used for assembly purposes with *fixed seating, bleachers, grandstands or folding and telescopic seating* shall comply with Sections 1109.2.1 through 1109.2.5. Lawn seating shall comply with Section 1109.2.6. Assistive listening systems shall comply with Section 1109.2.7. Performance areas viewed from assembly seating areas shall comply with Section 1109.2.8. Dining areas shall comply with Section 1109.2.9.

~~1108.2.2~~ 1109.2.2 Wheelchair spaces.

~~In rooms and spaces used for assembly purposes with fixed seating, accessible~~ *Accessible* wheelchair spaces shall be provided in accordance with Sections 1109.2.2.1 through 1109.2.2.3.

[NY] ~~1108.2.7~~ 1109.2.7 Assistive listening systems.

Each *building*, room or space used for assembly purposes where audible communications are integral to the use of the space shall have an assistive listening system. The assistive listening system shall comply with Appendix Q ~~Θ~~, Assistive Listening Systems Performance Standards.

Exception: Other than in courtrooms, an assistive listening system is not required where there is no audio amplification system.

~~1108.2.7.3~~ 1109.2.7.3 Public address systems.

Where stadiums, arenas and grandstands have 15,000 fixed seats or more and provide audible public announcements, they shall also provide prerecorded or real-time captions of those audible public announcements, *either prerecorded or real time*.

SECTION ~~1109~~ 1110 OTHER FEATURES AND FACILITIES

~~1109.1~~ 1110.1 General.

Accessible *building* features and *facilities* shall be provided in accordance with Sections 1110.2 through 1110.19.

Exception: *Accessible units, Type A units and Type B units* shall comply with Chapter ~~10-11~~ of ICC A117.1.

~~1109.2~~ 1110.2 Toilet and bathing facilities.

Each toilet room and bathing room shall be *accessible*. Where a floor level is not required to be connected by an *accessible route*, the only toilet rooms or bathing rooms provided within the facility shall not be located on the inaccessible floor. Except as provided for in Sections 1110.2.4 and 1110.2.5, at least one of each type of fixture, element, control or dispenser in each accessible toilet room and bathing room shall be *accessible*.

Exceptions:

1. Toilet rooms or bathing rooms accessed only through a private office, not for *common* or *public use* and intended for use by a single occupant, shall be permitted to comply with the specific exceptions in ICC A117.1.
2. This section is not applicable to toilet and bathing rooms ~~that serve~~ *located within dwelling units or sleeping units* that are not required to be *accessible* by Section 1108.
3. Where multiple single-user toilet rooms or bathing rooms are clustered at a single location, at least 50 percent but not less than one room for each use at each cluster shall be *accessible*.
4. Where no more than one urinal is provided in a toilet room or bathing room, the urinal is not required to be *accessible*.
5. Toilet rooms or bathing rooms that are part of critical care or intensive care patient sleeping rooms serving *Accessible units* are not required to be *accessible*.
6. Toilet rooms or bathing rooms designed for bariatrics patients are not required to comply with the toilet room and bathing room requirement in ICC A117.1. The *sleeping units* served by bariatrics toilet or bathing rooms shall not count toward the required number of *Accessible sleeping units*.

7. [Where permitted in Section 1108, in toilet rooms or bathrooms serving Accessible units, water closets designed for assisted toileting shall comply with Section 1110.2.2.](#)
8. [Where permitted in Section 1108, in bathrooms serving Accessible units, showers designed for assisted bathing shall comply with Section 1110.2.3.](#)
- ~~7.9.~~ 9. Where toilet facilities are primarily for children's use, required accessible water closets, toilet compartments and lavatories shall be permitted to comply with children's provision of ICC A117.1.

1109.2.1.2 1110.2.1.2 Family or assisted-use toilet rooms.

Family or assisted-use toilet rooms shall include only one water closet and only one lavatory. A family or assisted-use bathing room in accordance with Section 1110.2.1.3 shall be considered to be a family or assisted-use toilet room.

Exception: The following additional [plumbing](#) fixtures shall be permitted in a family or assisted-use toilet room:

1. A urinal.
2. A child-height water closet.
3. A child-height lavatory.
4. [An adult changing station also used for bathing.](#)

1109.2.1.6 Clear floor space.

~~Where doors swing into a family or assisted-use toilet or bathing room, a clear floor space not less than 30 inches by 48 inches (762 mm by 1219 mm) shall be provided, within the room, beyond the area of the door swing.~~

1109.2.1.7 1110.2.1.6 Privacy.

Doors to family or assisted-use toilet and bathing rooms shall be securable from within the room [and be provided with an "occupied" indicator.](#)

[1110.2.2 Water closets designed for assisted toileting.](#)

[Water closets designed for assisted toileting shall comply with Sections 1110.2.2.1 through 1110.2.2.6.](#)

[1110.2.2.1 Location.](#)

[The centerline of the water closet shall be not less than 24 inches \(610 mm\) and not greater than 26 inches \(660 mm\) from one side of the required clearance.](#)

[1110.2.2.2 Clearance.](#)

[Clearance around the water closet shall comply with Sections 1110.2.2.2.1 through 1110.2.2.2.3.](#)

[1110.2.2.2.1 Clearance width.](#)

[Clearance around a water closet shall be not less than 66 inches \(1675 mm\) in width, measured perpendicularly from the side of the clearance that is not less than 24 inches \(610 mm\) and not greater than 26 inches \(660 mm\) from the water closet centerline.](#)

[1110.2.2.2.2 Clearance depth.](#)

[Clearance around the water closet shall be not less than 78 inches \(1980 mm\) in depth, measured perpendicularly from the rear wall.](#)

[1110.2.2.2.3 Clearance overlap.](#)

[The required clearance around the water closet shall permit overlaps per ICC A117.1, Section 604.3.3](#)

[1110.2.2.3 Height.](#)

[The height of the water closet seats shall comply with ICC A117.1, Section 604.4.](#)

[1110.2.2.4 Swing-up grab bars.](#)

[Swing-up grab bars shall comply with ICC A117.1, Sections 609.2 and 609.8. Swing-up grab bars shall be provided on both sides of the water closet and shall comply with all of the following:](#)

1. The centerline of the grab bar shall be not less than 14 inches (356 mm) and not greater than 16 inches (405 mm) from the centerline of the water closet.
2. The length of the grab bar is not less than 36 inches (915 mm) in length, measured from the rear wall to the end of the grab bar.
3. The top of the grab bar in the down position is not less than 30 inches (760 mm) and not greater than 34 inches (865 mm) above the floor.

1110.2.2.5 Flush controls.

Flush controls shall comply with ICC A117.1, Section 604.6.

1110.2.2.6 Dispensers.

Toilet paper dispensers shall be mounted on at least one of the swing-up grab bars and the outlet of the dispenser shall be located not less than 24 inches (610 mm) and not greater than 36 inches (915 mm) from the rear wall.

1110.2.3 Standard roll-in-type shower compartment designed for assisted bathing.

Standard roll-in-type shower compartments designed for assisted bathing shall comply with Sections 1110.2.3.1 through 1110.2.3.9.

1110.2.3.1 Size.

Standard roll-in-type shower compartments shall have a clear inside dimension of not less than 60 inches (1525 mm) in width and 30 inches (760 mm) in depth, measured at the center point of opposing sides. An entry not less than 60 inches (1525 mm) minimum in width shall be provided.

1110.2.3.2 Clearance.

A clearance of not less than 60 inches (1525 mm) in length adjacent to the 60-inch (1525 mm) width of the open face of the shower compartment, and not less than 30 inches (760 mm) in depth, shall be provided.

Exceptions:

1. A lavatory complying with ICC A117.1, Section 606 shall be permitted at one end of the clearance.
2. Where the shower compartment exceeds minimum sizes, the clear floor space shall be placed adjacent to the grab bars and not less than 30 inches (762 mm) from the back wall.

1110.2.3.3 Grab bars.

Grab bars shall comply with ICC A117.1, Section 609 and shall be provided in accordance with Sections 1110.2.3.3.1 and 1110.2.3.3.2. In standard roll-in-type shower compartments, grab bars shall be provided on three walls. Where multiple grab bars are used, required horizontal grab bars shall be installed at the same height above the floor. Grab bars can be separate bars or one continuous bar.

1110.2.3.3.1 Back-wall grab bar.

The back-wall grab bar shall extend the length of the back wall and extend within 6 inches (150 mm) maximum from the two adjacent sidewalls.

Exception: The back-wall grab bar shall not be required to exceed 48 inches (1220 mm) in length. The rear grab bar shall be located with one end within 6 inches maximum of a sidewall with a grab bar complying with Section 1110.2.3.3.2.

1110.2.3.3.2 Sidewall grab bars.

The sidewall grab bars shall extend the length of the wall and extend within 6 inches (150 mm) of the adjacent back wall.

Exceptions:

1. The sidewall grab bar shall not be required to exceed 30 inches (760 mm) in length. The side grab bar shall be located with one end within 6 inches (152 mm) of the back wall with a grab bar complying with Section 1110.2.3.3.1.
2. Where the sidewalls are located 72 inches (1830 mm) or greater apart, a grab bar is not required on one of the sidewalls.

1110.2.3.4 Seats.

Wall-mounted folding seats shall not be installed.

1110.2.3.5 Controls and hand showers.

In standard roll-in-type showers, the controls and hand shower shall be located not less than 38 inches (965 mm) and not greater than 48 inches (1220 mm) above the shower floor. Controls shall be located to facilitate caregiver access.

1110.2.3.6 Hand showers.

Hand showers shall comply with ICC A117.1, Section 608.5.

1110.2.3.7 Thresholds.

Thresholds shall comply with ICC A117.1, Section 608.6.

1110.2.3.8 Shower enclosures.

Shower compartment enclosures for shower compartments shall comply with ICC A117.1, Section 608.7.

1110.2.3.9 Water temperature.

Water temperature shall comply with ICC A117.1, Section 608.8.

1110.3 Sinks.

Where sinks are provided, at least 5 percent but not less than one provided in accessible spaces shall be *accessible*.

Exception Exceptions:

1. Mop or service sinks are not required to be accessible.
2. For other than sinks in kitchens and kitchenette, where a sink requires a deep basin to perform its intended purpose or requires a specialized drain that cannot be located outside of the knee space, a parallel approach shall be permitted to be located adjacent to the sink.

1110.4 Adult Changing Stations.

Where provided, adult changing stations shall be accessible. Where required, adult changing stations and shall also comply with Sections 1110.3.1 through 1110.3.4.

1110.4.1 Where required.

At least one adult changing station shall be provided in all the following locations:

1. In assembly and mercantile occupancies, where family or assisted-use toilet or bathing rooms are required by Section 1110.2.1.
2. In Group B occupancies providing educational facilities for students above the 12th grade, where an aggregate of twelve of more male and female water closets are required to serve the classrooms and lecture halls.
3. In Group E occupancies, where a room or space used for assembly purposes requires an aggregate of six or more male and female water closets for that room or space.
4. In highway rest stops and highway service plazas.

1110.4.2 Room.

Adult changing stations shall be located in toilet rooms that include only one water closet and only one lavatory. Fixtures located in such rooms shall be included in determining the number of fixtures provided in an occupancy. The occupants shall have access to the required adult changing station at all times that the associated occupancy is occupied.

Exception: Adult changing stations shall be permitted to be located in family or assisted toilet rooms required in Section 1110.2.1.

1110.4.3 Prohibited location.

The *accessible route* from separate-sex toilet or bathing rooms to an accessible adult changing station shall not require travel through security checkpoints.

1110.4.4 Travel distance.

The adult changing station shall be located on an *accessible route* such that a *person* is not more than two *stories* above or below the *story* with the adult changing station and the path of travel to such *facility* shall not exceed 2,000 feet (609.6 m).

~~1110.4~~ 1110.5 Kitchens and kitchenettes.

Where kitchens and kitchenettes are provided in accessible spaces or rooms, they shall be *accessible*.

Exception: Kitchen and Kitchenette sinks shall be permitted to comply with Section 1110.3.

1110.6 Laundry equipment.

Where provided in spaces required to be *accessible*, washing machines and clothes dryers shall comply with this section.

1110.6.1 Washing machines.

Where three or fewer washing machines are provided, not fewer than one ~~or more~~ shall be *accessible*. Where more than three washing machines are provided, not fewer than two ~~or more~~ shall be *accessible*.

1110.6.2 Clothes dryers.

Where three or fewer clothes dryers are provided, not fewer than one ~~or more~~ shall be *accessible*. Where more than three clothes dryers are provided, not fewer than two ~~or more~~ shall be *accessible*.

~~1109.5~~ 1110.7 Drinking fountains.

Where drinking fountains are provided on an exterior *site*, on a floor or within a secured area, the drinking fountains shall be provided in accordance with Sections ~~1109.5.1~~ 1110.7.1 and ~~1109.5.2~~ 1110.7.2.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1109.5.1~~ 1110.5.1 Minimum number.

~~1109.5.2~~ 1110.5.2 More than the minimum number.

1110.8 Bottle-filling stations.

Where bottle-filling stations are provided, they shall be *accessible*.

Exception: Bottle-filling stations over drinking fountains for standing persons are not required to be *accessible*, provided that bottle-filling stations are also located over the drinking fountains for *persons* using wheelchairs.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1109.6~~ 1110.9 Saunas and steam rooms.

~~1109.7~~ 1110.10 Elevators.

~~1109.8~~ 1110.11 Lifts.

~~1109.9~~ 1110.12 Storage.

~~1109.9.1~~ 1110.12.1 Equity.

~~1109.9.2~~ 1110.12.2 Shelving and display units.

~~1109.10~~ 1110.13 Detectable warnings.

~~1109.11~~ 1110.14 Seating and standing spaces at dining surfaces ~~tables, counters,~~ and work surfaces.

Where seating or standing space ~~is provided at fixed, or built-in tables, counters~~ dining surfaces or work surfaces ~~is provided~~ in accessible spaces, ~~at least 5 percent of the~~ such seating and standing spaces, ~~but not less than one,~~ shall be *accessible* and shall comply with Sections 1110.14.1 through 1110.14.3.

~~Exception: Check-writing surfaces at check-out aisles not required to comply with Section 1110.13.1 are not required to be accessible.~~

1110.14.1 Dining Surfaces.

~~At least~~ Not less than 5 percent of the seating and standing space provided at fixed, built-in, and moveable dining surfaces shall be accessible.

1110.14.2 Work Surfaces.

~~At least~~ Not less than 5 percent of the seating and standing spaces at fixed or built-in work surfaces shall be accessible.

Exception: Check-writing surfaces at checkout aisles not required to comply with Section 1110.16.1 ~~1110.14.1~~ are not required to be accessible.

~~1109.11.1~~ 1110.14.3 Dispersion.

Accessible ~~fixed or built-in seating and standing space~~ at ~~tables, counters or dining or~~ work surfaces shall be distributed throughout the space or facility containing such elements and shall be located on a level accessed by an accessible route.

~~1109.11.2~~ 1110.15 Visiting areas.

Visiting areas in judicial facilities and Group I-3 shall comply with Sections ~~1110.12.2.1~~ 1110.15.1 and ~~1110.12.2.2~~ 1110.15.2.

[NY] 1109.11.2.1 1110.15.1 Cubicles and counters.

At least 5 percent, but not less than one of the cubicles, shall be accessible on both the visitor and detained individual sides. Where counters are provided, at least one shall be accessible on both the visitor and detainee sides.

Exception: This requirement shall not apply to the detainee side of cubicles or counters at noncontact visiting areas not serving Accessible unit holding cells.

~~1109.11.2.2~~ 1110.15.2 Partitions.

Where solid partitions or security glazing separate visitors from detainees, at least one of each type of cubicle or counter partition shall be accessible.

~~1109.12~~ 1110.16 Service facilities.

Service facilities shall provide for accessible features in accordance with Sections ~~1110.14~~ 1110.16.1 through ~~1110.13.4~~ 1110.16.4.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1109.12.2~~ 1110.16.1 Checkout aisles.

TABLE ~~1109.12.2~~ 1110.16.1

ACCESSIBLE CHECKOUT AISLES

Portions of table not shown remain unchanged.

~~1109.12.3~~ 1110.16.2 Point-of-sale Sales and service counters and windows.

Where counters or windows are provided for ~~sales~~ sale or distribution of goods or services, at least one of each type of counter and window provided shall be accessible. Where such counters or windows are dispersed throughout the building or facility, accessible counters or windows shall also be dispersed.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1110.15.3~~ 1110.16.3 Food service lines.

~~1110.15.4~~ 1110.16.4 Queue and waiting lines.

~~1109.12.1~~ 1110.17 Dressing, fitting and locker rooms.

~~1109.13~~ 1110.18 Controls, operating mechanisms and hardware.

Controls, operating mechanisms and hardware intended for operation by the occupant, including switches that control lighting and ventilation and electrical convenience outlets, in accessible spaces, along accessible routes or as parts of *accessible* elements shall be *accessible*.

Exceptions:

1. Operable parts that are intended for use only by service or maintenance personnel shall not be required to be *accessible*.
- ~~2. Electrical or communication receptacles serving a dedicated use shall not be required to be *accessible*.~~
- ~~3. Where two or more outlets are provided in a kitchen above a length of counter top that is uninterrupted by a sink or appliance, one outlet shall not be required to be *accessible*.~~
- ~~4. Floor electrical receptacles shall not be required to be *accessible*.~~
- ~~5. HVAC diffusers shall not be required to be *accessible*.~~
- ~~6. Except for light switches, where redundant controls are provided for a single element, one control in each space shall not be required to be *accessible*.~~
- ~~7. 2.~~ Access doors or gates in barrier walls and fences protecting pools, spas and hot tubs shall be permitted to comply with Section 1010.2.3.
3. Operable parts exempted in accordance with ICC A117.1 are not required to be *accessible*.

~~1109.15~~ 1110.19 Gaming machines and gaming tables.

At least two percent of the total, but not fewer than one, of each *gaming machine* type and *gaming table* type shall be accessible. Where multiple *gaming areas* occur, accessible gaming machines and gaming tables shall be distributed throughout.

SECTION ~~1110~~ 1111 RECREATIONAL FACILITIES

The bodies of Sections 1110.1 General through 1110.4.13 Play areas are unchanged and omitted for clarity but are renumbered as Sections 1111.1 General through 1111.4.13 Play areas accordingly.

~~1110.4.14~~ 1111.4.14 Swimming pools, wading pools, cold baths, hot tubs and spas.

Swimming pools, wading pools, cold baths, hot tubs and spas shall be *accessible* and be on an accessible route.

Exceptions:

1. ~~Catch pools~~ A catch pool or a designated section of a pool used as a terminus for a water slide flume shall not be required to provide an *accessible* means of entry, provided that a portion of the catch pool edge is on an *accessible route* or, where the area at the catch pool edge is located on a raised platform restricted to use by staff and persons exiting the pool, an accessible route serves the gate or area where participants discharge from the activity.
2. Where spas, cold baths or hot tubs are provided in a cluster, at least 5 percent, but not less than one of each type of spa, cold bath or hot tub in each cluster, shall be *accessible* and be on an *accessible route*.
3. *Swimming pools*, wading pools, spas, cold baths and hot tubs that are required to be *accessible* by Sections 1111.2.2 and 1111.2.3 are not required to provide *accessible* means of entry into the water.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1110.4.14.1~~ [1111.4.14.1](#) Raised diving boards and diving platforms.

~~1110.4.14.2~~ [1111.4.14.2](#) Water slides.

~~1110.4.15~~ [1111.4.15](#) Shooting facilities with firing positions.

Where shooting *facilities* with firing positions are designed and constructed at a site, at least 5 percent, but not less than one, of each type of firing position shall be *accessible* and be on an *accessible route*.

Exception: Shooting facilities with firing positions on free-standing platforms that are elevated more than 12 feet (3660 mm) above grade, provided that the aggregate area of the elevated firing positions is not more than 500 square feet (46 m2), are not required to be accessible.

SECTION ~~1111~~ [1112](#) SIGNAGE

~~1111.1~~ [1112.1](#) Signs.

Required accessible elements shall be identified by the International Symbol of Accessibility at the following locations.

1. Accessible parking spaces required by Section 1106.2.

Exception: Where the total number of parking spaces provided is four or less, identification of accessible parking spaces is not required.

2. Accessible parking spaces required by Section 1106.3.

Exception: In Group I-1, R-2, R-3 and R-4 *facilities*, where parking spaces are assigned to specific *dwelling units* or *sleeping units*, identification of *accessible* parking spaces is not required.

3. Accessible passenger loading zones.

4. Accessible [toilet or bathing](#) rooms where ~~not all multiple single-user~~ toilet or bathing rooms are [accessible clustered at a single location](#).

5. Accessible entrances where not all entrances are *accessible*.

6. Accessible check-out aisles where not all aisles are *accessible*. The sign, where provided, shall be above the check-out aisle in the same location as the checkout aisle number or type of check-out identification.

- ~~7. Family or assisted use toilet and bathing rooms.~~

- ~~8. 7.~~ Accessible dressing, fitting and locker rooms where not all such rooms are *accessible*.

- ~~9. 8.~~ Accessible areas of refuge in accordance with Section 1009.9.

- ~~10. 9.~~ Exterior areas for assisted rescue in accordance with Section 1009.9.

- ~~11. 10.~~ In recreational facilities, lockers that are required to be *accessible* in accordance with Section [1110.12](#)

[1112.2](#) Signs identifying toilet or bathing rooms.

Signs required in Section 403.4 of the *International Plumbing Code* identifying toilet rooms and bathing rooms shall be visual characters, raised characters and braille complying with ICC A117.1. Where pictograms are provided as designations for toilet rooms and bathing rooms, the pictograms shall have visual characters, raised characters and braille complying with ICC A117.1.

The bodies of the following code sections are unchanged and are omitted for clarity:

~~1111.2~~ [1112.3](#) Directional signage.

~~1111.3~~ [1112.4](#) Other signs.

~~1111.4~~ [1112.5](#) Variable message signs.

~~1111.4.1~~ [1112.5.1](#) Transportation facilities.

~~1111.4.2~~ [1112.5.2](#) Emergency shelters.

1112.6 Designations.

Where provided, interior and exterior signs identifying permanent rooms and spaces shall be visual characters, raised characters and braille complying with ICC A117.1. Where pictograms are provided as designations of interior rooms and spaces, the pictograms shall have visual characters, raised characters and braille complying with ICC A117.1.

Exceptions:

1. Exterior signs that are not located at the door to the space they serve are not required to comply.
2. Building directories, menus, seat and row designations in assembly areas, occupant names, building addresses and company names and logos are not required to comply.
3. Signs in parking facilities are not required to comply.
4. Temporary (7 days or less) signs are not required to comply.
5. In detention and correctional facilities, signs not located in public areas are not required to comply.

[NY] ~~1112.5~~ 1112.7 Access aisle signs.

Each *access aisle* shall be provided with signage reading “NO PARKING ANYTIME.” Signs shall be permanently installed in accordance with ICC A117.1 and shall not interfere with an *accessible route* from an *access aisle*.

Chapter 12 Interior Environment

SECTION 1201

GENERAL

1201.1 Scope.

The provisions of this chapter shall govern ventilation, temperature control, lighting, *yards and courts*, sound transmission, enhanced classroom acoustics, room interior space dimensions, surrounding materials, and rodent proofing access to unoccupied spaces, toilet and bathroom requirements and ultraviolet (UV) germicidal irradiation systems associated with the interior spaces of buildings.

SECTION 1202

VENTILATION

[NY] 1202.1 General.

Buildings shall be provided with natural ventilation in accordance with Section 1202.5, or mechanical ventilation in accordance with the *International Mechanical Code*. Where natural ventilation is proposed in buildings 4 or more stories in height containing dwelling units, dwelling units shall be tested in accordance with Section R402.4.1.2 of the Energy Conservation Code of New York State—Residential Provisions. ~~Where the air infiltration rate in a dwelling unit is less than 5 air changes per hour where tested with a blower door at a pressure 0.2 inch w.c. (50 Pa) in accordance with Section R402.4.1.2 of the International Energy Conservation Code—Residential Provisions, the dwelling unit~~ Dwelling units complying with the air leakage requirements of the International Energy Conservation Code or ASHRAE 90.1 shall be ventilated by mechanical means in accordance with Section 403 of the *International Mechanical Code*. *Ambulatory care facilities* and Group I-2 occupancies shall be ventilated by mechanical means in accordance with Section 407 of the *International Mechanical Code*.

1202.3 Unvented attic and unvented enclosed rafter assemblies.

Unvented *attics* and unvented enclosed roof framing assemblies created by ceilings applied directly to the underside of the roof framing members/rafters and the structural roof sheathing at the top of the roof framing members shall be permitted where all of the following conditions are met:

1. The unvented *attic* space is completely within the *building thermal envelope*.
2. No interior Class I vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly or on the ceiling side of the unvented enclosed roof framing assembly.

3. Where wood shingles or shakes are used, not less than a 1/4-inch (6.4 mm) vented airspace separates the shingles or shakes and the roofing underlayment above the structural sheathing.
4. In Climate Zones 5, 6, 7 and 8, any *air-impermeable insulation* shall be a Class II vapor retarder or shall have a Class II vapor retarder coating or covering in direct contact with the underside of the insulation.
5. Insulation shall ~~be located in accordance with the following:~~ comply with either Item 5.1 or 5.2, and additionally Item 5.3.

5.1 Item 5.1.1, 5.1.2, 5.1.3 or 5.1.4 shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing. Where only *air-impermeable insulation* is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.

- 5.1.1 Where only *air-impermeable insulation* is provided, it shall be applied in direct contact with the underside of the structural roof sheathing.
- 5.1.2 Where air-permeable insulation is provided inside the building thermal envelope, it shall be installed in accordance with Item 5.1.1. In addition to the air-permeable insulation installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing in accordance with the ~~R-values~~ R-value percentages in Table 1202.3 for condensation control.
- 5.1.3 Where both air-impermeable and air-permeable insulation are provided, the *air-impermeable insulation* shall be applied in direct contact with the underside of the structural roof sheathing in accordance with Item 5.1.1 and shall be in accordance with the ~~R-values~~ R-value percentages in Table 1202.3 for condensation control. The *air-permeable insulation* shall be installed directly under the *air-impermeable insulation*.
- 5.1.4 Alternatively, sufficient rigid board or sheet insulation shall be installed directly above the structural roof sheathing to maintain the monthly average temperature of the underside of the structural roof sheathing above 45°F (7°C). For calculation purposes, an interior air temperature of 68°F (20°C) is assumed and the exterior air temperature is assumed to be the monthly average outside air temperature of the three coldest months.

5.2 In Climate Zones 1, 2 and 3, air-permeable insulation installed in unvented attics shall meet the following requirements:

- 5.2.1 A vapor diffusion port shall be installed not more than 12 inches (305 mm) from the highest point of the roof, measured vertically from the highest point of the roof to the lower edge of the port.
- 5.2.2 The port area shall be greater than or equal to 1/150 of the ceiling area. Where there are multiple ports in the attic, the sum of the port areas shall be greater than or equal to the area requirement.
- 5.2.3 The vapor-permeable membrane in the vapor diffusion port shall have a vapor permeance rating of greater than or equal to 20 perms when tested in accordance with Procedure A of ASTM E96.
- 5.2.4 The vapor diffusion port shall serve as an air barrier between the attic and the exterior of the building.
- 5.2.5 The vapor diffusion port shall protect the attic against the entrance of rain and snow.
- 5.2.6 Framing members and blocking shall not block the free flow of water vapor to the port. Not less than a 2-inch (50 mm) space shall be provided between any blocking and the roof sheathing. Air-permeable insulation shall be permitted within that space.
- 5.2.7 The roof slope shall be greater than or equal to 3 units vertical in 12 units horizontal (3:12).
- 5.2.8 Where only air-permeable insulation is used, it shall be installed directly below the structural roof sheathing, on top the attic floor, or on top of the ceiling.

5.2.9 Where only air-permeable insulation is used and is installed directly below the structural roof sheathing, air shall be supplied at a flow rate greater than or equal to 50 cubic feet per minute (23.6 L/s) per 1,000 square feet (93 m²) of ceiling.

5.3 The air shall be supplied from ductwork providing supply air to the *occupiable space* when the conditioning system is operating. Alternatively, the air shall be supplied by a supply fan when the conditioning system is operating. Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

Exceptions:

1. Section 1202.3 does not apply to special use structures or enclosures such as swimming pool enclosures, data processing centers, *hospitals* or art galleries.
2. Section 1202.3 does not apply to enclosures in Climate Zones 5 through 8 that are humidified beyond 35 percent during the three coldest months.

TABLE 1202.3
INSULATION FOR CONDENSATION CONTROL

CLIMATE ZONE	MINIMUM R-VALUE OF AIR-IMPERMEABLE INSULATION ^a
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5 <u>10%</u>
4C	R-10 <u>20%</u>
4A, 4B	R-15 <u>30%</u>
5	R-20 <u>40%</u>
6	R-25 <u>50%</u>
7	R-30 <u>60%</u>
8	R-35 <u>70%</u>

a. Contributes to, but does not supersede, thermal resistance requirements for attic and roof assemblies in Section C402.2.1 of the International Energy Conservation Code.

1206.1 Scope.

This section shall apply to common interior walls, partitions and floor/ceiling assemblies between adjacent *dwelling units* and *sleeping units* or between *dwelling units* and *sleeping units* and adjacent public areas. ~~such as halls, corridors, stairways or service areas.~~

1206.2 Airborne sound.

Walls, partitions and floor-ceiling assemblies separating *dwelling units* and *sleeping units* from each other or from public or service areas shall have a sound transmission class of not less than 50 where tested in accordance with ASTM E90, or have a Normalized Noise Isolation Class (NNIC) rating of not less than 45 if field tested, ~~for airborne noise where tested in accordance with ASTM E90-ASTM E336 for airborne noise.~~ Alternatively, the sound transmission class of walls, partitions and floor-ceiling assemblies shall be established by engineering analysis based on a comparison of walls, partitions and floor-ceiling assemblies having sound transmission class ratings as determined by the test procedures set forth in ASTM E90. Engineering analysis shall be performed by a registered design professional. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to entrance doors; however, such doors shall be tight fitting to the frame and sill.

1206.3 Structure-borne sound.

Floor-ceiling assemblies between *dwelling units* and *sleeping units* or between a *dwelling unit* or *sleeping unit* and a public or service area within the structure shall have an impact insulation class rating of not less than 50 where tested in accordance with ASTM E492, or have a Normalized Impact Sound Rating (NISR) of not less than 45 if field tested, ~~where~~

~~tested~~ in accordance with ~~ASTM E492-ASTM E1007~~. Alternatively, the impact insulation class of floor-ceiling assemblies shall be established by engineering analysis based on a comparison of floor-ceiling assemblies having impact insulation class ratings as determined by the test procedures in ASTM E492. Engineering analysis shall be performed by a registered design professional.

[NY] SECTION 1207

~~ENHANCED CLASSROOM ACOUSTICS~~ RESERVED

~~1207.1 General.~~

~~Enhanced classroom acoustics, where required by this section, shall comply with Section 808 of ICC A117.1.~~

~~1207.2 Where required.~~

~~In Group E occupancies, enhanced classroom acoustics shall be provided in all classrooms with a volume of 20,000 cubic feet (566 m) or less.~~

SECTION ~~1207-1208~~

INTERIOR SPACE DIMENSIONS

~~1207.1~~ 1208.1 Minimum room widths.

Habitable spaces, other than a kitchen, shall be not less than 7 feet (2134 mm) in any plan dimension. Kitchens shall have a clear passageway of not less than 3 feet (914 mm) between counter fronts and appliances or counter fronts and walls.

~~1207.2~~ 1208.2 Minimum ceiling heights.

Occupiable spaces, *habitable spaces* and corridors shall have a ceiling height of not less than 7 feet 6 inches (2286 mm) above the finished floor. Bathrooms, toilet rooms, kitchens, storage rooms and laundry rooms shall have a ceiling height of not less than 7 feet (2134 mm) above the finished floor.

~~1207.2.1~~ 1208.2.1 Furred ceiling.

Any room with a furred ceiling shall be required to have the minimum ceiling height in two-thirds of the area thereof, but in no case shall the height of the furred ceiling be less than 7 feet (2134 mm).

1208.3 Dwelling unit size.

Dwelling units shall have a minimum of 190 square feet (17.7 m²) of habitable space.

1208.4 ~~1208.3~~ Room area.

Every *dwelling unit* shall have not less than one room that shall have not less than 120 square feet (11.2 m²) of *net floor area*. Sleeping units and other habitable rooms of a dwelling unit shall have a *net floor area* of not less than 70 square feet (6.5 m²).

Exception: Kitchens are not required to be of a minimum floor area.

1208.5 ~~1207.4~~ Efficiency dwelling units.

~~An efficiency living unit~~ Efficiency dwelling units shall conform to the requirements of the code except as modified herein:

1. The unit's *habitable space* shall ~~have a living room of not less than 220 square feet (20.4 m²) of floor area. An additional 100 square feet (9.3 m²) of floor area shall be provided for each occupant of such unit in excess of two.~~ comply with Sections 1208.1 through 1208.4.
2. The unit shall be provided with a separate closet.
3. ~~The~~ For other than Accessible, Type A and Type B dwelling units, the unit shall be provided with a kitchen sink, cooking appliance and ~~refrigeration facilities~~ refrigerator, each having a clear working space of not less than 30 inches (762 mm) in front. Light and *ventilation* conforming to this code shall be provided.
4. The unit shall be provided with a separate bathroom containing a water closet, lavatory and bathtub or shower.

SECTION ~~1208~~ 1209 ACCESS TO UNOCCUPIED SPACES

~~1208.1~~ 1209.1 Crawl spaces.

Crawl spaces shall be provided with not less than one access opening that shall be not less than 18 inches by 24 inches (457 mm by 610 mm).

~~1208.2~~ 1209.2 Attic spaces.

An opening not less than 20 inches by 30 inches (508 mm by 762 mm) shall be provided to any *attic* area having a clear height of over 30 inches (762 mm). Clear headroom of not less than 30 inches (762 mm) shall be provided in the *attic* space at or above the access opening.

~~1208.3~~ 1209.3 Mechanical appliances.

Access to mechanical appliances installed in under-floor areas, in *attic* spaces and on roofs or elevated structures shall be in accordance with the *International Mechanical Code*.

SECTION ~~1209~~ 1210 TOILET AND BATHROOM REQUIREMENTS

[P] ~~1209.1~~ 1210.1 Required fixtures.

The number and type of plumbing fixtures provided in any occupancy shall comply with Chapter 29.

[P] ~~1209.2~~ 1210.2 Finish materials.

Walls, floors and partitions in toilet and bathrooms shall comply with Sections 1210.2.1 through 1210.2.4.

[P] ~~1209.2.1~~ 1210.2.1 Floors and wall bases.

In other than *dwelling units*, toilet, bathing and shower room floor finish materials shall have a smooth, hard, nonabsorbent surface. The intersections of such floors with walls shall have a smooth, hard, nonabsorbent vertical base that extends upward onto the walls not less than 4 inches (102 mm).

~~1209.2.2~~ 1210.2.2 Walls and partitions.

Walls and partitions within 2 feet (610 mm) of service sinks, urinals and water closets shall have a smooth, hard, nonabsorbent surface, to a height of not less than 4 feet (1219 mm) above the floor, and except for structural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture.

Exception: This section does not apply to the following buildings and spaces:

1. Dwelling units and *sleeping units*.
2. Toilet rooms that are not ~~accessible to the~~ for use by the general public and that have not more than one water closet.

Accessories such as grab bars, towel bars, paper dispensers and soap dishes, provided on or within walls, shall be installed and sealed to protect structural elements from moisture.

1210.2.3 Adult changing table surround.

Walls and partitions within 2 feet (610 mm) measured horizontally from each end of the adult changing table and to a height of not less than 72 inches (1829 mm) above the floor shall have a smooth, hard, nonabsorbent surface, and except for structural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture.

[P] ~~1209.2.3~~ 1210.2.4 Showers.

Shower compartments and walls above bathtubs with installed shower heads shall be finished with a smooth, nonabsorbent surface to a height not less than 72 inches (1829 mm) above the drain inlet.

[P] ~~1209.2.4~~ 1210.2.5 Waterproof joints.

Built-in tubs with showers shall have waterproof joints between the tub and adjacent wall.

[P] ~~1209.3~~ 1210.3 Privacy.

Public restrooms shall be visually screened from outside entry or exit doorways to ensure user privacy within the restroom. This provision shall also apply where mirrors would compromise personal privacy. Privacy at water closets and urinals shall be provided in accordance with Sections 1210.3.1 and 1210.3.2.

Exception: Visual screening shall not be required for single-occupant toilet rooms with a lockable door.

[P] ~~1209.3.1~~ 1210.3.1 Water closet compartment. Each water closet utilized by the public or employees shall occupy a separate compartment with walls or partitions and a door enclosing the fixtures to ensure privacy.

Exceptions:

1. Water closet compartments shall not be required in a single-occupant toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more water closets shall be permitted to have one water closet without an enclosing compartment.
3. This provision is not applicable to toilet areas located within Group I-3 occupancy housing areas.

[P] ~~1209.3.2~~ 1210.3.2 Urinal partitions.

Each urinal utilized by the public or employees shall occupy a separate area with walls or partitions to provide privacy. The walls or partitions shall begin at a height not more than 12 inches (305 mm) from and extend not less than 60 inches (1524 mm) above the finished floor surface. The walls or partitions shall extend from the wall surface at each side of the urinal not less than 18 inches (457 mm) or to a point not less than 6 inches (152 mm) beyond the outermost front lip of the urinal measured from the finished backwall surface, whichever is greater.

Exceptions:

1. Urinal partitions shall not be required in a single-occupant or family or assisted-use toilet room with a lockable door.
2. Toilet rooms located in child day care facilities and containing two or more urinals shall be permitted to have one urinal without partitions.

SECTION 1211
UV GERMICIDAL IRRADIATION SYSTEMS

1211.1 General.

Where ultraviolet (UV) germicidal irradiation systems are provided they shall be listed and labeled in accordance with UL 8802 and installed in accordance with their listing and the manufacturer's instruction.

Chapter 13 Energy Efficiency

[E] 1301.1 Scope and intent.

~~This chapter governs the design and construction of buildings for energy efficiency.~~ The scope and intent of this chapter shall be as indicated in Sections C101.2 and C101.3 of the International Energy Conservation Code.

Chapter 14 Exterior Walls

1401.1 Scope.

The provisions of this chapter shall establish the minimum requirements for *exterior walls*; *exterior wall exterior wall assemblies, ~~coverings~~*; *exterior wall openings*; *exterior windows and doors*; *exterior soffits and fascias*; and *architectural trim*.

1402.1 General.

The provisions of this section shall apply to *exterior walls*, *exterior wall coverings* and components thereof.

1402.2 Weather protection.

~~Exterior walls shall provide the building~~ Buildings shall be provided with a weather-resistant *exterior wall assembly envelope*. The *exterior wall assembly envelope* shall include flashing, as described in Section 1404.4. The *exterior wall assembly envelope* shall be designed and constructed in such a manner as to prevent the accumulation of water within the *exterior wall assembly* by providing a *water-resistive barrier* behind the exterior *veneer*, as described in Section 1403.2, and a means for draining water that enters the assembly to the exterior. Protection against condensation in the *exterior wall assembly* shall be provided in accordance with Section 1404.3.

Exceptions:

1. A weather-resistant *exterior wall assembly envelope* shall not be required over concrete or masonry walls designed in accordance with Chapters 19 and 21, respectively.
2. Compliance with the requirements for a means of drainage, and the requirements of Sections 1403.2 and 1404.4, shall not be required for an *exterior wall assembly envelope* that has been demonstrated through testing to resist wind-driven rain, including joints, penetrations and intersections with dissimilar materials, in accordance with ASTM E331 under the following conditions: The *exterior wall envelope* design shall be considered to resist wind-driven rain where the results of testing, in accordance with ASTM E331, indicate that water did not penetrate control joints in the *exterior wall envelope*, joints at the perimeter of openings or intersections of terminations with dissimilar materials.
 - 2.1. *Exterior wall envelope* test assemblies shall include not fewer than one opening, one control joint, one wall/eave interface and one wall sill. Tested openings and penetrations shall be representative of the intended end-use configuration.
 - 2.2. *Exterior wall envelope* test assemblies shall be not less than 4 feet by 8 feet (1219 mm by 2438 mm) in size.
 - 2.3. *Exterior wall envelope test* assemblies shall be tested at a minimum differential pressure of 6.24 pounds per square foot (0.297 kN/m²).
 - 2.4. *Exterior wall envelope test* assemblies shall be subjected to a minimum test exposure duration of 2 hours.
3. *Exterior insulation and finish systems (EIFS)* complying with Section 1407.4.1.

[BS] 1402.3 ~~Structural~~ Wind resistance.

Exterior walls, exterior wall coverings, exterior soffits, fascias, and the associated openings, shall be designed and constructed to resist safely the superimposed loads required by Chapter 16.

1402.3.1 Attachments through exterior insulation.

Where exterior wall coverings are attached to the building structure through exterior continuous insulation, furring and attachments through the exterior insulation shall be designed to resist design loads determined in accordance with Chapter 16, including support of cladding weight as applicable. Exterior wall coverings attached to the building structure through foam plastic insulating sheathing shall comply with the attachment requirements of Section 1404.5.1, 14104.5.2, 1404.5.3.

1402.5 Vertical and lateral flame propagation.

Exterior walls on buildings of Type I, II, III or IV construction that contain a combustible exterior wall covering, combustible insulation or a combustible water-resistive barrier shall comply with Sections 1402.5.1 through 1402.5.5, as applicable. Where compliance with NFPA 285 and associated acceptance criteria is required in Sections 1402.5.1 through 1402.5.5, the exterior wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.

1402.5.1 Combustible water-resistive barrier.

Exterior walls containing a combustible water-resistive barrier shall comply with Section 1402.6

1402.5.2 Metal composite material (MCM).

Exterior walls containing metal composite material (MCM) systems shall comply with Section 1406.

1402.5.3 Exterior insulation and finish system (EIFS).

Exterior walls containing an exterior insulation and finish (EIFS) shall comply with Section 1407.

1402.5.4 High-pressure decorative exterior-grade compact laminate (HPL) system.

Exterior walls containing a high-pressure decorative exterior-grade compact laminate (HPL) system shall comply with Section 1408.

1402.5.5 Foam plastic insulation.

Exterior walls containing foam plastic insulation shall comply with Section 2603.

1402.5 1402.6 ~~Vertical and lateral flame propagation.~~ Water-resistive barriers.

Exterior walls on buildings of Type I, II, III or IV construction that are greater than 40 feet (12 192 mm) in height above grade plane and contain a combustible water-resistive barrier shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. Combustibility shall be determined in accordance with Section 703.3. For the purposes of this section, fenestration products, flashing of fenestration products and water-resistive-barrier flashing and accessories at other locations, including through wall flashings, shall not be considered part of the water-resistive barrier.

Exceptions:

1. *Exterior walls Walls in which the water-resistive barrier is the only combustible component and the exterior wall has a an exterior wall covering of brick, concrete, stone, terra cotta, stucco or steel with minimum thicknesses in accordance with Table 1404.2.*

2. Exterior walls ~~Walls~~ in which the *water-resistive barrier* is the only combustible component and the *water-resistive barrier* ~~has~~ complies with the following:
 - 2.1. ~~a~~ A peak heat release rate of less than 150 kW/m², a total heat release of less than 20 MJ/m² and an effective heat of combustion of less than 18 MJ/kg as determined in accordance with ASTM E1354, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m², ~~and has~~
 - 2.2. ~~a~~ A flame spread index of 25 or less and a smoke-developed index of 450 or less as determined in accordance with ASTM E84 or UL 723. The ASTM E1354 test shall be conducted on specimens at the thickness intended for use, in the horizontal orientation and at an incident radiant heat flux of 50 kW/m².

1402.7 Exterior wall veneers manufactured using combustible adhesives.

Exterior wall assemblies on buildings of Type I, II, III or IV construction that are greater than 40 feet (12,192 mm) in height above grade plane and contain an exterior wall veneer manufactured using a combustible adhesive to laminate a metal core with noncombustible facing materials shall be tested in accordance with, and comply with, the acceptance criteria of NFPA 285, with the adhesive level at the maximum application rate intended for use. Combustibility shall be determined in accordance with Section 703.3.

1402.8 Vertical and lateral flame propagation compliance methods.

When exterior wall assemblies are required in this chapter to be tested for vertical and lateral flame propagation in accordance with, and comply with the acceptance criteria of NFPA 285, compliance with the requirements shall be established by any of the following:

1. An exterior wall assembly tested in accordance with and meeting the acceptance criteria of NFPA 285.
2. An exterior wall assembly design listed by an approved agency for compliance with NFPA 285.
3. An approved analysis based on an assembly or condition tested in accordance with and meeting the acceptance criteria of NFPA 285

1403.2 Water-resistive barrier.

Not fewer than one layer of water-resistive barrier ~~No.15 asphalt felt, complying with ASTM D226 for Type 1 felt or other approved materials with a water resistance complying with ASTM E2556, Type I,~~ material shall be attached to the studs or sheathing, with flashing as described in Section 1404.4, in such a manner as to provide a continuous *water-resistive barrier* behind the exterior wall veneer. The intersection between the water-resistive barrier materials and fenestration openings shall be flashed and assembled in accordance with the fenestration manufacturer's installation instructions, or other approved methods for applications not addressed by the fenestration manufacturer's instructions. The water-resistive barrier material shall be continuous to the top of walls and terminated at penetrations and building appendages in a manner to meet the requirements of the exterior wall envelope as described in Section 1402.2. Water-resistive barriers shall comply with one of the following:

1. No. 15 felt complying with ASTM D226, Type 1.
2. ASTM E2556, Type I or II.
3. Foam plastic insulating sheathing water-resistive barrier systems complying with Section 1402.2 and installed in accordance with manufacturer's installation instructions.
4. ASTM E331 in accordance with Section 1402.2.
5. Other approved materials installed in accordance with the manufacturer's installation instructions.

No.15 asphalt felt and water-resistive barriers complying with ASTM E2556 shall be applied horizontally, with the upper layer lapped over the lower layer not less than 2 inches (51 mm). Where joints occur, the upper and lower layer shall be lapped not less than 6 inches (152 mm).

1403.8 Plastics.

~~Plastic panel, apron or spandrel walls as defined in this code shall not be limited in thickness, provided that such plastics and their assemblies conform to the requirements of Chapter 26 and are constructed of approved weather-resistant materials of adequate strength to resist the wind loads for cladding specified in Chapter 16.~~

~~1403.9~~ 1403.8 Vinyl siding.

Vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D3679 by an ~~approved~~ **quality control** agency.

~~1403.10~~ 1403.9 Fiber-cement siding.

Fiber-cement siding shall conform to the requirements of ASTM C1186, Type A (or ISO 8336, Category A), and shall be so identified on labeling listing an ~~approved~~ **quality control** agency.

~~1403.11~~ 1403.10 Exterior insulation and finish systems.

Exterior insulation and finish systems (EIFS) and exterior insulation and finish systems (EIFS) with drainage shall comply with Section 1407

~~1403.12~~ 1403.11 Polypropylene siding.

Polypropylene siding shall be certified and labeled as conforming to the requirements of D7425/D7425M—13 and those of Section 1403.12.1 or 1403.12.2 by an ~~approved~~ **quality control** agency. *Polypropylene siding* shall be installed in accordance with the requirements of Section 1404.18 and in accordance with the manufacturer's instructions. *Polypropylene siding* shall be secured to the building so as to provide weather protection for the *exterior walls* of the building.

~~1403.13~~ 1403.12 Foam plastic insulation.

Foam plastic insulation used in *exterior wall* ~~covering~~ assemblies shall comply with Chapter 26.

1403.13 Fiber-mat reinforced cementitious backer units.

Fiber-mat reinforced cementitious backer units used as an exterior substrate for the application of exterior finish materials shall comply with ASTM C1325.

1403.14 Insulated Vinyl Siding.

Insulated vinyl siding shall be certified and labeled as conforming to the requirements of ASTM D7793 by an approved agency.

1404.1.1 Soffits and fascias.

Soffits and fascias installed as part of roof overhangs shall comply with Section 1412.

**TABLE 1404.2
MINIMUM THICKNESS OF WEATHER COVERINGS**

COVERING TYPE	MINIMUM THICKNESS (inches)
<u>Fiber-mat reinforced cementitious backer units</u>	<u>0.5</u>
Adhered masonry veneer	<u>0.25</u>
Architectural cast stone	0.75

Other	0.25
Architectural cast stone	1.25 2.5
Porcelain tile	0.25 0.125 nominal
Portions of table not shown remain unchanged.	

1404.3 Vapor retarders.

Vapor retarders as described in Section 1404.3.3 shall be provided in accordance with Sections 1404.3.1 and 1404.3.2, or an approved design using accepted engineering practice for hygrothermal analysis. Vapor retarder materials shall be classified in accordance with Table 1404.3(1). A vapor retarder shall be provided on the interior side of frame walls in accordance with Tables 1404.3(2) and 1404.3(3), or 1404.3(4) as applicable, or an approved design using accepted engineering practice for hygrothermal analysis. Vapor retarders shall be installed in accordance with Section 1404.3.2. The appropriate climate zone shall be selected in accordance with Chapter 3 of the International Energy Conservation Code. Where a Class II vapor retarder is used in combination with foam plastic insulating sheathing installed as continuous insulation on the exterior side of frame walls, the continuous insulation shall comply with Table 1404.3(4) and the Class II vapor retarder shall have a vapor permeance greater than 1 perm when measured by ASTM E96 water method (Procedure B). Use of a Class I interior vapor retarder in frame walls with a Class I vapor retarder on the exterior side shall require an approved design.

Exceptions:

- Basement walls.
- Below-grade portion of any wall.
- Construction where accumulation, condensation or freezing of moisture will not damage the materials.
- ~~Class I and II vapor retarders with vapor permeance greater than 1 perm when measured by ASTM E96 water method (Procedure B) shall be allowed on the interior side of any frame wall in all climate zones.~~
- A vapor retarder shall not be required in Climate Zones 1, 2, and 3.
- In Climate Zones 4 through 8, a vapor retarder on the interior side of frame walls shall not be required where the assembly complies with Table 1404.3(5)

TABLE 1404.3(1) VAPOR RETARDER MATERIALS AND CLASSES

<u>VAPOR RETARDER CLASS</u>	<u>ACCEPTABLE MATERIALS</u>
<u>I</u>	<u>Sheet polyethylene, nonperforated aluminum foil, or other approved materials with a perm rating of less than or equal to 0.1</u>
<u>II</u>	<u>Kraft-faced fiberglass batts or vapor retarder paint or other approved materials, applied in accordance with the manufacturer's instructions for a perm rating greater than 0.1 and less than or equal to 1.0</u>
<u>III</u>	<u>Latex paint, enamel paint, or other approved materials, applied in accordance with the manufacturer's instructions for a perm rating of greater than 1.0 and less than or equal to 10</u>

TABLE 1404.3(2) VAPOR RETARDER OPTIONS

<u>CLIMATE ZONE</u>	<u>VAPOR RETARDER CLASS</u>		
	<u>I^a</u>	<u>II^a</u>	<u>III^a</u>
<u>1, 2</u>	<u>Not permitted</u>	<u>Not Permitted</u>	<u>Permitted</u>
<u>3</u>	<u>Not permitted</u>	<u>Permitted^c</u>	<u>Permitted</u>
<u>4 (except Marine)</u>	<u>Not permitted</u>	<u>Permitted^c</u>	<u>See Table 1404.3(3)</u>

Marine 4, 5, 6, 7, 8	Permitted^{b,c}	Permitted^c	See Table 1404.3(3)
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- ~~1. See also Section 1404.3.2. A responsive vapor retarder shall be allowed on the interior side of any frame wall in all climate zones.~~
- ~~2. In frame walls with a Class I vapor retarder on the exterior side, use of a Class I interior vapor retarder that is not a responsive vapor retarder shall require an approved design.~~
- ~~3. Where a Class I or II vapor retarder is used in combination with foam plastic insulating sheathing installed as continuous insulation on the exterior side of frame walls, the continuous insulation shall comply with Table 1404.3(4) and the Class I or II vapor retarder shall be a responsive vapor retarder.~~

TABLE 1404.3.2 TABLE 1404.3(3) CLASS III VAPOR RETARDERS

ZONE	CLASS III VAPOR RETARDERS PERMITTED FOR: ^{a, b}
Marine 4	Vented cladding over wood structural panels Vented cladding over fiberboard Vented cladding over gypsum Continuous insulation with $R\text{-value} \geq R2.5$ over 2×4 wall Continuous insulation with $R\text{-value} \geq R3.75$ over 2×6 wall
5	Vented cladding over wood structural panels Vented cladding over fiberboard Vented cladding over gypsum Continuous insulation with $R\text{-value} \geq R5$ over 2×4 wall Continuous insulation with $R\text{-value} \geq R7.5$ over 2×6 wall
6	Vented cladding over fiberboard Vented cladding over gypsum Continuous insulation with $R\text{-value} \geq R7.5$ over 2×4 wall Continuous insulation with $R\text{-value} \geq R11.25$ over 2×6 wall
7 and 8	Continuous insulation with $R\text{-value} \geq R10$ over 2×4 wall Continuous insulation with $R\text{-value} \geq R15$ over 2×6 wall
8	Continuous insulation with $R\text{-value} \geq R12.5$ over 2×4 wall Continuous insulation with $R\text{-value} \geq R20$ over 2×6 wall

~~a. Spray foam with a maximum permance of 1.5 perms at the installed thickness applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to meet the continuous insulation requirement where the spray foam R-value meets or exceeds the specified insulating sheathing R-value. Vented cladding shall include vinyl lap siding, polypropylene, or horizontal aluminum siding, brick veneer with airspace as specified in this code, rainscreen systems, and other approved vented claddings.~~

~~b. The requirements in this table apply only to insulation used to control moisture in order to permit the use of Class III vapor retarders. The insulation materials used to satisfy this option also contribute to but do not supersede the building thermal envelope requirements of the International Energy Conservation Code.~~

TABLE 1404.3(4) CONTINUOUS INSULATION WITH [A](#) CLASS [I](#) OR [II](#) [RESPONSIVE](#) VAPOR RETARDER

CLIMATE ZONE	PERMITTED CONDITIONS ^a
3	Continuous insulation with $R\text{-value} \geq R2$
4, 5, 6	Continuous insulation with $R\text{-value} \geq R3$ over 2×4 wall Continuous insulation with $R\text{-value} \geq R5$ over 2×6 wall
7	Continuous insulation with $R\text{-value} \geq R5$ over 2×4 wall Continuous insulation with $R\text{-value} \geq R7.5$ over 2×6 wall
8	Continuous insulation with $R\text{-value} \geq R7.5$ over 2×4 wall

	<i>Continuous insulation with R-value $\geq$ R10 over 2 $\times$ 6 wall</i>
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- a. The requirements in this table apply only to insulation used to control moisture in order to permit the use of Class I or II vapor retarders. The insulation materials used to satisfy this option also contribute to but do not supersede the building thermal envelope requirements of the *International Energy Conservation Code*. ~~In addition to the vapor retarder, spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to comply with the continuous insulation requirement only for the moisture control purposes of this table where the spray foam R-value plus any continuous insulation R-value provided equals or exceeds the specified continuous insulation R-value.~~

TABLE 1404.3(5) CONTINUOUS INSULATION ON WALLS WITHOUT A CLASS I, II, or III INTERIOR VAPOR RETARDER

<u>CLIMATE ZONE</u>	<u>PERMITTED CONDITIONS^{b,c}</u>
<u>4</u>	<u>Continuous insulation with R-value $\geq$ 4.5</u>
<u>5</u>	<u>Continuous insulation with R-value $\geq$ 6.5</u>
<u>6</u>	<u>Continuous insulation with R-value $\geq$ 8.5</u>
<u>7</u>	<u>Continuous insulation with R-value $\geq$ 11.5</u>
<u>8</u>	<u>Continuous insulation with R-value $\geq$ 14</u>

- a. The total insulating value of materials to the interior side of the exterior *continuous insulation*, including any cavity insulation, shall not exceed R-5. Where the R-value of materials to the interior side of the exterior continuous insulation exceeds R-5, an *approved design* shall be required.
- b. A water vapor control material layer having a permeance of not greater than 1 perm in accordance with ASTM E96, Procedure A (dry cup) shall be placed on the exterior side of the wall and to the interior side of the exterior continuous insulation. The exterior continuous insulation shall be permitted to serve as the vapor control layer where, at its installed thickness or with a facer on its interior face, the exterior continuous insulation is a Class I or II vapor retarder.
- c. The requirements of this table apply only to continuous insulation used to control moisture in order to allow walls without a Class I, II, or III interior vapor retarder. The insulation materials used to satisfy this option also contribute to but do not supersede the *building thermal envelope* requirements of the *International Energy Conservation Code*.

1404.3.2 1404.3.1 Spray foam plastic insulation for moisture control with Class II and III vapor retarders.

For purposes of compliance with ~~Table~~ Tables 1404.3(3) and 1404.3(4), spray foam with a maximum permeance of 1.5 perms at the installed thickness applied to the interior ~~cavity~~ side of wood structural panels, fiberboard, *insulating sheathing* or gypsum shall be deemed to meet the continuous insulation moisture control requirement ~~where the in~~ accordance with one of the following conditions:

- The spray foam R-value meets or exceeds the specified *continuous insulation* R-value.
- The combined R-value of the spray foam and *continuous insulation* is equal to or greater than the specified continuous insulation R-value.

TABLE 1404.3.1 CONTINUOUS INSULATION WITH CLASS II VAPOR RETARDER

<u>CLIMATE ZONE</u>	<u>PERMITTED CONDITIONS^a</u>
<u>3</u>	<u>Continuous insulation with R-value $\geq$ R2</u>
<u>4, 5, 6</u>	<u>Continuous insulation with R-value $\geq$ R3 over 2 $\times$ 4 wall Continuous insulation with R-value $\geq$ R5 over 2 $\times$ 6 wall</u>
<u>7</u>	<u>Continuous insulation with R-value $\geq$ R5 over 2 $\times$ 4 wall Continuous insulation with R-value $\geq$ R7.5 over 2 $\times$ 6 wall</u>

8	Continuous insulation with R-value $\geq$ R7.5 over 2×4 wall Continuous insulation with R-value $\geq$ R10 over 2×6 wall
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a. In addition to the vapor retarder, spray foam with a maximum permeance of 1.5 perms at the installed thickness, applied to the interior cavity side of wood structural panels, fiberboard, insulating sheathing or gypsum is deemed to comply with the continuous insulation requirement only for the moisture control purposes of this table where the spray foam R-value plus any continuous insulation R-value provided equals or exceeds the specified continuous insulation R-value.

~~1404.3.2 Hybrid insulation for moisture control with Class III vapor retarders.~~

~~For the purposes of compliance with Table 1404.3(3), the combined R-values of spray foam plastic insulation and continuous insulation shall be permitted to be counted toward the continuous R-value requirement.~~

~~1404.3.3 Material vapor retarder class.~~

~~The vapor retarder class shall be based on the manufacturer's certified testing or a tested assembly. The following shall be deemed to meet the class specified:~~

- ~~Class I:—Sheet polyethylene, nonperforated aluminum foil with a perm rating of less than or equal to 0.1;~~
- ~~Class II:—Kraft faced fiberglass batts or paint with a perm rating greater than 0.1 and less than or equal to 1.0;~~
- ~~Class III:—Latex or enamel paint with a perm rating of greater than 1.0 and less than or equal to 10.0;~~

~~1404.3.4 Minimum clear airspaces and vented openings for vented cladding.~~

~~For the purposes of this section, vented cladding shall include the following minimum clear airspaces:~~

- ~~1. Vinyl, polypropylene or horizontal aluminum siding applied over a weather resistive barrier as specified in this chapter;~~
- ~~2. Brick veneer with a clear airspace as specified in this code;~~
- ~~3. Other approved vented claddings;~~

1404.3.2 Vapor Retarder Installation.

Vapor retarders shall be installed in accordance with the manufacturer's instructions or an approved design. Where a vapor retarder also functions as a component of a continuous air barrier, the vapor retarder shall be installed as an air barrier in accordance with the International Energy Conservation Code.

~~1404.3.3 Material vapor retarder class.~~

~~The vapor retarder class shall be based on the manufacturer's certified testing or a tested assembly. The following shall be deemed to meet the class specified:~~

- ~~Class I:—Sheet polyethylene, nonperforated aluminum foil with a perm rating of less than or equal to 0.1;~~
- ~~Class II:—Kraft faced fiberglass batts or paint with a perm rating greater than 0.1 and less than or equal to 1.0;~~
- ~~Class III:—Latex or enamel paint with a perm rating of greater than 1.0 and less than or equal to 10.0;~~

~~1404.3.4 Minimum clear airspaces and vented openings for vented cladding.~~

~~For the purposes of this section, vented cladding shall include the following minimum clear airspaces:~~

- ~~1. Vinyl, polypropylene or horizontal aluminum siding applied over a weather resistive barrier as specified in this chapter;~~
- ~~2. Brick veneer with a clear airspace as specified in this code;~~
- ~~3. Other approved vented claddings;~~

1404.4 Flashing.

Flashing shall be installed in such a manner so as to prevent moisture from entering the *exterior wall* or to redirect that moisture to the ~~exterior surface of the exterior wall covering finish~~ or to a water-resistive barrier complying with Section 1403.2 and that is part of a means of drainage complying with Section 1402.2. Flashing shall be installed at the perimeters of exterior door and window assemblies in accordance with Section 1404.4.1, penetrations and terminations of *exterior wall* assemblies, *exterior wall* intersections with roofs, chimneys, porches, decks, balconies and similar projections and at built-in gutters and similar locations where moisture could enter the wall. Flashing with projecting flanges shall be installed on both sides and the ends of copings, under sills and continuously above projecting trim. Where self-adhered membranes are used as flashings of *fenestration* in *exterior wall assemblies*, those self-adhered flashings shall comply with AAMA 711. Where fluid applied membranes are used as flashing for *exterior wall* openings, those fluid applied membrane flashings shall comply with AAMA 714.

1404.4.1 Fenestration flashing.

Flashing of the fenestration to the wall assembly shall comply with the fenestration manufacturer's instructions or, for conditions not addressed by the fenestration manufacturer's instructions, shall comply with one of the following:

1. The water-resistive barrier manufacturer's flashing instructions;
2. The flashing manufacturer's flashing instructions;
3. A flashing design or method of a registered design professional; or,
4. Other approved methods.

[BS] 1404.5 ~~1404.17~~ Fastening.

~~Weather boarding and~~ *Exterior wall coverings* shall be securely fastened with ~~aluminum, copper, zinc, zinc-coated or other approved~~ corrosion-resistant fasteners in accordance with this code the nailing schedule in Table 2304.10.2 or the approved manufacturer's instructions. Fastenings of claddings or furring through foam plastic insulating sheathing shall comply with Section 1404.5.1, 1404.5.2 or 1404.5.3, as applicable. ~~Shingles and other weather coverings shall be attached with appropriate standard shingle nails to furring strips securely nailed to studs, or with approved mechanically bonding nails, except where sheathing is of wood not less than 1-inch (25 mm) nominal thickness or of wood structural panels as specified in Table 2308.6.3(3).~~

[BS] ~~2603.11~~ 1404.5.1 Cladding attachment over foam sheathing to masonry or concrete wall construction.

Cladding shall be specified and installed in accordance with this chapter ~~14~~ and the cladding manufacturer's installation instructions or an approved design. Foam sheathing shall be attached to masonry or concrete construction in accordance with the insulation manufacturer's installation instructions or an approved design. Furring and furring attachments through foam sheathing shall be designed to resist design *loads* determined in accordance with Chapter 16, including support of cladding weight as applicable. Fasteners used to attach cladding or furring through foam sheathing to masonry or concrete substrates shall be approved for application into masonry or concrete material and shall be installed in accordance with the fastener manufacturer's installation instructions.

Exceptions:

1. Where the cladding manufacturer has provided approved installation instructions for application over foam sheathing and connection to a masonry or concrete substrate, those requirements shall apply.
2. For *exterior insulation and finish systems*, refer to Section 1407.
3. For anchored masonry or stone *veneer* installed over foam sheathing, refer to Section 1404.

[BS] ~~2603.12~~ [1404.5.2](#) Cladding attachment over foam sheathing to cold-formed steel framing.

Cladding shall be specified and installed in accordance with [this](#) chapter ~~14~~ and the cladding manufacturer's approved installation instructions, including any limitations for use over foam plastic sheathing, or an approved design. Where used, furring and furring attachments shall be designed to resist design *loads* determined in accordance with Chapter 16. In addition, the cladding or furring attachments through foam sheathing to cold-formed steel framing shall meet or exceed the minimum fastening requirements of Sections [1404.5.2.1](#) ~~2603.12.1~~ and [1404.5.2.2](#) ~~2603.12.2~~, or an approved design for support of cladding weight.

Exceptions:

1. Where the cladding manufacturer has provided approved installation instructions for application over foam sheathing, those requirements shall apply.
2. For *exterior insulation and finish systems*, refer to Section 1407.
3. For anchored masonry or stone *veneer* installed over foam sheathing, refer to Section 1404.

[BS] ~~2603.12.1~~ [1404.5.2.1](#) Direct attachment.

Where cladding is installed directly over foam sheathing without the use of furring, cladding minimum fastening requirements to support the cladding weight shall be as specified in Table ~~2603.12.1~~ [1404.17.2.1](#).

TABLE ~~2603.12.1~~ [1404.5.2.1](#) CLADDING MINIMUM FASTENING REQUIREMENTS FOR DIRECT ATTACHMENT OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT^a

Table not shown as there were no changes to the table.

[BS] ~~2603.12.2~~ [1404.5.2.2](#) Furred cladding attachment.

Where steel or wood furring is used to attach cladding over foam sheathing, furring minimum fastening requirements to support the cladding weight shall be as specified in Table ~~2603.12.2~~ [1404.5.2.2](#). Where placed horizontally, wood furring shall be *preservative-treated wood* in accordance with Section 2303.1.9 or *naturally durable wood* and fasteners shall be corrosion resistant in accordance Section 2304.10.6. Steel furring shall have a minimum G60 galvanized coating.

TABLE ~~2603.12.2~~ [1404.5.2.2](#) FURRING MINIMUM FASTENING REQUIREMENTS FOR APPLICATION OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT

[BS] ~~2603.13~~ [1404.5.3](#) Cladding attachment over foam sheathing to wood framing.

Cladding shall be specified and installed in accordance with [this](#) chapter ~~14~~ and the cladding manufacturer's installation instructions. Where used, furring and furring attachments shall be designed to resist design *loads* determined in accordance with Chapter 16. In addition, the cladding or furring attachments through foam sheathing to framing shall meet or exceed the minimum fastening requirements of Section ~~2603.13.1~~ [1404.5.3.1](#) or ~~2603.13.2~~ [1404.5.3.2](#), or an approved design for support of cladding weight.

Exceptions:

1. Where the cladding manufacturer has provided approved installation instructions for application over foam sheathing, those requirements shall apply.
2. For *exterior insulation and finish systems*, refer to Section 1407.
3. For anchored masonry or stone *veneer* installed over foam sheathing, refer to Section 1404.

[BS] ~~2603.13.1~~ [1404.5.3.1](#) Direct attachment.

Where cladding is installed directly over foam sheathing without the use of furring, minimum fastening requirements to support the cladding weight shall be as specified in Table ~~2603.13.1~~ [1404.5.3.1](#).

TABLE 2603.13.1 1404.5.3.1 CLADDING MINIMUM FASTENING REQUIREMENTS FOR DIRECT ATTACHMENT OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT

Portions of table not shown remain unchanged.

CLADDING FASTENER THROUGH FOAM SHEATHING INTO:	CLADDING FASTENER TYPE AND MINIMUM SIZE ^{b c}	CLADDING FASTENER VERTICAL SPACING (INCHES)	MAXIMUM THICKNESS OF FOAM SHEATHING ^{e d} (INCHES)							
			16" o.c. fastener horizontal spacing				24" o.c. fastener horizontal spacing			
			Cladding weight:				Cladding weight:			
			3 psf	11 psf	18 psf	25 psf	3 psf	11 psf	18 psf	25 psf
Wood Framing (minimum 1 ¹ / ₄ - inch penetration) ^b	0.113" diameter nail	6	2.00	1.45	0.75	DR	2.00	0.85	DR	DR
		8	2.00	1.00	DR	DR	2.00	0.55	DR	DR
		12	2.00	0.55	DR	DR	1.85	DR	DR	DR
	0.120" diameter nail	6	3.00	1.70	0.90	0.55	3.00	1.05	0.50	DR
		8	3.00	1.20	0.60	DR	3.00	0.70	DR	DR
		12	3.00	0.70	DR	DR	2.15	DR	DR	DR
	0.131" diameter nail	6	4.00	2.15	1.20	0.75	4.00	1.35	0.70	DR
		8	4.00	1.55	0.80	DR	4.00	0.90	DR	DR
		12	4.00	0.90	DR	DR	2.70	0.50	DR	DR
	0.162" diameter nail	6	4.00	3.55	2.05	1.40	4.00	2.25	1.25	0.80
		8	4.00	2.55	1.45	0.95	4.00	1.60	0.85	0.50
		12	4.00	1.60	0.85	0.50	4.00	0.95	DR	DR

For SI: 1 inch = 25.4 mm, 1 pound per square foot (psf) = 0.0479 kPa. DR = Design Required, o.c. = on center.

- Wood framing shall be spruce-pine-fir or any wood species with a specific gravity of 0.42 or greater in accordance with ANSI/AWC NDS.
- [The thickness of wood structural panels complying with the specific gravity requirement of Note a shall be permitted to be included in satisfying the minimum penetration into framing.](#)
- [b.c.](#) Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths.
- [e.d.](#) Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.

[BS] 2603.13.2 1404.5.3.2 Furred cladding attachment.

Where wood furring is used to attach cladding over foam sheathing, furring minimum fastening requirements to support the cladding weight shall be as specified in Table 2603.13.2 1404.5.3.2. Where placed horizontally, wood furring shall be *preservative-treated wood* in accordance with Section 2303.1.9 or *naturally durable wood* and fasteners shall be corrosion resistant in accordance with Section 2304.10.6.

TABLE 2603.13.2 1404.5.3.2 FURRING MINIMUM FASTENING REQUIREMENTS FOR APPLICATION OVER FOAM PLASTIC SHEATHING TO SUPPORT CLADDING WEIGHT

FURRING MATERIAL	FRAMING MEMBER	FASTENER TYPE AND MINIMUM SIZE	MINIMUM PENETRATION INTO WALL FRAMING (INCHES) ^c	FASTENER SPACING IN FURRING (INCHES)	MAXIMUM THICKNESS OF FOAM SHEATHING ^{e f} (INCHES)	
					16" o.c. furring ^{e f}	24" o.c. furring ^{e f}
					Siding weight:	Siding weight:

					3 psf	11 psf	18 psf	25 psf	3 psf	11 psf	18 psf	25 psf
Minimum 1x Wood Furring ^{e,d}	Minimum 2x Wood Stud	0.131" diameter nail	1 ^{1/4}	8	4.00	2.45	1.45	0.95	4.00	1.60	0.85	DR
				12	4.00	1.60	0.85	DR	4.00	0.95	DR	DR
				16	4.00	1.10	DR	DR	3.05	0.60	DR	DR
		0.162" diameter nail	1 ^{1/4}	8	4.00	4.00	2.45	1.60	4.00	2.75	1.45	0.85
				12	4.00	2.75	1.45	0.85	4.00	1.65	0.75	DR
				16	4.00	1.90	0.95	DR	4.00	1.05	DR	DR
		No. 10 wood screw	1	12	4.00	2.30	1.20	0.70	4.00	1.40	0.60	DR
				16	4.00	1.65	0.75	DR	4.00	0.90	DR	DR
				24	4.00	0.90	DR	DR	2.85	DR	DR	DR
		1/4" lag screw	1 ^{1/2}	12	4.00	2.65	1.50	0.90	4.00	1.65	0.80	DR
				16	4.00	1.95	0.95	0.50	4.00	1.10	DR	DR
				24	4.00	1.10	DR	DR	3.25	0.50	DR	DR

For SI: 1 inch = 25.4 mm, 1 pound per square foot (psf) = 0.0479 kPa, 1 pound per square inch = 0.00689 MPa. DR = Design Required, o.c. = on center.

- Wood framing and furring shall be spruce-pine-fir or any wood species with a specific gravity of 0.42 or greater in accordance with ANSI/AWC NDS.
- Nail fasteners shall comply with ASTM F1667, except nail length shall be permitted to exceed ASTM F1667 standard lengths.
- [The thickness of wood structural panels complying with the specific gravity requirements of Note a shall be permitted to be included in satisfying the minimum required penetration into framing.](#)
- ^{e,d} Where the required cladding fastener penetration into wood material exceeds 3/4 inch and is not more than 1 1/2 inches, a minimum 2-inch nominal wood furring or an approved design shall be used.
- ^{d,e} Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.
- ^{e,f} Furring shall be spaced not greater than 24 inches on center in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, the indicated 8-inch and 12-inch fastener spacing in furring shall be achieved by use of two fasteners into studs at 16 inches and 24 inches on center, respectively.

~~[BS] 1404.6.2 Seismic requirements.~~

~~Anchored masonry veneer located in Seismic Design Category C, D, E or F shall conform to the requirements of Section 12.2.2.11 of TMS 402.~~

[BS] ~~1404.6~~ [1404.7](#) Anchored masonry veneer.

Anchored masonry veneer shall comply with the provisions of Sections 1404.6 through 1404.9 and Sections ~~12.1~~ [13.1](#) and ~~12.2~~ [13.2](#) of TMS 402.

[BS] ~~1404.6.1~~ [1404.7.1](#) Tolerances.

Anchored masonry veneers in accordance with Chapter 14 are not required to meet the tolerances in Article 3.3 ~~F16~~ [G.1](#) of TMS 602.

[BS] ~~1404.10~~ 1404.11 Adhered masonry veneer.

Adhered masonry veneer shall comply with the applicable requirements in this section and Sections ~~12.1~~ 13.1 and ~~12.3~~ 13.2 of TMS 402.

[BS] ~~1404.10.2~~ 1404.11.2 Exterior adhered masonry veneers-porcelain tile.

Adhered units weighing more than 3.5 pounds per square foot (0.17 kN/m²) shall not exceed ~~5/8-inch (15.8 mm)~~ thickness and 24 inches (610 mm) in any face dimension nor more than ~~3-9~~ square feet (0.28 m²) in total face area and shall not weigh more than ~~9-6~~ pounds per square foot (0.43 kN/m²). Adhered units weighing less than or equal to 3.5 pounds per square foot (0.17 kN/m²) shall not exceed 72 inches (1829 mm) in any face dimension nor more than 17.5 square feet (1.6 m²) in total face area. Porcelain tile shall be adhered to an approved backing system.

[BS] ~~1404.14~~ 1404.15 Vinyl siding and Insulated Vinyl Siding.

Vinyl siding and insulated vinyl siding conforming to the requirements of this section and complying with ASTM D3679 and ASTM D7793, respectively, shall be permitted on ~~exterior walls of buildings located in areas where Vasd as determined in accordance with Section 1609.3.1 does not exceed 100 miles per hour (45 m/s) and the building height is less than or equal to 40 feet (12 192 mm) in Exposure C. Where construction is located in areas where Vasd as determined in accordance with Section 1609.3.1 exceeds 100 miles per hour (45 m/s), or building heights are in excess of 40 feet (12 192 mm), tests or calculations indicating compliance with Chapter 16 shall be submitted.~~ Vinyl siding shall be secured to the building so as to provide weather protection for the exterior walls of the building, where the design wind pressure determined in accordance with Section 1609 does not exceed 30 pounds per square foot (1.44 kN/m²). Where the design wind pressure exceeds 30 pounds per square foot (1.44 kN/m²), tests or calculations indicating compliance with Chapter 16 shall be submitted.

[BS] ~~1404.14.1~~ 1404.15.1 Application.

The siding shall be applied over sheathing or materials listed in Section 2304.6. Siding shall be applied to conform to the *water-resistive barrier* requirements in Section 1402. Siding and accessories shall be installed in accordance with the *approved* manufacturer's instructions. ~~Unless otherwise specified in the approved manufacturer's instructions, nails used to fasten the siding and accessories shall have a minimum 0.313-inch (7.9 mm) head diameter and 1/8-inch (3.18 mm) shank diameter. The nails shall be corrosion resistant and shall be long enough to penetrate the studs or nailing strip not less than 3/4-inch (19 mm). For cold formed steel light frame construction, corrosion-resistant fasteners shall be used. Screw fasteners shall penetrate the cold formed steel framing not fewer than three exposed threads. Other fasteners shall be installed in accordance with the approved construction documents and manufacturer's instructions. Where the siding is installed horizontally, the fastener spacing shall not exceed 16 inches (406 mm) horizontally and 12 inches (305 mm) vertically. Where the siding is installed vertically, the fastener spacing shall not exceed 12 inches (305 mm) horizontally and 12 inches (305 mm) vertically.~~

1404.15.1.1 Fasteners and fastener penetration for wood construction.

Unless otherwise specified in the approved manufacturer's instructions, nails used to fasten the siding and accessories shall be corrosion resistant and have not less than a 0.313-inch (7.9 mm) head diameter and 1/8-inch (3.18 mm) shank diameter. The penetration into nailable substrate shall be not less than 1¹/₂ inches (32 mm).

1404.15.1.2 Fasteners and fastener penetration for cold-formed steel light-frame construction.

For cold-formed steel light-frame construction, corrosion-resistant fasteners shall be used. Screw fasteners shall penetrate through the steel with not fewer than three exposed threads. Other fasteners shall be installed in accordance with the approved construction documents and manufacturer's instructions.

1404.15.1.3 Fastener spacing.

Unless specified otherwise by the approved manufacturer's instructions, fasteners shall be installed in the middle third of the slots of the nail hem and spacing between fasteners shall be not greater than 16 inches (406 mm) for horizontal siding and 12 inches (305 mm) for vertical siding.

1404.15.2 Installation over foam plastic insulating sheathing.

Where vinyl siding or insulated vinyl siding is installed over foam plastic insulating sheathing, the vinyl siding or insulated vinyl siding shall comply with Section 1404.15 and shall have a wind load design pressure rating in accordance with Table 1404.15.2.

Exceptions:

1. Where the foam plastic insulating sheathing is applied directly over wood structural panels, fiberboard, gypsum sheathing or other approved backing capable of independently resisting the design wind pressure, the vinyl siding or insulated vinyl siding shall be installed in accordance with Section 1404.15.1.
2. Where the vinyl siding or insulated vinyl siding manufacturer's product specifications provide an approved wind load design pressure rating for installation over foam plastic insulating sheathing, use of this wind load design pressure rating shall be permitted and the siding shall be installed in accordance with the manufacturer's installation instructions.
3. Where the foam plastic insulating sheathing and its attachment has a design wind pressure resistance complying with Sections 2603.10 and 1609, the vinyl siding or insulated vinyl siding shall be installed in accordance with Section 1404.15.1.

TABLE 1404.15.2

REQUIRED MINIMUM WIND LOAD DESIGN PRESSURE RATING FOR VINYL SIDING INSTALLED OVER FOAM PLASTIC SHEATHING ALONE

<u>ULTIMATE DESIGN WIND SPEED (MPH)</u>	<u>ADJUSTED MINIMUM DESIGN WIND PRESSURE (ASD) (PSF)^{a, b}</u>					
	<u>Case 1: With interior gypsum wallboard^c</u>			<u>Case 2: Without interior gypsum wallboard^c</u>		
	<u>Exposure</u>			<u>Exposure</u>		
	<u>B</u>	<u>C</u>	<u>D</u>	<u>B</u>	<u>C</u>	<u>D</u>
<u>< 95</u>	<u>-30.0</u>	<u>-33.2</u>	<u>-39.4</u>	<u>-33.9</u>	<u>-47.4</u>	<u>-56.2</u>
<u>100</u>	<u>-30.0</u>	<u>-36.8</u>	<u>-43.6</u>	<u>-37.2</u>	<u>-52.5</u>	<u>-62.2</u>
<u>105</u>	<u>-30.0</u>	<u>-40.5</u>	<u>-48.1</u>	<u>-41.4</u>	<u>-57.9</u>	<u>-68.6</u>
<u>110</u>	<u>-31.8</u>	<u>-44.5</u>	<u>-52.8</u>	<u>-45.4</u>	<u>-63.5</u>	<u>-75.3</u>
<u>115</u>	<u>-35.5</u>	<u>-49.7</u>	<u>-59.0</u>	<u>-50.7</u>	<u>-71.0</u>	<u>-84.2</u>
<u>120</u>	<u>-37.4</u>	<u>-52.4</u>	<u>-62.1</u>	<u>-53.4</u>	<u>-74.8</u>	<u>-88.6</u>
<u>130</u>	<u>-44.9</u>	<u>-62.8</u>	<u>-74.5</u>	<u>-64.1</u>	<u>-89.7</u>	<u>-106</u>
<u>> 130</u>	<u>See Note d</u>					

For SI: 1 inch = 25.4 mm, 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.

- a. Linear interpolation is permitted.
- b. The table values are based on a maximum 30-foot mean roof height, and effective wind area of 10 square feet Wall Zone 5 (corner), and the ASD design component and cladding wind pressure determined in accordance with Section 1609 multiplied by the following adjustment factors: 1.87 (Case 1) and 2.67 (Case 2).

- c. Gypsum wallboard, gypsum panel product or equivalent.
- d. For the indicated wind speed condition and where foam sheathing is the only sheathing on the exterior of a frame wall with vinyl siding, the wall assembly shall be capable of resisting an impact without puncture at least equivalent to that of a wood frame wall with minimum 7/16 – inch OSB sheathing as tested in accordance with ASTM E1886. The vinyl siding shall comply with an adjusted design wind pressure requirement in accordance with Note b, using an adjustment factor of 2.67.

[BS] 1404.16 1404.17 Fiber-cement siding.

Fiber-cement siding complying with Section 1403.10 shall be permitted on *exterior walls* of Type I, II, III, IV and V construction for wind pressure resistance or basic wind speed exposures as indicated by the manufacturer's listing and *label* and *approved* installation instructions. Where specified, the siding shall be installed over sheathing or materials listed in Section 2304.6 and shall be installed to conform to the *water-resistive barrier* requirements in Section 1402. Siding and accessories shall be installed in accordance with *approved* manufacturer's instructions. Unless otherwise specified in the *approved* manufacturer's instructions, nails used to fasten the siding to wood studs shall be corrosion-resistant round head smooth shank and shall be long enough to penetrate the studs not less than 1 inch (25 mm). For cold-formed steel *light-frame construction*, corrosion-resistant fasteners shall be used. Screw fasteners shall penetrate the cold-formed steel framing not fewer than three exposed full threads. Other fasteners shall be installed in accordance with the approved construction documents and manufacturer's instructions.

[BS] 1404.18 Polypropylene siding.

Polypropylene siding conforming to the requirements of this section and complying with Section 1403.12 shall be limited to *exterior walls* located in areas where the basic wind speed, specified in Chapter 16 does not exceed 100 miles per hour (45 m/s) and the building height is less than or equal to 40 feet (12 192 mm) in Exposure C. Where construction is located in areas where the basic wind speed, exceeds 100 miles per hour (45 m/s), or building heights are in excess of 40 feet (12 192 mm), tests or calculations indicating compliance with Chapter 16 shall be submitted. ~~Polypropylene siding shall be installed in accordance with the manufacturer's instructions. Polypropylene siding shall be secured to the building so as to provide weather protection for the exterior walls of the building.~~

[BS] 1404.18.1 Installation.

Polypropylene siding and accessories shall be installed over and attached to wood structural panel sheathing with *nailable substrate* not less than 7/16 inch (11.1 mm) in thickness or other substrate suitable for mechanical fasteners in accordance with the approved manufacturer's instructions.

[BS] 1404.18.2 Fastener requirements.

Unless otherwise specified in the approved manufacturer's instructions, nails shall be corrosion resistant, with a minimum 0.120-inch (3 mm) shank and minimum 0.313-inch (8 mm) head diameter. Nails shall be a minimum of 1 1/4 inches (32 mm) long or as necessary to penetrate sheathing or *nailable substrate* not less than 3/4 inch (19.1 mm). Where the nail fully penetrates the sheathing or *nailable substrate*, the end of the fastener shall extend not less than 1/4 inch (6.4 mm) beyond the opposite face of the sheathing or *nailable substrate*. Spacing of fasteners shall be installed in accordance with the approved manufacturer's instructions.

1404.19 Fiber-mat reinforced cementitious backer units.

Fiber-mat reinforced cementitious backer units shall be permitted on exterior walls and shall meet the requirements of Section 1404.19.1.

1404.19.1 Installation.

Installation of fiber-mat reinforced cementitious backer units used as an exterior substrate for the application of exterior finish materials shall be in accordance with backer unit manufacturer's installation instructions. Panels shall be installed

using corrosion-resistant fasteners. Finish materials shall be installed in accordance with approved finish material manufacturer's instructions.

1405.1.1 Types I, II, III and IV-HT construction.

On buildings of Types I, II, III and IV-HT construction, *exterior wall coverings* shall be permitted to be constructed of combustible materials, complying with the following limitations:

1. Combustible exterior wall coverings shall not exceed 10 percent of an exterior wall surface area where the fire separation distance is 5 feet (1524 mm) or less.
2. Combustible *exterior wall coverings* shall be limited to 40 feet (12 192 mm) in height above *grade plane*.

Exceptions:

1. *Metal composite material (MCM) systems complying with Section 1406.*
2. *Exterior insulation and finish systems (EIFS) complying with Section 1407.*
3. *High-pressure decorative exterior-grade compact laminate (HPL) systems complying with Section 1408.*
4. *Exterior wall coverings containing foam plastic insulation complying with Section 2603.*
3. Combustible *exterior wall coverings* constructed of *fire-retardant-treated wood* complying with Section 2303.2 for exterior installation shall not be limited in wall surface area where the *fire separation* distance is 5 feet (1524 mm) or less and shall be permitted up to 60 feet (18 288 mm) in height above *grade plane* regardless of the *fire separation distance*.
4. Wood veneers shall comply with Section 1404.6.

1406.2 Exterior wall ~~finish~~ covering.

MCM used as *exterior wall ~~finish~~ covering* or as elements of balconies and similar projections and bay and oriel windows to provide cladding or weather resistance shall comply with Sections 1406.4 through 1406.13.

1406.8 Fire-resistance rating.

Where MCM systems are used on *exterior walls* required to have a *fire-resistance rating* in accordance with Section 705, evidence shall be submitted to the *building official* that the required *fire-resistance rating* is maintained.

Exception: MCM systems that are part of an exterior wall assembly envelope not containing *foam plastic insulation*, ~~which and~~ are installed on the outer surface of a fire-resistance-rated *exterior wall* in a manner such that the attachments do not penetrate through the entire *exterior wall* assembly, shall not be required to comply with this section.

1406.10 Type I, II, III and IV construction.

Where installed on buildings of Type I, II, III and IV construction, *metal composite material (MCM) ~~systems~~* shall comply with Sections 1406.10.1 and 1406.10.2 through 1406.10.4, or Section 1406.11. for installations up to 40 feet (12 192 mm) above grade plane. Where installed on buildings of Type I, II, III and IV construction, MCMs and MCM systems shall comply with Sections 1406.10.1 through 1406.10.3, for installations greater than 40 feet (12 192 mm) above grade plane.

1406.10.1 Surface-burning characteristics.

MCM shall have a *flame spread index* of not more than 25 and a *smoke-developed index* of not more than 450 when tested ~~as an assembly~~ in the maximum thickness intended for use in accordance with ASTM E84 or UL 723.

1406.10.2 Thermal barriers.

MCM shall be separated from the interior of a building by an approved thermal barrier consisting of 1/2-inch (12.7 mm) *gypsum wallboard* 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.

Exceptions:

1. The MCM system is specifically *approved* based on tests conducted in accordance with NFPA 286 and with the acceptance criteria of Section 803.1.1.1, UL 1040 or UL 1715. Such testing shall be performed with the MCM in the maximum thickness intended for use. The MCM system shall include seams, joints and other typical details used in the installation and shall be tested in the manner intended for use.
2. The MCM is used as elements of balconies and similar projections, architectural *trim* or *embellishments*.

~~1406.10.3 Thermal barrier not required.~~

~~The thermal barrier specified for MCM in Section 1406.10.2 is not required where:~~

- ~~1. The MCM system is specifically approved based on tests conducted in accordance with NFPA 286 and with the acceptance criteria of Section 803.1.1.1, UL 1040 or UL 1715. Such testing shall be performed with the MCM in the maximum thickness intended for use. The MCM system shall include seams, joints and other typical details used in the installation and shall be tested in the manner intended for use.~~
- ~~2. The MCM is used as elements of balconies and similar projections, architectural *trim* or *embellishments*.~~

~~1406.10.4~~ 1406.10.3 Full-scale tests.

The MCM system shall be tested in accordance with, and comply with, the acceptance criteria of NFPA 285. Such testing shall be performed on the MCM system with the MCM in the maximum thickness intended for use.

~~1406.11 Alternate conditions.~~

~~MCM and MCM systems shall not be required to comply with Sections 1406.10.1 through 1406.10.4 provided that such systems comply with Section 1406.11.1, 1406.11.2, 1406.11.3 or 1406.11.4.~~

~~1406.11.1 Installations up to 40 feet in height.~~

~~MCM shall not be installed more than 40 feet (12 190 mm) in height above grade where installed in accordance with Sections 1406.11.1.1 and 1406.11.1.2.~~

~~1406.11.1.1 Fire separation distance of 5 feet or less.~~

~~Where the *fire separation distance* is 5 feet (1524 mm) or less, the area of MCM shall not exceed 10 percent of the *exterior wall surface*.~~

~~1406.11.1.2 Fire separation distance greater than 5 feet.~~

~~Where the *fire separation distance* is greater than 5 feet (1524 mm), the area of *exterior wall surface coverage* using MCM shall not be limited.~~

~~1406.11.2 Installations up to 50 feet in height.~~

~~MCM shall not be installed more than 50 feet (15 240 mm) in height above grade where installed in accordance with Sections 1406.11.2.1 and 1406.11.2.2.~~

~~1406.11.2.1 Self-ignition temperature.~~

MCM shall have a self-ignition temperature of 650°F (343°C) or greater when tested in accordance with ASTM D1929.

1406.11.2.2 Limitations.

Sections of MCM shall not exceed 300 square feet (27.9 m²) in area and shall be separated by not less than 4 feet (1219 mm) vertically.

1406.11.3 Installations up to 75 feet in height (Option 1).

MCM shall not be installed more than 75 feet (22 860 mm) in height above grade plane where installed in accordance with Sections 1406.11.3.1 through 1406.11.3.5.

Exception: Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 shall be exempt from the height limitation.

1406.11.3.1 Prohibited occupancies.

MCM shall not be permitted on buildings classified as Group A-1, A-2, H, I-2 or I-3 occupancies.

1406.11.3.2 Nonfire-resistance-rated exterior walls.

MCM shall not be permitted on exterior walls required to have a fire-resistance rating by other provisions of this code.

1406.11.3.3 Specifications.

MCM shall be required to comply with all of the following:

- 1. MCM shall have a self-ignition temperature of 650°F (343°C) or greater when tested in accordance with ASTM D1929.
- 2. MCM shall conform to one of the following combustibility classifications when tested in accordance with ASTM D635:

- Class CC1:** Materials that have a burning extent of 1 inch (25 mm) or less when tested at a nominal thickness of 0.060 inch (1.5 mm) or in the thickness intended for use.
- Class CC2:** Materials that have a burning rate of 2½ inches per minute (1.06 mm/s) or less when tested at a nominal thickness of 0.060 inch (1.5 mm) or in the thickness intended for use.

1406.11.3.4 Area limitation and separation.

The maximum area of a single MCM panel and the minimum vertical and horizontal separation requirements for MCM panels shall be as provided for in Table 1406.11.3.4. The maximum percentage of exterior wall area of any story covered with MCM panels shall not exceed that indicated in Table 1406.11.3.4 or the percentage of unprotected openings permitted by Section 705.8, whichever is smaller.

Exception: In buildings provided with flame barriers complying with Section 705.8.5 and extending 30 inches (760 mm) beyond the exterior wall in the plane of the floor, a vertical separation shall not be required at the floor other than that provided by the vertical thickness of the flame barrier.

TABLE 1406.11.3.4 AREA LIMITATION AND SEPARATION REQUIREMENTS FOR MCM PANELS

FIRE SEPARATION DISTANCE (feet)	COMBUSTIBILITY CLASS OF MCM	MAXIMUM PERCENTAGE AREA OF EXTERIOR WALL COVERED WITH MCM PANELS	MAXIMUM SINGLE AREA OF MCM PANELS (square feet)	MINIMUM SEPARATION OF MCM PANELS (feet)	
				Vertical	Horizontal

Less than 6	—	Not Permitted	Not Permitted	—	—
6 or more but less than 11	CC1	10	50	8	4
	CC2	Not Permitted	Not Permitted	—	—
11 or more but less than or equal to 30	CC1	25	90	6	4
	CC2	15	70	8	4
More than 30	CC1	50	Not Limited	3a	0
	CC2	50	100	6a	3

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

a. For reductions in the minimum vertical separation, see Section 1406.11.3.4.

1406.11.3.5 Automatic sprinkler system increases.

Where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the maximum percentage area of *exterior wall* of any story covered with MCM panels and the maximum square footage of a single area of MCM panels in Table 1406.11.3.4 shall be increased 100 per cent. The area of MCM panels shall not exceed 50 percent of the *exterior wall* area of any story or the area permitted by Section 705.8 for unprotected openings, whichever is smaller.

1406.11.4 Installations up to 75 feet in height (Option 2).

MCM shall not be installed more than 75 feet (22 860 mm) in height above grade plane where installed in accordance with Sections 1406.11.4.1 through 1406.11.4.4.

Exception: Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 shall be exempt from the height limitation.

1406.11.4.1 Minimum fire separation distance.

MCM shall not be installed on any wall with a fire separation distance less than 30 feet (9 144 mm).

Exception: Where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, the fire separation distance shall be permitted to be reduced to not less than 20 feet (6 096 mm).

1406.11.4.2 Specifications.

MCM shall be required to comply with all of the following:

- MCM shall have a self-ignition temperature of 650°F (343°C) or greater when tested in accordance with ASTM D1929.
- MCM shall conform to one of the following combustibility classifications when tested in accordance with ASTM D635:

Class CC1: Materials that have a burning extent of 1 inch (25 mm) or less when tested at a nominal thickness of 0.060 inch (1.5 mm), or in the thickness intended for use.

Class CC2: Materials that have a burning rate of 2¹/₂ inches per minute (1.06 mm/s) or less when tested at a nominal thickness of 0.060 inch (1.5 mm), or in the thickness intended for use.

1406.11.4.3 Area and size limitations.

The aggregate area of MCM panels shall not exceed 25 percent of the area of any exterior wall face of the story on which those panels are installed. The area of a single MCM panel installed above the first story above grade plane shall not exceed 16 square feet (1.5 m²) and the vertical dimension of a single MCM panel shall not exceed 4 feet (1219 mm).

Exception: Where the building is equipped through out with an automatic sprinkler system in accordance with Section 903.3.1.1, the maximum aggregate area of MCM panels shall be increased to 50 percent of the exterior wall face of the story on which those panels are installed and there shall not be a limit on the maximum dimension or area of a single MCM panel.

1406.11.4.4 Vertical separations.

Flame barriers complying with Section 705.8 and extending 30 inches (762 mm) beyond the exterior wall or a vertical separation of not less than 4 feet (1219 mm) in height shall be provided to separate MCM panels located on the exterior walls at one-story intervals.

Exception: Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

1406.13 1406.12 Foam plastic insulation.

Where MCM systems are included in an exterior wall assembly envelope containing foam plastic insulation, the exterior wall assembly envelope shall also comply with the requirements of Section 2603.

1407.5 Exterior walls of buildings of any height.

Exterior wall assemblies containing an EIFS exterior wall covering shall comply with Section 2603.5.

1408.2 Exterior wall finish covering.

HPL used as exterior wall covering or as elements of balconies and similar projections and bay and oriel windows to provide cladding or weather resistance shall comply with Sections 1408.4 through 1408.14.

1408.10.3 Thermal barrier not required.

The thermal barrier specified for HPL in Section 1408.10.2 is not required where:

1. The HPL system is specifically approved based on tests conducted in accordance with NFPA 286, and with the acceptance criteria of Section 803.1.1.1, or with UL 1040 or UL 1715. Such testing shall be performed with the HPL in the minimum and maximum thicknesses intended for use. The HPL system shall include seams, joints and other typical details used in the installation and shall be tested in the manner intended for use.
2. The HPL is used as elements of balconies and similar projections, architectural trim or embellishments.

1408.11 Alternate conditions.

HPL and HPL systems shall not be required to comply with Sections 1408.10.1 through 1408.10.4 provided that such systems comply with Section 1408.11.1 or 1408.11.2.

1408.11.1 Installations up to 40 feet in height.

HPL shall not be installed more than permitted to be installed up to 40 feet (12 190 mm) in height above grade plane where installed in accordance with Section 1408.11.1.1 or 1408.11.1.2.

1408.11.2 Installations up to 50 feet in height.

HPL shall not be installed more than 50 feet (15 240 mm) in height above grade plane where installed in accordance with Sections 1408.11.2.1 and 1408.11.2.2.

~~1408.11.2.1 Self ignition temperature.~~

~~HPL shall have a self ignition temperature of 650°F (343°C) or greater when tested in accordance with D1970/D1970M—2017A.~~

~~**1408.11.2.2 Limitations.** Sections of HPL shall not exceed 300 square feet (27.9 m²) in area and shall be separated by a minimum 4 feet (1219 mm) vertically.~~

SECTION 1409 INSULATED METAL PANEL (IMP).

1409.1 General.

The provisions of this section, in addition to other applicable requirements of this chapter and Chapter 16, shall govern the materials, construction and quality of insulated metal panels (IMP) for use as exterior walls and exterior wall coverings.

1409.2 Structural design.

Structural design of IMP systems shall be in accordance with this section.

1409.2.1. IMP systems used as exterior walls.

IMP systems used as exterior wall shall be designed and constructed to resist design loads in accordance with applicable provisions of Chapter 16.

1409.2.2. IMP systems used as exterior wall coverings.

IMP systems used as exterior wall covering systems shall be designed and constructed to resist wind loads as required by Section 1609.

1409.2.3 Approval.

Results of *approved* tests or engineering analysis shall be submitted to the *building official* to verify compliance with the applicable requirements of Chapter 16.

1409.3. Weather resistance.

IMP systems shall comply with Section 1402 and shall be designed and constructed to resist wind and rain in accordance with this section and the manufacturer's installation instructions.

1409.4. Durability.

IMP systems shall be constructed of *approved* materials that maintain the performance characteristics required in section 1402 for the duration of use.

1409.5 Fire-resistance rating.

Evidence of the required *fire resistance rating* of IMPs systems shall be in accordance with this section.

1409.5.1. IMP used as exterior walls.

In all types of construction where IMP systems are used as exterior walls required to have a *fire resistance rating* in accordance with Section 705, evidence shall be submitted to the *building official* that the wall achieves the required *fire-resistance rating*.

1409.5.2. IMP used as exterior wall coverings.

In all types of construction where IMP systems are used as exterior wall coverings on exterior walls required to have a *fire resistance rating* in accordance with section 705, evidence shall be submitted to the *building official* that the *required fire-resistance rating* is maintained.

Exception: IMP systems not containing combustible insulation, which are installed on the outer surface of a fire-resistance rated exterior wall in a manner such that the attachments do not penetrate to the entire *exterior wall assembly*.

1409.6. IMP with noncombustible core insulation.

IMP with noncombustible core insulation shall comply with Sections 1409.1 through 1409.5. Combustibility shall be determined in accordance with Section 703.3.

1409.7. IMP Systems with combustible core insulation.

IMP systems with combustible core insulation shall comply with Sections 1409.1 through 1409.5 and this section. Combustibility shall be determined in accordance with Section 703.3.

1409.7.1. Surface-burning characteristics.

Unless otherwise specified in this section, a combustible core 4 inches (102mm) or less in thickness shall have a *flame spread index* of 75 or less and a *smoke developed index* of 450 or less when tested in the maximum thickness intended for use, in accordance with ASTM E84 or UL 723. For thickness greater than 4 inches (102 mm), the combustible core shall have a *flame spread index* of 75 or less and a *smoke developed index* of 450 or less at 4 inches (102 mm) thickness and the IMP *approved* based on testing in accordance with 1409.7.2.2 at the maximum IMP thickness intended for use.

1409.7.1.1. Foam plastic core.

For IMP having a core insulation composed of foam plastic, the insulation core shall comply with Section 2603.3.

1409.7.2. Thermal Barrier.

Unless otherwise specified in this section, IMP with combustible core shall be separated from the interior of a *building* by an *approved* thermal barrier consisting of 1/2 -inch (12.7 mm) *gypsum wallboard* 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.

1409.7.2.1. Foam plastic core.

For IMP having a foam plastic core, use with the thermal barrier prescribed in Section 1409.7.2 shall be in accordance with Section 2603.4 unless special approval is obtained on the basis of Section 2603.9.

1409.7.2.2 Special approval.

The thermal barrier specified Section 1409.7.2 is not required where IMP is specifically *approved* based on tests conducted in accordance with, but not limited to, NFPA 286 (with the acceptance criteria of Section 803.1.1.1), FM 4880 or UL 1715. Such testing shall be performed with the IMP in a configuration related to the actual end-use and at the

maximum thickness intended for use, and shall include seams, factory joints, sealants and other typical details intended for use.

1409.7.3 Type I, II, III, and IV construction.

Where used as exterior walls or as exterior wall coverings on *buildings* of Type I, II, III, and IV construction, IMP systems shall comply with this section as follows:

1. IMP having a foam plastic core shall comply with Section 2603.5.
2. IMP having combustible core other than foam plastic shall comply with Sections 1409.7.3.1 through 1409.7.3.4.

1409.7.3.1. Surface-burning characteristics.

A combustible core not greater than 4 inches (102 mm) in thickness shall have a *flame spread index* of 25 or less and a *smoke developed index* of 450 or less when tested in the maximum thickness intended for use in accordance with ASTM E84 or UL 723. For thickness greater than 4 inches (102 mm) the combustible core shall have a *flame spread index* of 75 or less and a *smoke developed index* of 450 or less at 4 inches (102 mm) thickness and the IMP *approved* based on testing in accordance with 1409.7.2.2 at the maximum IMP thickness intended for use.

1409.7.3.2. Thermal barrier.

IMP shall be separated from the interior of a *building* by an *approved* thermal barrier in accordance with Section 1409.7.2.

1409.7.3.3. Vertical and lateral flame propagation.

IMP installations greater than 40 feet (12,192 mm) in height above *grade plane* shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. Such testing shall be performed on the *exterior wall assembly* and with the IMP in the maximum thickness intended for use.

1409.7.3.4. Ignition.

IMP installations shall not exhibit sustained flaming where tested in accordance with NFPA 268. Where a material is intended to be installed in more than one thickness, tests of the minimum and maximum thickness intended for use shall be performed.

Exception: Assemblies protected on the outside with one of the following:

1. A thermal barrier complying with Section 1409.7.2.
2. Concrete or *masonry* not less than 1-inch (25 mm) in thickness.
3. Glass-fiber-reinforced concrete panels not less than 3/8 inch (9.5 mm) in thickness.
4. Metal-faced panels having outer facings not less in thickness than 0.019-inch (0.48 mm) aluminum or 0.016-inch-(0.41 mm) corrosion-resistant steel.
5. Stucco not less than 7/8-inch (22.2 mm) in thickness, complying with Section 2510.
6. Fiber-cement lap, panel or shingle siding complying with Section 1404.17 and Ection 104.17.1 or 1404.17.2, and having a thickness of not less than 1/4-inch (6.4 mm).

1409.8. Type V construction.

IMP shall be permitted for use in Type V construction.

1409.9. Labeling.

Unless otherwise specified, the edge or face of each IMP or package shall bear the *label* of an *approved agency*. The *label* shall contain the manufacturer's or distributor's identification, model number, serial number or definitive information describing the product or materials' performance characteristics and *approved agency*'s identification.

1409.9.1. Foam plastic core.

IMP having a foam plastic core shall be *labeled* in accordance with Section 2603.2 and 2603.5.6, as applicable.

SECTION ~~1409~~-1410

PLASTIC COMPOSITE DECKING

~~1409.1~~ 1410.1 Plastic composite decking.

SECTION 1411

BUILDING-INTEGRATED PHOTOVOLTAIC (BIPV) SYSTEMS FOR EXTERIOR WALL COVERINGS AND FENESTRATION.

1410.1 Listing required.

In addition to complying with other provisions of this code, *building-integrated photovoltaic* (BIPV) systems used as exterior wall coverings or fenestration shall be *listed* and *labeled* in accordance with UL 1703 or both UL 61730-1 and UL 61730-2.

SECTION 1412

SOFFITS AND FASCIAS AT ROOF OVERHANGS

1412.1 General.

Soffits and fascias at roof overhangs shall be designed and constructed in accordance with the applicable provisions of this section.

1412.2 General wind requirements.

Soffits and fascias shall be capable of resisting the component and cladding *loads* for walls determined in accordance with Chapter 16 using an effective wind area of 10 square feet (0.93 m²).

1412.3 Vinyl and aluminum soffit panels.

Vinyl and aluminum soffit panels shall comply with Section 1412.2,d shall be installed using fasteners specified by the manufacturer and shall be fastened at both ends to a supporting component such as a nailing strip, fascia or subfascia component in accordance with Figure 1412.3.1(1). Where the unsupported span of soffit panels is greater than 12 inches (406 mm) and the design wind pressure is greater than 30 psf or the unsupported span of soffit panels is greater than 16 inches and the wind pressure is 30 psf or less, intermediate nailing strips shall be provided in accordance with Figure 1412.3(2). Vinyl and aluminum soffit panels shall be installed in accordance with the manufacturer's installation instructions.

Fascia shall be installed in accordance with 1410.7

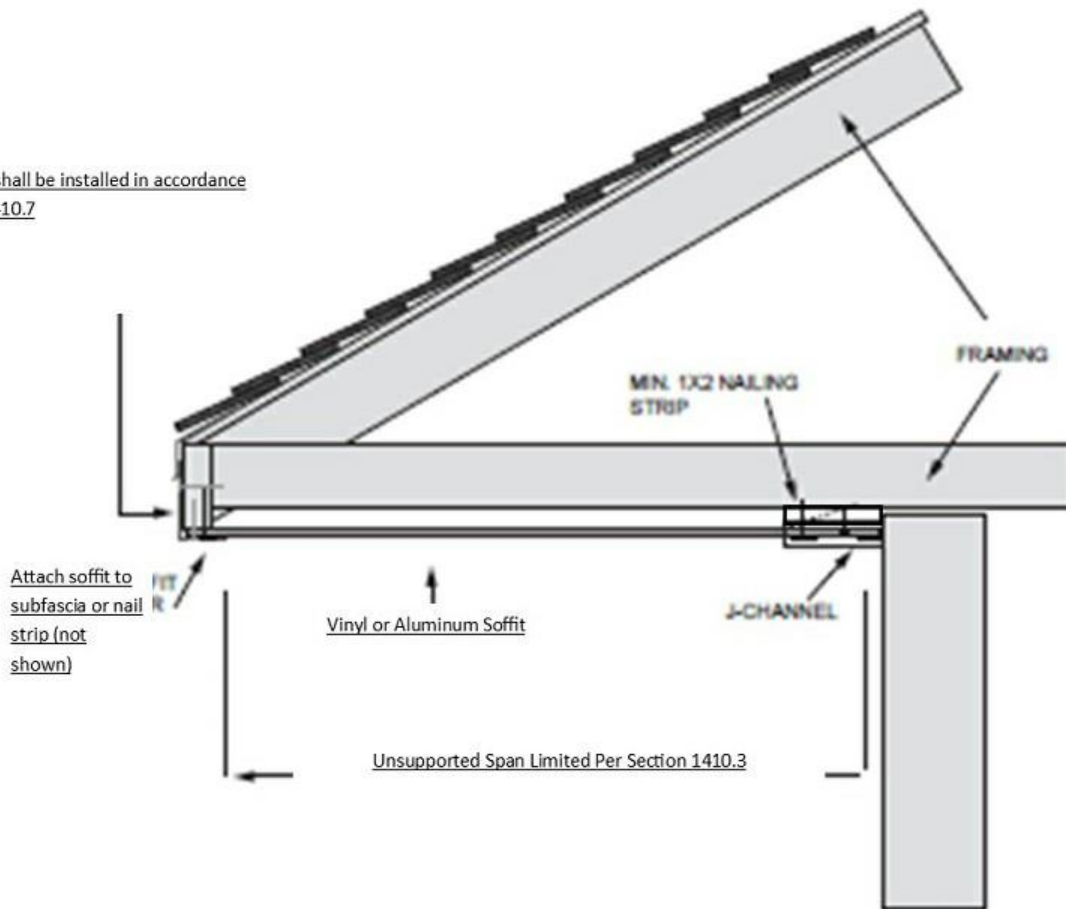


FIGURE 1412.3(1) SINGLE-SPAN VINYL OR ALUMINUM SOFFIT PANEL SUPPORT

Fascia shall be installed in accordance with 1410.7

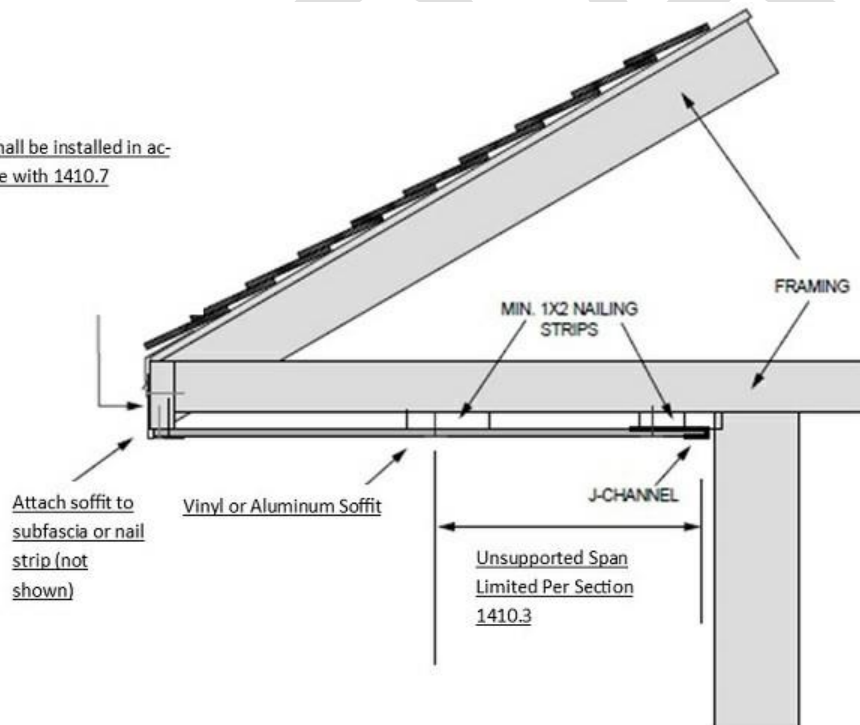


FIGURE 1412.3.1(2) DOUBLE-SPAN VINYL OR ALUMINU SOFFIT PANEL SUPPORT

1412.4 Fiber-cement soffit panels.

Fiber-cement soffit panels shall comply with Section 1412.2, shall be not less than 1/4 inch (6.4 mm) in thickness and shall comply with the requirements of ASTM C1186, Type A, minimum Grade II, or ISO 8336, Category A, minimum Class 2. Panel joints shall occur over framing or over wood structural panel sheathing. Soffit panels shall be installed with spans and fasteners in accordance with the manufacturer's installation instructions.

TABLE 1412.6PRESCRIPTIVE ALTERNATE FOR WOOD STRUCTURAL PANEL SOFFIT^{b, c, d, e}

<u>Maximum Design Pressure (+ or - psf)</u>	<u>Minimum Panel Span Rating</u>	<u>Minimum Panel Performance Category</u>	<u>Nail Type and Size</u>	<u>Fastener^a Spacing Along Edges and Intermediate Supports</u>	
				<u>Galvanized Steel</u>	<u>Stainless Steel</u>
<u>30</u>	<u>24/0</u>	<u>3/8</u>	<u>6d box</u> <u>(2 x 0.099 x 0.266 head diameter)</u>	<u>6^f</u>	<u>4</u>
<u>40</u>	<u>24/0</u>	<u>3/8</u>	<u>6d box</u> <u>(2 x 0.099 x 0.266 head diameter)</u>	<u>6</u>	<u>4</u>
<u>50</u>	<u>24/0</u>	<u>3/8</u>	<u>6d box</u> <u>(2 x 0.099 x 0.266 head diameter)</u>	<u>4</u>	<u>4</u>
			<u>8d common</u> <u>(21/2 x 0.131 x 0.281 head diameter)</u>	<u>6</u>	<u>6</u>
<u>60</u>	<u>24/0</u>	<u>3/8</u>	<u>6d box</u> <u>(2 x 0.099 x 0.266 head diameter)</u>	<u>4</u>	<u>3</u>
			<u>8d common</u> <u>(21/2 x 0.131 x 0.281 head diameter)</u>	<u>6</u>	<u>4</u>
<u>70</u>	<u>24/16</u>	<u>7/16</u>	<u>8d common</u> <u>(21/2 x 0.131 x 0.281 head diameter)</u>	<u>4</u>	<u>4</u>
			<u>10d box</u> <u>(3 x 0.128 x 0.312 head diameter)</u>	<u>6</u>	<u>4</u>

<u>80</u>	<u>24/16</u>	<u>7/16</u>	<u>8d common</u> <u>(21/2 x 0.131 x 0.281</u> <u>head diameter)</u>	<u>4</u>	<u>4</u>
			<u>10d box</u> <u>(3 x 0.128 x 0.312 head</u> <u>diameter)</u>	<u>6</u>	<u>4</u>
<u>90</u>	<u>32/16</u>	<u>15/32</u>	<u>8d common</u> <u>(21/2 x 0.131 x 0.281</u> <u>head diameter)</u>	<u>4</u>	<u>3</u>
			<u>10d box</u> <u>(3 x 0.128 x 0.312</u> <u>head diameter)</u>	<u>6</u>	<u>4</u>

- Fasteners shall comply with Section 1410.6.
- Maximum spacing of soffit framing members shall not exceed 24 inches.
- Wood structural panels shall be of an exterior exposure grade.
- Wood structural panels shall be installed with strength axis perpendicular to supports with a minimum of two continuous spans.
- Wood structural panels shall be attached to soffit framing members with specific gravity of at least 0.42. Framing members shall be minimum 2" x 3" nominal with the larger dimension in the cross section aligning with the length of fasteners to provide sufficient embedment depths.
- Spacing at intermediate supports is permitted to be 12 inches on center.

1412.5 Hardboard soffit panels.

Hardboard soffit panels shall comply with Section 1410.2 and shall be not less than 7/16 inch (11.11 mm) in thickness and fastened to framing or nailing strips to meet the required design wind pressures. Where the design wind pressure is 30 pounds per square foot (1.44 kPa) and less, hardboard soffit panels are permitted to be attached to wood framing with 2 1/2-inch by 0.113-inch (64 mm by 2.9 mm) siding nails spaced not more than 6 inches (152 mm) on center at panel edges and 12 inches (305 mm) on center at intermediate supports. Soffit panels shall be installed with spans and fasteners in accordance with the manufacturer's installation instructions.

1412.6 Wood structural panel soffit.

Wood structural panel soffits shall comply with Section 1412.2 and shall have minimum panel performance category of 3/8. Wood structural panel soffits are permitted to be attached to wood framing in accordance with Table 1412.6.

1412.7 Aluminum Fascia.

Aluminum fascia shall comply with Section 1412.2 and shall be not less than 0.019 inches and installed in accordance with manufacturer's instructions. Aluminum fascia shall be attached to wood frame construction in accordance with Section 1412.7.1 or 1412.7.2.

1412.7.1 Fascia installation where the design wind pressure is 30 psf or less.

Where the design wind pressure is 30 pounds per square foot (1.44kPA) or less, aluminum fascia shall be attached with one finish nail (1 ¼ x 0.057 x 0.177 head diameter) (32 mm x 1.4mm x 1.4 mm x 4.5 mm) in the return leg spaced a maximum of 24 inches (610 mm) on center, and the fascia shall be inserted under the drip edge with not less than 1 inch (305 mm) of fascia material covered by the drip edge. Where the fascia cannot be inserted under the drip edge, the top edge of the fascia shall be secured using one finish nail (1 ¼ x 0.057 x 0.177 head diameter) (32 mm x 1.4mm x 4.5mm) located not more than 1 inch(25 mm) below the drip edge and spaced not greater than 24 inches on center.

1412.7.2 Fascia installation where the design wind pressure exceeds 30 psf.

Where the design wind pressure is greater than 30 pounds per square foot (1.44kPA), aluminum fascia shall be attached with one finish nail (1 ¼ x 0.057 x 0.177 head diameter) (32 mm x 1.4mm x 4.5mm) in the return leg spaced a maximum of 16 inches on center and one finish nail located not greater than 1 inch (25 mm) below the drip edge spaced a maximum of 16 inches (406 mm) on center. As an alternative, the top edge of the fascia is permitted to be secured using utility trim installed beneath the drip edge with snap locks punched into the fascia spaced not greater than 6 inches (152 mm) on center.

Chapter 15 Roof Assemblies and Rooftop Structures

[P] 1502.1 General.

Design and installation of roof drainage systems shall comply with this section, Section 1611 ~~Section 1502~~ of this code ~~and Sections 1106 and 1108, as applicable, and Chapter 11~~ of the *International Plumbing Code*.

[P] 1502.2 Secondary (emergency overflow) drains or scuppers.

Where roof drains are required, secondary (emergency overflow) roof drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason. The installation and sizing of secondary emergency overflow drains, leaders and conductors shall comply with ~~Sections 1106 and 1108, as applicable,~~ Section 1611 of this code and Chapter 11 of the *International Plumbing Code*.

~~1502.3~~ 1502.3 Gutters.

~~1502.3~~ Scuppers.

~~Where scuppers are used for secondary (emergency overflow) roof drainage, the quantity, size, location and inlet elevation of the scuppers shall be sized to prevent the depth of ponding water from exceeding that for which the roof was designed as determined by Section 1611.1. Scuppers shall not have an opening dimension of less than 4 inches (102 mm). The flow through the primary system shall not be considered when locating and sizing scuppers.~~

1503.3 Parapet walls ~~Coping.~~

Parapet walls shall be ~~properly coped with noncombustible, weatherproof materials of a width not less than the thickness of the parapet wall~~ coped or covered in accordance with Sections 1503.3.1 and 1503.3.2. The top surface of the parapet wall shall provide positive drainage.

1503.3.1 Fire-resistance-rated parapet walls.

Parapet walls required by Section 705.11 shall be coped or covered with weatherproof materials of a width not less than the thickness of the parapet wall such that the fire-resistance rating of the wall is not decreased.

1503.3.2 Other parapet walls.

Parapet walls meeting one of the exceptions in Section 705.11 shall be coped or covered with weatherproof materials of a width not less than the thickness of the parapet wall.

1503.4 Attic and rafter ventilation.

Intake and exhaust vents for ventilation of attic and enclosed rafter assemblies shall be provided in accordance with Section 1202.2 and the vent product manufacturer's installation instructions.

Exception: Unvented attic and unvented enclosed rafter assemblies in accordance with Section 1202.3.

1504.1 Wind resistance of roofs.

Roof decks and roof coverings shall be designed ~~for wind loads~~ in accordance with ~~Chapter 16 and~~ Sections ~~1504.2, 1504.3, 1504.~~

~~1504.1.1~~ 1504.2 **Wind resistance of asphalt shingles.**

Asphalt shingles shall be tested in accordance with ASTM D7158. Asphalt shingles shall meet the classification requirements of Table ~~1504.1.1~~ 1504.2 for the appropriate maximum basic wind speed. Asphalt shingle packaging shall bear a label to indicate compliance with ASTM D7158 and the required classification in Table ~~1504.1.1~~ 1504.2.

Exception: Asphalt shingles not included in the scope of ASTM D7158 shall be tested and labeled in accordance with ASTM D3161. Asphalt shingle packaging shall bear a label to indicate compliance with ASTM D3161 and the required classification in Table ~~1504.1.1~~ 1504.2.

TABLE 1504.2 CLASSIFICATION OF STEEP SLOPE ROOF SHINGLES TESTED IN ACCORDANCE WITH ASTM D3161 OR D7158

The remaining portion of the table is unchanged and omitted for clarity.

MAXIMUM BASIC WIND SPEED, V, FROM FIGURES 1609.3(1) (8) <u>(4)</u> OR ASCE 7 (mph)	MAXIMUM ALLOWABLE STRESS DESIGN WIND SPEED, V_{asd} , FROM Table 1609.3.1 (mph)	ASTM D7158 ^a CLASSIFICATION	ASTM D3161 or UL 7103 CLASSIFICATION
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For SI: 1 foot = 304.8 mm; 1 mph = 0.447 m/s.

a. The standard calculations contained in ASTM D7158 assume Exposure Category B or C and building height of 60 feet or less. Additional calculations are required for conditions outside of these assumptions.

~~1504.2.1~~ 1504.3.1 **Testing.**

Testing of concrete and clay roof tiles shall be in accordance with Sections 1504.3.1.1, 1504.3.1.2 and 1504.3.1.3.

~~1504.2.1.1~~ 1504.3.1.1 **Overturning resistance.**

Concrete and clay roof tiles shall be tested to determine their resistance to overturning due to wind in accordance with Chapter 15 and either SBCCI SSTD 11 ~~and chapter 15~~ or ASTM C1568.

~~1504.2.1.2~~ 1504.3.1.2 **Wind tunnel testing.**

Where concrete and clay roof tiles do not satisfy the limitations in Chapter 16 for rigid tile, a wind tunnel test shall be used to determine the wind characteristics of the concrete or clay tile *roof covering* in accordance with Chapter 15 and either SBCCI SSTD 11 ~~and Chapter 15~~ or ASTM C1569.

1504.3.1.3 Air permeability testing.

The lift coefficient for concrete and clay tile shall be 0.2 or shall be determined in accordance with SBCCI SSTD 11 or ASTM C1570.

1504.4 Slate shingles.

Slate shingles shall be tested in accordance with ASTM D3161. Slate packaging shall bear a label indicating compliance with ASTM D3161 and the required classification in Table 1504.2.

1504.4 1504.5 Ballasted low-slope single-ply roof systems.

Ballasted low-slope ~~(roof slope < 2:12)~~ single-ply roof system coverings installed in accordance with Section 1507.12 ~~and 1507.13~~ shall be designed in accordance with ~~Section 1504.8 and~~ ANSI/SPRI RP-4.

1504.6 Edge securement systems for low-slope roofs.

~~Low-slope~~ Metal edge systems, ~~except gutters and counterflashing, installed on~~ built-up, modified bitumen and single-ply roof ~~system metal edge securement, except gutters, systems having a slope less than 2 units vertical in 12 units horizontal (2:12) on a low-slope roof~~ shall be designed and installed for wind loads in accordance with Chapter 16 and tested for resistance in accordance with Test Methods RE-1, RE-2 and RE-3 of ANSI/SPRI ES-1, except basic ~~design~~ wind speed, V, shall be determined from Figures 1609.3(1) through ~~1609.3(12)~~ 1609.3(4) as applicable.

1504.6.1 Gutter securement for low-slope roofs.

Gutters that are used to secure the perimeter edge of the roof membrane on low-slope (less than 2:12 slope) built-up, modified bitumen, and single-ply roofs, shall be designed, constructed and installed to resist wind loads in accordance with Section 1609 and shall be tested in accordance with Test Methods G-1 and G-2 of SPRI GT-1.

1504.7 Physical properties.

~~Roof coverings installed on low-slope roofs (roof slope < 2:12) in accordance with Section 1507 shall demonstrate physical integrity over the working life of the roof based on 2,000 hours of exposure to accelerated weathering tests conducted in accordance with ASTM G152, ASTM G154 or ASTM G155. Those roof coverings that are subject to cyclical flexural response due to wind loads shall not demonstrate any significant loss of tensile strength for unreinforced membranes or breaking strength for reinforced membranes when tested as herein required.~~

1504.7 Impact resistance.

Roof coverings installed on low-slope roofs ~~(roof slope < 2:12)~~ in accordance with Section 1507 shall resist impact damage based on the results of tests conducted in accordance with ASTM D3746, ASTM D4272 or the “Resistance to Foot Traffic Test” in ~~Section 5.5 of~~ FM 4470.

~~TABLE 1504.8~~
~~MAXIMUM ALLOWABLE MEAN ROOF HEIGHT PERMITTED FOR BUILDINGS WITH AGGREGATE ON THE ROOF IN AREAS OUTSIDE A HURRICANE-PRONE REGION~~

BCD	
NOMINAL DESIGN WIND SPEED, V_w (mph)^{b,c,d}	MAXIMUM MEAN ROOF HEIGHT (ft)^{a,b,e}
	Exposure category

85	170	60	30
90	110	35	15
95	75	20	NP
100	55	15	NP
105	40	NP	NP
110	30	NP	NP
115	20	NP	NP
120	15	NP	NP
Greater than 120	NP	NP	NP

For SI: 1 foot = 304.8 mm; 1 mile per hour = 0.447 m/s.

Mean roof height as defined in ASCE 7.

For intermediate values of *Vasd*, the height associated with the next higher value of *Vasd* shall be used, or direct interpolation is permitted.

NP = gravel and stone not permitted for any roof height.

Vasd shall be determined in accordance with Section 1609.3.1.

1504.8 Wind resistance of aggregate-surfaced roofs. Surfacing and ballast materials in hurricane-prone regions.

Parapets shall be provided for aggregate surfaced roofs and shall comply with Table 1504.8. Such parapets shall be provided on the perimeter of the roof at all exterior sides except where an adjacent wall extends above the roof to a height at least equivalent to that required for the parapet. For roofs with differing surface elevations due to slope or sections at different elevations, the minimum parapet height shall be determined based on each roof surface elevation and at no point shall the parapet height be less than that required by Table 1504.8.

Exception: Ballasted single-ply roof coverings shall be designed and installed accordance with Section 1504.5. For a building located in a hurricane-prone region as defined in Section 202, or on any other building with a mean roof height exceeding that permitted by Table 1504.8 based on the exposure category and basic wind speed at the site, the following materials shall not be used on the roof:

1. Aggregate used as surfacing for roof coverings.
2. Aggregate, gravel or stone used as ballast.

TABLE 1504.8 MINIMUM REQUIRED PARAPET HEIGHT (INCHES) FOR AGGREGATE SURFACED ROOFS a, b, c, d, e

AGGREGATE SIZE	MEAN ROOF	WIND EXPOSURE AND BASIC WIND SPEED, V (MPH)																	
		Exposure B									Exposure C ^f								
	HEIGHT (ft)	≤ 95	100	105	110	115	120	130	140	150	≤ 95	100	105	110	115	120	130	140	150
ASTM D1863 (No. 7 or No. 67)	15	2	2	2	2	12	12	16	20	24	2	13	15	18	20	23	27	32	37
	20	2	2	2	2	12	14	18	22	26	12	15	17	19	22	24	29	34	39
	30	2	2	2	13	15	17	21	25	30	14	17	19	22	24	27	32	37	42
	50	12	12	14	16	18	21	25	30	35	17	19	22	25	28	30	36	41	47
	100	14	16	19	21	24	27	32	37	42	21	24	26	29	32	35	41	47	53

	<u>150</u>	<u>17</u>	<u>19</u>	<u>22</u>	<u>25</u>	<u>27</u>	<u>30</u>	<u>36</u>	<u>41</u>	<u>46</u>	<u>23</u>	<u>26</u>	<u>29</u>	<u>32</u>	<u>35</u>	<u>38</u>	<u>44</u>	<u>50</u>	<u>56</u>
ASTM D1863 (No. 6)	<u>15</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>15</u>	<u>18</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>13</u>	<u>15</u>	<u>17</u>	<u>22</u>	<u>26</u>	<u>30</u>
	<u>20</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>12</u>	<u>12</u>	<u>13</u>	<u>17</u>	<u>21</u>	<u>2</u>	<u>2</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>19</u>	<u>23</u>	<u>28</u>	<u>32</u>
	<u>30</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>12</u>	<u>12</u>	<u>16</u>	<u>20</u>	<u>24</u>	<u>2</u>	<u>12</u>	<u>14</u>	<u>17</u>	<u>19</u>	<u>21</u>	<u>26</u>	<u>31</u>	<u>35</u>
	<u>50</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>12</u>	<u>14</u>	<u>16</u>	<u>20</u>	<u>24</u>	<u>28</u>	<u>12</u>	<u>15</u>	<u>17</u>	<u>19</u>	<u>22</u>	<u>24</u>	<u>29</u>	<u>34</u>	<u>39</u>
	<u>100</u>	<u>12</u>	<u>12</u>	<u>14</u>	<u>16</u>	<u>19</u>	<u>21</u>	<u>26</u>	<u>30</u>	<u>35</u>	<u>16</u>	<u>18</u>	<u>21</u>	<u>24</u>	<u>26</u>	<u>29</u>	<u>34</u>	<u>39</u>	<u>45</u>
	<u>150</u>	<u>12</u>	<u>14</u>	<u>17</u>	<u>19</u>	<u>22</u>	<u>24</u>	<u>29</u>	<u>34</u>	<u>39</u>	<u>18</u>	<u>21</u>	<u>23</u>	<u>26</u>	<u>29</u>	<u>32</u>	<u>37</u>	<u>43</u>	<u>48</u>

For SI: 1 inch = 25.4 mm; 1 foot = 304.8 mm; 1 mile per hour = 0.447 m/s.

- Parapet height is measured vertically from the top surface of the coping down to the surface of the roof covering in the field of the roof adjacent to the parapet and outbound of any cant strip.
- Interpolation shall be permitted for wind speed, mean roof height and parapet height. Extrapolation is not permitted.
- Basic wind speed, V, and wind exposure shall be determined in accordance with Section 1609.
- Where the minimum required parapet height is indicated to be 2 inches (51 mm), a gravel stop shall be permitted and shall extend not less than 2 inches (51 mm) from the roof surface and not less than the height of the aggregate.
- The tabulated values apply only to conditions where the topographic factor (Kzt) determined in accordance with Chapter 26 of ASCE 7 is 1.0 or where Kzt is incorporated in the basic wind speed in Section 1609.
- For Exposure D, add 8 inches (203 mm) to the parapet height required for Exposure C and the parapet height shall not be less than 12 inches (305 mm).

[BF] 1505.1 General.

Fire classification of *roof assemblies* shall be in accordance with Section 1505. ~~Roof assemblies shall be divided into the classes defined in this section.~~ The minimum fire classification of *roof assemblies* installed on buildings shall comply with Table 1505.1 based on type of construction of the building. Class A, B and C *roof assemblies* and *roof coverings* required to be listed by this section shall be tested in accordance with ASTM E108 or UL 790. In addition, *fire-retardant-treated wood roof coverings* shall be tested in accordance with ASTM D2898. ~~The minimum roof coverings installed on buildings shall comply with Table 1505.1 based on the type of construction of the building.~~

Exception: *Skylights and sloped glazing* that comply with Chapter 24 or Section 2610.

[NY] TABLE 1505.1 MINIMUM ROOF **ASSEMBLY COVERING** CLASSIFICATION FOR TYPES OF CONSTRUCTION^{a, b}

IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C _c	B	C _c	B	B	C _c

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

- [NY] Reserved.
- Nonclassified roof coverings shall be permitted on buildings of ~~Group R-3 and~~ Group U occupancies, where there is a minimum fire-separation distance of 6 feet measured from the leading edge of the roof.
- Buildings that are not more than two stories above grade plane and having not more than 6,000 square feet of projected roof area and where there is a minimum 10-foot fire-separation distance from the leading edge of the roof to a lot line on all sides of the building, except for street fronts or public ways, shall be permitted to have roofs of No. 1 cedar or redwood shakes and No. 1 shingles constructed in accordance with Section 1505.7.

[BF] 1505.2 Class A roof assemblies.

Class A *roof assemblies* are those that are effective against severe fire test exposure. Class A *roof assemblies* and *roof coverings* shall be *listed* and identified as Class A by an *approved* testing agency. Class A *roof assemblies* shall be permitted for use in buildings or structures of all types of construction.

Exceptions:

1. Class A *roof assemblies* include those with coverings of brick, masonry or an exposed concrete roof deck.
2. Class A *roof assemblies* also include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile or slate installed on noncombustible decks or ferrous, copper or metal sheets installed without a roof deck on noncombustible framing.
3. Class A *roof assemblies* include minimum 16 ounce per square foot (0.0416 kg/m²) copper sheets installed over combustible decks.
4. Class A *roof assemblies* include slate installed over ASTM D226, Type II [or ASTM D4869, Type IV underlayment](#) over combustible decks.

[BF] 1505.8 Building-integrated photovoltaic (BIPV) ~~products~~ [systems](#).

Building-integrated photovoltaic (BIPV) ~~products~~ [systems](#) installed as the *roof covering* shall be tested, *listed* and *labeled* for fire classification in accordance with Section 1505.1.

[BF] 1505.9 Rooftop mounted photovoltaic (PV) [panel systems](#).

Rooftop ~~rack~~ mounted *photovoltaic (PV) [panel systems](#)* shall be tested, *listed* and identified with a fire classification in accordance with ~~UL 1703 and~~ UL 2703. [Listed systems shall be installed in accordance with the manufacturer's installation instructions and their listing.](#) The fire classification shall comply with Table 1505.1 based on the type of construction of the *building*.

[BF] 1505.10 ~~Roof gardens and landscaped~~ [Landscaped and vegetative](#) roofs.

~~Roof gardens and landscaped~~ [Landscaped and vegetative](#) roofs shall comply with Sections 1505.1 and 1507.15, [Vegetative roofs](#) ~~and~~ shall be installed in accordance with ANSI/SPRI VF-1.

SECTION 1506

MATERIALS

1506.1 Scope.

The requirements set forth in this section shall apply to the application of roof-covering materials specified herein. *Roof coverings* shall be applied in accordance with this chapter and the ~~manufacturer's installation instructions~~ [roof covering listing as required by Section 1505](#). Installation of *roof coverings* shall comply with the applicable provisions of Section 1507.

1507.1.1 Underlayment.

Underlayment [in accordance with this section is required](#) for asphalt shingles, clay and concrete tile, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shingles, wood shakes, metal roof panels and ~~photovoltaic shingles BIPV roof coverings and shall conform to the applicable standards listed in this chapter.~~ [Such underlayment](#) shall conform to the applicable standards listed in this chapter. Underlayment materials required to comply with ASTM D226, D1970, D4869, ~~and~~ D6757, [ASTM D8257, D2626 or D6380 Class M](#) shall bear a label indicating compliance with the standard designation and, if applicable, type classification indicated in Table 1507.1.1(1). Underlayment shall be fastened in accordance with Table 1507.1.1(2). Underlayment shall be ~~attached~~ [attached](#) in accordance with Table 1507.1.1(3).

Exception:

1. ~~As an alternative, self-adhering polymer-modified bitumen underlayment bearing a label indicating compliance with ASTM D1970 and installed in accordance with both the underlayment manufacturer's and roof covering manufacturer's instructions for the deck material, roof ventilation configuration and climate exposure for the roof covering to be installed, shall be permitted.~~
2. ~~As an alternative, a minimum 4-inch-wide (102-mm) strip of self-adhering polymer-modified bitumen membrane complying with ASTM D1970 and installed in accordance with the manufacturer's installation instructions for the deck material shall be applied over all joints in the roof decking. An approved underlayment for the applicable roof covering for design wind speeds less than 120 mph (54 m/s) shall be applied over the 4-inch-wide (102-mm) membrane strips.~~
3. ~~As an alternative, two layers of underlayment complying with ASTM D226 Type II or ASTM D4869 Type IV shall be permitted to be installed as follows: Apply a 19-inch (483 mm) strip of underlayment parallel with the eave. Starting at the eave, apply 36-inch-wide (914 mm) strips of underlayment felt, overlapping successive sheets 19 inches (483 mm). The underlayment shall be attached with corrosion-resistant fasteners in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at side and end laps. End laps shall be 4 inches (102 mm) and shall be offset by 6 feet (1829 mm). Underlayment shall be attached using metal or plastic cap nails with a nominal cap diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a thickness of not less than 0.010 inch (0.254 mm). Thickness of the outside edge of plastic caps shall be not less than 0.035 inch (0.89 mm). The cap-nail shank shall be not less than 0.083 inch (2.1 mm) for ring shank cap nails and 0.091 inch (2.3 mm) for smooth shank cap nails. The cap-nail shank shall have a length sufficient to penetrate through the roof sheathing or not less than 3/4 inch (19.1 mm) into the roof sheathing.~~
4. Structural metal panels that do not require a substrate or underlayment.

TABLE 1507.1.1(1) UNDERLAYMENT TYPES

ROOF COVERING	SECTION	<u>AREAS NOT WITHIN HURRICANE-PRONE REGIONS</u> MAXIMUM BASIC WIND SPEED, V < 130 MPH IN HURRICANE-PRONE REGIONS OR V < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS	MAXIMUM BASIC DESIGN WIND SPEED, V ≥ <u>130 140 MPH IN HURRICANE-PRONE REGIONS OR V ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS</u>
Asphalt shingles	1507.2	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV ASTM D6757 <u>ASTM D8257</u>	ASTM D226 Type II ASTM D4869 Type III or IV ASTM D6757 <u>ASTM D8257</u>
Clay and concrete tiles	1507.3	ASTM D226 Type II ASTM D2626 Type I ASTM D6380 Class M mineral-surfaced roll roofing <u>ASTM D8257</u>	ASTM D226 Type II ASTM D2626 Type I ASTM D6380 Class M mineral-surfaced roll roofing <u>ASTM D8257</u>
Metal roof panels <u>applied to a solid or closely fitted deck</u>	1507.4	Manufacturer's instructions <u>ASTM D226 Type I or II</u> <u>ASTM D4869, Type I, II, III or IV</u> <u>ASTM D8257</u>	ASTM D226 Type II ASTM D4869 Type III or IV <u>ASTM D8257</u>

Metal roof shingles	1507.5	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D4869 Type III or IV ASTM D8257
Mineral-surfaced roll roofing	1507.6	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV ASTM D8257	ASTM D226 Type II ASTM D4869 Type III or IV ASTM D8257
Slate shingles	1507.7	ASTM D226 Type II ASTM D4869 Type III or IV ASTM D8257	ASTM D226 Type II ASTM D4869 Type III or IV ASTM D8257
Wood shingles	1507.8	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Wood shakes applied to a solid sheathing roof deck	1507.9	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV	ASTM D226 Type II ASTM D4869 Type III or IV
Photovoltaic shingles BIPV roof coverings	1507.16	ASTM D226 Type I or II ASTM D4869 Type I, II, III or IV ASTM D6757 ASTM D8257	ASTM D226 Type II ASTM D4869 Type III or IV ASTM D6757 ASTM D8257

TABLE 1507.1.1(2) UNDERLAYMENT APPLICATION

ROOF COVERING	SECTION	MAXIMUM BASIC DESIGN WIND SPEED, $V < \underline{130 \text{ 140}} \text{ MPH}$ IN HURRICANE-PRONE REGIONS OR $V < 140 \text{ MPH}$ OUTSIDE HURRICANE- PRONE REGIONS	MAXIMUM BASIC DESIGN WIND SPEED, $V \geq \underline{130 \text{ 140}} \text{ MPH}$ IN HURRICANE-PRONE REGIONS OR $V \geq 140 \text{ MPH}$ OUTSIDE HURRICANE-PRONE REGIONS
Asphalt shingles	1507.2	Underlayment shall be one of the following: - For roof slopes from 2 units vertical in 12 units horizontal (2:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied as follows: in the following manner: Apply a 19-inch strip of underlayment felt that is half the width of a full sheet parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide full width sheets of underlayment, overlapping successive sheets 19-inches half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. - For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches, Distortions in the underlayment	Same as Maximum Basic Design Wind Speed, $V < 140 \text{ mph}$ except all laps shall be not less than 4 inches Underlayment shall be one of the following: Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment felt that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the

		shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. 3. <u>A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.</u>	<u>shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.</u> 2. <u>A minimum 4 inch wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4 inch (95.25mm) wide membrane strips.</u> 3. <u>A single layer of self- adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.</u>
Clay and concrete tile	1507.3	<u>Underlayment shall be one of the following:</u> 1. For roof slopes from 2½ units vertical in 12 units horizontal (2½:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be not fewer than two layers applied as follows: <u>in the following manner:</u> Starting at the eave, a 19-inch strip of underlayment shall be applied parallel with the eave. Starting at the eave, a 36-inch-wide full width strip of underlayment felt that is half the width of a full sheet shall be applied, overlapping successive sheets 19-inches half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. 2. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. 3. <u>A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.</u>	Same as Maximum Basic Design Wind Speed, V < 140 mph except all laps shall be not less than 4 inches <u>Underlayment shall be one of the following:</u> 1. <u>Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.</u> 2. <u>A minimum 4 inch wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in</u>

			<u>accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4 inch wide membrane strips.</u> 3. <u>A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.</u>
Metal roof panels	1507.4	Apply in accordance with the manufacturer's installation instructions	For roof slopes from 2 units vertical in 12 units horizontal (2:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied as follows: Apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36 inch wide sheets of underlayment, overlapping successive sheets 19 inches. End laps shall be 4 inches and shall be offset by 6 feet. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 4 inches. End laps shall be 4 inches and shall be offset by 6 feet. <u>Underlayment shall be one of the following:</u> 1. <u>Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere</u>
Metal roof shingles	1507.5		
Mineral-surfaced roll roofing	1507.6		
Slate shingles	1507.7		
Wood shingles	1507.8		
Wood shakes	1507.9		

			<u>with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.</u> 2. <u>A minimum 4 inch wide strip of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table R905.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4 inch wide membrane strips.</u> 3. <u>A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.</u>
Photo-voltaic shingles <u>BIPV roof coverings</u>	1507.16	<u>Underlayment shall be one of the following:</u> For roof slopes from 3 units vertical in 12 units horizontal (3:12), up to 4 units vertical in 12 units horizontal (4:12), underlayment shall be two layers applied as follows: <u>in the following manner: Apply a 19-inch strip of underlayment felt that is half the width of a full sheet</u> parallel to and starting at the eaves. Starting at the eave, apply 36-inch-wide full width sheets of underlayment, overlapping successive sheets 19 inches half the width of a full sheet plus 2 inches. End laps shall be 4 inches and shall be offset by 6 feet. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. For roof slopes of 4 units vertical in 12 units horizontal (4:12) or greater, underlayment shall be one layer applied as follows: Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet. <u>A single layer of self- adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.</u>	Same as Maximum Basic Design Wind Speed, V < 140 mph except all laps shall be not less than 4 inches <u>Underlayment shall be one of the following:</u> 1. <u>Two layers of mechanically fastened underlayment applied in the following manner: Apply a strip of underlayment felt that is half the width of a full sheet parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36- inch-wide full width sheets of underlayment, overlapping successive sheets half the width of a full sheet plus 2 inches. Distortions in the underlayment shall not interfere with the ability of the shingles to seal. End laps shall be 4 inches and shall be offset by 6 feet.</u> 2. <u>A minimum 4 inch wide strip of self-adhering polymer modified bitumen underlayment complying</u>

			<u>with ASTM D1970, installed in accordance with the manufacturer's installation instructions for the deck material, shall be applied over all joints in the roof decking. An approved underlayment complying with Table 1507.1.1(1) for the applicable roof covering shall be applied over the entire roof over the 4 inch wide membrane strips.</u> 3. <u>A single layer of self-adhering polymer modified bitumen underlayment complying with ASTM D1970, installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.</u>
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For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm; 1 mile per hour = 0.447 m/s.

TABLE 1507.1.1(3) UNDERLAYMENT FASTENING

ROOF COVERING	SECTION	MAXIMUM BASIC DESIGN WIND SPEED, V < 130 140 MPH IN <u>HURRICANE-PRONE REGIONS OR V < 140 MPH OUTSIDE HURRICANE-PRONE REGIONS</u>	MAXIMUM BASIC DESIGN WIND SPEED, V ≥ 130 140 MPH IN <u>HURRICANE-PRONE REGIONS OR V ≥ 140 MPH OUTSIDE HURRICANE-PRONE REGIONS</u>
Asphalt shingles	1507.2	Fastened sufficiently to hold in place	The Mechanically fastened underlayment shall be attached with corrosion-resistant fasteners in a grid pattern of <u>maximum</u> 12 inches <u>horizontally and vertically</u> between side laps with a 6-inch spacing at side and end laps. <u>Mechanically fastened</u> Uunderlayment shall be attached <u>fastened</u> using <u>annular ring or deformed shank nails with 1 inch diameter</u> metal or plastic caps nails or cap staples with a nominal cap diameter of not less than 1 inch. Metal caps shall have a thickness of not less than 32-gage (0.0134 inch) sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch for ring shank cap nails and 0.091 inch for smooth shank cap nails. Staples shall be not less than 21 gage (0.032 inch). The cap nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or not less than ³/₄ inch into the roof sheathing. <u>Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturer's installation instructions</u>
Clay and concrete tile	1507.3		
Photovoltaic shingles <u>BIPV roof coverings</u>	1507.16		

			for the deck material, roof ventilation configuration, and climate exposure of the roof covering.
Metal roof panels	1507.4	Manufacturer's installation instructions	The Mechanically fastened underlayment shall be attached with corrosion-resistant fasteners in a grid pattern of maximum 12 inches horizontally and vertically between side laps with a 6-inch spacing at side and end laps. Mechanically fastened Uunderlayment shall be attached fastened using annular ring or deformed shank nails with 1 inch diameter metal or plastic caps nails or cap staples with a nominal cap diameter of not less than 1 inch. Metal caps shall have a thickness of not less than 32-gage sheet metal. Power-driven metal caps shall have a minimum thickness of 0.010 inch. Minimum thickness of the outside edge of plastic caps shall be 0.035 inch. The cap nail shank shall be not less than 0.083 inch for ring shank cap nails and 0.091 inch for smooth shank cap nails. Staples shall be not less than 21 gage. The cap nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or not less than ³/₄ inch into the roof sheathing. Self-adhering polymer modified bitumen underlayment shall be installed in accordance with the underlayment and roof covering manufacturer's installation instructions for the deck material, roof ventilation configuration, and climate exposure of the roof covering.
Metal roof shingles	1507.5		
Mineral-surfaced roll roofing	1507.6		
Slate shingles	1507.7		
Wood shingles	1507.8		
Wood shakes	1507.9		

For SI: 1 inch = 25.4 mm; 1 mile per hour = 0.447 m/s.

1507.2.8 Flashings.

Flashing for asphalt shingles shall comply with this section. Flashing shall be applied in accordance with this section and the asphalt shingle manufacturer's ~~printed~~ instructions.

1507.2.8.2 Valleys.

Valley linings shall be installed in accordance with the manufacturer's instructions before applying shingles. Valley linings of the following types shall be permitted:

1. For open valleys (valley lining exposed) lined with metal, the valley lining shall be not less than 24 inches (610 mm) wide and of any of the corrosion-resistant metals in Table 1507.2.8.2.
2. For open valleys, valley lining of two plies of mineral-surfaced roll roofing complying with ASTM D3909 or ASTM D6380 shall be permitted. The bottom layer shall be 18 inches (457 mm) and the top layer not less than 36 inches (914 mm) wide.
3. For closed valleys (valleys covered with shingles), valley lining of one ply of smooth roll roofing complying with ASTM D6380, and not less than 36 inches (914 mm) wide or types as described in Item 1 or 2 above shall be permitted. Self-adhering polymer modified bitumen *underlayment* bearing a label indicating compliance with ASTM D1970 [and not less than 36 inches \(914 mm\) wide](#) shall be permitted in lieu of the lining material.

1507.3.1 Deck requirements.

Concrete and clay tile shall be installed only over solid sheathing ~~or spaced structural sheathing boards~~.

[Exception: Spaced lumber sheathing shall be permitted in Seismic Design Categories A, B and C.](#)

1507.3.6 Fasteners.

Tile fasteners shall be corrosion resistant and not less than 11-gage, [\[0.120 inch \(3 mm\)\]](#), 5/16-inch (8.0 mm) head, and of sufficient length to penetrate the deck not less than 3/4 inch (19.1 mm) or through the thickness of the deck, whichever is

less. Attaching wire for clay or concrete tile shall not be smaller than 0.083 inch (2.1 mm). Perimeter fastening areas include three tile courses but not less than 36 inches (914 mm) from either side of hips or ridges and edges of eaves and gable rakes.

1507.4.3 Material standards.

Metal-sheet roof covering systems that incorporate supporting structural members shall be designed in accordance with Chapter 22. Metal-sheet roof coverings ~~installed over structural decking~~ shall comply with Table 1507.4.3(1). ~~The materials used for metal-sheet roof coverings shall be naturally corrosion resistant or provided with corrosion resistance in accordance with the standards and minimum thicknesses shown in Table 1507.4.3(2).~~

TABLE 1507.4.3(1) METAL ROOF COVERINGS

Portions of table not shown remain unchanged.

ROOF COVERING TYPE	STANDARD APPLICATION RATE/THICKNESS
5% Aluminum alloy-coated steel	ASTM A875, GF60
Aluminum-coated steel	ASTM A463, T2 65
55%-a Aluminum-zinc alloy coated steel	ASTM A792 AZ 50

Footnote a. remains unchanged and is omitted for clarity.

~~TABLE 1507.4.3(2) MINIMUM CORROSION RESISTANCE~~

55% Aluminum-zinc alloy coated steel	ASTM A792 AZ-50
5% Aluminum alloy-coated steel	ASTM A875 GF60
Aluminum-coated steel	ASTM A463 T2-65
Galvanized steel	ASTM A653 G-90
Prepainted steel	ASTM A755^a

~~a. —Paint systems in accordance with ASTM A755 shall be applied over steel products with corrosion-resistant coatings complying with ASTM A463, ASTM A653, ASTM A792 or ASTM A875.~~

1507.5.5 Material standards.

Metal roof shingle roof coverings shall comply with Table 1507.4.3(1). ~~The materials used for metal roof shingle roof coverings shall be naturally corrosion resistant or provided with corrosion resistance in accordance with the standards and minimum thicknesses specified in the standards listed in Table 1507.4.3(2).~~

1507.8.1 Deck requirements.

Wood shingles shall be installed on solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall be not less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners. [Where 1-inch by 4-inch \(25 mm by 102 mm\) spaced sheathing is installed at 10 inches \(254 mm\) on center or greater, additional 1-inch by 4-inch \(25 mm by 102 mm\) boards shall be installed between the sheathing boards. When wood shingles are installed over spaced sheathing and the underside of the shingles are exposed to the attic space, the attic shall be ventilated in accordance with Section 1202.2. The shingles shall not be backed with materials that will occupy the required air gap space and prevent the free movement of air on the interior side of the spaced sheathing.](#)

1507.9.1 Deck requirements.

Wood shakes shall only be used on solid or spaced sheathing. Where spaced sheathing is used, sheathing boards shall be not less than 1-inch by 4-inch (25 mm by 102 mm) nominal dimensions and shall be spaced on centers equal to the weather exposure to coincide with the placement of fasteners. Where 1-inch by 4-inch (25 mm by 102 mm) spaced sheathing is installed at 10 inches (254 mm) on center, additional 1-inch by 4-inch (25 mm by 102 mm) boards shall be installed between the sheathing boards. Where wood shakes are installed over spaced sheathing and the underside of the shakes are exposed to the attic space, the attic shall be ventilated in accordance with Section 1202.2. The shakes shall not be backed with materials that will occupy the required air gap space and prevent the free movement of air on the interior side of the spaced sheathing.

1507.12 ~~Thermoset single-ply~~ Single-ply roofing.

The installation of ~~thermoset~~ single-ply roofing shall comply with the provisions of this section.

1507.12.1 ~~Thermoset single-ply~~ Slope.

Single-ply ~~Thermoset single-ply~~ membrane roofs shall have a design slope of not less than 1/4 unit vertical in 12 units horizontal (2-percent slope) for drainage.

1507.12.2 Material standards.

~~Thermoset single-ply~~ Single-ply roof coverings shall comply with ~~ASTM D4637 or ASTM D5019~~ the material standards in Table 1507.12.2.

TABLE 1507.12.2

SINGLE-PLY ROOFING MATERIAL STANDARDS

<u>MATERIAL</u>	<u>MATERIAL STANDARD</u>
<u>Chlorosulfonated polyethylene (CSPE) or polyisobutylene (PIB)</u>	<u>ASTM D5019</u>
<u>Ethylene propylene diene monomer (EPDM)</u>	<u>ASTM D4637</u>
<u>Ketone Ethylene Ester (KEE)</u>	<u>ASTM D6754</u>
<u>Polyvinyl Chloride (PVC) or (PVC/KEE)</u>	<u>ASTM D4434</u>
<u>Thermoplastic polyolefin (TPO)</u>	<u>ASTM D6878</u>

1507.12.3 Ballasted ~~thermoset~~ low-slope roofs.

Ballasted ~~thermoset~~ low-slope roofs (~~roof slope < 2:12~~) shall be installed in accordance with this section and Section 1504.5. Stone used as ballast shall comply with ASTM D448 or ASTM D7655.

~~1507.13 Thermoplastic single-ply roofing.~~

~~The installation of thermoplastic single-ply roofing shall comply with the provisions of this section.~~

~~**1507.13.1 Slope.** Thermoplastic single-ply membrane roofs shall have a design slope of not less than one-fourth unit vertical in 12 units horizontal (2-percent slope).~~

~~1507.13.2 Material standards.~~

~~Thermoplastic single-ply roof coverings shall comply with ASTM D4434, ASTM D6754 or ASTM D6878.~~

~~1507.13.3 Ballasted thermoplastic low-slope roofs.~~

~~Ballasted thermoplastic low-slope roofs (roof slope $\leq$ 2:12) shall be installed in accordance with this section and Section 1504.5. Stone used as ballast shall comply with ASTM D448 or ASTM D7655.~~

~~1507.14~~ 1507.13 Sprayed polyurethane foam roofing.

The installation of sprayed polyurethane foam roofing shall comply with the provisions of this section.

~~1507.14.1~~ 1507.13.1 Slope.

Sprayed polyurethane foam roofs shall have a design slope of not less than $\frac{1}{4}$ unit vertical in 12 units horizontal (2-percent slope) for drainage.

~~1507.14.2~~ 1507.13.2 Material standards.

Spray-applied polyurethane foam insulation shall comply with ASTM C1029 Type III or IV or ASTM D7425.

~~1507.14.3~~ 1507.13.3 Application.

Foamed-in-place roof insulation shall be installed in accordance with the manufacturer's instructions. A liquid-applied protective coating that complies with Table 1507.13.3 shall be applied not less than 2 hours nor more than 72 hours following the application of the foam.

~~TABLE 1507.14.3~~ TABLE 1507.13.3

PROTECTIVE COATING MATERIAL STANDARDS

MATERIAL	STANDARD
Acrylic coating	ASTM D6083
Silicone coating	ASTM D6694
Moisture-cured polyurethane coating	ASTM D6947

~~1507.14.4~~ 1507.13.4 Foam plastics.

Foam plastic materials and installation shall comply with Chapter 26.

~~1507.15~~ 1507.14 Liquid-applied roofing.

The installation of liquid-applied roofing shall comply with the provisions of this section.

~~1507.15.1~~ 1507.14.1 Slope.

Liquid-applied roofing shall have a design slope of not less than $\frac{1}{4}$ unit vertical in 12 units horizontal (2-percent slope).

~~1507.15.2~~ 1507.14.2 Material standards.

Liquid-applied roofing shall comply with ASTM C836, ASTM C957, ~~ASTM D1227~~ or ASTM D3468 ~~D3468, ASTM D6083, ASTM D6694 or ASTM D6947.~~

1507.14.3 Application.

Liquid-applied roofing shall be installed in accordance with this chapter and the manufacturer's installation instructions.

~~1507.16~~ 1507.15 Vegetative roofs, ~~roof gardens~~ and landscaped roofs.

Vegetative roofs, ~~roof gardens~~ and landscaped roofs shall comply with the requirements of this chapter, Section ~~1607.14.2.2~~ 1607.13.2 Section 1607.14 and the *International Fire Code*.

[BF] ~~1507.16.1~~ 1507.15.1 Structural fire resistance.

The structural frame and roof construction supporting the load imposed on the roof by the *vegetative roof*, ~~roof gardens~~ or landscaped roofs shall comply with the fire resistance rating requirements of Table 601.

1507.16 ~~Photovoltaic~~ BIPV shingles.

The installation of *building-integrated photovoltaic* ~~photovoltaic~~ (BIPV) shingles shall comply with the provisions of this section.

1507.16.1 Deck requirements.

~~Photovoltaic~~ BIPV shingles shall be applied to a solid or closely fitted deck, except where the shingles are specifically designed to be applied over spaced sheathing.

1507.16.2 Deck slope.

~~Photovoltaic~~ BIPV shingles shall be installed on roof slopes of not less than 2 units vertical in 12 units horizontal (2:12).

1507.16.5 Fasteners.

Fasteners for ~~photovoltaic~~ BIPV shingles shall be galvanized, stainless steel, aluminum or copper roofing nails, minimum 12- gage [0.105 inch (2.67 mm)] shank with a minimum $\frac{3}{8}$ -inch-diameter (9.5 mm) head, of a length to penetrate through the roofing materials and not less than $\frac{3}{4}$ inch (19.1 mm) into the roof sheathing. Where the roof sheathing is less than $\frac{3}{4}$ inch (19.1 mm) thick, the nails shall penetrate through the sheathing. Fasteners shall comply with ASTM F1667.

~~1507.17.6~~ 1507.16.6 Material standards.

~~Photovoltaic~~ BIPV shingles shall be *listed* and labeled in accordance with UL 7103.

~~1507.17.7~~ 1507.16.7 Attachment.

~~Photovoltaic~~ BIPV shingles shall be attached in accordance with the manufacturer's installation instructions.

~~1507.17.8~~ 1507.16.8 Wind resistance.

~~Photovoltaic~~ BIPV shingles shall ~~be tested in accordance with procedures and acceptance criteria in ASTM D3161. Photovoltaic shingles shall~~ comply with the classification requirements of Table 1504.2 for the appropriate maximum basic wind speed. ~~Photovoltaic shingle packaging shall bear a label to indicate compliance with the procedures in ASTM D3161 and the required classification from Table 1504.1.1.~~

1507.16.9 Flashing.

Flashing for BIPV shingles shall be installed in accordance with the *roof covering manufacturer's installation instructions* to prevent water from entering the wall and roof through joints in copings, through moisture-permeable materials and at intersections with parapet walls and other penetrations through the roof plane.

~~1507.18~~ [1507.17](#) Building-integrated photovoltaic roof panels.

The installation of *BIPV roof* panels shall comply with the provisions of this section.

~~1507.18.1~~ [1507.17.1](#) Deck requirements.

BIPV roof panels shall be applied to a solid or closely fitted deck, except where the *roof covering* is specifically designed to be applied over spaced sheathing.

~~1507.18.2~~ [1507.17.2](#) Deck slope.

BIPV roof panels shall be used only on roof slopes of 2 units vertical in 12 units horizontal (2:12) or greater.

~~1507.18.3~~ [1507.17.3](#) Underlayment.

Underlayment shall comply with ASTM D226, ASTM D4869 or ASTM D6757.

~~1507.18.4~~ [1507.17.4](#) Underlayment application.

Underlayment shall be applied shingle fashion, parallel to and starting from the eave, lapped 2 inches (51 mm) and fastened sufficiently to hold in place.

~~1507.18.4.1~~ [1507.17.4.1](#) High-wind attachment.

Underlayment applied in areas subject to high winds [*Vasd* greater than 110 mph (49 m/s) as determined in accordance with Section 1609.3.1] shall be applied in accordance with the manufacturer's instructions. Fasteners shall be applied along the overlap at not more than 36 inches (914 mm) on center. *Underlayment* installed where *Vasd* is not less than 120 mph (54 m/s) shall comply with ASTM D226, Type III, ASTM D4869, Type IV or ASTM D6757. The *underlayment* shall be attached in a grid pattern of 12 inches (305 mm) between side laps with a 6-inch (152 mm) spacing at the side laps. The *underlayment* shall be applied in accordance with Section 1507.1.1 except all laps shall be not less than 4 inches (102 mm). *Underlayment* shall be attached using cap nails or cap staples. Caps shall be metal or plastic with a nominal head diameter of not less than 1 inch (25.4 mm). Metal caps shall have a thickness of not less than 0.010 inch (0.25 mm). Power-driven metal caps shall have a thickness of not less than 0.010 inch (0.25 mm). Thickness of the outside edge of plastic caps shall be not less than 0.035 inch (0.89 mm). The cap nail shank shall be not less than 0.083 inch (2.11 mm) for ring shank cap nails and 0.091 inch (2.31 mm) for smooth shank cap nails. Staple gage shall be not less than 21 gage [0.02 inch (0.81 mm)]. Cap nail shank and cap staple legs shall have a length sufficient to penetrate through-the-roof sheathing or not less than $\frac{3}{4}$ inch (19.1 mm) into the roof sheathing.

Exception: As an alternative, adhered *underlayment* complying with ASTM D1970 shall be permitted.

~~1507.18.4.2~~ [1507.17.4.2](#) Ice barrier.

In areas where there has been a history of ice forming along the eaves causing a back-up of water, an ice barrier consisting of not fewer than two layers of *underlayment* cemented together or of a self-adhering polymer modified bitumen sheet shall be used instead of normal *underlayment* and extend from the lowest edges of all roof surfaces to a point not less than 24 inches (610 mm) inside the *exterior wall* line of the building.

Exception: Detached accessory structures that do not contain conditioned floor area.

~~1507.18.5~~ [1507.17.5](#) Material standards.

BIPV roof panels shall be listed and labeled in accordance with [UL 7103](#) ~~1703~~.

~~1507.18.6~~ 1507.17.6 **Attachment.**

BIPV roof panels shall be attached in accordance with the manufacturer's installation instructions.

1507.17.9 Flashing.

Flashing for BIPV roof panels shall be installed in accordance with the roof covering manufacturer's installation instructions to prevent water from entering the wall and roof through joints in copings, through moisture-permeable materials and at intersections with parapet walls and other penetrations through the roof plane.

~~1507.18.7 Wind resistance.~~

~~BIPV roof panels shall be tested in accordance with UL 1897. BIPV roof panel packaging shall bear a label to indicate compliance with UL 1897.~~

[BF] 1508.1 General.

The use of above-deck thermal insulation shall be permitted provided that such insulation is covered with an approved roof covering and passes the tests of NFPA 276 or UL 1256 when tested as an assembly.

Exceptions:

1. Foam plastic roof insulation shall conform to the material and installation requirements of Chapter 26.
2. Where a concrete or composite metal and concrete roof deck is used and the above-deck thermal insulation is covered with an approved roof covering.

TABLE 1508.2 MATERIAL STANDARDS FOR ROOF INSULATION

Cellular glass board	ASTM C552 <u>or ASTM C1902</u>
Composite boards	ASTM C1289, Type III, IV, V or VII
Expanded polystyrene	ASTM C578
Extruded polystyrene	ASTM C578
Fiber-reinforced gypsum board	ASTM C1278
Glass-faced gypsum board	ASTM C1177
High-density polyisocyanurate board	ASTM C1289, Type II, Class 4
Mineral fiber insulation board	ASTM C726
Perlite board	ASTM C728
Polyisocyanurate board	ASTM C1289, Type I or II
Wood fiberboard	ASTM C208, Type II

SECTION 1509

ROOF COATINGS

1509.1 General.

The installation of a roof coating on a roof covering shall comply with the requirements of Section 1505 and this section.

1509.2 Material standards.

Roof coating materials shall comply with the standards in Table 1509.2.

TABLE 1509.2
ROOF COATING MATERIAL STANDARDS

<u>MATERIAL</u>	<u>STANDARD</u>
<u>Acrylic coating</u>	<u>ASTM D6083</u>
<u>Asphaltic emulsion coating</u>	<u>ASTM D1227</u>
<u>Asphalt coating</u>	<u>ASTM D2823</u>
<u>Asphalt roof coating</u>	<u>ASTM D4479</u>
<u>Aluminum-pigmented asphalt coating</u>	<u>ASTM D2824</u>
<u>Silicone coating</u>	<u>ASTM D6694</u>
<u>Moisture-cured polyurethane coating</u>	<u>ASTM D6947</u>

~~{BG} 1510.7 Photovoltaic panels and modules.~~

~~Rooftop-mounted photovoltaic panels and modules shall be designed in accordance with this section.~~

~~{BG} 1510.7.1 Fire classification.~~

~~Rooftop-mounted photovoltaic panels and modules shall have the fire classification in accordance with Section 1505.9.~~

~~{BG} 1510.7.2 Photovoltaic panels and modules.~~

~~Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL-1703 and shall be installed in accordance with the manufacturer's instructions.~~

SECTION 1510-1511 **ROOFTOP STRUCTURES**

~~1510.1.1~~ 1511.1.1 Area limitation.

The aggregate area of penthouses and other enclosed rooftop structures shall not exceed one-third the area of the supporting roof deck. Such penthouses and other enclosed rooftop structures shall not be required to be included in determining the ~~building area or number of stories~~ building height, number of stories or building area as regulated by Section 503.1. The area of such *penthouses* shall not be included in determining the *fire area* specified in Section 901.7.

~~[BG] 1510.2.2~~ 1511.2.2 Use limitations.

Penthouses shall not be used for purposes other than the shelter of mechanical or electrical equipment, tanks, elevators and related machinery, stairways or vertical *shaft* openings in the roof assembly, including ancillary spaces used to access elevators and stairways.

~~[BG] 1510.2.4~~ 1511.2.4 Type of construction.

Penthouses shall be constructed ~~with walls, floors and roofs~~ of building elements materials as required for the type of construction of the *building*.

Penthouses shall be constructed ~~with walls, floors and roofs of building element materials~~ as required for the type of construction of the building ~~on which such penthouses are built~~. Penthouse exterior walls and roof construction shall have a fire-resistance rating as required for the type of construction of the building. Supporting construction of such exterior walls and roof construction shall have a fire-resistance rating not less than required for the exterior wall or roof supported.

Exceptions:

1. On buildings of Type I construction, the *exterior walls* and roofs of *penthouses* with a *fire separation distance* greater than 5 feet (1524 mm) and less than 20 feet (6096 mm) shall be permitted to have not less than a 1-hour *fire-resistance rating*. The *exterior walls* and roofs of *penthouses* with a *fire separation distance* of 20 feet (6096 mm) or greater shall not be required to have a *fire-resistance rating*.
2. On buildings of Type I construction two stories or less in height above *grade plane* or of Type II construction, the *exterior walls* and roofs of *penthouses* with a *fire separation distance* greater than 5 feet (1524 mm) and less than 20 feet (6096 mm) shall be permitted to have not less than a 1-hour *fire-resistance rating* or a lesser *fire-resistance rating* as required by [Table 705.5](#) and be constructed of fire-retardant-treated wood. The *exterior walls* and roofs of *penthouses* with a *fire separation distance* of 20 feet (6096 mm) or greater shall be permitted to be constructed of *fire-retardant-treated wood* and shall not be required to have a *fire-resistance rating*. Interior framing and walls shall be permitted to be constructed of *fire-retardant-treated wood*.
3. On buildings of Type III, IV or V construction, the *exterior walls* of *penthouses* with a *fire separation distance* greater than 5 feet (1524 mm) and less than 20 feet (6096 mm) shall be permitted to have not less than a 1-hour *fire-resistance rating* or a lesser *fire-resistance rating* as required by [Table 705.5](#). On buildings of Type III, IV or VA construction, the *exterior walls* of *penthouses* with a *fire separation distance* of 20 feet (6096 mm) or greater shall be permitted to be of heavy timber construction complying with Sections 602.4 and 2304.11 or noncombustible construction or *fire-retardant-treated wood* and shall not be required to have a *fire-resistance rating*.

1511.7.6 Lightning Protection Systems.

Lightning protection system components shall be installed in accordance with Sections 1511.7.6.1, 1511.7.6.2 and 2703.

1511.7.6.1 Installation on metal edge systems or gutters.

Lightning protection system components directly attached to ANSI/SPRI/FM 4435/ES-1 or ANSI/SPRI GT-1 tested metal edge systems or gutters shall be installed with compatible brackets, fasteners, or adhesives, in accordance with the metal edge systems or gutter manufacturer's installation instructions. When metal edge system or gutter manufacturer is unknown, installation shall be as directed by a registered design professional.

1511.7.6.2 Installation on roof coverings.

Lightning protection system components directly attached to or through the *roof covering* shall be installed in accordance with this chapter and the *roof covering* manufacturer's installation instructions. Flashing shall be installed in accordance with the *roof assembly* manufacturer's installation instructions and Sections 1503.2 and 1507 where the lightning protection system installation results in a penetration through the *roof covering*. When the *roof covering* manufacturer is unknown, installation shall be as directed by a registered design professional.

1511.9 Raised-deck systems installed over a roof assembly.

Raised-deck systems installed above a *roof assembly* shall comply with Sections 1511.9.1 through 1511.9.5.

1511.9.1 Installation.

The installation of a *raised-deck system* shall comply with all of the following:

1. The perimeter of the *raised-deck system* shall be surrounded on all sides by walls or by a noncombustible enclosure approved to prevent fire intrusion below the *raised-deck system*. The wall or enclosure shall extend at

least from the *roof assembly* to the top surface of the *raised deck system*. The enclosure shall not impede roof drainage in accordance with Section 1511.9.5.

2. A *raised-deck system* shall be installed above a listed roof assembly.

Exception: Where the *roof assembly* is not required to have a fire classification in accordance with Section 1505.2.

3. A *raised-deck system* shall be installed in accordance with the manufacturer's installation instructions.
4. A *raised-deck system* shall not impede the operation of plumbing or mechanical vents, exhaust, air inlets, or roof drains. Where required, access for inspection, cleaning or maintenance shall be provided.

1511.9.2 Fire classification.

The *raised-deck system* shall be listed and identified with a fire *classification* in accordance with Section 1505 and shall be tested in accordance with either Section 1511.9.2.1 or Section 1511.9.2.2.

1511.9.2.1 Fire testing of the raised deck system installed over a classified roof assembly.

The *raised deck system* shall be tested separately from the *roof assembly* over which it is installed. The fire classification of the *raised deck system* shall be not less than the fire classification for the *roof assembly* over which it is installed.

Exception: Where the decking or pavers of the *raised deck system* consists of brick, masonry, concrete , or other noncombustible materials, fire testing of the *raised deck system* is not required.

1511.9.2.2 Fire testing of the raised deck system together with the roof assembly.

The *roof assembly* and the *raised deck system* shall be tested together.

1511.9.3 Pedestals or supports.

The pedestals or supports for the *raised deck system* shall be installed in accordance with manufacturer's installation instructions.

1511.9.4 Structural requirements.

The *raised-deck system* shall be designed for all applicable loads in accordance with Chapter 16 and performance requirements in Section 1504.5.

1511.9.5 Roof drainage.

The *raised-deck system*, including the wall or enclosure between the *roof assembly* and the raised deck, shall be designed and installed to allow for the operation of the roof drainage system as required by Section 1502 and the *International Plumbing Code*. The roof structure shall be designed to support any standing water resulting from the installation of the *raised-deck system*.

1511.9.6 Accessibility and Egress.

The *raised-deck system* shall be accessible in accordance with Chapter 11 and *means of egress* shall be provided in accordance with Chapter 10.

SECTION 1512

PHOTOVOLTAIC PANELS AND MODULES

~~1512.1 Photovoltaic panels and modules.~~

~~Photovoltaic panels and modules installed on a roof or as an integral part of a roof assembly shall comply with the requirements of this code and the International Fire Code.~~

SECTION ~~1511~~1512

REROOFING

~~1511.1~~ 1512.1 General.

Materials and methods of application used for recovering or replacing an existing *roof covering* shall comply with the requirements of Chapter 15.

Exceptions:

1. *Roof replacement* or *roof recover* of existing low-slope *roof coverings* shall not be required to meet the minimum design slope requirement of $\frac{1}{4}$ unit vertical in 12 units horizontal (2-percent slope) in Section 1507 for roofs that provide *positive roof drainage* and meet the requirements of Section 1608.3 and Section 1611.2.
2. Recovering or replacing an existing *roof covering* shall not be required to meet the requirement for secondary (emergency overflow) drains or *scuppers* in Section 1502.2 for roofs that provide for *positive roof drainage* and meet the requirements of Section 1608.3 and Section 1611.2. For the purposes of this exception, existing secondary drainage or *scupper* systems required in accordance with this code shall not be removed unless they are replaced by secondary drains or *scuppers* designed and installed in accordance with Section 1502.2.

~~1511.2 Structural and construction loads.~~

~~Structural roof components shall be capable of supporting the roof covering system and the material and equipment loads that will be encountered during installation of the system.~~

~~1511.3~~ 1512.2 Roof replacement.

Roof replacement shall include the removal of all existing layers of ~~roof coverings~~ roof assembly materials down to the *roof deck*.

~~Exception~~ Exceptions:

1. Where the existing *roof assembly* includes an ice barrier membrane that is adhered to the *roof deck* and the existing sheathing is not water soaked or deteriorated to the point that it is not adequate as a base for additional roofing, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507 where permitted by the roof covering manufacturer and self-adhered underlayment manufacturer.
2. Where the existing roof includes a self-adhered underlayment and the existing sheathing is not water soaked or deteriorated to the point that it is not adequate as a base for additional roofing, the existing self-adhered underlayment shall be permitted to remain in place and covered with an underlayment complying with Table 1507.1.1(1), Table 1507.1.1(2), and Table 1507.1.1(3).
3. Where the existing roof includes one layer of self-adhered underlayment and the existing layer cannot be removed without damaging the roof deck, a second layer of self-adhered underlayment is permitted to be installed over the existing self-adhered underlayment provided the following conditions are met:
 - 3.1. It is permitted by the roof covering manufacturer and self-adhered underlayment manufacturer,
 - 3.2. The existing sheathing is not water soaked or deteriorated to the point that it is not adequate as a base for additional roofing, and
 - 3.3. The second layer of self-adhered underlayment is installed such that buildup of material at walls, valleys, roof edges, end laps, and side laps does not exceed two layers.

~~1511.3.1~~ 1512.3 Roof recover.

The installation of a new *roof covering* over an existing *roof covering* shall be permitted where any of the following conditions occur:

1. Where the new *roof covering* is installed in accordance with the *roof covering* manufacturer's approved instructions.
2. Complete and separate roofing systems, such as standing-seam *metal roof panel* systems, that are designed to transmit the roof loads directly to the *building's* structural system and do not rely on existing roofs and *roof coverings* for support, shall not require the removal of existing *roof coverings*.
3. Metal panel, metal shingle and concrete and clay tile *roof coverings* shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 1511.4.
4. The application of a new protective roof coating over an existing protective *roof coating*, *metal roof panel*, built-up roof, spray polyurethane foam roofing system, *metal roof shingles*, mineral-surfaced roll roofing, modified bitumen roofing or *thermoset* and *thermoplastic* single-ply roofing shall be permitted without tear off of existing *roof coverings*.

Exception: A roof recover shall not be permitted where any of the following conditions occur:

1. The existing roof or roof covering is water-soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. The existing roof covering is slate, clay, cement or asbestos-cement tile.
3. The existing roof has two or more applications of any type of roof covering.

~~1511.4~~ 1512.3.1 Roof recovering over wood shingles or shakes.

Where the application of a new roof covering over wood shingle or shake roofs creates a combustible concealed space, the entire existing surface shall be covered with gypsum panel products, ~~board~~, mineral fiber, glass fiber or other approved materials securely fastened in place.

Chapter 16 Structural Design

1601.1 Scope.

The provisions of this chapter shall govern the structural design of buildings, structures and portions thereof ~~this code~~ **regulated by**.

1602.1 Notations.

The following notations are used in this chapter:

D	=	Dead load.
D _i	=	Weight of ice in accordance with Chapter 10 of ASCE 7.
E	=	Combined effect of horizontal and vertical earthquake induced forces as defined in Section 12.4 of ASCE 7.
F	=	Load due to fluids with well-defined pressures and maximum heights.
F _a	=	Flood load in accordance with Chapter 5 of ASCE 7.
H	=	Load due to lateral earth pressures, ground water pressure or pressure of bulk materials.
L	=	Live load.
L _r	=	Roof live load.
<u>p_{g(asd)}</u>	≡	<u>Allowable stress design ground snow load</u>

p_g	=	Ground snow load determined from Figures 1608.2(1) through 1608.2(4) and Table 1608.2
R	=	Rain load.
S	=	Snow load.
T	=	Cumulative effects of self-straining load forces and effects.
V_{asd}	=	Allowable stress design wind speed, miles per hour (mph) (km/hr) (m/s) where applicable.
V	=	Basic design wind speed, V , miles per hour (mph) (km/hr) (m/s) determined from Figures 1609.3(1) through 1609.3 (12) (4) or ASCE 7.
V_T	=	Tornado speed, mph (m/s) determined from Chapter 32 of ASCE 7.
W	=	Load due to wind pressure.
W_i	=	Wind-on-ice in accordance with Chapter 10 of ASCE 7.

1603.1 General.

Construction documents shall show the [material](#), size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.9 shall be indicated on the *construction documents*.

Exception: Construction documents for buildings constructed in accordance with the *conventional light-frame construction* provisions of Section 2308 shall indicate the following structural design information:

1. Floor and roof dead and live loads.
2. Ground snow load, p_g and *allowable stress design* ground snow load, $p_{g(asd)}$.
3. Basic ~~design~~ wind speed, V, ~~miles per hour~~ mph ~~(km/hr)~~ (m/s) and allowable stress design wind speed, V_{asd} , as determined in accordance with Section 1609.3.1 and wind exposure.
4. *Seismic design category* and *site class*.
5. Flood design data, if located in *flood hazard areas* established in Section 1612.3.
6. Design load-bearing values of soils.
7. Rain load data.

1603.1.2 Roof live load.

The roof live load used in the design shall be indicated for roof areas ~~(Section 1607.14)~~.

1603.1.3 Roof snow load data.

The ground snow load, p_g , shall be indicated. In areas where the ground snow load, p_g , exceeds ~~10~~ [15](#) pounds per square foot (psf) (~~0.479~~ [0.72](#) kN/m²), the following additional information shall also be provided, regardless of whether snow loads govern the design of the roof:

1. Flat-roof snow load, p_f .
2. Snow exposure factor, C_e and allowable stress design ground snow load, $p_{g(asd)}$.
3. ~~Snow load importance factor, I_s .~~ [Risk category](#).
4. Thermal factor, C_t .
5. Slope factor(s), C_s .
6. Drift surcharge load(s), p_d , where the sum of p_d and p_f exceeds ~~20~~ [30](#) psf (~~0.96~~ [1.44](#) kN/m²).
7. Width of snow drift(s), w .

8. Winter wind parameter for snow drift, W2.

1603.1.4 Wind and tornado design data.

The following information related to wind loads, and where required by Section 1609.5 tornado loads, shall be shown, regardless of whether wind or tornado loads govern the design of the lateral force-resisting system of the structure:

1. Basic ~~design~~ wind speed, V mph (m/s), tornado speed, V_t mph (m/s), ~~miles per hour~~ and allowable stress design wind speed, V_{asd} mph (m/s), as determined in accordance with Section 1609.3.1.
2. Risk category.
3. Effective plan area, A_e , for tornado design in accordance with Chapter 32 of ASCE 7.
4. Wind exposure. Applicable wind direction if more than one wind exposure is utilized.
5. Applicable internal pressure coefficients, and applicable tornado internal pressure coefficients.
6. Design wind pressures and their applicable zones with dimensions to be used for exterior component and cladding materials not specifically designed by the *registered design professional* responsible for the design of the structure, pounds per square foot (kN/m²). Where design for tornado loads is required, the design pressures shown shall be the maximum of wind or tornado pressures.

1603.1.5 Earthquake design data.

The following information related to seismic loads shall be shown, regardless of whether seismic loads govern the design of the lateral force-resisting system of the structure:

1. Risk category.
2. Seismic importance factor, I_e .
3. ~~Mapped-s~~ Spectral response acceleration parameters, S_s and S_1 .
4. Site class.
5. Design spectral response acceleration parameters, S_{DS} and S_{D1} .
6. Seismic design category.
7. Basic seismic force-resisting system(s).
8. Design base shear(s).
9. Seismic response coefficient(s), C_S .
10. Response modification coefficient(s), R .
11. Analysis procedure used.

1603.1.9 Roof rain load data.

Design rainfall ~~Rain~~ intensity, i (in/hr) (cm/hr), and roof drain, scupper and overflow locations shall be shown regardless of whether rain loads govern the design.

1604.3 Serviceability.

Structural systems and members thereof shall be designed to have adequate stiffness to limit deflections as indicated in Table 1604.3. ~~Drift limits applicable to earthquake loading shall be in accordance with ASCE 7 Chapter 12, 13, 15 or 16, as applicable.~~

TABLE 1604.3 DEFLECTION LIMITS a, b, c, h, i

The body of the table is unchanged and omitted for clarity. Footnotes are below.

- a. For structural roofing and siding made of formed metal sheets, the total load deflection shall not exceed $l/60$. For secondary roof structural members supporting formed metal roofing, the live load deflection shall not exceed $l/150$. For secondary wall members supporting formed metal siding, the design wind load deflection shall not exceed $l/90$. For roofs, this exception only applies when the metal sheets have no roof covering.
- b. Flexible, folding and portable partitions are not governed by the provisions of this section. The deflection criterion for interior partitions is based on the horizontal load defined in Section 1607.16.
- c. See Section 2403 for glass supports.
- d. The deflection limit for the $D+(L+L_r)$ load combination only applies to the deflection due to the creep component of long-term dead load deflection plus the short-term live load deflection. For lumber, structural glued laminated timber, prefabricated wood I-joists and structural composite lumber members that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection shall be permitted to be estimated as the immediate dead load deflection resulting from $0.5D$. For lumber and glued laminated timber members installed or used at all other moisture conditions or cross laminated timber and wood structural panels that are dry at time of installation and used under dry conditions in accordance with the ANSI/AWC NDS, the creep component of the long-term deflection is permitted to be estimated as the immediate dead load deflection resulting from D . The value of $0.5D$ shall not be used in combination with ANSI/AWC NDS provisions for long-term loading.
- e. The preceding deflections do not ensure against ponding. Roofs that do not have sufficient slope or camber to ensure adequate drainage shall be investigated for ponding. See Chapter 8 of ASCE 7.
- f. The wind load shall be permitted to be taken as 0.42 times the “component and cladding” loads or directly calculated using the 10-year mean return interval [basic](#) wind speed, V , for the purpose of determining deflection limits in Table 1604.3. Where framing members support glass, the deflection limit therein shall not exceed that specified in Section 1604.3.7
- g. For steel structural members, the deflection due to creep component of long-term dead load shall be permitted to be taken as zero.
- h. For aluminum structural members or aluminum panels used in skylights and sloped glazing framing, roofs or walls of sunroom additions or patio covers not supporting edge of glass or aluminum 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 aluminum sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed $l/120$.
- i. l = Length of the member between supports. For cantilever members, l shall be taken as twice the length of the cantilever.

TABLE 1604.3 DEFLECTION LIMITS a,b,c,h,i

The remaining portion of the table is unchanged and omitted for clarity.

CONSTRUCTION	L or L _r	S ⁱ or W ^f	D + L ^{d,g}
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- j. [The snow load shall be permitted to be taken as 0.7 times the design snow load determined in accordance with Section 1608.1 for the purpose of determining deflection limits in Table 1604.3](#)

1604.4 Analysis.

Load effects on structural members and their connections shall be determined by methods of structural analysis that take into account equilibrium, general stability, geometric compatibility and both short- and long-term material properties. Members that tend to accumulate residual deformations under repeated service loads shall have included in their analysis the effects of added deformations expected to occur during their service life.

Any system or method of construction to be used shall be based on a rational analysis in accordance with well-established principles of mechanics. Such analysis shall result in a system that provides a complete *load* path capable of transferring *loads* from their point of origin to the load-resisting elements.

The total lateral force shall be distributed to the various vertical elements of the lateral force-resisting system in proportion to their rigidities, considering the rigidity of the horizontal bracing system or *diaphragm*. Rigid elements assumed not to be a part of the lateral force-resisting system are permitted to be incorporated into buildings provided that their effect on the action of the system is considered and provided for in the design. Where a diaphragm is not permitted to be idealized as either flexible or rigid in accordance with ASCE 7 or for wood diaphragms in accordance with AWC SDPWS, the structure shall be analyzed and designed utilizing one of the following procedures:

1. An envelope analysis of the structure using a flexible and rigid diaphragm analysis separately and designing each component for the more severe load condition.
2. A semirigid diaphragm analysis and design.

~~A diaphragm is rigid for the purpose of distribution of story shear and torsional moment when the lateral deformation of the diaphragm is less than or equal to two times the average story drift.~~

Where required by ASCE 7, provisions shall be made for the increased forces induced on resisting elements of the structural system resulting from torsion due to eccentricity between the center of application of the lateral forces and the center of rigidity of the lateral force- resisting system.

Every structure shall be designed to resist the effects caused by the forces specified in this chapter, including overturning, uplift and sliding. Where sliding is used to isolate the elements, the effects of friction between sliding elements shall be included as a force.

1604.5 Risk category.

Each building and structure shall be assigned a *risk category* in accordance with Table 1604.5. Where a referenced standard specifies an occupancy category, the *risk category* shall not be taken as lower than the occupancy category specified therein. Where a referenced standard specifies that the assignment of a *risk category* be in accordance with ASCE 7, Table 1.5-1, Table 1604.5 shall be used in lieu of ASCE 7, Table 1.5-1.

Exception Exceptions:

1. The assignment of buildings and structures to Tsunami *Risk Categories* III and IV is permitted to be in accordance with Section 6.4 of ASCE 7.
2. Free standing parking garages not used for the storage of emergency services vehicles or not providing means of egress for buildings or structures assigned to a higher risk category shall be assigned to Risk Category II.

TABLE 1604.5 RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES

RISK CATEGORY	NATURE OF OCCUPANCY
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: Agricultural facilities. Certain temporary facilities. Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV.

III	Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to: • Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300. • Buildings and other structures containing one or more public assembly spaces, each having an occupant load greater than 300 and a cumulative occupant load of these public assembly spaces of greater than 2,500. • Buildings and other structures containing Group E or Group I-4 occupancies or combination thereof, with an occupant load greater than 250. • Buildings and other structures containing educational occupancies for students above the 12th grade with an occupant load greater than 500. • Group I-2, Condition 1 occupancies with 50 or more care recipients. • Group I-2, Condition 2 occupancies not having emergency surgery or emergency treatment facilities. • Group I-3, Condition 1 occupancies. • Any other occupancy with an occupant load greater than 5,000.^a • Power-generating stations with individual power units rated 75 MWAC (megawatts, alternating current) or greater, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category IV. • Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: ○ Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area in accordance with the <i>International Fire Code</i>; and ○ Are sufficient to pose a threat to the public if released.^b
IV	Buildings and other structures designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users, including but not limited to: • Group I-2, Condition 2 occupancies having emergency surgery or emergency treatment facilities. • Ambulatory care facilities having emergency surgery or emergency treatment facilities. • Group I-3 occupancies other than Condition 1. • Fire, rescue, ambulance and police stations and emergency vehicle garages • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Public utility facilities providing power generation, potable water treatment, or wastewater treatment. • Power-generating stations and other public utility facilities required as emergency backup facilities for <i>Risk Category IV</i> structures. Buildings and other structures containing quantities of highly toxic materials that: ○ Exceed maximum allowable quantities per control area as given in Table 307.1(2) or per outdoor control area in accordance with the <i>International Fire Code</i>; and ○ Are sufficient to pose a threat to the public if released.^b • Aviation control towers, air traffic control centers and emergency aircraft hangars. Buildings and other structures having critical national defense functions.

	Water storage facilities and pump structures required to maintain water pressure for fire suppression.
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- a. For purposes of occupant load calculation, occupancies required by Table 1004.5 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load. [The floor area for vehicular drive aisles shall be permitted to be excluded in the determination of net floor area in parking garages.](#)
- b. Where approved by the building official, the classification of buildings and other structures as Risk Category III or IV based on their quantities of toxic, highly toxic or explosive materials is permitted to be reduced to Risk Category II, provided that it can be demonstrated by a hazard assessment in accordance with Section 1.5.3 of ASCE 7 that a release of the toxic, highly toxic or explosive materials is not sufficient to pose a threat to the public.

1604.5.1 Multiple occupancies.

Where a building or structure is occupied by two or more occupancies not included in the same *risk category*, it shall be assigned the classification of the highest *risk category* corresponding to the various occupancies. Where buildings or structures have two or more portions that are structurally separated, each portion shall be separately classified. Where a separated portion of a building or structure provides required access to, required egress from or shares life safety ~~components~~ [systems, designated seismic systems, emergency power systems, or emergency and egress lighting systems](#) with another portion having a higher *risk category*, [or provides required electrical, communications, mechanical, plumbing, or conveying support to another portion assigned to Risk Category IV,](#) both portions shall be assigned to the higher *risk category*.

Exception: Where a *storm shelter* designed and constructed in accordance with ICC 500 is provided in a building, structure or portion thereof normally occupied for other purposes, the *risk category* for the normal occupancy of the building shall apply unless the *storm shelter* is a designated emergency shelter in accordance with Table 1604.5.

1604.5.2 Photovoltaic (PV) panel systems.

[Photovoltaic \(PV\) panel systems and elevated PV support structures shall be assigned a risk category as follows:](#)

1. [Ground-mounted PV panel systems serving only Group R-3 buildings shall be assigned to Risk Category II.](#)
2. [Ground-mounted PV panel systems other than those describes in Items 1 and 5 shall be assigned to Risk Category I.](#)
3. [Elevated PV support structures other than those described in Items 4, 5 and 6 shall be assigned to Risk Category II.](#)
4. [Rooftop-mounted PV panel systems and elevated PV support structures installed on top of buildings shall be assigned to the same risk category as the risk category of the building on which they are mounted.](#)

5. PV panel systems and elevated PV support structures paired with energy storage systems (ESS) and serving as a dedicated, stand-alone source of backup power for Risk Category IV buildings shall be assigned to Risk Category IV.
6. Elevated PV support structures where the usable space underneath is used for parking of emergency vehicles shall be assigned to Risk Category IV.

1604.8.2 Structural walls.

Walls that provide vertical load-bearing resistance or lateral shear resistance for a portion of the structure shall be anchored to the roof and to all floors and members that provide lateral support for the wall or that are supported by the wall. The connections shall be capable of resisting the horizontal forces that result from the application of the prescribed loads. The required earthquake out-of-plane loads are specified in Section 1.4.4 of ASCE 7 for walls of structures assigned to *Seismic Design Category A* and to Section 12.11 of ASCE 7 for walls of structures assigned to all other *seismic design categories*. Required anchors in masonry walls of hollow units or *cavity walls* shall be embedded in a reinforced grouted structural element of the wall. See Sections 1609 for wind design requirements and 1613 for earthquake design requirements.

1605.1 General.

Buildings and other structures and portions thereof shall be designed to resist the strength load combinations specified in ASCE 7, Section 2.3, the allowable stress design load combinations specified in ASCE 7, Section 2.4, or the alternative allowable stress design load combinations of Section 1605.2.

~~Buildings and other structures and portions thereof shall be designed to resist all of the following:~~

- ~~1. The load combinations specified in Section 1605.2, 1605.3.1 or 1605.3.2.~~
- ~~2. The load combinations specified in Chapters 18 through 23.~~
- ~~3. The seismic load effects including overstrength factor in accordance with Sections 2.3.6 and 2.4.5 of ASCE 7 where required by Chapters 12, 13, and 15 of ASCE 7. With the simplified procedure of ASCE 7, Section 12.14, the seismic load effects including overstrength factor in accordance with Section 12.14.3.2 and Chapter 2 of ASCE 7 shall be used.~~

~~Applicable loads shall be considered, including both earthquake and wind, in accordance with the specified load combinations. Each load combination shall also be investigated with one or more of the variable loads set to zero.~~

~~Where the load combinations with overstrength factor in Sections 2.3.6 and 2.4.5 of ASCE 7 apply, they shall be used as follows:~~

- ~~1. The basic combinations for strength design with overstrength factor in lieu of Equations 16-5 and 16-7 in Section 1605.2.~~
- ~~2. The basic combinations for allowable stress design with overstrength factor in lieu of Equations 16-12, 16-14 and 16-16 in Section 1605.3.1.~~
- ~~3. The basic combinations for allowable stress design with overstrength factor in lieu of Equations 16-21 and 16-22 in Section 1605.3.2.~~

Exceptions:

1. The modifications to load combinations of ASCE 7 Section 2.3, ASCE 7, Section 2.4, and Section 1605.2 specified in ASCE 7 Chapters 18 and 19 shall apply.
2. Where the allowable stress design load combinations of ASCE 7, Section 2.4 are used, flat roof snow loads of 45 pounds per square foot (2.15 kN/m²) and roof live loads of 30 pounds per square foot (1.44 kN/m²) or less need not be combined with seismic load. Where flat roof snow loads exceed 45 pounds per square foot (2.15 kN/m²), 15 percent shall be combined with seismic loads.
3. Where the allowable stress design load combinations of ASCE 7 Section 2.4 are used, crane hook loads need not be combined with roof live loads or with more than three-fourths of the snow load or one-half of the wind loads.

4. Where design for tornado loads is required, the alternative allowable stress design load combinations of Section 1605.2 shall not apply when tornado loads govern the design.

1605.1.1 Stability.

Regardless of which load combinations are used to design for strength, where overall structure stability (such as stability against overturning, sliding, or buoyancy) is being verified, use of the load combinations specified in ~~Section 1605.2 or 1605.3~~ Section 2.3 or 2.4 of ASCE 7, and in Section 1605.2 shall be permitted. Where the load combinations specified in ~~Section 1605.2~~ ASCE 7, Section 2.3 are used, strength reduction factors applicable to soil resistance shall be provided by a registered design professional. The stability of retaining walls shall be verified in accordance with Section 1807.2.3.

~~1605.2 Load combinations using strength design or load and resistance factor design. Where strength design or load and resistance factor design is used, buildings and other structures, and portions thereof, shall be designed to resist the most critical effects resulting from the following combinations of factored loads:~~

$$1.4(D + F) \quad \text{(Equation 16-1)}$$

$$1.2(D + F) + 1.6(L + H) + 0.5(L_r \text{ or } S \text{ or } R) \quad \text{(Equation 16-1)}$$

$$1.2(D + F) + 1.6(L_r \text{ or } S \text{ or } R) + 1.6H + (f_1L \text{ or } 0.5W) \quad \text{(Equation 16-3)}$$

$$1.2(D + F) + 1.0W + f_1L + 1.6H + 0.5(L_r \text{ or } S \text{ or } R) \quad \text{(Equation 16-4)}$$

$$1.2(D + F) + 1.0E + f_1L + 1.6H + f_2S \quad \text{(Equation 16-5)}$$

$$0.9D + 1.0W + 1.6H \quad \text{(Equation 16-6)}$$

$$0.9(D + F) + 1.0E + 1.6H \quad \text{(Equation 16-7)}$$

where:

$f_1 = 1$ for places of public assembly live loads in excess of 100 pounds per square foot (4.79 kN/m²), and parking garages; and 0.5 for other live loads.

$f_2 = 0.7$ for roof configurations (such as saw tooth) that do not shed snow off the structure, and 0.2 for other roof configurations.

Exceptions:

Where other factored load combinations are specifically required by other provisions of this code, such combinations shall take precedence.

Where the effect of H resists the primary variable load effect, a load factor of 0.9 shall be included with H where H is permanent and H shall be set to zero for all other conditions.

~~1605.3.2~~ 1605.2 Alternative allowable stress design load combinations.

In lieu of the ~~basic load combinations specified in Section 1605.3.1~~ load combinations in ASCE 7, Section 2.4, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following combinations. Where using these alternative allowable stress load combinations that include wind or seismic loads, allowable stresses are permitted to be increased or load combinations reduced where permitted by the material chapter of this code or the referenced standards. For load combinations that include the counteracting effects of dead and wind loads, only two-thirds of the minimum dead load likely to be in place during a design wind event shall be used. ~~Where using allowable stresses that have been increased or load combinations that have been reduced as permitted by the material chapter of this code or the referenced standards, where wind loads are calculated in accordance with Chapters 26 through 31 of ASCE 7, the coefficient (ω) in the following equations shall be taken as 1.3. For other wind loads, (ω) shall be taken as 1. Where allowable stresses have not been increased or load combinations have not been reduced as permitted by the material chapter of this code or the referenced standards, (ω) shall be taken as 1.~~ Where using these alternative load combinations to evaluate sliding, overturning and soil bearing at the soil-structure interface, the reduction of foundation

overturning from Section 12.13.4 in ASCE 7 shall not be used. Where using these alternative basic *load* combinations for proportioning foundations for loadings, which include seismic *loads*, the vertical seismic *load effect*, E_v , in Equation 12.4-4 of ASCE 7 is permitted to be taken equal to zero. Where required by ASCE 7, Chapters 12, 13 and 15, the load combinations including overstrength of ASCE 7, Section 2.3.6 shall be used.

$$D + L + (L_r \text{ or } 0.7S \text{ or } R) \quad 17\text{-(Equation 16-1)}$$

$$D + L + 0.6W \quad 18\text{-(Equation 16-2)}$$

$$D + L + 0.6W + 0.7S/2 \quad 19\text{-(Equation 16-3)}$$

$$D + L + 0.7S + 0.6(W/2) \quad 20\text{-(Equation 16-4)}$$

$$D + L + 0.7S + E/1.4 \quad 21\text{-(Equation 16-5)}$$

$$0.9D + E/1.4 \quad 22\text{-(Equation 16-6)}$$

Exceptions:

1. Crane hook *loads* need not be combined with *roof live loads* or with more than three-fourths of the snow load or one-half of the wind load
2. Flat roof snow loads of 45 pounds per square foot (2.15 kN/m²) or less and *roof live loads* of 30 pounds for square foot (1.44 kN/m²) or less need not be combined with seismic loads. Where flat roof snow loads exceed 45 pounds per square foot (2.15 kN/m²), 15 percent shall be combined with seismic loads.

~~1605.2.1 Other loads.~~

~~Where flood loads, F_a , are to be considered in the design, the load combinations of Section 2.3.2 of ASCE 7 shall be used. Where self-straining loads, T , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.3.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of section 2.3.3 of ASCE 7 shall be considered.~~

~~1605.3 Load combinations using allowable stress design.~~

~~Load combinations for allowable stress design shall be in accordance with Section 1605.3.1 or 1605.2.~~

~~1605.3.1 Basic load combinations.~~

~~Where allowable stress design (working stress design), as permitted by this code, is used, structures and portions thereof shall resist the most critical effects resulting from the following combinations of loads:~~

$$D + F \quad (\text{Equation 16-8})$$

$$D + H + F + L \quad (\text{Equation 16-9})$$

$$D + H + F + (L_r \text{ or } S \text{ or } R) \quad (\text{Equation 16-10})$$

$$D + H + F + 0.75(L) + 0.75(L_r \text{ or } S \text{ or } R) \quad (\text{Equation 16-11})$$

$$D + H + F + (0.6W \text{ or } 0.7E) \quad (\text{Equation 16-12})$$

$$D + H + F + 0.75(0.6W) + 0.75L + 0.75(L_r \text{ or } S \text{ or } R) \quad (\text{Equation 16-13})$$

$$D + H + F + 0.75(0.7E) + 0.75L + 0.75S \quad (\text{Equation 16-14})$$

$$0.6D + 0.6W + H \quad (\text{Equation 16-15})$$

$$0.6(D + F) + 0.7E + H \quad (\text{Equation 16-16})$$

Exceptions:

~~Crane hook loads need not be combined with roof live load or with more than three-fourths of the snow load or one-half of the wind load.~~

~~Flat roof snow loads of 30 psf (1.44 kN/m²) or less and roof live loads of 30 psf (1.44 kN/m²) or less need not be combined with seismic loads. Where flat roof snow loads exceed 30 psf (1.44 kN/m²), 20 percent shall be combined with seismic loads.~~

~~Where the effect of H resists the primary variable load effect, a load factor of 0.6 shall be included with H where H is permanent and H shall be set to zero for all other conditions.~~

~~In Equation 16-15, the wind load, W , is permitted to be reduced in accordance with Exception 2 of Section 2.4.1 of ASCE 7.~~

~~In Equation 16-16, 0.6 D is permitted to be increased to 0.9 D for the design of special reinforced masonry shear walls complying with Chapter 21.~~

1605.3.1.1 Stress increases.

~~Increases in allowable stresses specified in the appropriate material chapter or the referenced standards shall not be used with the load combinations of Section 1605.3.1, except that increases shall be permitted in accordance with Chapter 23.~~

1605.3.1.2 Other loads.

~~Where flood loads, F_a , are to be considered in design, the load combinations of Section 2.4.2 of ASCE 7 shall be used. Where self-straining loads, T , are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.4.3 of ASCE 7 shall be considered.~~

SECTION 1606 DEAD LOADS

1606.1 General.

~~Dead loads are those loads defined in Chapter 2 of this code. Dead loads shall be considered to be permanent loads. Buildings, structures, and parts thereof shall be designed to resist the effects of *dead loads*.~~

1606.2 ~~Design dead load~~ Weights of materials of construction.

For purposes of design, the actual weights of materials of construction ~~and fixed service equipment~~ shall be used. In the absence of definite information, values used shall be subject to the approval of the *building official*.

1606.3 Weight of fixed service equipment.

In determining dead loads for purposes of design, the weight of fixed service equipment, including the maximum weight of the contents of fixed service equipment, shall be included. The components of fixed service equipment that are variable, such as liquid contents and movable trays, shall not be used to counteract forces causing overturning, sliding, and uplift conditions in accordance with Section 1.3.6 of ASCE 7.

Exceptions:

5. Where force effects are the result of the presence of the variable components, the components are permitted to be used to counter those *load effects*. In such cases, the *structure* shall be designed for force effects with the variable components present and with them absent.
6. For the calculation of seismic force effects, the components of fixed service equipment that are variable, such as liquid contents and movable trays, need not exceed those expected during normal operation.

1606.4 Photovoltaic panel systems.

The weight of photovoltaic panel systems, their support system, and ballast shall be considered as dead load.

1606.5 Vegetative and landscaped roofs.

The weight of all landscaping and hardscaping materials for vegetative and landscaped roofs shall be considered as dead load. The weight shall be computed considering both fully saturated soil and drainage layer materials and fully dry soil and drainage layer materials to determine the most severe load effects on the structure.

1607.1 General.

~~Live loads are those loads defined in Chapter 2 of this code.~~ Buildings, structures, and parts thereof shall be designed to resist the effects of live loads.

TABLE 1607.1 MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_0 , AND MINIMUM CONCENTRATED LIVE LOADS g

OCCUPANCY OR USE		UNIFORM (psf)	CONCENTRA TED (pounds)	ALSO SEE SECTION
1.	Armories and drill rooms		—	—
2.	Access floor systems	Office use	50	2,000
		Computer use	100	2,000
3.	Armories and drill rooms		150 ^{ma}	—
4.	Assembly areas	Fixed seats (fastened to floor)	60 ^{ma}	—
		Follow spot, projections and control rooms	50	
		Lobbies	100 ^{ma}	
		Movable seats	100 ^{ma}	
		Stage floors	150 ^{ma}	
		Platforms (assembly)	100 ^{ma}	
		Bleachers, folding and telescopic seating and grandstands	100^a (See Section 1607.18)	
		Stadiums and arenas with fixed seats (fastened to the floor)	60^a (See Section 1607.18)	
		Other assembly areas	100 ^{ma}	
5.	Balconies and decks		1.5 times the live load for the area served, not required to exceed 100	—
6.	Catwalks for maintenance and service access		40	300
7.	Cornices		60	—

8.	Corridors	First floor	100	—	=	
		Other floors	Same as occupancy served except as indicated			
		Other floors				
9.	Dining rooms and restaurants		100 ^{-ma}	—	=	
10.	Dwellings (see residential)		—	—	=	
11.	Elevator machine room and control room grating (on area of 2 inches by 2 inches)		—	300	=	
12.	Finish light floor plate construction (on area of 1 inch by 1 inch)		—	200	=	
13.	Fire escapes		100	—	=	
		On single-family dwellings only	40			
14.	Fixed ladders		See Section 1607.17		=	
14.	Garages and vehicle floors	Passenger vehicles only garages	40 ^{-ec}	Note a See Section 1607.7	=	
15.		Trucks and buses	See Section 1607.7 1607.8			
		Fire trucks and emergency vehicles	See Section 1607.8			=
		Forklifts and movable equipment	See Section 1607.8			=
15.	Handrails, guards and grab bars		See Section 1607.8 1607.9		=	
16.	Helipads	Helicopter takeoff weight 3,000 pounds or less	40^a	See Section 1607.6.1	=	
17.		Helicopter takeoff weight more than 3,000 pounds	60^a	See Section 1607.6.1	=	
17.	Hospitals	Corridors above first floor	80	1,000	=	
18.		Operating rooms, laboratories	60	1,000		
		Patient rooms	40	1,000		
18.	Hotels (see residential)		—	—	=	
19.	Libraries	Corridors above first floor	80	1,000	=	
20.		Reading rooms	60	1,000	=	
		Stack rooms	150 ^{b,m}	1,000	Section 1607.18	
20.	Manufacturing	Heavy	250 ^{nb}	3,000	=	
21.		Light	125 ^{-nb}	2,000		
21.	Marquees, except one- and two-family dwellings		75	—	=	

22.					
22.	Office buildings	Corridors above first floor	80	2,000	=
23.		File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—	
		Lobbies and first-floor corridors	100	2,000	
		Offices	50	2,000	
23.	Penal institutions	Cell blocks	40	—	=
24.		Corridors	100		
25.	Public restrooms		Same as live load for area served but not required to exceed 60 psf		
24.	Recreational uses	Bowling alleys, poolrooms and similar uses	75 ^{ma}	—	=
26.		Dance halls and ballrooms	100 ^{ma}		
		Gymnasiums	100 ^{ma}		
		Theater projection, control, and follow spot rooms	50		
		Ice skating rinks	250 ^{mb}		
		Roller skating rinks	100 ^{ma}		
		Stadiums and arenas with fixed seats (fastened to floor)	60 ^{c,m}		
25.	Residential	One- and two-family dwellings:		—	Section 1607.22
27.		Uninhabitable attics without storage	10		
		Uninhabitable attics with storage	20		
		Habitable attics and sleeping areas	30		
		Canopies, including marquees	20		
		All other areas	40		
		Hotels and multifamily dwellings:		—	
		Private rooms and corridors serving them	40		
		Public rooms ^m and corridors serving them	100 ^a		
		Corridors serving public rooms	100		
26.	Roofs	Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	—	Section 1607.14
28.		Roof areas used for assembly purposes	100 ^a	=	

		Roof areas used for occupancies other than assembly	Same as occupancy served	—	
		Roof Gardens Vegetative and landscaped roofs:		100 —	
		Roof areas not intended for occupancy	20	—	
		Roof areas used for assembly areas areas purposes	100 ^a	—	
		Roof areas used for occupancies other than assembly	Same as occupancy served	—	
		All other similar areas	Note 1	Note 1	
		Awnings and canopies:		—	
		Fabric construction supported by a skeleton structure	5 ^a	—	
		All other construction, except one- and two-family dwellings	20	—	
		Primary roof members exposed to a work floor:			
		Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages	—	2,000	Section 1607.15
		All other primary roof members	—	300	
		All roof surfaces subject to maintenance workers	—	300	
27. 29.	Schools	Classrooms	40	1,000	
		Corridors above first floor	80	1,000	—
		First-floor corridors	100	1,000	
28. 30.	Scuttles, skylight ribs and accessible ceilings		—	200	—
29. 31.	Sidewalks, vehicular driveways and yards, subject to trucking		250 ^{b,d,n}	8,000 ^e	Section 1607.20
30. 32.	Stairs and exits	One- and two-family dwellings	40	300 ^f	Section 1607.21
		All other	100	300 ^f	Section 1607.21
33.	Storage areas above ceilings		20	—	—
32. 34.	Storage warehouses (shall be designed for heavier loads if required for anticipated storage)	Heavy	250 ^{-nb}		
		Light	125 ^{-nb}	—	—

33. <u>35.</u>	Stores	Retail:			=
		First floor	100	1,000	
		Upper floors	75	1,000	
		Wholesale, all floors	125 ^{mb}	1,000	
34. <u>36.</u>	Vehicle barriers	See Section 1607.9 <u>1607.10</u>			=
35. <u>37.</u>	Walkways and elevated platforms (other than exitways)	60	—		=
36. <u>38.</u>	Yards and terraces, pedestrian	100 ^{ma}	—		=

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm², 1 square foot = 0.0929 m²,

1 pound per square foot = 0.0479 kN/m², 1 pound = 0.004448 kN,

1 pound per cubic foot = 16 kg/m³.

~~a. Floors in garages or portions of buildings used for the storage of motor vehicles shall be designed for the uniformly distributed live loads of this table or the following concentrated loads: (1)~~

~~for garages restricted to passenger vehicles accommodating not more than nine passengers, 3,000 pounds acting on an area of 4 1/2 inches by 4 1/2 inches; (2) for mechanical parking~~

~~structures without slab or deck that are used for storing passenger vehicles only, 2,250 pounds per wheel.~~

~~b. The loading applies to stack room floors that support nonmobile, double faced library book stacks, subject to the following limitations:~~

~~1. The nominal book stack unit height shall not exceed 90 inches.~~

~~2. The nominal shelf depth shall not exceed 12 inches for each face.~~

~~3. Parallel rows of double faced book stacks shall be separated by aisles not less than 36 inches wide.~~

~~c. Design in accordance with ICG 300.~~

~~d. Other uniform loads in accordance with an approved method containing provisions for truck loadings shall be considered where appropriate.~~

~~e. The concentrated wheel load shall be applied on an area of 4.5 inches by 4.5 inches.~~

~~f. The minimum concentrated load on stair treads shall be applied on an area of 2 inches by 2 inches. This load need not be assumed to act concurrently with the uniform load.~~

~~g. Where snow loads occur that are in excess of the design conditions, the structure shall be designed to support the loads due to the increased loads caused by drift buildup or a greater snow design determined by the building official (see Section 1608).~~

~~h. See Section 1604.8.3 for decks attached to exterior walls.~~

~~i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less 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.~~

j. ~~Uninhabitable attics with storage are those where the maximum clear height between the 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 both of the following conditions are met:~~

~~i. The attic area is accessible 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.~~

~~ii. The slopes of the joists or truss bottom chords are not greater than two units vertical in 12 units horizontal.~~

~~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.~~

k. ~~Attic spaces served by stairways other than the pull-down type shall be designed to support the minimum live load specified for habitable attics and sleeping rooms.~~

l. ~~Areas of occupiable roofs, other than roof gardens and assembly areas, shall be designed for appropriate loads as approved by the building official. Unoccupied landscaped areas of roofs shall be designed in accordance with Section 1607.14.2.2.~~

a. ~~m.~~ Live load reduction is not permitted.

b. ~~n.~~ Live load reduction is only permitted in accordance with Section ~~1607.11.1.2~~ [1607.13.1.2](#) or Item 1 of ~~Section 1607.11.2~~ [Section 1607.13.2](#).

c. ~~o.~~ Live load reduction is only permitted in accordance with Section ~~1607.11.1.3~~ [1607.13.1.3](#) or Item 2 of ~~Section 1607.11.2~~ [1607.13.2](#).

1607.1 General.

[Buildings, structures, and parts thereof shall be designed to resist the effects of live loads.](#)

1607.2 Loads not specified.

For occupancies or uses not designated in ~~Table 1607.1~~ [Section 1607](#), the *live load* shall be determined in accordance with a method approved by the *building official*.

1607.3 Uniform live loads.

The *live loads* used in the design of buildings and *other structures* shall be the maximum loads expected by the intended use or occupancy but shall not be less than the minimum uniformly distributed *live loads* given in Table 1607.1. [Live loads acting on a sloping surface shall be assumed to act vertically on the horizontal projection of that surface.](#)

~~1607.13~~ [1607.3.1](#) ~~Distribution of floor loads.~~ [Partial loading of floors.](#)

Where uniform floor *live loads* are involved in the design of structural members arranged so as to create continuity, the minimum applied loads shall be the full *dead loads* on all spans in combination with the floor *live loads* on spans selected to produce the greatest *load effect* at each location under consideration. ~~Floor~~ [Uniform floor live loads applied to selected spans](#) are permitted to be reduced in accordance with Section 1607.13.

1607.14.1 1607.3.2 Distribution of roof loads Partial loading of roofs.

Where uniform roof *live loads* are reduced to less than 20 psf (0.96 kN/m²) in accordance with Section ~~1607.14.2.1~~ 1607.14.1 and are applied to the design of structural members arranged so as to create continuity, the reduced roof *live load* shall be applied to adjacent spans or to alternate spans, whichever produces the most unfavorable *load effect*. ~~See Section 1607.14.2 for reductions in minimum roof live loads and Section 7.5 of ASCE 7 for partial snow loading.~~

1607.4 Concentrated live loads.

Floors, roofs and other similar surfaces shall be designed to support the uniformly distributed live loads prescribed in Section 1607.3 or the concentrated live loads, given in Table 1607.1, whichever produces the greater load effects. Unless otherwise specified, the indicated concentrated load shall be assumed to be uniformly distributed over an area of 21/2 feet by 21/2 feet (762 mm by 762 mm) and shall be located so as to produce the maximum load effects in the structural members.

1607.5 Partition loads.

In office buildings and in other buildings where partition locations are subject to change, provisions for partition weight shall be made, whether or not partitions are shown on the construction documents, ~~unless the specified live load is 80 psf (3.83 kN/m²) or greater.~~ The partition *load* shall be not less than a ~~uniformly distributed~~ live load of 15 psf (0.72 kN/m²) and live load reductions in accordance with Section 1607.13 are not permitted to be applied to the partition loads.

Exception: A partition *live load* is not required where the minimum specified live load is 80 pounds per square foot (3.83 kN/m²) or greater.

1607.6 Helipads.

Helipads shall be marked to indicate the maximum take-off weight. The take-off weight limitation shall be indicated in units of thousands of pounds and placed in a box that is located in the bottom right corner of the landing area as viewed from the primary approach path. The box shall be not less than 5 feet (1524 mm) in height. Helipads shall be designed for the following live loads:

- ~~1.— A uniform *live load*, *L*, as specified in Items 1.1 and 1.2. This *load* shall not be reduced.~~
 - ~~1.1. 40 psf (1.92 kN/m²) where the design basis helicopter has a maximum take-off weight of 3,000 pounds (13.35 kN) or less.~~
 - ~~1.2. 60 psf (2.87 kN/m²) where the design basis helicopter has a maximum take-off weight greater than 3,000 pounds (13.35 kN).~~
- ~~2.— A single concentrated *live load*, *L*, of 3,000 pounds (13.35 kN) applied over an area of 4.5 inches by 4.5 inches (114 mm by 114 mm) and located so as to produce the maximum *load effects* on the structural elements under consideration. The concentrated *load* is not required to act concurrently with other uniform or concentrated *live loads*.~~
- ~~3.— Two single concentrated *live loads*, *L*, 8 feet (2438 mm) apart applied on the landing pad (representing the helicopter's two main landing gear, whether skid type or wheeled type), each having a magnitude of 0.75 times the maximum take-off weight of the helicopter, and located so as to produce the maximum *load effects* on the structural elements under consideration. The concentrated loads shall be applied over an area of 8 inches by 8 inches (203 mm by 203 mm) and are not required to act concurrently with other uniform or concentrated *live loads*.~~

~~Landing areas designed for a design basis helicopter with maximum take-off weight of 3,000 pounds (13.35 kN) shall be identified with a 3,000-pound (13.34 kN) weight limitation. The landing area weight limitation shall be indicated by the numeral "3" (kips) located in the bottom right corner of the landing area as viewed from the primary approach path. The indication for the landing area weight limitation shall be a minimum 5 feet (1524 mm) in height.~~

1607.6.1 Concentrated loads.

Helipads shall be designed for the following concentrated live loads:

1. A single concentrated live load, L , of 3,000 pounds (13.35 kN) applied over an area of 4.5 inches by 4.5 inches (114 mm by 114 mm) and located so as to produce the maximum load effects on the structural elements under consideration. The concentrated load is not required to act concurrently with other uniform or concentrated live loads.
2. Two single concentrated live loads, L , 8 feet (2438 mm) apart applied on the landing pad (representing the helicopter's two main landing gear, whether skid type or wheeled type), each having a magnitude of 0.75 times the maximum take-off weight of the helicopter, and located so as to produce the maximum load effects on the structural elements under consideration. The concentrated loads shall be applied over an area of 8 inches by 8 inches (203 mm by 203 mm) and are not required to act concurrently with other uniform or concentrated live loads.

1607.7 Passenger vehicle garages.

Floors in garages and portions of a building used for the storage of motor vehicles shall be designed for the uniformly distributed live loads indicated in Table 1607.1 or the following concentrated load:

1. For garages restricted to passenger vehicles accommodating not more than nine passengers, 3,000 pounds (13.35 kN) acting on an area of 4.5 inches by 4.5 inches (114 mm by 114 mm).
2. For mechanical parking structures without slab or deck that are used for storing passenger vehicles only, 2,250 pounds (10 kN) per wheel.

[NY] 1607.7.1 Posting.

The maximum weight of vehicles allowed into or on a passenger vehicle garage or other structure shall be posted by the owner or the owner's authorized agent.

~~1607.7~~ 1607.8 Heavy vehicle loads.

Floors and other surfaces that are intended to support vehicle loads greater than a 10,000-pound (4536 kg) gross vehicle weight rating shall comply with Sections 1607.8.1 through 1607.8.5.

~~1607.7.1~~ 1607.8.1 Loads.

Where any structure does not restrict access for vehicles that exceed a 10,000-pound (4536 kg) gross vehicle weight rating, those portions of the structure subject to such loads shall be designed using the vehicular live loads, including consideration of impact and fatigue, in accordance with the codes and specifications required by the jurisdiction having authority for the design and construction of the roadways and bridges in the same location of the structure.

~~1607.7.2~~ 1607.8.2 Fire truck and emergency vehicles.

Where a structure or portions of a structure are accessed ~~and loaded~~ by fire department ~~access~~ vehicles and other similar emergency vehicles, those portions of the structure subject to such loads shall be designed for the greater of the following loads:

1. The actual operational loads, including outrigger reactions and contact areas of the vehicles as stipulated and approved by the building official.
2. The live loading specified in Section 1607.8.1.

Emergency vehicle loads need not be assumed to act concurrently with other uniform live loads.

~~1607.7.5~~ 1607.8.5 Posting.

The maximum weight of vehicles allowed into or on a heavy vehicle garage or other structure shall be posted by the owner or the owner's authorized agent in accordance with Section 106.1.

~~1607.8~~ 1607.9 Loads on handrails, guards, grab bars and seats.

Handrails and *guards* shall be designed and constructed for the structural loading conditions set forth in Section 1607.9.1. Grab bars, shower seats and accessible benches shall be designed and constructed for the structural loading conditions set forth in Section 1607.9.2.

~~1607.8.1.1~~ 1607.9.1.1 Concentrated load.

Handrails and *guards* shall be designed to resist a concentrated *load* of 200 pounds (0.89 kN) in accordance with Section ~~4.5.1.1~~ 4.5.1 of ASCE 7. ~~1607.8.1.2~~ Glass handrail assemblies and guards shall comply with Section 2407.

~~1607.8.1~~ 1607.9.1.1 Concentrated Uniform load.

Handrails and *guards* shall be designed to resist a linear *load* of 50 pounds per linear foot (plf) (0.73 kN/m) in accordance with Section 4.5.1.1 of ASCE 7. This load need not be assumed to act concurrently with the concentrated load specific in Section 1607.9.1.

Exceptions:

1. For one- and two-family dwellings, only the single concentrated *load* required by Section 1607.9.1.1 shall be applied.
2. In Group I-3, F, H and S occupancies, for areas that are not accessible to the general public and that have an *occupant load* less than 50, the minimum *load* shall be 20 pounds per foot (0.29 kN/m).
3. For roofs not intended for occupancy, only the single concentrated load required by Section 1607.9.1 shall be applied.

~~1607.8.1.2~~ 1607.9.1.2 ~~Intermediate rails~~ Guard component loads ~~Intermediate rails~~ ~~Intermediate rails (all those except the handrail), balusters and panel fillers shall~~ Balusters, panel fillers and guard infill components, including all rails except the handrail and the top rail, shall be designed to resist a concentrated load of 50 pounds (0.22 kN) in accordance with Section ~~4.5.1.1~~ 4.5.1.2 of ASCE 7.

~~1607.8.2~~ 1607.9.2 Grab bars, shower seats and ~~dressing room bench seats~~ accessible benches.

Grab bars, shower seats and ~~dressing room~~ accessible benches ~~bench seats~~ shall be designed to resist a single concentrated *load* of 250 pounds (1.11 kN) applied in any direction at any point on the grab bar, shower seat, or seat of the accessible bench so as to produce the maximum *load* effects.

1607.10 Fixed ladders.

Fixed ladders with rungs shall be designed to resist a single concentrated load of 300 pounds (1.33 kN) in accordance with Section 4.5.4 of ASCE 7. Where rails of fixed ladders extend above a floor or platform at the top of the ladder, each side rail extension shall be designed to resist a single concentrated load of 100 pounds (0.445 kN) in accordance with Section 4.5.4 of ASCE 7. Ship's ladders shall be designed to resist the stair loads given in Table 1607.1.

~~1607.10.4~~ 1607.12.4 Fall arrest, ~~and~~ lifeline, and rope descent system anchorages.

In addition to any other applicable *live loads*, fall arrest, ~~and~~ lifeline ~~lifeline~~, and rope descent system anchorages and structural elements that support these anchorages shall be designed for a *live load* of not less than 3,100 pounds (13.8 kN) for each attached lifeline line, in ~~every~~ any direction that ~~a fall arrest~~ the *load* can be applied. Anchorage of horizontal

lifelines and the structural elements that support these anchorages shall be designed for the maximum tension that develops in the horizontal lifeline from these live loads.

~~1607.11~~ 1607.13 Reduction in uniform live loads.

Except for uniform roof live loads ~~at roofs~~, all other minimum uniformly distributed *live loads*, L_o , in Table 1607.1 are permitted to be reduced in accordance with Section ~~1607.12.1~~ 1607.13.1 or ~~1607.12.2~~ 1607.13.2. Uniform roof live loads ~~at roofs~~ are permitted to be reduced in accordance with Section ~~1607.14.2~~ 1607.14.

~~1607.11.1~~ 1607.13.1 Basic uniform live load reduction.

Subject to the limitations of Sections ~~1607.12.1.1~~ 1607.13.1.1 through ~~1607.12.1.3~~ 1607.13.1.3 and Table 1607.1, members for which a value of K_{LL} is 400 square feet for a reduced uniformly distributed *live load*, L , in accordance with the following equation:

$$L = L_o \left(0.25 + \frac{15}{\sqrt{K_{LL} A_T}} \right)$$

~~22~~ (Equation 16-7)

K_{LL} = Live load element factor (see Table ~~1607.12.1~~ 1607.13.1).

portion of equation is unchanged and omitted for clarity

~~1607.11.1.3~~ 1607.13.1.3 Passenger vehicle garages.

The *live loads* shall not be reduced in passenger vehicle garages.

Exception: The *live loads* for members supporting two or more floors are permitted to be reduced by not greater than 20 percent, but the reduced live load ~~be~~ shall be not less than L as calculated in Section ~~1607.12.1~~ 1607.13.1.

~~1607.11.2~~ 1607.13.2 Alternative uniform live load reduction.

As an alternative to Section 1607.13.1 and subject to the limitations of Table 1607.1, uniformly distributed *live loads* are permitted to be reduced in accordance with the following provisions. Such reductions shall apply to slab systems, beams, girders, columns, piers, walls and foundations.

1. For live loads not exceeding 100 psf (4.79 kN/m²), the design live load for structural members supporting 150 square feet (13.94 m²) or more is permitted to be reduced in accordance with Equation 16-8.

$$R = 0.08(A - 150) \quad \text{(Equation 16-8)}$$

$$\text{For SI: } R = 0.861(A - 13.94)$$

where:

A = Area of floor supported by the member, square feet (m²).

R = Reduction in percent.

Such reduction shall not exceed the smallest of:

- 1.1. 40 percent for members supporting one floor.
- 1.2. 60 percent for members supporting two or more floors.
- 1.3. R as determined by the following equation:

$$R = 23.1(1 + D/L_o) \quad \text{(Equation 16-9)}$$

where:

D = Dead load per square foot (m²) of area supported.

L_o = Unreduced live load per square foot (m²) of area supported.

2. A reduction shall not be permitted where the live load exceeds 100 pounds per square foot (4.79 kN/m²) except that the design live load for members supporting two or more floors is permitted to be reduced by not greater than 20 percent.

Exception: For uses other than storage, where approved, additional live load reductions shall be permitted where shown by the registered design professional that a rational approach has been used and that such reductions are warranted.

3. A reduction shall not be permitted in passenger vehicle parking garages except that the live loads for members supporting two or more floors are permitted to be reduced by not greater than 20 percent.
4. For one-way slabs, the area, A, for use in Equation 16-8 shall not exceed the product of the slab span and a width normal to the span of 0.5 times the slab span.

- ~~1. A reduction shall not be permitted where the live load exceeds 100 psf (4.79 kN/m²) except that the design live load for members supporting two or more floors is permitted to be reduced by not greater than 20 percent.~~

~~**Exception:** For uses other than storage, where approved, additional live load reductions shall be permitted where shown by the registered design professional that a rational approach has been used and that such reductions are warranted.~~

- ~~2. A reduction shall not be permitted in passenger vehicle parking garages except that the live loads for members supporting two or more floors are permitted to be reduced by not greater than 20 percent.~~
- ~~3. For live loads not exceeding 100 psf (4.79 kN/m²), the design live load for any structural member supporting 150 square feet (13.94 m²) or more is permitted to be reduced in accordance with Equation 16-8~~
- ~~4. For one-way slabs, the area, A, for use in Equation 16-8 shall not exceed the product of the slab span and a width normal to the span of 0.5 times the slab span.~~

$$R = 0.08(A - 150) \quad \text{(Equation 16-8)}$$

For SI: $R = 0.861(A - 13.94)$

Such reduction shall not exceed the smallest of:

40 percent for members supporting one floor.

60 percent for members supporting two or more floors.

R as determined by the following equation:

$$R = 23.1(1 + D/L_o) \quad \text{(Equation 16-9)}$$

where:

A = Area of floor supported by the member, square feet (m²).

D = Dead load per square foot (m²) of area supported.

L_o = Unreduced live load per square foot (m²) of area supported.

R = Reduction in percent.

1607.12 Distribution of floor loads.

Where uniform floor live loads are involved in the design of structural members arranged so as to create continuity, the minimum applied loads shall be the full dead loads on all spans in combination with the floor live loads on spans selected to produce the greatest load effect at each location under consideration. Floor live loads are permitted to be reduced in accordance with Section 1607.11.

1607.13 Roof loads.

The structural supports of roofs and marquees shall be designed to resist wind and, where applicable, snow and earthquake loads, in addition to the dead load of construction and the appropriate live loads as prescribed in this section, or as set forth in Table 1607.1. The live loads acting on a sloping surface shall be assumed to act vertically on the horizontal projection of that surface.

1607.13.1 Distribution of roof loads.

Where uniform roof live loads are reduced to less than 20 psf (0.96 kN/m²) in accordance with Section 1607.13.2.1 and are applied to the design of structural members arranged so as to create continuity, the reduced roof live load shall be applied to adjacent spans or to alternate spans, whichever produces the most unfavorable load effect. See Section 1607.13.2 for reductions in minimum roof live loads and Section 7.5 of ASCE 7 for partial snow loading.

1607.14.2 1607.14 General. Reduction in uniform roof live loads.

The minimum uniformly distributed *live loads* of roofs and *marquees*, L_o , in Table 1607.1 are permitted to be reduced in accordance with Section ~~1607.14.2.1~~ 1607.14.1.

~~1607.14.1 Maximum wheel load.~~

~~The maximum wheel loads shall be the wheel loads produced by the weight of the bridge, as applicable, plus the sum of the rated capacity and the weight of the trolley with the trolley positioned on its runway at the location where the resulting load effect is maximum.~~

~~1607.14.2.1~~ 1607.14.1 Ordinary roofs, awnings and canopies.

Ordinary flat, pitched and curved roofs, and *awnings* and canopies other than of fabric construction supported by a skeleton structure, are permitted to be designed for a reduced uniformly distributed *roof live load*, L_r , as specified in the following equations or other controlling combinations of *loads* as specified in Section 1605, whichever produces the greater *load effect*.

In structures such as *greenhouses*, where special scaffolding is used as a work surface for workers and materials during maintenance and repair operations, a lower roof *load* than specified in the following equations shall not be used unless *approved* by the *building official*. Such structures shall be designed for a minimum roof live *load* of 12 psf (0.58 kN/m²).

$$L_r = L_o R_1 R_2 \quad \text{(Equation 16-~~26~~ 10)}$$

where: $12 \leq L_r \leq 20$

For SI: $L_r = L_o R_1 R_2$

where: $0.58 \leq L_r \leq 0.96$

L_o = Unreduced *roof live load* per square foot (m²) of horizontal projection supported by the member (see Table 1607.1).

L_r = Reduced *roof live load* per square foot (m²) of horizontal projection supported by the member.

The reduction factors R_1 and R_2 shall be determined as follows:

$$R_1 = 1 \text{ for } A_t \leq 200 \text{ square feet (18.58 m}^2\text{)} \quad \text{(Equation 16-~~27~~ 11)}$$

$$R_1 = 1.2 - 0.001A_t \text{ for } 200 \text{ square feet} < A_t < 600 \text{ square feet} \quad \text{(Equation ~~28~~ 12)}$$

$$R_1 = 0.6 \text{ for } A_t \geq 600 \text{ square feet (55.74 m}^2\text{)} \quad \text{(Equation ~~29~~ 13)}$$

where:

A_t = Tributary area (span length multiplied by effective width) in square feet (m²) supported by the member, and

$$R_2 = 1 \text{ for } F \leq 4 \quad \text{(Equation ~~30~~ 14)}$$

$$R_2 = 1.2 - 0.05 F \text{ for } 4 < F < 12 \quad \text{(Equation ~~31~~ 15)}$$

$$R_2 = 0.6 \text{ for } F \geq 12 \quad \text{(Equation ~~32~~ 16)}$$

where:

F = For a sloped roof, the number of inches of rise per foot (for SI: $F = 0.12 \times \text{slope}$, with slope expressed as a percentage), or for an arch or dome, the rise-to-span ratio multiplied by 32.

1607.14.2 Vertical impact force.

The maximum wheel loads of the crane shall be increased by the following percentages to determine the induced vertical impact or vibration force:

~~Monorail cranes (powered)~~

~~Cab-operated or remotely operated bridge cranes (powered)~~

~~Pendant-operated bridge cranes (powered)~~

~~Bridge cranes or monorail cranes with hand-gear bridge, trolley and hoist~~

1607.13.3 1607.14.2 Occupiable roofs.

Areas of roofs that are occupiable, such as *vegetative roofs*, ~~roof gardens~~ landscaped roofs or for assembly or other similar purposes, and *marquees* are permitted to have their uniformly distributed *live loads* reduced in accordance with Section 1607.12.

1607.13.3.1 Vegetative and landscaped roofs.

The weight of all landscaping materials shall be considered as dead load and shall be computed on the basis of saturation of the soil as determined in accordance with Section 3.1.4 of ASCE 7. The uniform design live load in unoccupied landscaped areas on roofs shall be 20 psf (0.958 kN/m²). The uniform design live load for occupied landscaped areas on roofs shall be determined in accordance with Table 1607.1

1607.14.3 Awnings and canopies.

Awnings and canopies shall be designed for uniform *live loads* as required in Table 1607.1 as well as for *snow loads* and *wind loads* as specified in Sections 1608 and 1609.

1607.14.3 Lateral force.

The lateral force on crane runway beams with electrically powered trolleys shall be calculated as 20 percent of the sum of the rated capacity of the crane and the weight of the hoist and trolley. The lateral force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction perpendicular to the beam, and shall be distributed with due regard to the lateral stiffness of the runway beam and supporting structure.

1607.13.5.2.1 1607.14.3.3 Photovoltaic panels installed on Elevated photovoltaic (PV) support structures with open grid ~~roof structures framing~~.

Elevated photovoltaic (PV) support structures with open grid framing and without a *roof deck* or sheathing ~~supporting photovoltaic panel systems~~ shall be designed to support the uniform and concentrated *roof live loads* specified in Section 1607.14.4.1, except that the uniform *roof live load* shall be permitted to be reduced to 12 psf (0.57 kN/m²).

1607.13.5.3 1607.14.3.4 Ground-mounted photovoltaic (PV) panel systems.

~~Solar photovoltaic panels or modules~~ Ground-mounted photovoltaic (PV) panel systems are not required to accommodate a *roof live load*, ~~provided that the area under the structure is restricted to keep the public away.~~ Other loads and combinations in accordance with Section 1605 shall be accommodated. ~~Solar photovoltaic panels or modules that are designed to be the roof, span to structural supports and have accessible/occupied space underneath shall have the panels or modules and all supporting structures designed to support a roof photovoltaic live load, as defined in Section 1607.14.4.1 in combination with other applicable loads. Solar photovoltaic panels or modules in this application are not permitted to be classified as "not accessible" in accordance with Section 1607.14.4.1.~~

1607.13.5.3 Photovoltaic panels or modules installed as an independent structure.

~~Solar photovoltaic panels or modules that are independent structures and do not have accessible/occupied space underneath are not required to accommodate a roof photovoltaic live load, provided that the area under the structure is restricted to keep the public away. Other loads and combinations in accordance with Section 1605 shall be accommodated.~~

~~Solar photovoltaic panels or modules that are designed to be the roof, span to structural supports and have accessible/occupied space underneath shall have the panels or modules and all supporting structures designed to support a roof photovoltaic live load, as defined in Section 1607.13.5.1 in combination with other applicable loads. Solar photovoltaic panels or modules in this application are not permitted to be classified as “not accessible” in accordance with Section 1607.13.5.1.~~

1607.14.3.4 Ground-mounted photovoltaic (PV) panel systems.

Ground-mounted photovoltaic (PV) panel systems are not required to accommodate a roof live load. Other loads and combinations in accordance with Section 1605 shall be accommodated.

~~1607.14.4 Longitudinal force.~~

~~The longitudinal force on crane runway beams, except for bridge cranes with hand-gearred bridges, shall be calculated as 10 percent of the maximum wheel loads of the crane. The longitudinal force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction parallel to the beam.~~

~~1607.14~~ 1607.15 Crane loads.

The crane live load shall be the rated capacity of the crane. Design loads for the runway beams, including connections and support brackets, of moving bridge cranes and monorail cranes shall be in accordance with Section 4.9 of ASCE 7. ~~include the maximum wheel loads of the crane and the vertical impact, lateral and longitudinal forces induced by the moving crane.~~

~~1607.14.1 Maximum wheel load.~~

~~The maximum wheel loads shall be the wheel loads produced by the weight of the bridge, as applicable, plus the sum of the rated capacity and the weight of the trolley with the trolley positioned on its runway at the location where the resulting load effect is maximum.~~

~~1607.14.2 Vertical impact force.~~

~~The maximum wheel loads of the crane shall be increased by the following percentages to determine the induced vertical impact or vibration force:~~

~~Monorail cranes (powered)~~

~~Cab-operated or remotely operated bridge cranes (powered)~~

~~Pendant-operated bridge cranes (powered)~~

~~Bridge cranes or monorail cranes with hand-gearred bridge, trolley and hoist~~

~~1607.14.3 Lateral force.~~

~~The lateral force on crane runway beams with electrically powered trolleys shall be calculated as 20 percent of the sum of the rated capacity of the crane and the weight of the hoist and trolley. The lateral force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction perpendicular to the beam, and shall be distributed with due regard to the lateral stiffness of the runway beam and supporting structure.~~

~~1607.14.4 Longitudinal force.~~

~~The longitudinal force on crane runway beams, except for bridge cranes with hand-gearred bridges, shall be calculated as 10 percent of the maximum wheel loads of the crane. The longitudinal force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction parallel to the beam.~~

1607.17 Library stack rooms.

The live loading indicated in Table 1607.1 for library stack rooms applies to stack room floors that support nonmobile, double-faced library book stacks, subject to the following limitations:

1. The nominal book stack unit height shall not exceed 90 inches (2290 mm).
2. The nominal shelf depth shall not exceed 12 inches (305 mm) for each face.
3. Parallel rows of double-faced book stacks shall be separated by aisles not less than 36 inches (914 mm) in width.

1607.18 Seating for assembly uses.

Bleachers, folding and telescopic seating and grandstands shall be designed for the loads specified in ICC 300. Stadiums and arenas with fixed seats shall be designed for the horizontal sway loads in Section 1607.19.1.

1607.18.1 Horizontal sway loads.

The design of stadiums and arenas with fixed seats shall include horizontal swaying forces applied to each row of seats as follows:

1. Twenty-four pounds per linear foot (0.35 kN/m) of seat applied in a direction parallel to each row of seats.
2. Ten pounds per linear foot (0.15 kN/m) of seat applied in a direction perpendicular to each row of seats.

The parallel and perpendicular horizontal swaying forces are not required to be applied simultaneously.

1607.19 Sidewalks, vehicular driveways, and yards subject to trucking.

The live loading indicated in Table 1607.1 for sidewalks, vehicular driveways, and yards subject to trucking shall comply with the requirements of this section.

1607.19.1 Uniform loads.

In addition to the loads indicated in Table 1607.1, other uniform loads in accordance with an approved method that contains provisions for truck loading shall be considered where appropriate.

1607.19.2 Concentrated loads.

The concentrated wheel load indicated in Table 1607.1 shall be applied on an area of 41/2 inches by 41/2 inches (114 mm by 114 mm).

1607.20 Stair treads.

The concentrated load indicated in Table 1607.1 for stair treads shall be applied on an area of 2 inches by 2 inches (51 mm by 51 mm). This load need not be assumed to act concurrently with the uniform load.

1607.21 Residential attics.

The live loads indicated in Table 1607.1 for attics in residential occupancies shall comply with the requirements of this section.

1607.21.1 Uninhabitable attics without storage.

In residential occupancies, uninhabitable attic areas without storage are those where the maximum clear height between the joists and rafters is less than 42 inches (1067 mm), or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches (1067 mm) in height by 24 inches (610 mm) in

width, or greater, within the plane of the trusses. The *live load* in Table 1607.1 need not be assumed to act concurrently with any other *live load* requirement.

1607.21.2 Uninhabitable attics with storage.

In residential occupancies, uninhabitable *attic* areas with storage are those where the maximum clear height between the joist and rafter is 42 inches (1067 mm) or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches (1067 mm) in height by 24 inches (610 mm) in width, or greater, within the plane of the trusses. The *live load* in Table 1607.1 need only be applied to those portions of the joists or truss bottom chords where both of the following conditions are met:

1. The *attic* area is accessed from an opening not less than 20 inches (508 mm) in width by 30 inches (762 mm) in length that is located where the clear height in the *attic* is not less than 30 inches (762 mm).
2. The slope of the joists or truss bottom chords is not greater than 2 units vertical in 12 units horizontal. 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 (0.48 kN/m²).

1607.21.3 Attics served by stairs.

Attic spaces served by *stairways* other than the pull-down type shall be designed to support the minimum *live load* specified for habitable *attics* and sleeping rooms.

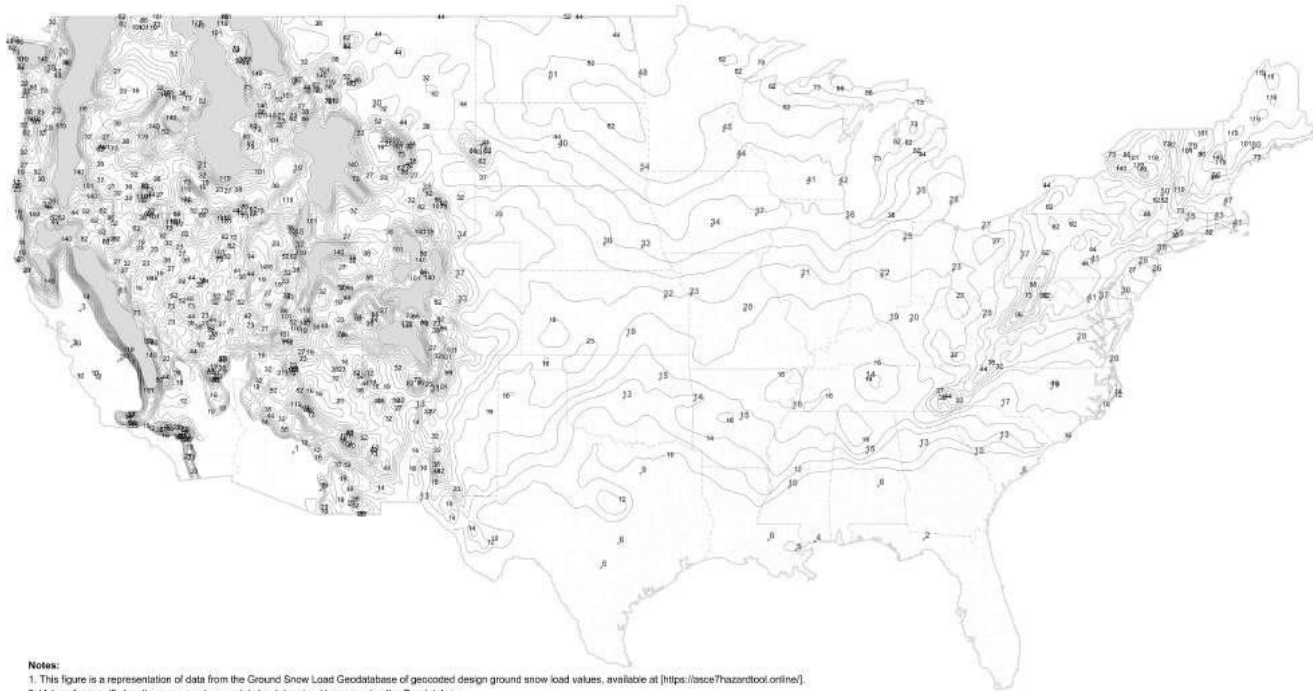
1608.1 General.

Design snow *loads* shall be determined in accordance with Chapter 7 of ASCE 7, but the design roof *load* shall be not less than that determined by Section 1607.

Exception: *Temporary structures* complying with Section 3103.6.1.1.

[NY] 1608.2 Ground snow loads.

The ground snow *loads* to be used in determining the design snow *loads* for roofs shall be determined in accordance with the reliability-targeted (strength based) ground snow load values in Chapter 7 of ASCE 7 or Figures 1608.2(1) through 1608.2(4). Site-specific case studies shall be determined in accordance with Chapter 7 of ASCE 7 and shall be approved by the building official. ~~made in areas designated "CS" in Figures 1608.2(1) and 1608.2(2). Ground snow loads for sites at elevations above the limits indicated in Figures 1608.2(1) and 1608.2(2) and for all sites within the CS areas shall be approved. Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2-percent annual probability of being exceeded (50-year mean recurrence interval).~~



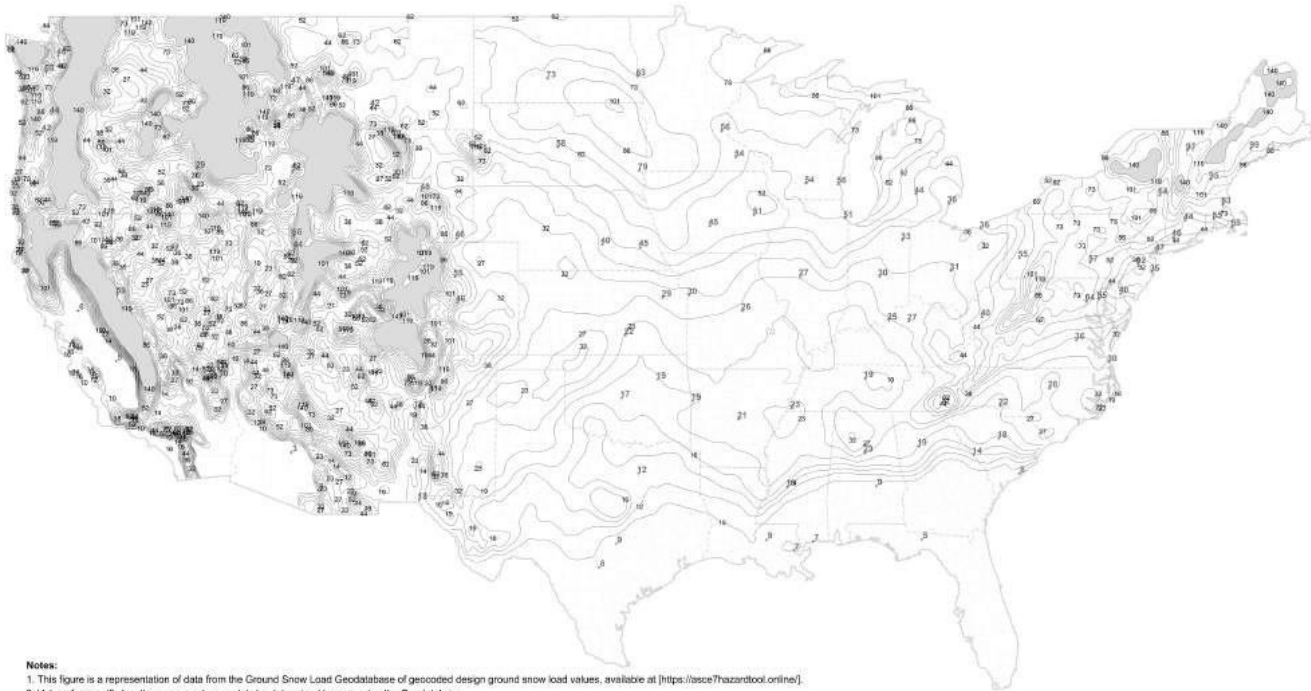
Notes:

1. This figure is a representation of data from the Ground Snow Load Geodatabase of geocoded design ground snow load values, available at (<https://asce7hazardtool.online/>).
2. Values for specific locations can most accurately be determined by accessing the Geodatabase.
3. Lines shown on the figure are contours separated by a constant ratio of 1.18 with values of 10, 12, 14, 16, 19, 23, 27, 32, 38, 44, 52, 62, 73, 86, 101, 119 and 140 psf.
4. Values denoted with a "+" symbol indicate design ground snow loads at state capitals or other cities with large populations.
5. Areas shown in gray represent areas with ground snow loads exceeding 140 psf. Ground snow load values for these locations must be determined from the Geodatabase.

NOTES:

- a. Location-specific ground snow load values are provided in the *Ground Snow Load Geodatabase* of geocoded design ground snow load values, which can be accessed at the ASCE 7 Hazard Tool at <https://asce7hazardtool.online/> or an approved equivalent.
- b. Lines shown on the figure are contours separated by a constant ratio 1.18 with values of 10, 12, 14, 16, 19, 23, 27, 32, 38, 44, 52, 62, 73, 86, 101, 119, and 140 psf.
- c. Values denoted with a "+" symbol indicate design ground snow loads at state capitals or other high-population locations.
- d. Areas shown in gray represent areas with ground snow loads exceeding 140 psf. Ground snow load values for these locations can be determined from the Geodatabase.

FIGURE 1608.2(1) Ground snow loads, p_g , for Risk Category I for the conterminous United States (lb/ft²).

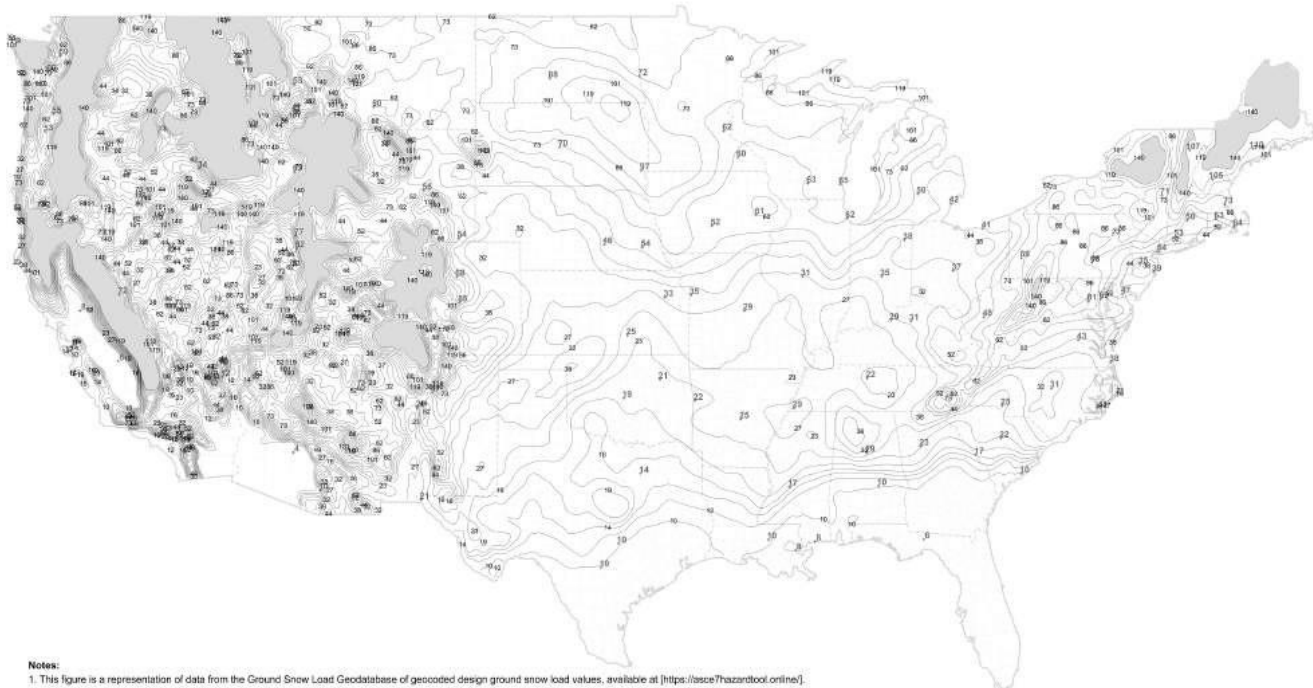


Notes:
 1. This figure is a representation of data from the Ground Snow Load Geodatabase of geocoded design ground snow load values, available at (<https://asce7hazardtool.online/>).
 2. Values for specific locations can most accurately be determined by accessing the Geodatabase.
 3. Lines shown on the figure are contours separated by a constant ratio of 1.18 with values of 10, 12, 14, 16, 19, 23, 27, 32, 38, 44, 52, 62, 73, 86, 101, 119 and 140 psf.
 4. Values denoted with a "+" symbol indicate design ground snow loads at state capitals or other cities with large populations.
 5. Areas shown in gray represent areas with ground snow loads exceeding 140 psf. Ground snow load values for these locations must be determined from the Geodatabase.

NOTES:

- Location-specific ground snow load values are provided in the *Ground Snow Load Geodatabase* of geocoded design ground snow load values, which can be accessed at the ASCE 7 Hazard Tool at <https://asce7hazardtool.online/> or an approved equivalent.
- Lines shown on the figure are contours separated by a constant ratio 1.18 with values of 10, 12, 14, 16, 19, 23, 27, 32, 38, 44, 52, 62, 73, 86, 101, 119, and 140 psf.
- Values denoted with a "+" symbol indicate design ground snow loads at state capitals or other high-population locations.
- Areas shown in gray represent areas with ground snow loads exceeding 140 psf. Ground snow load values for these locations can be determined from the Geodatabase.

FIGURE 1608.2(2) Ground snow loads, p_g , for Risk Category II for the conterminous United States (lb/ft²).

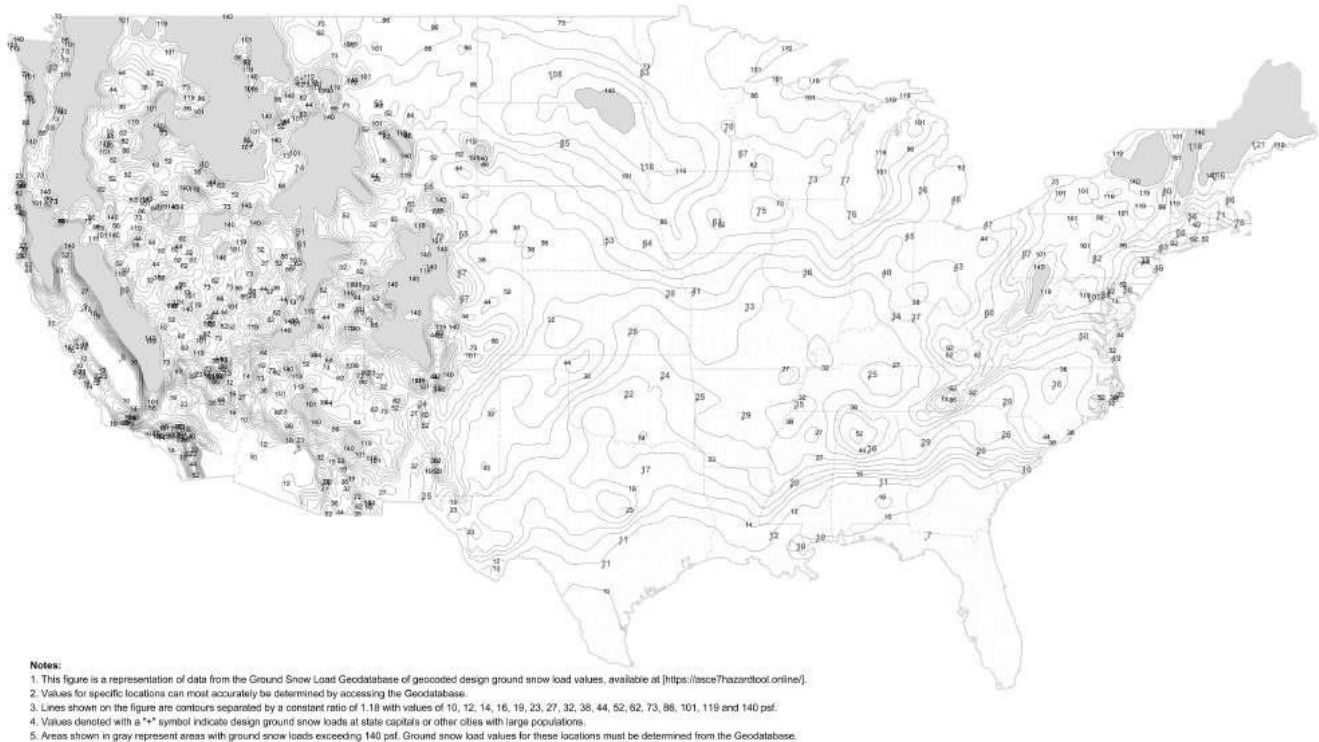


Notes:
 1. This figure is a representation of data from the Ground Snow Load Geodatabase of geocoded design ground snow load values, available at (<https://asce7hazardtool.online/>).
 2. Values for specific locations can most accurately be determined by accessing the Geodatabase.
 3. Lines shown on the figure are contours separated by a constant ratio of 1.18 with values of 10, 12, 14, 16, 19, 23, 27, 32, 38, 44, 52, 62, 73, 86, 101, 119 and 140 psf.
 4. Values denoted with a "+" symbol indicate design ground snow loads at state capitals or other cities with large populations.
 5. Areas shown in gray represent areas with ground snow loads exceeding 140 psf. Ground snow load values for these locations must be determined from the Geodatabase.

NOTES:

- Location-specific ground snow load values are provided in the *Ground Snow Load Geodatabase* of geocoded design ground snow load values, which can be accessed at the ASCE 7 Hazard Tool at <https://asce7hazardtool.online/> or an approved equivalent.
- Lines shown on the figure are contours separated by a constant ratio 1.18 with values of 10, 12, 14, 16, 19, 23, 27, 32, 38, 44, 52, 62, 73, 86, 101, 119, and 140 psf.
- Values denoted with a "+" symbol indicate design ground snow loads at state capitals or other high-population locations.
- Areas shown in gray represent areas with ground snow loads exceeding 140 psf. Ground snow load values for these locations can be determined from the Geodatabase.

FIGURE 1608.2(3) Ground snow loads, p_g , for Risk Category III for the conterminous United States (lb/ft²)



NOTES:

- a. Location-specific ground snow load values are provided in the *Ground Snow Load Geodatabase* of geocoded design ground snow load values, which can be accessed at the ASCE 7 Hazard Tool at <https://asce7hazardtool.online/> or an approved equivalent.
- b. Lines shown on the figure are contours separated by a constant ratio 1.18 with values of 10, 12, 14, 16, 19, 23, 27, 32, 38, 44, 52, 62, 73, 86, 101, 119, and 140 psf.
- c. Values denoted with a "+" symbol indicate design ground snow loads at state capitals or other high-population locations.
- d. Areas shown in gray represent areas with ground snow loads exceeding 140 psf. Ground snow load values for these locations can be determined from the Geodatabase.

FIGURE 1608.2(4) Ground snow loads, p_g , for Risk Category IV for the conterminous United States (lb/ft²)

1608.2.1 Ground snow conversion.

Where required, the ground snow loads, p_g , of Figures 1608.2(1) through 1608.2(4) and Table 1608.2 shall be converted to allowable stress design ground snow loads, $p_{g(asd)}$, using Equation 16-17 .

$$p_{g(asd)} = 0.7p_g \quad \text{(Equation 16-17)}$$

where:

$p_{g(asd)}$ = Allowable stress design ground snow load

p_g = Ground snow load determined from Figures 1608.2(1) through 1608.2(4) and Table 1608.2.

1608.3 Ponding instability.

~~Susceptible bays of roofs shall be evaluated for ponding~~ Ponding instability on roofs shall be evaluated in accordance with ~~Chapters 7 and 8 of~~ ASCE 7.

1609.1.1 Determination of wind loads.

Wind loads on every building or structure shall be determined in accordance with Chapters 26 to 30 of ASCE 7. The type of opening protection required, the basic ~~design~~ wind speed, V , and the exposure category for a site is permitted to be determined in accordance with Section 1609 or ASCE 7. Wind shall be assumed to come from any horizontal direction and wind pressures shall be assumed to act normal to the surface considered.

Exceptions:

1. Subject to the limitations of Section 1609.1.1.1, the provisions of ICC 600 shall be permitted for applicable Group R-2 and R-3 buildings.
2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AWC WFCM.
3. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AISI S230.
4. Designs using NAAMM FP 1001.
5. Designs using TIA-222 for antenna-supporting structures and antennas, provided that the horizontal extent of Topographic Category 2 escarpments in Section 2.6.6.2 of TIA-222 shall be 16 times the height of the escarpment.
6. Wind tunnel tests in accordance with ASCE 49 and Sections 31.4 and 31.5 of ASCE 7.
7. Temporary structures complying with Section 3103.6.1.2.

The wind speeds in Figures 1609.3(1) through ~~1609.3(12)~~ 1609.3(4) are basic ~~design~~ wind speeds, V , and shall be converted in accordance with Section 1609.3.1 to allowable stress design wind speeds, V_{asd} , when the provisions of the standards referenced in Exceptions 4 and 5 are used.

TABLE 1609.2 WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR WOOD STRUCTURAL PANELS^{a, b, c, d}

The body of the table is unchanged and omitted for clarity. Footnotes are below.

- a. This table is based on a 140 mph basic wind speeds, V , and a 45-foot mean roof height.
- b. Fasteners shall be installed at opposing ends of the wood structural panel. Fasteners shall be located not less than 1 inch from the edge of the panel.
- c. Anchors shall penetrate through the exterior wall covering with an embedment length of 2 inches minimum into the building frame. Fasteners shall be located not less than 2½ inches from the edge of concrete block or concrete.
- d. Where panels are attached to masonry or masonry/stucco, they shall be attached using vibration-resistant anchors having a minimum ultimate withdrawal capacity of 1,500 pounds.

1609.2.2 Application of ASTM E1996.

The text of Section 6.2.2 of ASTM E1996 shall be substituted as follows:

6.2.2 Unless otherwise specified, select the wind zone based on the basic design wind speed, V , as follows:

6.2.2.1 Wind Zone 1— $130 \text{ mph} \leq \text{basic design wind speed}, V < 140 \text{ mph}$.

6.2.2.2 Wind Zone 2— $140 \text{ mph} \leq \text{basic design wind speed}, V < 150 \text{ mph}$ at greater than one mile (1.6 km) from the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.3 Wind Zone 3— $150 \text{ mph} (67 \text{ m/s}) \leq \text{basic design wind speed}, V \leq 160 \text{ mph} (72 \text{ m/s})$, or $140 \text{ mph} (63 \text{ m/s}) \leq \text{basic design wind speed}, V \leq 160 \text{ mph} (72 \text{ m/s})$ and within one mile (1.6 km) of the coastline. The coastline shall be measured from the mean high water mark.

6.2.2.4 Wind Zone 4—basic design wind speed, $V > 160 \text{ mph} (72 \text{ m/s})$.

1609.3 Basic design wind speed.

The basic design wind speed, V , in mph, for the determination of the wind loads shall be determined by Figures 1609.3(1) through 1609.3(12).

The basic design wind speed, V , for use in the design of Risk Category I buildings and structures shall be obtained from Figures 1609.3(1), 1609.3(5) and 1609.3(6).

The basic design wind speed, V , for use in the design of Risk Category II buildings and structures shall be obtained from Figures 1609.3(2), 1609.3(7) and 1609.3(8).

The basic design wind speed, V , for use in the design of Risk Category III buildings and structures shall be obtained from Figures 1609.3(3), 1609.3(9) and 1609.3(10).

The basic design wind speed, V , for use in the design of Risk Category IV buildings and structures shall be obtained from Figures 1609.3(4), 1609.3(11) and 1609.3(12).

The basic design wind speed, V , for the special wind regions indicated near mountainous terrain and near gorges shall be in accordance with local jurisdiction requirements. The basic design wind speeds, V , determined by the local jurisdiction shall be in accordance with Chapter 26 of ASCE 7.

In nonhurricane-prone regions, when the basic design wind speed, V , is estimated from regional climatic data, the basic design wind speed, V , shall be determined in accordance with Chapter 26 of ASCE 7.

1609.3.1 Wind speed conversion.

Where required, the basic design wind speed, V , of Figures 1609.3(1) through 1609.3(4) shall be converted to allowable stress design wind speeds, V_{asd} , using Table 1609.3.1 or Equation 16-87.

$$V_{asd} = V\sqrt{0.6}$$

(Equation 16-18)

where:

V_{asd} = Allowable stress design wind speed applicable to methods specified in Exceptions 4 and 5 of Section 1609.1.1.

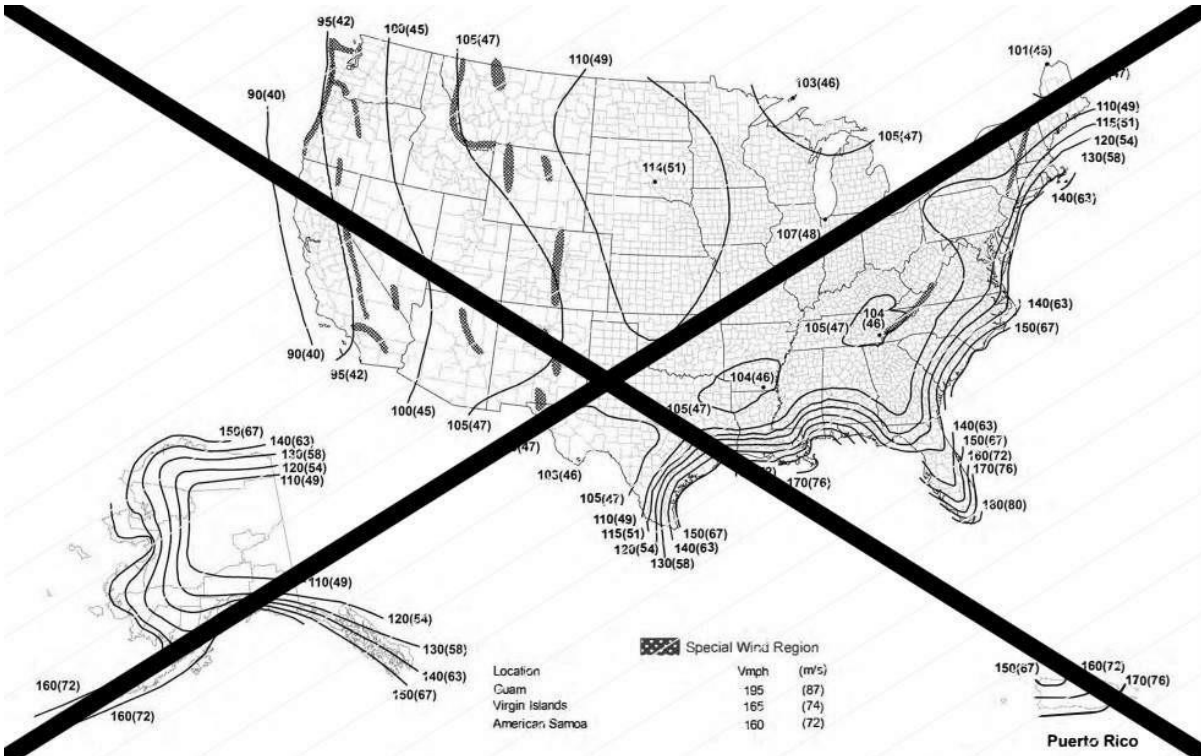
V = Basic design wind speeds determined from Figures 1609.3(1) through 1609.3(4).

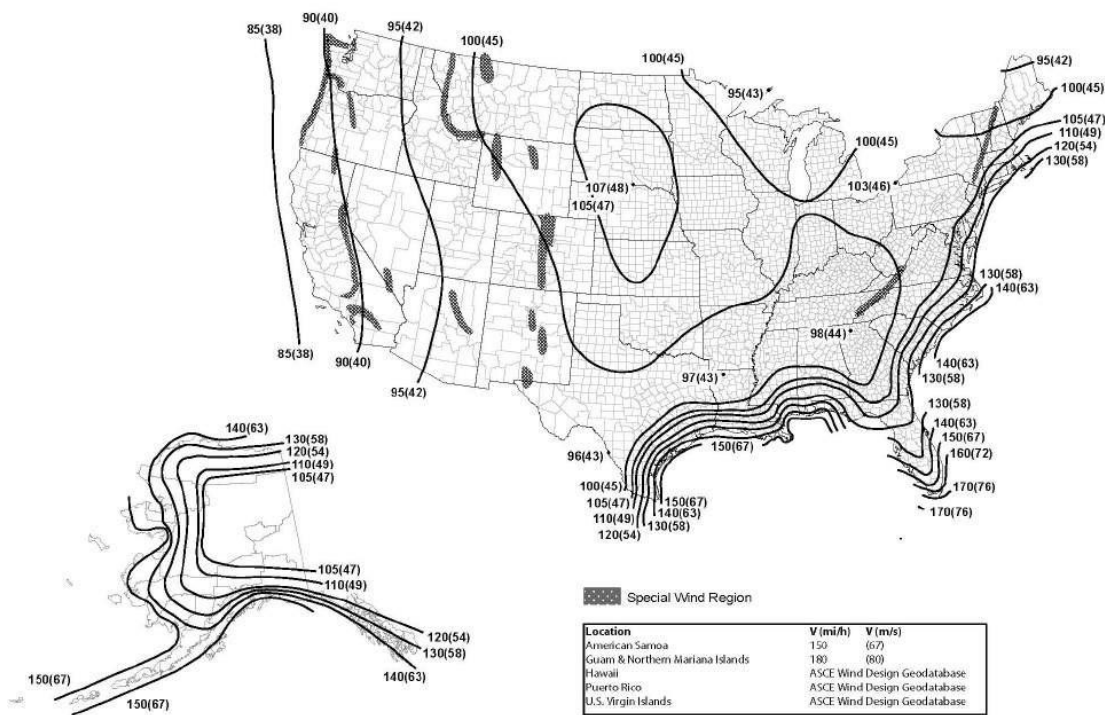
TABLE 1609.3.1 WIND SPEED CONVERSIONS a, b, c

V	100	110	120	130	140	150	160	170	180	190	200
V _{asd}	78	85	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.44 m/s.

- Linear interpolation is permitted.
- V_{asd} = allowable stress design wind speed applicable to methods specified in Exceptions 1 through 5 of Section 1609.1.1.
- V = basic ~~design~~ wind speeds determined from Figures 1609.3(1) through 1609.3(4).





Notes:

Values are nominal design 3-second gust wind speeds in miles per hour (mph) at 33 feet (10 m) above ground for Exposure C-Category.

Linear interpolation between contours. Point values are provided to aid with interpolation.

Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

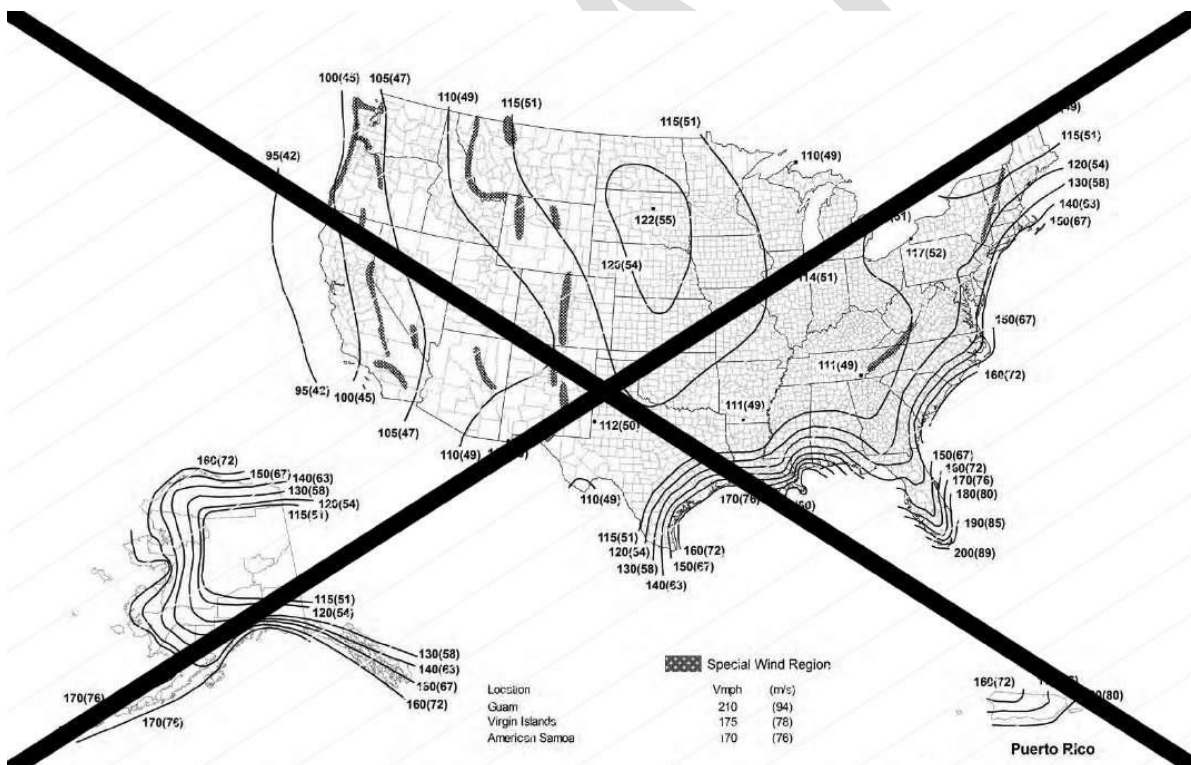
Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

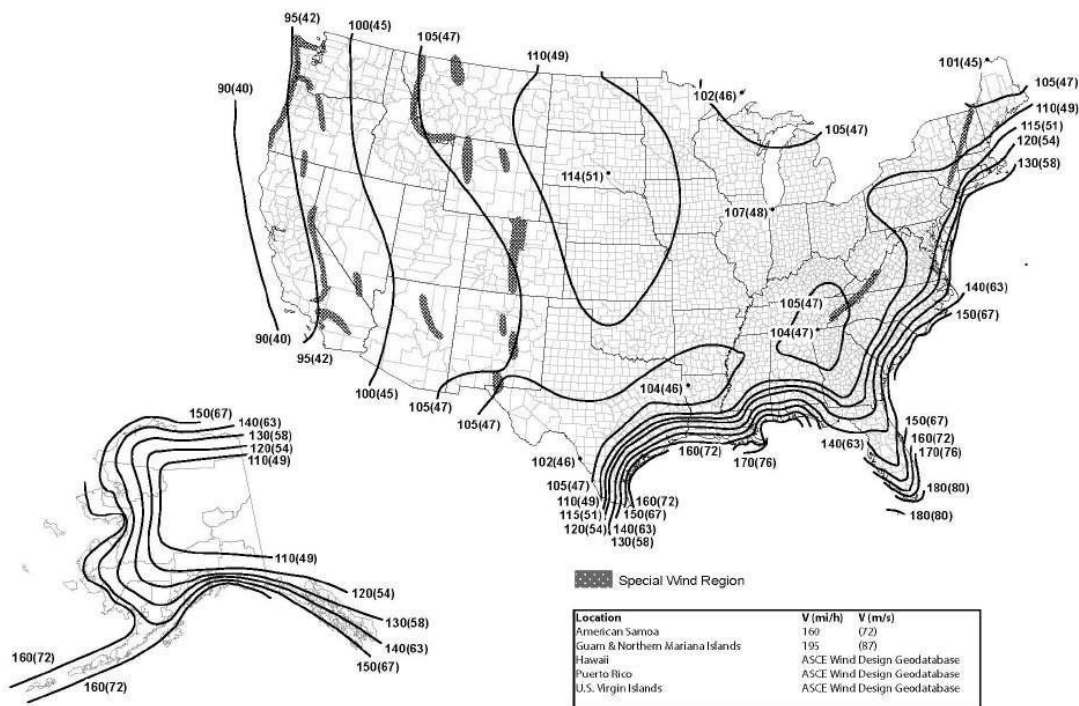
Location specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed

Notes:

1. Values are 3-second s gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure Category C.
2. Linear interpolation is permitted between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Location-specific basic wind speeds shall be permitted to be determined using the ASCE Wind Design Geodatabase.
5. Wind speeds for Hawaii, US Virgin Islands, and Puerto Rico shall be determined from the ASCE Wind Design Geodatabase.
6. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions. Site specific values for selected special wind regions shall be permitted to be determined using the ASCE Wind Design Geodatabase.
7. Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (annual exceedance probability = 0.00333, MRI = 300 years).
8. The ASCE Wind Design Geodatabase can be accessed at the ASCE 7 Hazard Tool (<https://asce7hazardtool.online>) or approved equivalent.

FIGURE 1609.3(1) BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY I BUILDINGS AND OTHER STRUCTURES





Notes:

Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure C-Category.

Linear interpolation between contours. Point values are provided to aid with interpolation.

Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

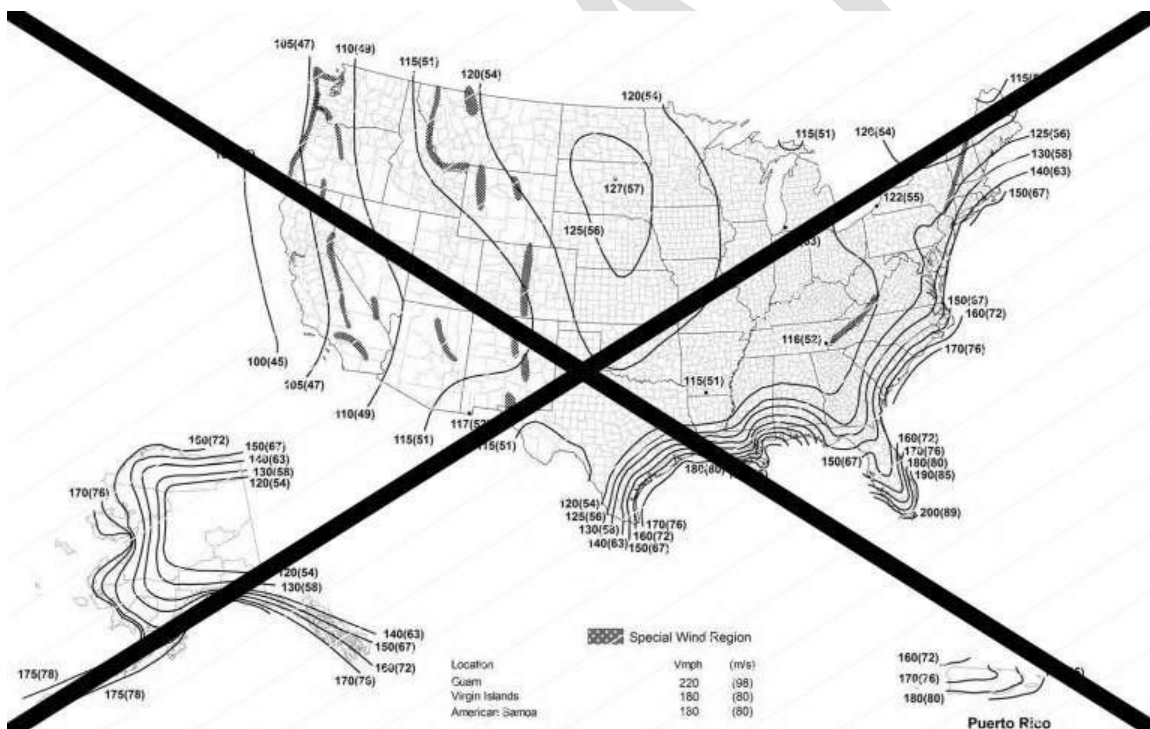
Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00143, MRI = 700 Years).

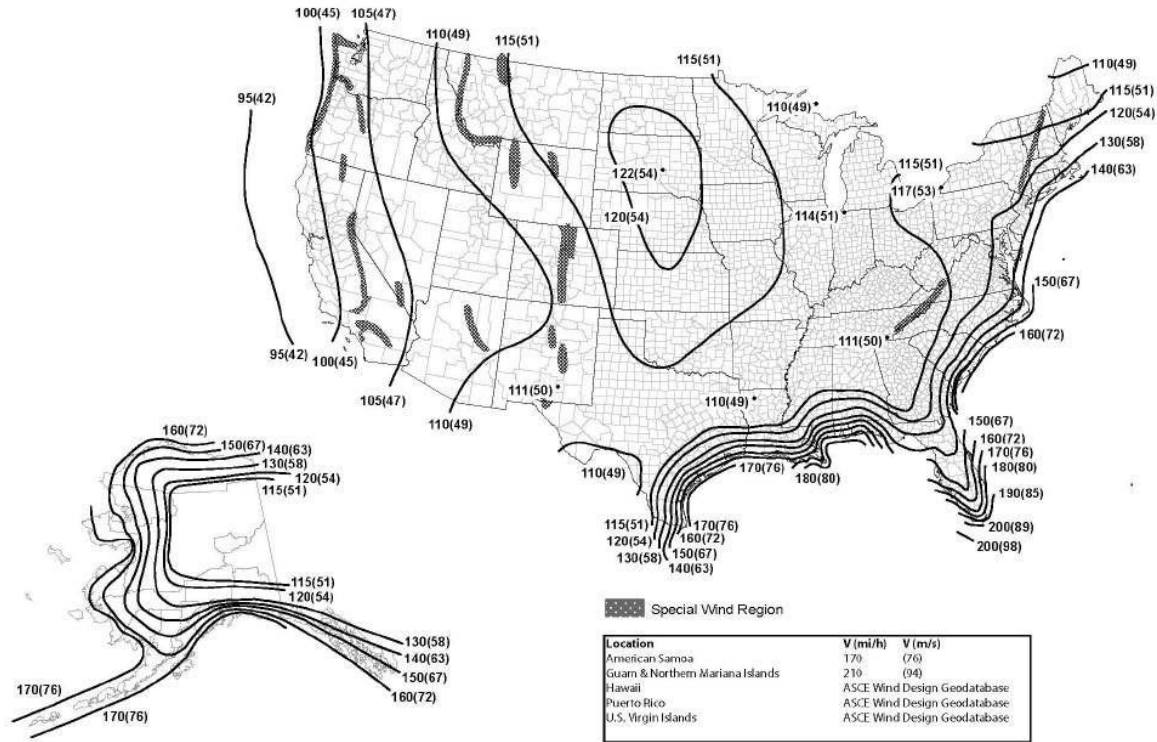
Location-specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed

Notes:

1. Values are 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure Category C.
2. Linear interpolation is permitted between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Location-specific basic wind speeds shall be permitted to be determined using the ASCE Wind Design Geodatabase.
5. Wind speeds for Hawaii, US Virgin Islands, and Puerto Rico shall be determined from the ASCE Wind Design Geodatabase.
6. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions. Site specific values for selected special wind regions shall be permitted to be determined using the ASCE Wind Design Geodatabase.
7. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.000333, MRI = 700 years).
8. The ASCE Wind Design Geodatabase can be accessed at the ASCE 7 Hazard Tool (<https://asce7hazardtool.online>) or approved equivalent.

FIGURE 1609.3(2) BASIC ~~DESIGN~~ WIND SPEEDS, V, FOR RISK CATEGORY II III BUILDINGS AND OTHER STRUCTURES





Notes:

Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure C-Category.

Linear interpolation between contours. Point values are provided to aid with interpolation.

Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

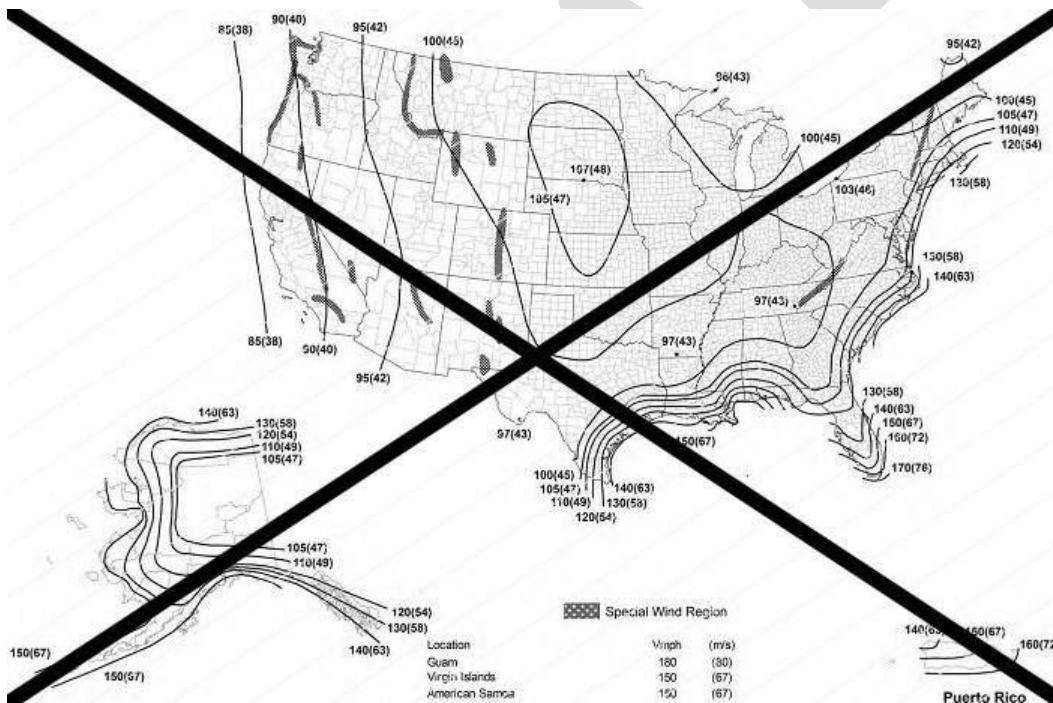
Wind speeds correspond to approximately a 1.6% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00033, MRI = 3000 Years).

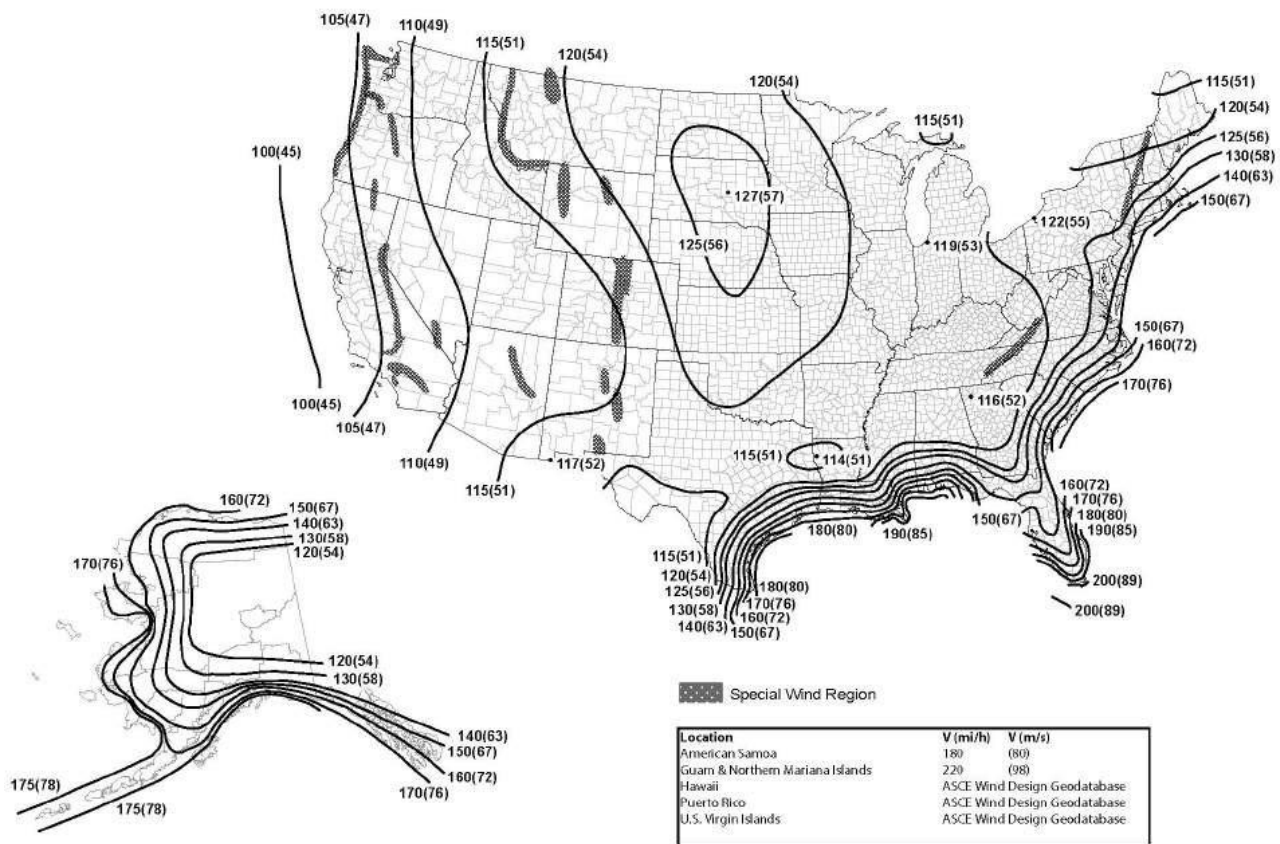
Location-specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed

Notes:

1. Values are 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure Category C.
2. Linear interpolation is permitted between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Location-specific basic windspeeds shall be permitted to be determined using the ASCE Wind Design Geodatabase.
5. Wind speeds for Hawaii, US Virgin Islands, and Puerto Rico shall be determined from the ASCE Wind Design Geodatabase.
6. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions. Site specific values for selected special wind regions shall be permitted to be determined using the ASCE Wind Design Geodatabase.
7. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 1,700 years).
8. The ASCE Wind Design Geodatabase can be accessed at the ASCE 7 Hazard Tool (<https://asce7hazardtool.online>) or approved equivalent.

FIGURE 1609.3(3) BASIC DESIGN WIND SPEEDS, V, FOR RISK CATEGORY III BUILDINGS AND OTHER STRUCTURES





Notes:

Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure C Category.

Linear interpolation between contours. Point values are provided to aid with interpolation.

Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.

Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.

Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00333, MRI = 300 Years).

Location-specific basic wind speeds shall be permitted to be determined using www.atcouncil.org/windspeed.

Notes:

1. Values are 3-second gust wind speeds in miles per hour (m/s) at 33 feet (10 m) above ground for Exposure Category C.
2. Linear interpolation is permitted between contours. Point values are provided to aid with interpolation.
3. Islands, coastal areas, and land boundaries outside the last contour shall use the last wind speed contour.
4. Location-specific basic wind speeds shall be permitted to be determined using the ASCE Wind Design Geodatabase.
5. Wind speeds for Hawaii, US Virgin Islands, and Puerto Rico shall be determined from the ASCE Wind Design Geodatabase.
6. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions. Site specific values for selected special wind regions shall be permitted to be determined using the ASCE Wind Design Geodatabase.
7. Wind speeds correspond to approximately a 1.6% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 3,000 years).
8. The ASCE Wind Design Geodatabase can be accessed at the ASCE 7 Hazard Tool (<https://asce7hazardtool.online>) or approved equivalent.

FIGURE 1609.3(4) BASIC DESIGN WIND SPEEDS, V , FOR RISK CATEGORY IV BUILDINGS AND OTHER STRUCTURES
1609.3.1 Wind speed conversion. Where required, the basic design wind speeds of Figures 1609.3(1) through 1609.3(12) (4) shall be converted to allowable stress design wind speeds, V_{asd} , using Table 1609.3.1 or Equation 16-17.



(Equation 17-18)

where:

V_{asd} = Allowable stress design wind speed applicable to methods specified in Exceptions 4 and 5 of Section 1609.1.1.

V = Basic design wind speeds determined from Figures 1609.3(1) through 1609.3(12) (4).

TABLE 1609.3.1 WIND SPEED CONVERSIONS a, b, c

V	100	110	120	130	140	150	160	170	180	190	200
V_{asd}	78	85	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.44 m/s.

- a. Linear interpolation is permitted.
- b. V_{asd} = allowable stress design wind speed applicable to methods specified in Exceptions 1 through 5 of Section 1609.1.1.
- c. V = basic design wind speeds determined from Figures 1609.3(1) through 1609.3(12) (4).

1609.5 Tornado Loads.

The design and construction of Risk Category III and IV buildings and other structures located in the tornado-prone region as shown in Figure 1609.5 shall be in accordance with Chapter 32 of ASCE 7, except as modified by this code.



FIGURE 1609.5 TORNADO-PRONE REGION

1609.5 1609.6 Roof systems.

Roof systems shall be designed and constructed in accordance with Sections 1609.6.1 through 1609.6.3, as applicable.

1609.5.1 1609.6.1 Roof deck.

The roof deck shall be designed to withstand the greater of wind pressures or tornado pressures determined in accordance with ASCE 7.

1609.5.2 1609.6.2 Roof coverings.

Roof coverings shall comply with Section ~~1609.5.4~~ 1609.6.1.

Exception: Rigid tile roof coverings that are air permeable and installed over a roof deck complying with Section 1609.6.1 are permitted to be designed in accordance with Section ~~1609.5.3~~ 1609.6.3.

1609.6.2.1 Asphalt shingles.

Asphalt shingles installed over a roof deck complying with Section 1609.6.1 shall comply with the wind-resistance requirements of Section 1504.2.

~~1609.5.3 1609.6.3 Rigid tile. Wind loads on rigid tile roof coverings shall be determined in accordance with the following equation:~~ Wind and tornado loads on rigid tiles shall comply with Section 1609.6.3.1 or 1609.6.3.2, as applicable.

$$M_a = q_h K_d C_L b L L_a [1.0 - (GC_p)] \quad \text{(Equation 16-18)}$$

For SI:

$$M_a = q_h K_d C_L b L L_a [1.0 - (GC_p)] / 1,000$$

where:

b = Exposed width, feet (mm) of the roof tile.

C_L = Lift coefficient. The lift coefficient for concrete and clay tile shall be 0.2 or shall be determined by test in accordance with Section 1504.3.1.

(GC_p) = Roof pressure coefficient for each applicable roof zone determined from Chapter 30 of ASCE 7. Roof coefficients shall not be adjusted for internal pressure.

L = Length, feet (mm) of the roof tile.

L_a = Moment arm, feet (mm) from the axis of rotation to the point of uplift on the roof tile. The point of uplift shall be taken at 0.76L from the head of the tile and the middle of the exposed width. For roof tiles with nails or screws (with or without a tail clip), the axis of rotation shall be taken as the head of the tile for direct deck application or as the top edge of the batten for battened applications. For roof tiles fastened only by a nail or screw along the side of the tile, the axis of rotation shall be determined by testing. For roof tiles installed with battens and fastened only by a clip near the tail of the tile, the moment arm shall be determined about the top edge of the batten with consideration given for the point of rotation of the tiles based on straight bond or broken bond and the tile profile.

M_u = Aerodynamic uplift moment, foot-pounds (N-mm) acting to raise the tail of the tile.

q_h = Wind velocity pressure, psf (kN/m²) determined from Section 26.10.2 of ASCE 7.

Concrete and clay roof tiles complying with the following limitations shall be designed to withstand the aerodynamic uplift moment as determined by this section:

1. The roof tiles shall be either loose laid on battens, mechanically fastened, ~~mortar set or adhesive set.~~
2. The roof tiles shall be installed on solid sheathing that has been designed as components and cladding.
3. An ~~underlayment~~ shall be installed in accordance with Chapter 15.
4. The tile shall be single lapped interlocking with a minimum head lap of not less than 2 inches (51 mm).
5. The length of the tile shall be between 1.0 and 1.75 feet (305 mm and 533 mm).
6. The exposed width of the tile shall be between 0.67 and 1.25 feet (204 mm and 381 mm).
7. The maximum thickness of the tail of the tile shall not exceed 1.3 inches (33 mm).
8. Roof tiles using ~~mortar set or adhesive set~~ systems shall have not less than two thirds of the tile's area free of ~~mortar or adhesive contact.~~

1609.6.3.2 Tornado loads.

Tornado loads on rigid tile roof coverings shall be determined in accordance with Section 1609.6.3.1, replacing q_h with q_{hT} and (GC_p) with $K_{VT}(GC_p)$ in Equation 16-19, where:

q_{hT} = tornado velocity pressure, pounds per square foot (kN/m²) determined in accordance with Section 32.10 of ASCE 7.

K_{VT} = tornado pressure coefficient adjustment factor for vertical winds, determined in accordance with Section 32.14 of ASCE 7.

1609.7 Elevators, escalators and other conveying systems.

Elevators, escalators and other conveying systems and their components exposed to outdoor environments shall satisfy the wind design requirements of ASCE 7.

SECTION 1610

SOIL ~~LATERAL~~ LOADS AND HYDROSTATIC PRESSURE

1610.1 ~~General~~ Lateral pressures.

~~Foundation walls and retaining walls~~ Structures below grade shall be designed to resist lateral soil loads from adjacent soil. Soil loads specified in Table 1610.1 shall be used as the minimum design lateral soil loads unless determined otherwise by a geotechnical investigation in accordance with Section 1803. Foundation walls and other walls in which horizontal movement is restricted at the top shall be designed for at-rest pressure. ~~Retaining walls~~ Walls that are free to move and rotate at the top, such as retaining walls, shall be permitted to be designed for active pressure.

Where applicable, lateral ~~Lateral Design lateral~~ pressure from fixed or moving surcharge loads shall be added to the lateral ~~earth pressure~~ soil load. ~~Design lateral~~ Lateral pressure shall be increased if expansive soils are present at the site ~~are expansive~~. Foundation walls shall be designed to support the weight of the full hydrostatic pressure of undrained backfill unless a drainage system is installed in accordance with Sections 1805.4.2 and 1805.4.3.

Exception: Foundation walls extending not more than 8 feet (2438 mm) below grade and laterally supported at the top by flexible *diaphragms* shall be permitted to be designed for active pressure.

1610.2 Uplift loads on floor and foundations. Basement floors, slabs on ground, foundations, and similar approximately horizontal elements below grade shall be designed to resist uplift loads where applicable. The upward pressure of water shall be taken as the full hydrostatic pressure applied over the entire area. The hydrostatic load shall be measured from the underside of the element being evaluated. The design for upward loads caused by expansive soils shall comply with Section 1808.6.

SECTION 1611

RAIN LOADS

[NY] 1611.1 Design rain loads.

Each portion of a roof shall be designed to sustain the *load* of rainwater ~~rainwater that will accumulate on it if the primary drainage system for that portion is blocked plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow.~~ as per the requirements of Chapter 8 of ASCE 7. Rain loads shall be based on the summation of the static head, d_s , hydraulic head, d_h , and ponding head, d_p , using Eqn. 16-20. The hydraulic head shall be based on hydraulic test data or hydraulic calculations assuming a flow rate corresponding to a rainfall intensity equal to or greater than the 15-minute duration storm with return period given in Table 1611.1. Rainfall intensity shall be determined in inches per hour for 15-minute duration storms for risk categories given in Table 1611.1. ~~The design rainfall shall be based on the 100-year~~ The ponding head shall be based on structural analysis as the depth of water due to deflections of the roof subjected to unfactored rain load and unfactored *dead load*.

$$R = 5.2 (d_s + d_h + d_p)$$

(Equation 16-19)

For SI: $R = 0.0098(d_s + d_h + d_p)$

where:

d_h = Hydraulic head equal to the depth of water on the undeflected roof above the inlet of the secondary drainage system for structural loading (SDSL) required to achieve the design flow in inches. (mm) ~~Additional depth of water on the undeflected roof above the inlet of secondary drainage system at its design flow (in other words, the hydraulic head), in inches (mm).~~

d_p = Ponding head equal to the depth of water due to deflections of the roof subjected to unfactored rain load and unfactored *dead load*, in inches. (mm)

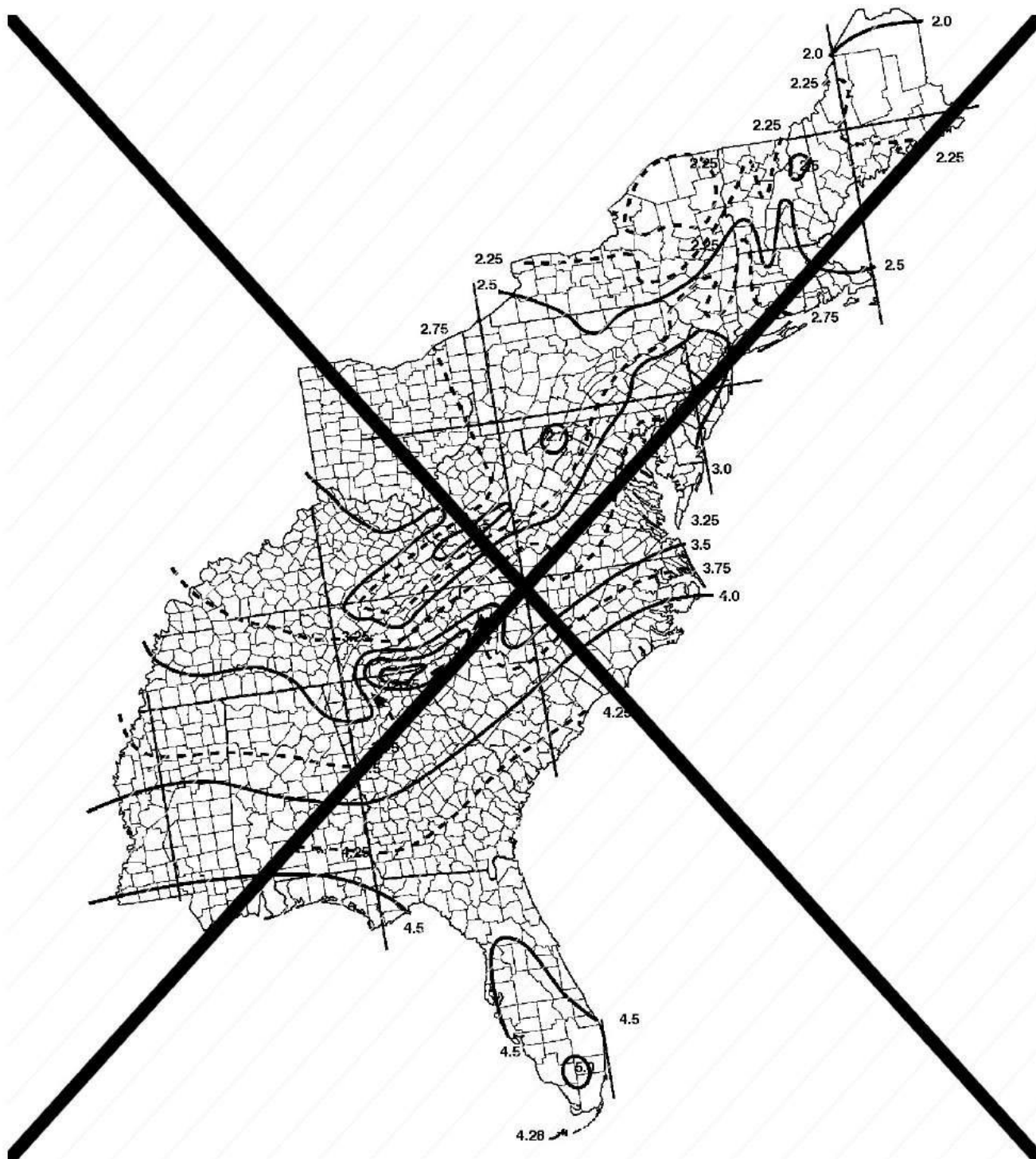
d_s = Static head equal to the depth of water on the undeflected roof up to the inlet of the secondary drainage system for structural loading (SDSL) in inches (mm). ~~Depth of water on the undeflected roof up to the inlet of secondary drainage system when the primary drainage system is blocked (in other words, the static head), in inches (mm).~~

R = Rain load ~~on the undeflected roof~~, in pounds per square foot (kN/m^2). ~~Where the phrase “undeflected roof” is used, deflections from loads (including dead loads) shall not be considered when determining the amount of rain on the roof.~~

SDSL is the roof drainage system through which water is drained from the roof when the drainage systems listed in ASCE 7 Section 8.2 (a) through (d) are blocked or not working.

Table 1611.1 Design Storm Return Period by Risk Category

Risk Category	Design Storm Return Period
I & II	100 Years
III	200 Years
IV	500 Years



For SI: 1 inch = 25.4 mm.

Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

FIGURE 1611.1(3) 100-YEAR, 1-HOUR RAINFALL (INCHES) EASTERN UNITED STATES



[For SI: 1 inch = 25.4 mm.](#)

[Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.](#)

[\[NY\] FIGURE 1611.1 100-YEAR, 1-HOUR RAINFALL \(INCHES\)](#)

1611.2 Ponding instability.

~~Susceptible bays of roofs shall be evaluated for ponding~~ Ponding instability on roofs shall be evaluated in accordance with ~~Section 8.4 of~~ ASCE 7.

[NY] 1612.2 Design and construction. The design and construction of buildings and structures located in *flood hazard areas*, including *coastal high hazard areas* and *coastal A zones*, and B Zones or shaded X zones adjacent to a coastal A or V Zone, shall be in accordance with Chapter 5 of ASCE 7 and ASCE 24. Elevators, escalators, conveying systems and their components shall conform to ASCE 24 and ASME A17.1/CSA B44 as applicable.

Exception: Temporary structures complying with Section 3103.5.1.3.

[NY] 1612.2.1 ASCE 7 and ASCE 24.

- The provisions of ASCE 7 and ASCE 24 that apply to buildings or structures in A Zones will also apply to buildings and structures in B Zones and shaded X Zones.
- The provisions of ASCE 7 and ASCE 24 that apply to buildings or structures in Coastal A Zones will also apply to buildings or structures in B Zones shaded X zones adjacent to a Coastal A or V Zone.
- The *design flood elevation* (DFE) specified in ASCE 7 and ASCE 24 shall be the ~~design~~ required flood elevation determined in accordance with Sections 1612.3 through 1612.3.1.

[NY] 1612.3.1 Design Required flood elevations. At a minimum, the required flood elevation shall be the higher of the following:

- 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,
 - plus 2 feet (610 mm) of freeboard, and
 - plus a sea level rise of 18 inches (457 mm) in flood hazard areas adjacent to tidal areas.

Exception: Where there are nontidal coastal A zones, coastal V zones and B zones or shaded X zones adjacent to a coastal A or V zone

- The elevation of the *design flood* associated with the area designated on a flood hazard map adopted by the community, or otherwise legally designated.

Where design or base flood elevations are not included in the flood hazard areas established in Section 1612.3, or where floodways are not designated, the building official is authorized to require the applicant to do one of the following:

- Obtain and reasonably utilize any design flood elevation (DFE) and floodway data available from a federal, state or other source.
- Determine the design flood elevation or floodway 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.

Exception: Where it is not possible to obtain a design flood elevation in accordance with Section 1612.3.1, Items 1 and 2, the design flood elevation shall be 3 feet (914 mm) above the highest adjacent grade, where the highest adjacent grade is the natural ground elevation within the perimeter of the proposed building prior to construction.

~~**[NY] 1612.3.1.1 Freeboard.** The design flood elevation for the design and construction of buildings and structures shall be determined in accordance with Sections 1612.3 through 1612.3.1, as applicable, plus a freeboard of 2 feet (610 mm).~~

~~**Exception:** Freeboard is not required when the exception to 1612.3.1 is applied.~~

[NY] 1612.3.2 Determination of impacts. In riverine *flood hazard areas* where design or base flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that

the proposed work will not increase the design [or base](#) flood elevation more than 1 foot (305 mm) at any point within the jurisdiction of the applicable governing authority. For the purpose of applying this section, the ~~design required~~ flood elevation shall be the elevation established in accordance with Sections 1612.3 through 1612.3.1 and shall not include the application of freeboard.

[NY] 1612.4 Flood hazard documentation.

The following documentation shall be prepared and sealed by a *registered design professional* and submitted to the *building official*:

1. For construction in *flood hazard areas* other than *coastal high hazard areas* or *coastal A zones*:
 - 1.1. The elevation of the *lowest floor*, including the basement, as required by the lowest floor elevation inspection in Section 110.3.3 and for the final inspection in Section 110.3.12.1.
 - 1.2. For fully enclosed areas below the ~~design required~~ flood elevation, [determined in accordance with Section 1612.3.1](#), where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.7.2.1 of ASCE 24, construction documents shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.7.2.2 of ASCE 24.
 - 1.3. For *dry floodproofed* nonresidential buildings, *construction documents* shall include a statement that the *dry floodproofing* is designed in accordance with ASCE 24 [and shall include the flood emergency plan specified in Chapter 6 of ASCE 24](#).
 - 1.4. [For dry floodproofed nonresidential buildings, the elevation to which the building is dry floodproofed as required for the final inspection in Section 110.3.12.1.](#)
2. For construction in coastal high hazard areas and coastal A zones:
 - 2.1. The elevation of the bottom of the lowest horizontal structural member as required by the *lowest floor* elevation inspection in Section 110.3.3 and for the final inspection in Section 110.3.12.1.
 - 2.2. *Construction documents* shall include a statement that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and *flood loads* acting simultaneously on all building components, and other *load* requirements of Chapter 16.
 - 2.3. For breakaway walls designed to have a resistance of more than 20 psf (0.96 kN/m²) determined using *allowable stress design* [or a resistance to an ultimate load of more than 33 pounds per square foot \(1.58 kN/m²\)](#), *construction documents* shall include a statement that the breakaway wall is designed in accordance with ASCE 24.
 - 2.4. [For breakaway walls where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.7.2.1 of ASCE 24, construction documents shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.7.2.2 of ASCE 24.](#)

1613.1 Scope. Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with Chapters 11, 12, 13, 15, 17 and 18 of ASCE 7, as applicable. The *seismic design category* for a structure is permitted to be determined in accordance with Section 1613 or ASCE 7.

Exceptions:

1. Detached one- and two-family dwellings, assigned to *Seismic Design Category* A, B or C, ~~, or located where the mapped short-period spectral response acceleration, *SS*, is less than 0.4 g.~~
2. The *seismic force-resisting system* of wood-frame buildings that conform to the provisions of Section 2308 are not required to be analyzed as specified in this section.
3. Agricultural storage structures intended only for incidental human occupancy.
4. Structures that require special consideration of their response characteristics and environment that are not addressed by this code or ASCE 7 and for which other regulations provide seismic criteria, such as vehicular bridges, electrical transmission towers, hydraulic structures, buried utility lines and their appurtenances and nuclear reactors.
5. References within ASCE 7 to Chapter 14 shall not apply, except as specifically required herein.
6. [Temporary structures complying with Section 3103.6.1.4.](#)

[NY] 1613.2 Determination of Seismic Design Category ~~Seismic ground motion values.~~

Structures shall be assigned to a seismic design category based on one of the following methods unless the authority having jurisdiction or geotechnical data determines that Site Class DE, E or F soils are present at the site. Where Site Class DE, E or F soils are present, the Seismic Design Category shall be determined in accordance with ASCE.

1. Using Figure 1613.2 based on the structure *Risk Category*, or
2. Determined in accordance with ASCE 7.

Where Site Class DE, E or F soils are present, the seismic design category shall be determined in accordance with ASCE 7.

~~1613.2.1 Mapped acceleration parameters.~~

~~The parameters S_s and S_1 shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.2.1(1) through 1613.2.1(10). Where S_1 is less than or equal to 0.04 and S_s is less than or equal to 0.15, the structure is permitted to be assigned Seismic Design Category A.~~

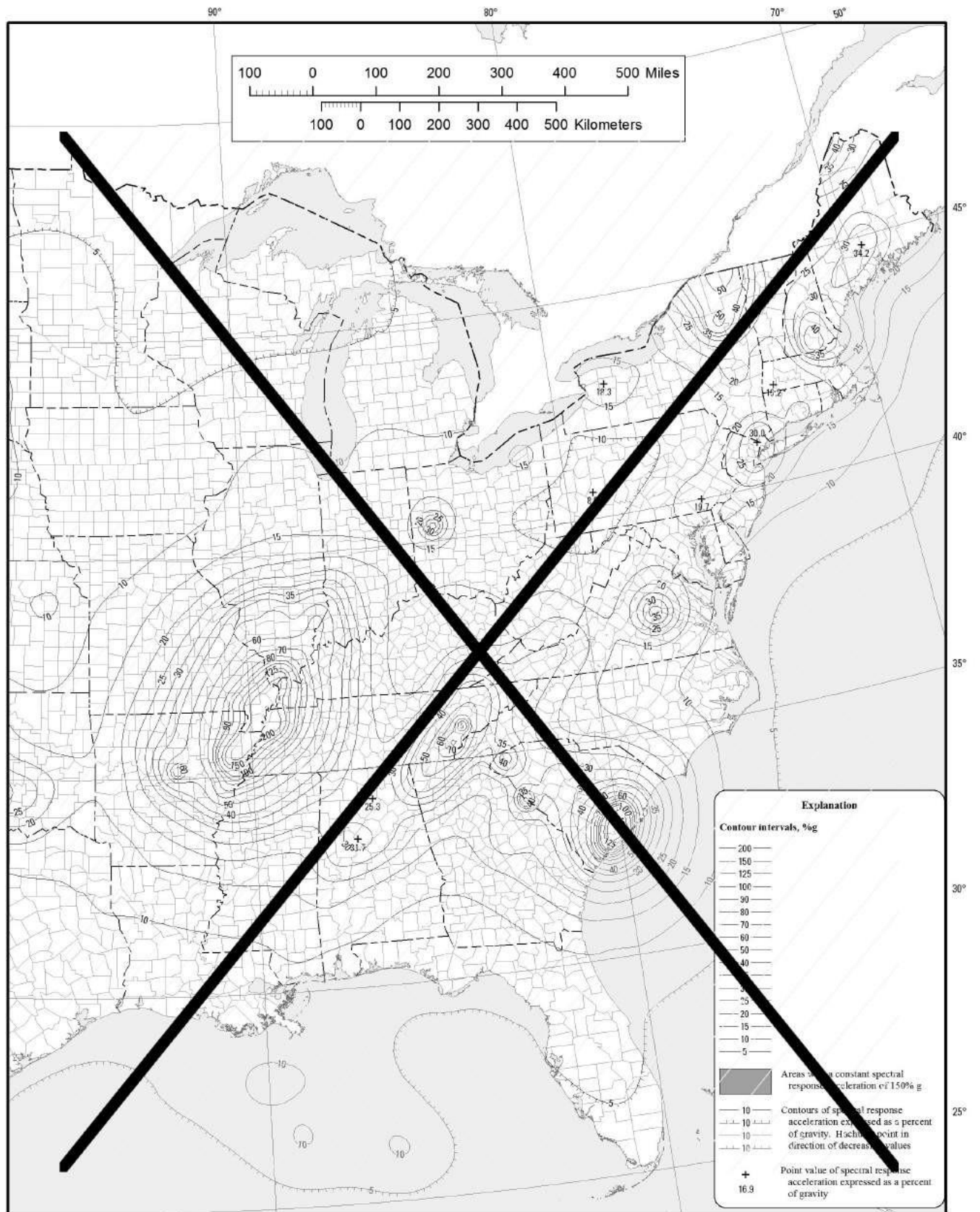
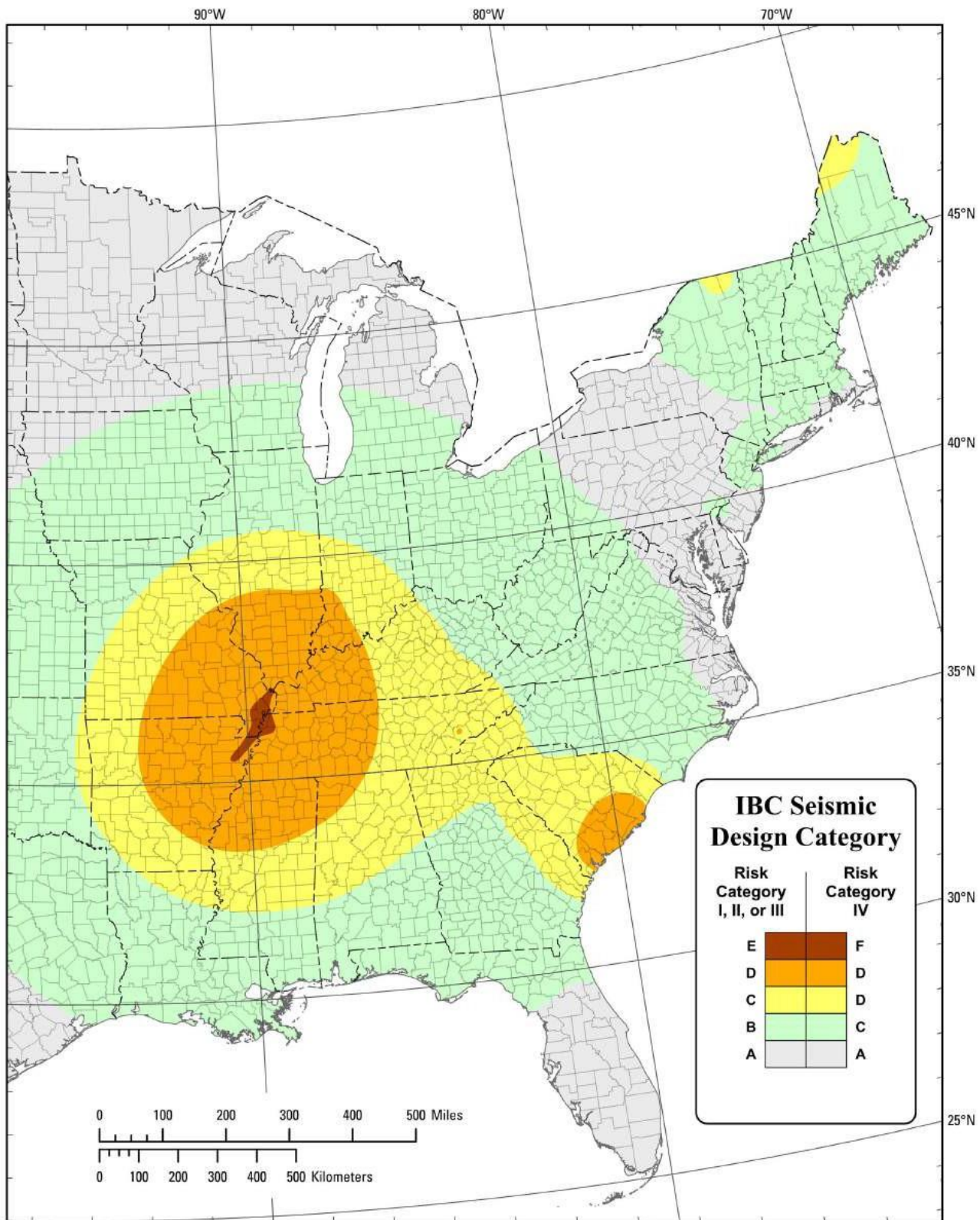


Figure 1613.3.1(1)-continued Risk-Targeted Maximum Considered Earthquake (MCE_R) Ground Motion for the Conterminous United States of 0.2-Second Spectral Response Acceleration (5% of Critical Damping)

[NY] FIGURE 1613.2.1(2)

RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATIONS FOR THE CONTERMINOUS UNITED STATES OF 1-SECOND SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING)



[\[NY\] FIGURE 1613.2.1 SEISMIC DESIGN CATEGORIES FOR DEFAULT SITE CONDITIONS](#)

1613.2.2 Site class definitions:

Based on the site soil properties, the site shall be classified as *Site Class* A, B, C, D, E or F in accordance with Chapter 20 of ASCE 7.

Where the soil properties are not known in sufficient detail to determine the site class, *Site Class* D, subjected to the requirements of Section 1613.2.3, shall be used unless the *building official* or geotechnical data determines that *Site Class* E or F soils are present at the site.

Where site investigations that are performed in accordance with Chapter 20 of ASCE 7 reveal rock conditions consistent with *Site Class* B, but site-specific velocity measurements are not made, the *site coefficients* F_a and F_v shall be taken at unity (1.0).

1613.2.3 Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters:

The maximum considered earthquake spectral response acceleration for short periods, S_{MS} , and at 1-second period, S_{M1} , adjusted for site class effects shall be determined by Equations 16-20 and 16-21, respectively:

$$S_{MS} = F_a S_S \quad \text{(Equation 16-20)}$$

$$S_{M1} = F_v S_1 \quad \text{(Equation 16-21)}$$

but S_{MS} shall not be taken less than S_{M-1} . Except when determining the seismic design category in accordance with Section 1613.2.5.

where:

F_a = Site coefficient defined in Table 1613.2.3(1).

F_v = Site coefficient defined in Table 1613.2.3(2).

S_S = The mapped spectral accelerations for short periods as determined in Section 1613.2.1.

S_1 = The mapped spectral accelerations for a 1-second period as determined in Section 1613.2.1.

Where *Site Class* D is selected as the default site class per Section 1613.2.2, the value of F_a shall be not less than 1.2.

Where the simplified design procedure of ASCE 7 Section 12.14 is used, the value of F_a shall be determined in accordance with ASCE 7 Section 12.14.8.1, and the values of F_v , S_{MS} and S_{M-1} need not be determined.

TABLE 1613.2.3(1) VALUES OF SITE COEFFICIENT F_a ^a

SITE CLASS	MAPPED RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) SPECTRAL RESPONSE ACCELERATION PARAMETER AT SHORT PERIOD					
	$S_s \leq 0.25$	$S_s = 0.50$	$S_s = 0.75$	$S_s = 1.00$	$S_s = 1.25$	$S_s \geq 1.5$
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.9	0.9	0.9	0.9	0.9	0.9
C	1.3	1.3	1.2	1.2	1.2	1.2
D	1.6	1.4	1.2	1.1	1.0	1.0
E	2.4	1.7	1.3	Note b	Note b	Note b
F	Note b	Note b	Note b	Note b	Note b	Note b

Use straight-line interpolation for intermediate values of mapped spectral response acceleration at short period, S_s .

Values shall be determined in accordance with Section 11.4.8 of ASCE 7.

TABLE 1613.2.3(2) VALUES OF SITE COEFFICIENT F^a

SITE CLASS	MAPPED RISK TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE _R) SPECTRAL RESPONSE ACCELERATION PARAMETER AT 1-SECOND PERIOD					
	$S_1 \leq 0.1$	$S_1 = 0.2$	$S_1 = 0.3$	$S_1 = 0.4$	$S_1 = 0.5$	$S_1 \geq 0.6$
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.8	0.8	0.8	0.8	0.8	0.8
C	1.5	1.5	1.5	1.5	1.5	1.4
D	2.4	2.2 ^e	2.0 ^e	1.9 ^e	1.8 ^e	1.7 ^e
E	4.2	3.3 ^e	2.8 ^e	2.4 ^e	2.2 ^e	2.0 ^e
F	Note b	Note b	Note b	Note b	Note b	Note b

a.—Use straight-line interpolation for intermediate values of mapped spectral response acceleration at 1-second period, S_1 .

b.—Values shall be determined in accordance with Section 11.4.8 of ASCE 7.

c.—See requirements for site-specific ground motions in Section 11.4.8 of ASCE 7.

1613.2.4 Design spectral response acceleration parameters.

Five percent damped design spectral response acceleration at short periods, S_{DS} , and at 1-second period, S_{D1} , shall be determined from Equations 16-22 and Equation 16-23, respectively:

$$S_{DS} = \frac{2}{3} S_{MS}$$

$$S_{D1} = \frac{2}{3} S_{M1}$$

(Equation 16-22)

(Equation 16-23)

where:

S_{MS} —The maximum considered earthquake spectral response accelerations for short period as determined in Section 1613.2.3.

S_{M1} —The maximum considered earthquake spectral response accelerations for 1-second period as determined in Section 1613.2.3.

1613.2.5 Determination of seismic design category.

Structures classified as *Risk Category* I, II or III that are located where the mapped spectral response acceleration parameter at 1-second period, S_1 , is greater than or equal to 0.75 shall be assigned to *Seismic Design Category* E. Structures classified as *Risk Category* IV that are located where the mapped spectral response acceleration parameter at 1-second period, S_1 , is greater than or equal to 0.75 shall be assigned to *Seismic Design Category* F. Other structures shall be assigned to a *seismic design category* based on their *risk category* and the design spectral response acceleration parameters, S_{DS} and S_{D1} , determined in accordance with Section 1613.2.4 or the site-specific procedures of ASCE 7. Each building and structure shall be assigned to the more severe *seismic design category* in accordance with Table 1613.2.5(1) or 1613.2.5(2), irrespective of the fundamental period of vibration of the structure, T .

TABLE 1613.2.5(1) SEISMIC DESIGN CATEGORY BASED ON SHORT PERIOD (0.2-second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \leq S_{DS} < 0.33g$	B	B	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D
$0.50g \leq S_{DS}$	D	D	D

TABLE 1613.2.5(2) SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \leq S_{D1} < 0.133g$	B	B	C
$0.133g \leq S_{D1} < 0.20g$	C	C	D
$0.20g \leq S_{D1}$	D	D	D

1613.2.5.1 Alternative seismic design category determination.

Where S_1 is less than 0.75, the seismic design category is permitted to be determined from Table 1613.2.5(1) alone where all of the following apply:

1. In each of the two *orthogonal* directions, the approximate fundamental period of the structure, T_a , in each of the two *orthogonal* directions determined in accordance with Section 12.8.2.1 of ASCE 7, is less than $0.8 T_s$ determined in accordance with Section 11.8.6 of ASCE 7.
2. In each of the two *orthogonal* directions, the fundamental period of the structure used to calculate the story drift is less than T_s .
3. Equation 12.8-2 of ASCE 7 is used to determine the seismic response coefficient, C_s .
4. The *diaphragms* are rigid or are permitted to be idealized as rigid in accordance with Section 12.3.1 of ASCE 7 or, for *diaphragms* permitted to be idealized as flexible in accordance with Section 12.3.1 of ASCE 7, the distances between vertical elements of the seismic force-resisting system do not exceed 40 feet (12 192 mm).

1613.3 1613.2.5.2 Simplified design procedure.

Where the alternate simplified design procedure of ASCE 7 is used, the seismic design category shall be determined in accordance with ASCE 7.

~~1613.3~~ 1613.4 Ballasted photovoltaic panel systems.

Ballasted, roof-mounted *photovoltaic (PV) panel systems* need not be rigidly attached to the roof or supporting structure. ~~Ballasted non-penetrating systems~~ *Ballasted, unattached PV panel systems* shall be designed and installed only on roofs with slopes not more than one unit vertical in 12 units horizontal. ~~Ballasted nonpenetrating systems~~ *Ballasted, unattached PV panel systems* shall be designed to ~~accommodate~~ *resist* sliding ~~uplift in accordance with ASCE 7 Chapter 13. resulting from lateral and vertical forces as required by Section 1605, using a coefficient of friction determined by acceptable engineering principles. In structures assigned to Seismic Design Category C, D, E or F, ballasted nonpenetrating systems shall be designed to accommodate seismic displacement determined by nonlinear response hi story or other approved analysis or shake table testing, using input motions consistent with ASCE 7 lateral and vertical seismic forces for nonstructural components on roofs.~~

1613.5 Elevators, Escalators, and other Conveying Systems.

Elevators, escalators, and other conveying systems and their components shall satisfy the seismic requirements of ASCE 7 and ASME A17.1/CSA B44 as applicable.

1613.6 Automatic sprinkler systems.

Where required, automatic sprinkler systems, anchorage and bracing, shall comply with ASCE 7 and Section 903.3.1.1.

1614.1 General.

Ice-sensitive structures shall be designed for atmospheric ice loads in accordance with Chapter 10 of ASCE 7.

Exception: *Temporary structures complying with Section 3103.6.1.5.*

1615.1 General.

The design and construction of *Risk Category III and IV buildings and structures located in the Tsunami Design Zones* defined in the *Tsunami Design Geodatabase* shall be in accordance with Chapter 6 of ASCE 7, except as modified by this code.

Exception: *Temporary structures complying with Section 3103.6.1.6.*

Chapter 17 Special Inspections and Tests

1704.2.4 Report requirement.

Approved agencies shall keep records of *special inspections* and tests. The *approved agency* shall submit reports of special inspections and tests to the *building official* and to the *registered design professional in responsible charge* at frequencies required by the approved construction documents or building official. ~~All r~~ Reports shall describe the nature and extent of inspections and tests, the location where the inspections and tests were performed, and indicate that work inspected or tested was or was not completed in conformance to *approved construction documents*. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the *building official* and to the *registered design professional in responsible charge* prior to the completion of that phase of the work. A final report documenting required *special inspections* and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted at a point in time agreed upon prior to the start of work by the *owner* or the *owner's* authorized agent to the *building official*.

1704.3.1 Content of statement of special inspections.

The statement of *special inspections* shall identify the following:

1. The materials, systems, components and work required to have *special inspections* or tests by the *building official* or by the *registered design professional* responsible for each portion of the work.
2. The type and extent of each *special inspection*.
3. The type and extent of each test.
4. Additional requirements for *special inspections* or tests for seismic or wind resistance as specified in Sections 1705.12, 1705.13 and 1705.14.
5. For each type of *special inspection*, identification as to whether it will be continuous *special inspection*, periodic *special inspection* or performed in accordance with the notation used in the referenced standard where the inspections are defined.
6. Deferred submittal items that require a supplemental statement of special inspections.

1704.6 Structural observations.

Where required by the provisions of Section 1704.6.1, ~~1704.6.2 or 1704.6.3~~, the owner or the owner's authorized agent shall employ a *registered design professional* to perform *structural observations*. The structural observer shall visually observe representative locations of structural systems, details and load paths for general conformance to the approved construction documents. *Structural observation* does not include or waive the responsibility for the inspections in Section 110 or the *special inspections* in Section 1705 or other sections of this code. Prior to the commencement of observations, the structural observer shall submit to the *building official* a written statement identifying the frequency and extent of *structural observations*. At the conclusion of the work included in the permit, the structural observers at, to the best of the structural observer's knowledge, have not been resolved.

1704.6.1 Structural observations for structures.

Structural observations shall be provided for those structures where one or more of the following conditions exist:

1. The structure is classified as Risk Category III or IV.
2. The structure is a *high-rise building*.
3. The structure is assigned to Seismic Design Category E, and is greater than two stories above grade plane.
- ~~3.4.~~ Such observation is required by the *registered design professional* responsible for the structural design.
- ~~4.5.~~ Such observation is specifically required by the *building official*.

~~**1704.6.2 Structural observations for seismic resistance.**~~

~~Structural observations shall be provided for those structures assigned to Seismic Design Category D, E or F where one or more of the following conditions exist:~~

- ~~1. The structure is classified as Risk Category III or IV.~~
- ~~2. The structure is assigned to Seismic Design Category E, is classified as Risk Category I or II, and is greater than two stories above the grade plane.~~

~~**1704.6.3 Structural observations for wind resistance.**~~

~~Structural observations shall be provided for those structures sited where V is 130 mph (58 m/sec) or greater and the structure is classified as Risk Category III or IV.~~

1705.2.2 Structural Stainless Steel.

Special inspections and nondestructive testing of structural stainless steel elements in buildings and portions thereof shall be in accordance with the quality assurance inspection requirements of AISC 370.

1705.2.6 Metal building systems.

Special inspections of *metal building systems* shall be performed in accordance with Sections 1705.2.1, 1705.2.2, 1705.2.3, 1705.2.4, 1705.2.5 and Table 1705.2.5. The *approved agency* shall perform inspections of the erected *metal building system* to verify compliance with the *approved construction documents*.

Table 1705.2.6 SPECIAL INSPECTIONS OF METAL BUILDING SYSTEMS

<u>TYPE</u>	<u>CONTINUOUS SPECIAL INSPECTION</u>	<u>PERIODIC SPECIAL INSPECTION</u>
<u>1. Installation of rafter / beam flange braces and column flange braces.</u>	<u>---</u>	<u>X</u>
<u>2. Installation of purlins and girts, including specified lapping.</u>	<u>---</u>	<u>X</u>
<u>3. Purlin and girt restraint / bridging / bracing.</u>	<u>---</u>	<u>X</u>
<u>4. Installation of X-bracing, tightened to remove any sag.</u>	<u>---</u>	<u>X</u>

TABLE 1705.3

REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD^a	IBC REFERENCE
1. Inspect reinforcement, including prestressing tendons, and verify placement.	—	X	ACI 318: Ch. 20, 25.2, 25.3, 26.6.1-26.6.3	1908.4 —
2. Reinforcing bar welding: a. Verify weldability of reinforcing bars other than ASTM A706.	—	X	AWS D1.4	—
b. Inspect single-pass fillet welds, maximum 5/16" ; and <u>welding of reinforcement for special moment frames, boundary elements of special structural walls and coupling beams.</u>	X	—	ACI 318: 26.6.4	
c. Inspect all other welds. <u>Welded reinforcement splices.</u>	<u>X</u>	<u>==</u>	<u>==</u>	
d. <u>Inspect welding of primary tension reinforcement in corbels.</u>	<u>X</u>	<u>==</u>	<u>==</u>	
e. <u>Inspect single-pass fillet welds, maximum 5/16".</u>	<u>X</u>	<u>X</u>	<u>AWS D1.4</u> <u>ACI 318: 26.13.3</u>	
f. <u>Inspect all other welds.</u>	<u>X</u>	<u>X</u>	<u>AWS D1.4</u> <u>ACI 318: 26.13.3</u>	
3. Inspect anchors cast in concrete.	—	X	ACI 318: 17.8.2	—

4. Inspect anchors post-installed in hardened concrete members.b a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads. b. Mechanical anchors and adhesive anchors not defined in 4.a.	X —	— X	ACI 318: 17.8.2.4 ACI 318: 17.8.2	—
5. Verify use of required design mix.	—	X	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	—	ASTM C31 ASTM C172 ACI 318: 26.5, 26.12	1908.10 —
7. Inspect concrete and shotcrete placement for proper application techniques.	X	—	ACI 318: 26.5	1908.6, 1908.7, 1908.8 —
8. Verify maintenance of specified curing temperature and techniques.	—	X	ACI 318: 26.5.3- 26.5.5	1908.9 —
9. Inspect prestressed concrete for: a. Application of prestressing forces; and b. Grouting of bonded prestressing tendons.	X X	— —	ACI 318: 26.10	—
10. Inspect erection of precast concrete members.	—	X	ACI 318: 26.9	—
11. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	—	X	ACI 318: 26.11.2	—
12. Inspect formwork for shape, location and dimensions of the concrete member being formed.	—	X	ACI 318: 26.11.1.2(b)	—

1705.4 Masonry construction.

Special inspections and tests of masonry construction shall be performed in accordance with the quality assurance program requirements of TMS 402 and TMS 602.

Exception: *Special inspections* and tests shall not be required for:

1. [Glass unit masonry or masonry veneer designed in accordance with Section 2110 or Chapter 14,](#) ~~Empirically designed masonry, glass unit masonry or masonry veneer designed in accordance with Section 2109, Section 2110 or Chapter 14,~~ respectively, where they are part of a *structure* classified as *Risk Category I, II or III*.
2. Masonry foundation walls constructed in accordance with Table 1807.1.6.3(1), 1807.1.6.3(2), 1807.1.6.3(3) or 1807.1.6.3(4).
3. Masonry fireplaces, masonry heaters or masonry chimneys installed or constructed in accordance with Section 2111, 2112 or 2113, respectively.

1705.4.1 ~~Empirically designed masonry, glass~~ [Glass](#) unit masonry and masonry veneer in Risk Category IV.

Special inspections and tests for ~~empirically designed masonry~~, glass unit masonry or masonry veneer designed in accordance with ~~Section 2109~~, Section 2110 or Chapter 14, respectively, where they are part of a structure classified as Risk Category IV shall be performed in accordance with TMS 602 Level 2.

1705.5.3 Mass timber construction.

Special inspections of mass timber elements in Types IV-A, IV-B and IV-C construction shall be in accordance with Table 1705.5.3.

TABLE 1705.5.3
REQUIRED SPECIAL INSPECTIONS OF MASS TIMBER CONSTRUCTION

<u>TYPE</u>		<u>CONTINUOUS SPECIAL INSPECTION</u>	<u>PERIODIC SPECIAL INSPECTION</u>
<u>1.</u>	<u>Inspection of anchorage and connections of mass timber construction to timber deep foundation systems.</u>	=	X
<u>2.</u>	<u>Inspect erection of mass timber construction.</u>	=	X
<u>3.</u>	<u>Inspection of connections where installation methods are required to meet design loads</u>		
<u>Threaded fasteners</u>	<u>Verify use of proper installation equipment.</u>	=	X
	<u>Verify use of pre-drilled holes where required.</u>	=	X
	<u>Inspect screws, including diameter, length, head type, spacing, installation angle and depth.</u>	=	X
	<u>Adhesive anchors installed in horizontal or upwardly inclined orientation to resist sustained tension loads.</u>	X	=
	<u>Adhesive anchors not defined in preceding cell.</u>	=	X
	<u>Bolted connections.</u>	=	X
	<u>Concealed connections.</u>	=	X

1705.6 Soils.

Special inspections and tests of existing site soil conditions, fill placement and load-bearing requirements shall be performed in accordance with this section and Table 1705.6. The *approved* geotechnical report and the *construction documents* prepared by the *registered design professionals* shall be used to determine compliance. ~~During fill placement, the special inspector shall verify that proper materials and procedures are used in accordance with the provisions of the approved geotechnical report.~~

Exception: Where Section 1803 does not require reporting of materials and procedures for fill placement, the *special inspector* shall verify that the in-place dry density of the compacted fill is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D1557.

TABLE 1705.6
REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify materials below <i>shallow foundations</i> are adequate to achieve the design bearing capacity.	—	X
2. Verify excavations are extended to proper depth and have reached proper material.	—	X
3. Perform classification and testing of compacted fill materials.	—	X
4. Verify During fill placement, verify use of proper materials and procedures in accordance with the provisions of the approved geotechnical report . Verify densities and lift thicknesses during placement and compaction of compacted fill.	X	—
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	—	X

TABLE 1705.7

REQUIRED SPECIAL INSPECTIONS AND TESTS OF DRIVEN DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify element materials, sizes and lengths comply with the requirements.	X	—
2. Determine capacities of test elements and conduct additional load tests, as required.	X	—
3. Inspect driving operations and maintain complete and accurate records for each element.	X	—
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element.	X	—
5. For steel elements, perform additional special inspections in accordance with Section 1705.2 .	In accordance with Section 1705.2	
6. For concrete elements and concrete-filled elements, perform tests and additional special inspections in accordance with Section 1705.3 .	In accordance with Section 1705.3	
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge.	In accordance with Statement of Special Inspections	

TABLE 1705.8

REQUIRED SPECIAL INSPECTIONS AND TESTS OF CAST-IN-PLACE DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	X	—

2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes.	X	—
3. For concrete elements, perform tests and additional <i>special inspections</i> in accordance with Section 1705.3 .	In accordance with Section 1705.3	

1705.10 Structural integrity of deep foundation elements.

Whenever there is a reasonable doubt as to the structural integrity of a deep foundation element, an engineering assessment shall be required. The engineering assessment shall include tests for defects performed in accordance with ASTM D4945, ASTM D5882, ASTM D6760 or ASTM D7949, or other approved method.

1705.11-1705.12 Special inspections for wind resistance.

Special inspections for wind resistance specified in Sections 1705.12.1 through 1705.12.3, unless exempted by the exceptions to Section 1704.2, are required for buildings and structures constructed in the following areas:

1. In wind Exposure Category B, where basic wind speed, ~~V_{asdas determined in accordance with Section 1609.3.1 is 120}~~ is 150 mph (~~52.8-67~~ m/sec) or greater.
2. In wind Exposure Category C or D, where basic wind speed, ~~V_{asdas determined in accordance with Section 1609.3.1 is 110}~~ is 140 mph (~~49-62.6~~ m/sec) or greater.

1705.11.1-1705.12.1 Structural wood.

Continuous *special inspection* is required during field gluing operations of elements of the main windforce-resisting system. *Periodic special inspection* is required for nailing, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.

Exception: *Special inspections* are not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other elements of the main windforce-resisting system, where the lateral resistance is provided by structural sheathing and the specified fastener spacing at panel edges is more than 4 inches (102 mm) on center.

1705.11.2-1705.12.2 Cold-formed steel light-frame construction.

Periodic special inspection is required for welding operations of elements of the main windforce-resisting system. *Periodic special inspection* is required for screw attachment, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

Exception: *Special inspections* are not required for cold-formed steel light-frame shear walls and diaphragms, including screwing, bolting, anchoring and other fastening to components of the windforce-resisting system, where either of the following applies:

1. The sheathing is gypsum board or fiberboard.
2. The sheathing is wood structural panel or steel sheets on only one side of the shear wall, shear panel or diaphragm assembly and the specified fastener spacing of at the sheathing panel or sheet edges is more than 4 inches (102 mm) on center (o.c.).

1705.12.2-1705.13.2 Structural wood.

For the seismic force-resisting systems of structures assigned to Seismic Design Category C, D, E or F:

1. Continuous *special inspection* shall be required during field gluing operations of elements of the seismic force-resisting system.
2. Periodic *special inspection* shall be required for nailing, bolting, anchoring and other fastening of elements of the seismic force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, shear panels and hold-downs.

Exception: *Special inspections* are not required for wood *shear walls*, shear panels and *diaphragms*, including nailing, bolting, anchoring and other fastening to other elements of the *seismic force-resisting system*, where the lateral resistance is provided by structural sheathing, and the specified fastener spacing of at the sheathing is panel edges is more than 4 inches (102 mm) on center.

~~1705.12.3~~ 1705.13.3 Cold-formed steel light-frame construction.

For the *seismic force-resisting systems* of structures assigned to *Seismic Design Category C, D, E or F*, *periodic special inspection* shall be required for both:

1. Welding operations of elements of the *seismic force-resisting system*.
2. Screw attachment, bolting, anchoring and other fastening of elements of the *seismic force-resisting system*, including shear walls, braces, *diaphragms*, *collectors (drag struts)* and *hold-downs*.

Exception: *Special inspections* are not required for cold-formed steel light-frame shear walls and *diaphragms*, including screw installation, bolting, anchoring and other fastening to components of the *seismic force-resisting system*, where either of the following applies:

1. The sheathing is gypsum board or *fiberboard*.
2. The sheathing is wood *structural panel* or steel sheets on only one side of the *shear wall*, shear panel or *diaphragm* assembly and the specified fastener spacing of the sheathing at the panel or sheet edge is more than 4 inches (102 mm) on center.

~~1705.12.6~~ 1705.13.6 Plumbing, mechanical and electrical components.

Periodic special inspection of plumbing, mechanical and electrical components shall be required for the following:

1. Anchorage of electrical equipment for emergency and standby power systems in structures assigned to *Seismic Design Category C, D, E or F*.
2. Anchorage of other electrical equipment in structures assigned to *Seismic Design Category E or F*.
3. Installation and anchorage of piping systems designed to carry hazardous materials and their associated mechanical units in structures assigned to *Seismic Design Category C, D, E or F*.
4. Installation and anchorage of ductwork designed to carry hazardous materials in structures assigned to *Seismic Design Category C, D, E or F*.
5. Installation and anchorage of vibration isolation systems in structures assigned to *Seismic Design Category C, D, E or F* where the *approved construction documents* require a nominal clearance of $\frac{1}{4}$ inch (6.4 mm) or less between the equipment support frame and restraint.
6. Installation of mechanical and electrical equipment, including duct work, piping systems and their structural supports, where automatic fire sprinkler systems are installed in structures assigned to *Seismic Design Category C, D, E or F* to verify one of the following:
 - 6.1. Minimum clearances have been provided as required by Section 13.2.3 ASCE/SEI 7.
 - 6.2. A nominal clearance of not less than 3 inches (76 mm) has been be provided between ~~fire protection~~ automatic sprinkler system drops and sprigs and: structural members not used collectively or independently to support the sprinklers; equipment attached to the building structure; and other systems' piping.

Where flexible sprinkler hose fittings are used, *special inspection* of minimum clearances is not required.

1705.13.7 Storage racks.

Steel storage racks and steel cantilevered storage racks that are 8 feet (24389 mm) in height or greater and assigned to Seismic Design Category D, E or F shall be provided with periodic special inspection as required by Table 1705.13.7.

TABLE 1705.13.7

REQUIRED INSPECTIONS OF STORAGE RACK SYSTEMS

<u>TYPE</u>	<u>CONTINUOUS INSPECTION</u>	<u>PERIODIC INSPECTION</u>	<u>REFERENCED STANDARD</u>	<u>IBC REFERENCE</u>
<u>1. Materials used, to verify compliance with one or more of the material test reports in accordance with the approved construction documents.</u>	=	<u>X</u>	=	=
<u>2. Fabricated storage rack elements.</u>	=	<u>X</u>	=	<u>Section 1704.2.5</u>
<u>3. Storage rack anchorage installation.</u>	=	<u>X</u>	<u>ANSI/MH16.1 Section 7.3.2</u>	=
<u>4. Completed storage rack system, to indicate compliance with the approved construction documents.</u>	=	<u>X</u>	=	=

~~[BF] 1705.14~~ **[BF] 1705.15 Sprayed fire-resistant materials (SFRM).**

Special inspections and tests of sprayed fire-resistive materials (~~SFRM~~ ~~sprayed fire-resistant materials~~) applied to floor, roof and wall assemblies and structural members shall be performed in accordance with Sections 1705.15.1 through 1705.15.6. Special inspections shall be based on the fire-resistance design as designated in the approved construction documents. The tests set forth in this section shall be based on samplings from specific floor, roof and wall assemblies and structural members. Special inspections and tests shall be performed during construction with an additional visual inspection after the rough installation of electrical, automatic sprinkler systems, mechanical and plumbing systems and suspension systems for ceilings, and before concealment where applicable. The required sample size shall not exceed 110 percent of that specified by the referenced standards in Sections 1705.15.4.1 through 1705.15.4.9.

~~[BF] 1705.14.2-1705.15.2~~ **Structural member surface conditions.**

The surfaces shall be prepared in accordance with the approved fire-resistance design and the written instructions of approved manufacturers. The prepared surface of structural members to be sprayed shall be inspected by the special inspector before the application of the ~~SFRM sprayed fire-resistant material~~.

~~[BF] 1705.14.4-1705.15.4~~ **Thickness.**

Not more than 10 percent of the thickness measurements of the ~~sprayed fire-resistant materials~~ ~~SFRM~~ applied to floor, roof and wall assemblies and structural members shall be less than the thickness required by the approved fire-resistance design, and none shall be less than the minimum allowable thickness required by Section 1705.15.4.1.

~~[BF] 1705.14.4.1-1705.15.4.1~~ **Minimum allowable thickness.**

For design thicknesses 1 inch (25 mm) or greater, the minimum allowable individual thickness shall be the design thickness minus 1/4 inch (6.4 mm). For design thicknesses less than 1 inch (25 mm), the minimum allowable individual thickness shall be the design thickness minus 25 percent. Thickness shall be determined in accordance with ASTM E605. Samples of the ~~SFRM sprayed fire-resistant materials~~ shall be selected in accordance with Sections 1705.15.4.2 and 1705.15.4.3.

~~[BF] 1705.14.4.2-1705.15.4.2~~ **Floor, roof and wall assemblies.**

The thickness of the ~~SFRM sprayed fire-resistant material~~ applied to floor, roof and wall assemblies shall be determined in accordance with ASTM E605, making not less than four measurements for each 1,000 square feet (93 m²) of the sprayed area, or portion thereof, in each story.

[BF] ~~1705.14.4.5~~ 1705.15.4.5 Structural members.

The thickness of the ~~SFRM sprayed fire-resistant material~~ applied to structural members shall be determined in accordance with ASTM E605. Thickness testing shall be performed on not less than 25 percent of the structural members on each floor.

[BF] ~~1705.14.5~~ 1705.15.5 Density.

The density of the ~~SFRM sprayed fire-resistant material~~ shall be not less than the density specified in the *approved* fire-resistance design. Density of the ~~sprayed fire-resistant material~~ ~~SFRM~~ shall be determined in accordance with ASTM E605. The test samples for determining the density of the ~~sprayed fire-resistant materials~~ ~~SFRM~~ shall be selected as follows:

1. From each floor, roof and wall assembly at the rate of not less than one sample for every 2,500 square feet (232 m²) or portion thereof of the sprayed area in each story.
2. From beams, girders, trusses and columns at the rate of not less than one sample for each type of structural member for each 2,500 square feet (232 m²) of floor area or portion thereof in each story.

[BF] ~~1705.15~~ 1705.16 ~~Mastic and intumescent~~ Intumescent fire-resistant coatings resistive materials.

Special inspections and tests for ~~mastic and intumescent fire-resistant coatings~~ resistive materials applied to structural elements and decks shall be performed in accordance with AWC 12-B. *Special inspections* and tests shall be based on the fire-resistance design as designated in the *approved construction documents*. *Special inspections and tests shall be performed during construction. Additional visual inspection shall be performed after the rough installation and, where applicable, prior to the concealment of electrical, automatic sprinkler, mechanical and plumbing systems.*

[BF] ~~1705.17~~ 1705.18 Fire-resistant penetrations and joints.

In ~~high-rise buildings or~~ in buildings assigned to Risk Category III or IV, or in fire areas containing Group R occupancies with an occupant load greater than 250, *special inspections* for through- penetrations, membrane penetration firestops, fire-resistant joint systems and perimeter fire-~~barrier~~ containment systems that are tested and listed in accordance with Sections 714.4.1.2, 714.5.1.2, 715.3.1 and 715.4 shall be in accordance with Section 1705.18.1 or 1705.18.2.

1705.20 Sealing of mass timber.

Periodic special inspections of sealants or adhesives shall be conducted where sealant or adhesive required by Section 703.7 is applied to mass timber building elements as designated in the approved construction documents.

1709.5 Exterior window and door assemblies.

The design pressure rating of exterior windows and doors in *buildings* shall be determined in accordance with Section 1709.5.1 or 1709.5.2. For exterior windows and doors tested in accordance with Section 1709.5.1 or 1709.5.2, required design wind pressures determined from ASCE 7 shall be permitted to be converted to *allowable stress design* by multiplying by 0.6.

Exception: Structural wind load design pressures for window or door assemblies other than the size tested in accordance with Section 1709.5.1 or 1709.5.2 shall be permitted to be different than the design value of the tested assembly, provided that such pressures are determined by accepted engineering analysis or validated by an additional test of the window or door assembly to the alternative allowable design pressure in accordance with Section 1709.5.2. Components of the alternate size assembly shall be the same as the tested or labeled assembly. Where engineering analysis is used, it shall be performed in accordance with the analysis procedures of AAMA 2502 or WDMA I.S. 11.

1709.5.2 Exterior windows and door assemblies not provided for in Section 1709.5.1.

Exterior window and door assemblies shall be tested in accordance with ASTM E330 ~~Structural performance of garage doors and rolling doors shall be determined in accordance with either ASTM E330 or ANSI/DASMA 108, and shall meet~~

~~the acceptance criteria of ANSI/DASMA 108.~~ Exterior window and door assemblies containing glass shall comply with Section 2403. The design pressure for testing shall be calculated in accordance with Chapter 16. Each assembly shall be tested for 10 seconds at a load equal to 1.5 times the design pressure.

1709.5.2.1 Garage doors and rolling doors.

Garage doors and rolling doors shall be tested in accordance with either ASTM E330 or ANSI/DASMA 108, and shall meet the pass/fail criteria of ANSI/DASMA 108. Garage doors and rolling doors shall be labeled with a permanent label identifying the door manufacturer, the door model/series number, the positive and negative design wind pressure rating, the installation instruction drawing reference number, and the applicable test standard.

1709.5.3 Windborne debris protection.

Protection of exterior glazed openings in buildings located in windborne debris regions shall be in accordance with Section 1609.2.

1709.5.3.1 Impact protective systems testing and labeling.

Impact protective systems shall be tested for impact resistance by an approved independent laboratory for compliance with ASTM E1886 and ASTM E1996 and for design wind pressure for compliance with ASTM E330. Required design wind pressures shall be determined in accordance with ASCE 7, and for the purposes of this section, multiplied by 0.6 to convert to allowable stress design.

Impact protective systems shall have a permanent label applied in accordance with Section 1703.5.4, identifying the manufacturer, product designation, performance characteristics, and approved inspection agency.

Chapter 18 Soils and Foundations

1802.1 General.

Allowable bearing pressures, allowable stresses and design formulas provided in this chapter shall be used with the allowable stress design load combinations specified in ASCE 7, Section 2.4 or the alternative allowable stress design load combinations of Section 1605.3.2. The quality and design of materials used structurally in excavations and foundations shall comply with the requirements specified in Chapters 16, 19, 21, 22 and 23. Excavations and fills shall comply with Chapter 33.

1803.5.1 Classification.

Soil materials shall be classified in accordance with ASTM D2487. Rock shall be classified in accordance with ASTM D5878.

1803.5.2 Questionable soil and rock.

Where the classification, strength, moisture sensitivity or compressibility of the soil or rock is in doubt or where a load-bearing value superior to that specified in this code is claimed, the *building official* shall be permitted to require that a geotechnical investigation be conducted.

1803.5.3 Expansive soil.

In areas likely to have expansive soil, the *building official* shall require soil tests to determine where such soils do exist. Soils meeting all four 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~~ [D6913](#).
3. More than 10 percent of the soil particles are less than 5 micrometers in size, determined in accordance with ASTM ~~D422~~ [D6913](#).
4. Expansion index greater than 20, determined in accordance with ASTM D4829.

1803.5.4 ~~Ground-water table~~ [Groundwater](#).

A ~~subsurface soil~~ [geotechnical](#) investigation shall be performed to determine ~~whether if~~:

1. ~~the existing ground-water table~~ [Groundwater](#) is above or within 5 feet (1524 mm) below the elevation of the lowest floor level where such floor is located below the finished ground level adjacent to the foundation; [and](#)
2. [the groundwater depth will affect the design and construction of buildings and structures.](#)

~~**Exception:** A subsurface soil investigation to determine the location of the ground-water table shall not be required where waterproofing is provided in accordance with Section 1805.~~

1803.5.6 Rock strata.

Where subsurface explorations at the project site indicate variations in the structure of rock on which foundations are to be constructed [on or in rock](#), ~~a sufficient number of borings shall be drilled to sufficient depths to~~ [the geotechnical investigation shall](#) assess the [variations in rock strata depth](#), competency, ~~of the rock~~ and ~~its~~ load-bearing capacity.

1803.5.7 Excavation near foundations.

Where excavation will reduce support from any foundation, a *registered design professional* shall prepare an assessment of the structure as determined from examination of the structure, ~~the review of~~ available design documents, [available subsurface data](#), and, if necessary, excavation of test pits. The *registered design professional* shall determine the requirements for ~~underpinning~~ [support](#) and protection [of any existing foundation](#) and prepare site-specific plans, details and sequence of work for submission. Such support shall be provided by underpinning, ~~sheeting and~~ bracing, [excavation retention systems](#), or by other means acceptable to the *building official*.

1804.1 Excavation near foundations.

Excavation for any purpose shall not reduce vertical or lateral support from any foundation or adjacent without first underpinning or protecting the foundation against detrimental lateral or vertical movement, or both, [in accordance with Section 1803.5.7](#).

1806.1 Load combinations.

The presumptive load-bearing values provided in Table 1806.2 shall be used with the *allowable stress design* load combinations specified in ASCE 7, Section 2.4 or the alternative allowable stress design load combinations of Section 1605.2. The values of vertical foundation pressure and lateral bearing pressure given in Table 1806.2 shall be permitted to be increased by one-third where used with the alternative ~~Basic~~ [allowable stress design](#) load combinations of Section 1605.2 that include wind or earthquake loads.

1806.2 Presumptive load-bearing values.

The load-bearing values used in design for supporting soils [and rock](#) near the surface shall not exceed the values specified in Table 1806.2 unless data to substantiate the use of higher values are submitted and *approved*. Where the *building official* has reason to doubt the classification, strength or compressibility of the soil [or rock](#), the requirements of Section 1803.5.2 shall be satisfied.

Presumptive load-bearing values shall apply to materials with similar physical and engineering characteristics ~~and dispositions~~. Mud, organic silt, and organic clays (OL, OH), peat (Pt) ~~or-unprepared and undocumented~~ fill shall not be assumed to have a presumptive load-bearing capacity unless data to substantiate the use of such a value are submitted.

Exception: A presumptive load-bearing capacity shall be permitted to be used where the *building official* deems the load-bearing capacity ~~of mud, organic silt or unprepared fill~~ is adequate for the support of lightweight or temporary structures.

1807.2.4 Segmental retaining walls.

Dry-cast concrete units used in the construction of segmental retaining walls shall comply with ASTM C1372.

1807.2.5 Guards.

Guards shall be provided at retaining walls in accordance with Sections 1807.2.5.1 through 1807.2.5.3.

Exception: Guards are not required at retaining walls not accessible to the public.

1807.2.5.1 Where required.

At retaining walls located within 36 inches (914mm) of walking surfaces, a guard shall be required between the walking surface and the open side of the retaining wall where the walking surface is located more than 30 inches (762 mm) measured vertically to the surface or grade below at any point within 36 inches (914mm) horizontally to the edge of the open side. Guards shall comply with Section 1607.9.

1807.2.5.2 Height.

Required guards at retaining walls shall comply with the height requirements of Section 1015.3.

1807.2.5.3 Opening limitations.

Required guards shall comply with the opening limitations of Section 1015.4.

1807.3 Embedded posts and poles.

Designs to resist both axial and lateral loads employing posts or poles as columns embedded in earth or in concrete footings in earth shall be in accordance with Sections 1807.3.1 through 1807.3 or ASABE EP 486.3.

1807.3.2.2 Constrained.

The following formula shall be used to determine the depth of embedment required to resist lateral loads where lateral constraint is provided at the ground surface, such as by a rigid floor or slab-on-ground pavement.

$$d = \sqrt{\frac{4.25Ph}{S_3b}} \quad \text{(Equation 18-2)}$$

or alternatively

$$d = \sqrt{\frac{4.25M_g}{S_3b}} \quad \text{(Equation 18-3)}$$

where:

M_g = Moment in the post at grade, in foot-pounds (kN-m).

S_3 = Allowable lateral soil-bearing pressure as set forth in Section 1806.2 based on a depth equal to the depth of embedment in pounds per square foot (kPa).

1808.3 Design loads.

Foundations shall be designed for the most unfavorable effects due to the combinations of loads specified [Section 2.3 or 2.4 of ASCE 7 or the alternative allowable stress design load combinations of](#) Section 1605.2 ~~or 1605.~~ The *dead load* is permitted to include the weight of foundations and overlying fill. Reduced *live loads*, as specified in Sections 1607.13 and ~~1607.14~~ [1607.14](#), shall be permitted to be used in the design of foundations.

1808.3.1 Seismic overturning. Where foundations are proportioned using the load combinations of ~~Section 1605.2 or 1605.3.1~~ [Section 2.3 or 2.4 of ASCE 7](#), and the computation of seismic overturning effects is by equivalent lateral force analysis or modal analysis, the proportioning shall be in accordance with Section 12.13.4 of ASCE 7.

1808.8.1 Concrete or grout strength and mix proportioning.

Concrete or grout in foundations shall have a specified compressive strength (f'_c) not less than the largest applicable value indicated in [Table 1808.8.1](#). ~~Where concrete is placed through a funnel hopper at the top of a deep foundation element, the concrete mix shall be designed and proportioned so as to produce a cohesive workable mix having a slump of not less than 4 inches (102 mm) and not more than 8 inches (204 mm).~~

[Where](#) concrete or grout is to be pumped, the mix design including slump shall be adjusted to produce a pumpable mixture.

1808.8.6 Seismic requirements.

See Section 1905 for additional requirements for foundations of structures assigned to *Seismic Design Category C, D, E or F*.

For structures assigned to *Seismic Design Category C, D, E or F*, provisions of Section 18.13 of ACI 318 shall apply where not in conflict with the provisions of Sections 1808 through 1810.

Exceptions [Exception](#): Detached one- and two-family *dwelling*s of *light-frame construction* and two stories or less above *grade plane* are not required to comply with the provisions of Section 18.13 of ACI 318.

~~Section 18.13.4.3(a) of ACI 318 shall not apply.~~

1809.5.1 Frost protection at required exits.

[Frost protection shall be provided at exterior landings for all required exits with outward-swinging doors. Frost protection shall only be required to the extent necessary to ensure the unobstructed opening of the required exit doors.](#)

1809.6 Location of footings.

Footings on granular soil shall be so located that the line drawn between the lower edges of ~~adjoining~~ [adjacent](#) footings shall not have a slope steeper than 30 degrees (0.52 rad) with the horizontal, unless the material supporting the higher footing is braced or retained or otherwise laterally supported in an *approved* manner or a greater slope has been properly established by engineering analysis.

1809.14 Grade beams.

[Grade beams shall comply with the provisions of ACI 318.](#)

Exception: [Grade Beams not subject to differential settlement exceeding one-fourth of the thresholds specified in ASCE 7 Table 12.13-3 and designed to resist the seismic load effects including overstrength factor in accordance with Section 2.3.6 or 2.4.5 of ASCE 7 need not comply with ACI 318 Section 18.13.3.1.](#)

1810.2.2 Stability.

Deep foundation elements shall be braced to provide lateral stability in all directions. Three or more elements connected by a rigid cap shall be considered to be braced, provided that the elements are located in radial directions from the centroid of the group not less than 60 degrees (1 rad) apart. A two-element group in a rigid cap shall be considered to be

braced along the axis connecting the two elements. Methods used to brace *deep foundation* elements shall be subject to the approval of the *building official*.

Deep foundation elements supporting walls shall be placed alternately in lines spaced not less than 1 foot (305 mm) apart and located symmetrically under the center of gravity of the wall load carried, unless effective measures are taken to provide for eccentricity and lateral forces, or the foundation elements are adequately braced to provide for lateral stability.

Exceptions:

1. Isolated cast-in-place *deep foundation* elements without lateral bracing shall be permitted where the least horizontal dimension is not less than 2 feet (610 mm), adequate lateral support in accordance with Section 1810.2.1 is provided for the entire height and [analysis demonstrates that the element can support the required loads, including mislocations required by Section 1810.3.1.3, with neither harmful distortion nor instability in the structure](#) ~~the height does not exceed 12 times the least horizontal dimension.~~
2. A single row of *deep foundation* elements without lateral bracing is permitted for one- and two-family dwellings and lightweight construction not exceeding two *stories above grade plane* or 35 feet (10 668 mm) in *building height*, provided that the centers of the elements are located within the width of the supported wall.

TABLE 1810.3.2.6

ALLOWABLE STRESSES FOR MATERIALS USED IN DEEP FOUNDATION ELEMENTS

MATERIAL TYPE AND CONDITION	MAXIMUM ALLOWABLE STRESS ^a
1. Concrete or grout in compression^b Cast-in-place with a permanent casing in accordance with Section 1810.3.2.7 or Section 1810.3.5.3.4 Cast-in-place in a pipe, tube, other permanent casing or rock Cast-in-place without a permanent casing Precast nonprestressed Precast prestressed	0.4 f 'c 0.33 f 'c 0.3 f 'c 0.33 f 'c 0.33 f 'c - 0.27 fpc
2. Nonprestressed reinforcement in compression	0.4 f_y ≤ 30,000 psi
3. Steel in compression Cores within concrete-filled pipes or tubes Pipes, tubes or H-piles, where justified in accordance with Section 1810.3.2.8 Pipes or tubes for micropiles Other pipes, tubes or H-piles Helical piles	0.5 F _y ≤ 32,000 psi 0.5 F _y ≤ 32,000 psi 0.4 F _y ≤ 32,000 psi 0.35 F _y ≤ 16,000 24,000 psi 0.6 F _y ≤ 0.5 F _u
4. Nonprestressed reinforcement in tension Within micropiles Other conditions For load combinations that do not include wind or seismic loads For load combinations that include wind or seismic loads	0.6 f _y 0.5 f _y ≤ 24,000 30,000 psi 0.5 f_y ≤ 40,000 psi
5. Steel in tension Pipes, tubes or H-piles, where justified in accordance with Section 1810.3.2.8 Other pipes, tubes or H-piles Helical piles	0.5 F _y ≤ 32,000 psi 0.35 F _y ≤ 16,000 24,000 psi 0.6 F _y ≤ 0.5 F _u
6. Timber	In accordance with the ANSI/AWC NDS

a. f'_c is the specified compressive strength of the concrete or grout; f_{pc} is the compressive stress on the gross concrete section due to effective prestress forces only; f_y is the specified yield strength of reinforcement; F_y is the specified minimum yield stress of steel; F_u is the specified minimum tensile stress of structural steel.

b. The stresses specified apply to the gross cross-sectional area ~~within the concrete surface~~ of the concrete for precast prestressed piles and to the net cross-sectional area for all other piles. Where a temporary or permanent casing is used, the inside face of the casing shall be considered ~~to be the outer edge of~~ the concrete ~~surface~~ cross-section.

1810.3.2.8 Justification of higher allowable stresses.

Use of allowable stresses ~~greater than those specified in Section~~ in Table 1810.3.2.6 that must be justified in accordance with this section shall be permitted where supporting data justifying such higher stresses is ~~filed with~~ submitted to and approved by the *building official*. Such substantiating data shall include the following:

1. A geotechnical investigation in accordance with Section 1803.
2. Load tests in accordance with Section 1810.3.3.1.2, regardless of the load supported by the element.

The design and installation of *deep foundation* elements shall be under the direct supervision of a *registered design professional* knowledgeable in the field of soil mechanics and deep foundations who shall submit a report to the *building official* stating that the elements as installed satisfy the design criteria.

1810.3.3.1 Allowable axial load.

The allowable axial load on a deep foundation element shall be determined in accordance with Sections 1810.3.3.1.1 through 1810.3.3.1.9.

Exception: Where approved by the building official, load testing is not required.

1810.3.3.1.9 Helical piles.

The allowable axial design *load*, P_a , of *helical piles* shall be determined as follows:

$$P_a = 0.5 P_u$$

(Equation 18-4)

where P_u is the least value of:

1. Base capacity plus shaft resistance of the helical pile. The base capacity is equal to the sum ~~Sum~~ of the areas of the helical bearing plates times the ultimate bearing capacity of the soil or rock comprising the bearing stratum. The shaft resistance is equal to the area of the shaft above the uppermost helical bearing plate times the ultimate skin resistance.
2. Ultimate capacity determined from well-documented correlations with installation torque.
3. Ultimate capacity determined from load tests where required by Section 1810.3.3.1.2.
4. Ultimate axial capacity of pile shaft.
5. Ultimate axial capacity of pile shaft couplings.
6. Sum of the ultimate axial capacity of helical bearing plates affixed to pile.

1810.3.3.2 Allowable lateral load.

Where required by the design, the lateral load capacity of a single *deep foundation* element or a group thereof shall be determined by an *approved* method of analysis or by lateral load tests to not less than twice the proposed design working *load*. The resulting allowable lateral *load* shall not be more than one-half of the *load* that produces a gross lateral movement of 1 inch (25 mm) at the lower of the top of the foundation element and the ground surface, unless it can be shown that the predicted lateral movement shall cause neither harmful distortion of, nor instability in, the structure, nor cause any element to be loaded beyond its capacity. Group effects shall be evaluated where required by Section 1810.2.5.

1810.3.4 Subsiding soils [or strata](#).

Where *deep foundation* elements are installed through subsiding ~~fills-soils~~ or other subsiding strata and derive support from underlying firmer materials, consideration shall be given to the downward frictional forces potentially imposed on the elements by the subsiding upper strata. Where the influence of subsiding ~~fills-soils or strata~~ is considered as imposing loads on the element, the allowable stresses specified in this chapter shall be permitted to be increased where satisfactory substantiating data are submitted.

1810.3.5.3.1 Structural steel H-piles.

Sections of structural steel H-piles shall comply with the requirements for HP shapes in ASTM A6, or the following:

1. The flange projections shall not exceed 14 times the minimum thickness of metal in either the flange or the web and the flange widths shall be not less than 80 percent of the depth of the section.
2. The nominal depth in the direction of the web shall be not less than 8 inches (203 mm).
3. Flanges and web shall have a minimum nominal thickness of 3/8 inch (9.5 mm).

[For structures assigned to Seismic Design Category D, E or F, design and detailing of H-piles shall also conform to the requirements of AISC 341.](#)

1810.3.6 Splices.

Splices shall be constructed so as to provide and maintain true alignment and position of the component parts of the *deep foundation* element during installation and subsequent thereto and shall be designed to resist the axial and shear forces and moments occurring at the location of the splice during driving and for design load combinations. Where *deep foundation* elements of the same type are being spliced, splices shall develop not less than 50 percent of the bending strength of the weaker section. Where *deep foundation* elements of different materials or different types are being spliced, splices shall develop the full compressive strength and not less than 50 percent of the tension and bending strength of the weaker section. Where structural steel cores are to be spliced, the ends shall be milled or ground to provide full contact and shall be full-depth welded.

[Exception: For buildings assigned to Seismic Design Category A or B, splices need not comply with the 50-percent tension and bending strength requirements where justified by supporting data.](#)

Splices occurring in the upper 10 feet (3048 mm) of the embedded portion of an element shall be designed to resist at allowable stresses the moment and shear that would result from an assumed eccentricity of the axial load of 3 inches (76 mm), or the element shall be braced in accordance with Section 1810.2.2 to other deep foundation elements that do not have splices in the upper 10 feet (3048 mm) of embedment.

1810.3.8 Precast concrete piles.

Precast concrete piles shall be designed and detailed in accordance ~~with Sections 1810.3.8.1 through 1810.3.8.3~~ [ACI 318](#).

[Exceptions:](#)

1. [For precast prestressed piles in Seismic Design Category C, the minimum volumetric ratio of spirals or circular hoops required by Section 18.13.5.10.4 of ACI 318 shall not apply in cases where the design includes full consideration of load combinations specified in ASCE 7, Section 2.3.6 or Section 2.4.5 and the applicable overstrength factor, \$\Omega\$ 0. In such cases, minimum transverse reinforcement index shall be as specified in Section 13.4.5.6 of ACI 318.](#)
2. [For precast prestressed piles in Seismic Design Categories D through F and in Site Class A, B, BC, C, CD, D or DE sites, the minimum volumetric ratio of spirals or circular hoops required by Section 18.13.5.10.5\(c\) of ACI 318 shall not apply in cases where the design includes full consideration of load combinations specified in ASCE 7, Section 2.3.6 or Section 2.4.5 and the applicable overstrength factor, \$\Omega\$ 0. In such cases, minimum transverse reinforcement shall be as specified in Section 13.4.5.6 of ACI 318.](#)

~~1810.3.8.1 Reinforcement.~~

Longitudinal steel shall be arranged in a symmetrical pattern and be laterally tied with steel ties or wire spiral spaced center to center as follows:

- 1.—At not more than 1 inch (25 mm) for the first five ties or spirals at each end; then
- 2.—At not more than 4 inches (102 mm), for the remainder of the first 2 feet (610 mm) from each end; and then
- 3.—At not more than 6 inches (152 mm) elsewhere.

The size of ties and spirals shall be as follows:

- 1.—For piles having a least horizontal dimension of 16 inches (406 mm) or less, wire shall not be smaller than 0.22 inch (5.6 mm) (No. 5 gage).
- 2.—For piles having a least horizontal dimension of more than 16 inches (406 mm) and less than 20 inches (508 mm), wire shall not be smaller than 0.238 inch (6 mm) (No. 4 gage).
- 3.—For piles having a least horizontal dimension of 20 inches (508 mm) and larger, wire shall not be smaller than $\frac{3}{4}$ -inch (6.4 mm) round or 0.259 inch (6.6 mm) (No. 3 gage).

1810.3.8.2 Precast nonprestressed piles.

Precast nonprestressed concrete piles shall comply with the requirements of Sections 1810.3.8.2.1 through 1810.3.8.2.3.

1810.3.8.2.1 Minimum reinforcement.

Longitudinal reinforcement shall consist of not fewer than four bars with a minimum longitudinal reinforcement ratio of 0.008.

1810.3.8.2.2 Seismic reinforcement in Seismic Design Categories C through F.

For structures assigned to Seismic Design Category C, D, E or F, precast nonprestressed piles shall be reinforced as specified in this section. The minimum longitudinal reinforcement ratio shall be 0.01 throughout the length. Transverse reinforcement shall consist of closed ties or spirals with a minimum $\frac{3}{8}$ inch (9.5 mm) diameter. Spacing of transverse reinforcement shall not exceed the smaller of eight times the diameter of the smallest longitudinal bar or 6 inches (152 mm) within a distance of three times the least pile dimension from the bottom of the pile cap. Spacing of transverse reinforcement shall not exceed 6 inches (152 mm) throughout the remainder of the pile.

1810.3.8.2.3 Additional seismic reinforcement in Seismic Design Categories D through F.

For structures assigned to Seismic Design Category D, E or F, transverse reinforcement shall be in accordance with Section 1810.3.9.4.2.

1810.3.8.3 Precast prestressed piles.

Precast prestressed concrete piles shall comply with the requirements of Sections 1810.3.8.3.1 through 1810.3.8.3.3.

1810.3.8.3.1 Effective prestress.

The effective prestress in the pile shall be not less than 400 psi (2.76 MPa) for piles up to 30 feet (9144 mm) in length, 550 psi (3.79 MPa) for piles up to 50 feet (15 240 mm) in length and 700 psi (4.83 MPa) for piles greater than 50 feet (15 240 mm) in length.

Effective prestress shall be based on an assumed loss of 30,000 psi (207 MPa) in the prestressing steel. The tensile stress in the prestressing steel shall not exceed the values specified in ACI 318.

1810.3.8.3.2 Seismic reinforcement in Seismic Design Category C.

For structures assigned to *Seismic Design Category C*, precast prestressed piles shall have transverse reinforcement in accordance with this section. The volumetric ratio of spiral reinforcement shall not be less than the amount required by the following formula for the upper 20 feet (6096 mm) of the pile:

$$\rho_s = 0.04(f'_c/f_{yh})[2.8 + 2.34P/f'_c A_g] \quad (\text{Equation 18-5})$$

where:

A_g = Pile cross-sectional area square inches (mm²).

f'_c = Specified compressive strength of concrete, psi (MPa).

f_{yh} = Yield strength of spiral reinforcement $\leq$ 85,000 psi (586 MPa).

P = Axial load on pile, pounds (kN), as determined from Equations 16-5 and 16-7.

ρ_s = Spiral reinforcement index or volumetric ratio (vol. spiral/vol. core).

Not less than one-half the volumetric ratio required by Equation 18-5 shall be provided below the upper 20 feet (6096 mm) of the pile.

Exception: The minimum spiral reinforcement index required by Equation 18-5 shall not apply in cases where the design includes full consideration of load combinations specified in ASCE 7, Section 2.3.6 and the applicable overstrength factor, Ω_0 . In such cases, minimum spiral reinforcement index shall be as specified in Section 1810.3.8.1.

1810.3.8.3.3 Seismic reinforcement in Seismic Design Categories D through F.

For structures assigned to *Seismic Design Category D, E or F*, precast prestressed piles shall have transverse reinforcement in accordance with the following:

1. Requirements in ACI 318, Chapter 18, need not apply, unless specifically referenced.
2. Where the total pile length in the soil is 35 feet (10 668 mm) or less, the lateral transverse reinforcement in the ductile region shall occur through the length of the pile. Where the pile length exceeds 35 feet (10 668 mm), the ductile pile region shall be taken as the greater of 35 feet (10 668 mm) or the distance from the underside of the pile cap to the point of zero curvature plus three times the least pile dimension.
3. In the ductile region, the center to center spacing of the spirals or hoop reinforcement shall not exceed one-fifth of the least pile dimension, six times the diameter of the longitudinal strand or 8 inches (203 mm), whichever is smallest.
4. Circular spiral reinforcement shall be spliced by lapping one full turn and bending the end of each spiral to a 90-degree hook or by use of a mechanical or welded splice complying with Section 25.5.7 of ACI 318.
5. Where the transverse reinforcement consists of circular spirals, the volumetric ratio of spiral transverse reinforcement in the ductile region shall comply with the following:

$$\rho_s = 0.06(f'_c/f_{yh})[2.8 + 2.34P/f'_c A_g] \quad (\text{Equation 18-6})$$

but not exceed:

$$\rho_s = 0.021 \quad (\text{Equation 18-7})$$

where:

g = Pile cross-sectional area, square inches (mm²).

c = Specified compressive strength of concrete, psi (MPa).

F_y = Yield strength of spiral reinforcement—85,000 psi (586 MPa).

P = Axial load on pile, pounds (kN), as determined from Equations 16-5 and 16-7.

P_s = Volumetric ratio (vol. spiral/vol. core).

This required amount of spiral reinforcement is permitted to be obtained by providing an inner and outer spiral.

Exception: The minimum spiral reinforcement required by Equation 18-6 shall not apply in cases where the design includes full consideration of load combinations specified in

ASCE 7, Section 2.3.6 and the applicable overstrength factor, Ω_0 . In such cases, minimum spiral reinforcement shall be as specified in Section 1810.3.8.1.

6. Where transverse reinforcement consists of rectangular hoops and cross ties, the total cross-sectional area of lateral transverse reinforcement in the ductile region with spacing, s , and perpendicular dimension, h_c , shall conform to:

$$A_{sh} = 0.3s h_c (f'_c / f'_{yh}) (A_g / A_{sh} - 1.0) / [0.5 + 1.4P / (f'_c A_g)] \quad (\text{Equation 18-8})$$

but not less than:

$$A_{sh} = 0.12s h_c (f'_c / f'_{yh}) [0.5 + 1.4P / (f'_c A_g)] \quad (\text{Equation 18-9})$$

where:

f_{yh} = yield strength of transverse reinforcement $\leq 70,000$ psi (483 MPa).

h_c = Cross-sectional dimension of pile core measured center to center of hoop reinforcement, inch (mm).

s = Spacing of transverse reinforcement measured along length of pile, inch (mm).

A_{sh} = Cross-sectional area of transverse reinforcement, square inches (mm²).

f'_c = Specified compressive strength of concrete, psi (MPa).

The hoops and cross ties shall be equivalent to deformed bars not less than No. 3 in size. Rectangular hoop ends shall terminate at a corner with seismic hooks.

Outside of the length of the pile requiring transverse confinement reinforcing, the spiral or hoop reinforcing with a volumetric ratio not less than one-half of that required for transverse confinement reinforcing shall be provided.

1810.3.8.3.4 Axial load limit in Seismic Design Categories C through F.

For structures assigned to Seismic Design Category C, D, E, or F, the maximum factored axial load on precast prestressed piles subjected to a combination of seismic lateral force and axial load shall not exceed the following values:

1. $0.2f'_c A_g$ for square piles

2. $0.4f'_c A$

1810.3.9.2 Required reinforcement.

Where subject to uplift or where the required moment strength determined using the load combinations of [ASCE 7, Section 2.3](#) exceeds the design cracking moment determined in accordance with Section 1810.3.9.1, cast-in-place deep foundations not enclosed by a structural steel pipe or tube shall be reinforced. [Where reinforcement is required it shall be in compliance with Chapter 20 of ACI 318.](#)

1810.3.9.4.2 Seismic reinforcement in Seismic Design Category D through F.

Portions of this section not shown remain unchanged and were omitted for clarity

4. The distance from the top of the element to the point where the design cracking moment determined in accordance with Section 1810.3.9.1 exceeds the required moment strength determined using the load combinations of [ASCE 7](#), Section [2.3](#), ~~1605.2~~.

1810.3.9.4.2.1 Site Classes A through ~~D~~E.

For Site Class A, B, [BC](#), C, [CD](#), [D](#) or ~~D~~ [DE](#) sites, transverse confinement reinforcement shall be provided in the element in accordance with Sections 18.7.5.2, 18.7.5.3 and 18.7.5.4 of ACI 318 within three times the least element dimension of the bottom of the pile cap. A transverse spiral reinforcement ratio of not less than one-half of that required in Table 18.10.6.4(g) of ACI 318 shall be permitted.

1810.3.11 Pile caps.

Pile caps shall conform with ACI 318 and this section. Pile caps shall be of reinforced concrete, and shall include all elements to which vertical *deep foundation* elements are connected, including grade beams and mats. The soil immediately below the pile cap shall not be considered as carrying any vertical load, with the exception of a *combined pile raft*. The tops of vertical *deep foundation* elements shall be embedded not less than 3 inches (76 mm) into pile caps and the caps shall extend not less than 4 inches (102 mm) beyond the edges of the elements. The tops of elements shall be cut or chipped back to sound material before capping.

1810.3.11.1 Seismic Design Categories C through F.

For structures assigned to *Seismic Design Category* C, D, E or F, concrete *deep foundation* elements shall be connected to the pile cap ~~by embedding the element reinforcement or field-placed dowels anchored in the element into the pile cap for a distance equal to their development length~~ in accordance [with ACI 318](#). ~~It shall be permitted to connect precast prestressed piles to the pile cap by developing the element prestressing strands into the pile cap provided that the connection is ductile. For deformed bars, the development length is the full development length for compression, or tension in the case of uplift, without reduction for excess reinforcement in accordance with Section 25.4.10 of ACI 318. Alternative measures for laterally confining concrete and maintaining toughness and ductile-like behavior at the top of the element shall be permitted provided that the design is such that any hinging occurs in the confined region. The minimum transverse steel ratio for confinement shall be not less than one-half of that required for columns.~~ [For](#) resistance to uplift forces, anchorage of steel pipes, tubes or H-piles to the pile cap shall be made by means other than concrete bond to the bare steel section. Concrete-filled steel pipes or tubes shall have reinforcement of not less than 0.01 times the cross-sectional area of the concrete fill developed into the cap and extending into the fill a length equal to two times the required cap embedment, but not less than the development length in tension of the reinforcement.

1810.3.11.2 Seismic Design Categories D through F.

For structures assigned to *Seismic Design Category* D, E or F, *deep foundation* element resistance to uplift forces or rotational restraint shall be provided by anchorage into the pile cap, designed considering the combined effect of axial forces due to uplift and bending moments due to fixity to the pile cap. Anchorage shall develop not less than 25 percent of the strength of the element in tension. Anchorage into the pile cap shall comply with the following:

1. In the case of uplift, the anchorage shall be capable of developing the least of the following:
 - 1.1. The nominal tensile strength of the longitudinal reinforcement in a concrete element.
 - 1.2. The nominal tensile strength of a steel element.
 - 1.3. The frictional force developed between the element and the soil multiplied by 1.3.

Exception: The anchorage is permitted to be designed to resist the axial tension force resulting from the seismic load effects including overstrength factor in accordance with Section 2.3.6 or 2.4.5 of ASCE 7.

2. In the case of rotational restraint, the anchorage shall be designed to resist the axial and shear forces, and moments resulting from the seismic load effects including overstrength factor in accordance with Section 2.3.6

or 2.4.5 of ASCE 7 or the anchorage shall be capable of developing the full axial, bending and shear nominal strength of the element.

3. The connection between the pile cap and the steel H-piles or unfilled steel pipe piles in structures assigned to Seismic Design Category D, E or F shall be designed for a tensile force of not less than 10 percent of the pile compression capacity.

Exceptions:

1. Connection tensile capacity need not exceed the strength required to resist seismic load effects including overstrength of ASCE 7 Section 12.4.3 or 12.14.3.2.
2. Connections need not be provided where the foundation or supported structure does not rely on the tensile capacity of the piles for stability under the design seismic force.

1810.3.12 Grade beams.

~~For structures assigned to Seismic Design Category D, E or F, grade~~ Grade beams shall comply with the provisions ~~in Section 18.13.3 of ACI 318 for grade beams, except where they are designed to resist the seismic load effects including overstrength factor in accordance with Section 2.3.6 or 2.4.5 of ASCE 7.~~

Exception: Grade beams not subject to differential settlement exceeding one-fourth of the thresholds specified in ASCE 7 Table 12.13-3 and designed to resist the seismic load effects including overstrength factor in accordance with Section 2.3.6 or 2.4.5 of ASCE 7 need not comply with ACI 318 Section 18.13.3.1.

1810.3.13 Seismic ties.

~~For structures assigned to Seismic Design Category C, D, E or F, individual deep foundations shall be interconnected by ties. Unless it can be demonstrated that equivalent restraint is provided by reinforced concrete beams within slabs on grade or reinforced concrete slabs on grade or confinement by competent rock, hard cohesive soils or very dense granular soils, ties shall be capable of carrying, in tension or compression, a force equal to the lesser of the product of the larger pile cap or column design gravity load times the seismic coefficient, SDS, divided by 10, and 25 percent of the smaller pile or column design gravity load.~~ Seismic ties shall comply with the provisions of ACI 318.

Exception: In Group R-3 and U occupancies of *light-frame construction*, *deep foundation* elements supporting foundation walls, isolated interior posts detailed so the element is not subject to lateral loads or exterior decks and patios are not subject to interconnection where the soils are of adequate stiffness, subject to the approval of the *building official*.

1810.4.1.2 ~~Casing.~~ Shafts in unstable soils.

Where cast-in-place *deep foundation* elements are formed through unstable soils ~~and concrete is placed in an open drilled hole, a casing shall be inserted in the hole,~~ the open hole shall be stabilized by a casing, slurry, or other approved method prior to placing the concrete. Where the casing is withdrawn during concreting, the level of concrete shall be maintained above the bottom of the casing at a sufficient height to offset any hydrostatic or lateral soil pressure. Driven casings shall be mandrel driven their full length in contact with the surrounding soil.

1810.4.1.3 Driving near uncased concrete.

Deep foundation elements shall not be driven within six element diameters center to center in granular soils or within one-half the element length in cohesive soils of an uncased element filled with concrete less than 48 hours old unless *approved* by the *building official*. If driving near uncased concrete elements causes the concrete surface in any completed element ~~rises or drops~~ to rise or drop significantly or bleed additional water, the completed element shall be replaced. ~~-Driven uncased deep foundation elements shall not be installed in soils that could cause heave.~~

1810.4.5 Vibratory driving.

Vibratory drivers shall only be used to install *deep foundation* elements where the element load capacity is verified by load tests in accordance with Section 1810.3.3.1.2. ~~The installation of production elements shall be controlled according~~

~~to power consumption, rate of penetration or other approved means that ensure element capacities equal or exceed those of the test elements.~~

Exceptions:

1. The pile installation is completed by driving with an impact hammer in accordance with Section 1810.3.3.1.1.
2. The pile is to be used only for lateral resistance.

The installation of production elements shall be controlled according to power consumption, rate of penetration or other approved means that ensure element capacities equal or exceed those of the test elements.

1810.4.11 Helical piles.

Helical piles shall be installed to specified embedment depth and torsional resistance criteria as determined by a *registered design professional*. The torque applied during installation shall not exceed the manufacturer's rated maximum ~~allowable~~ installation torque resistance of the *helical pile*.

Chapter 19 Concrete

1901.2 Plain and reinforced concrete.

Structural concrete shall be designed and constructed in accordance with the requirements of this chapter and ACI 318 as ~~amended~~ supplemented in Section 1905 of this code. ~~Except for the provisions of Sections 1904 and 1907, the design and construction of slabs on grade shall not be governed by this chapter unless they transmit vertical loads or lateral forces from other parts of the structure to the soil. Precast concrete diaphragms in buildings assigned to Seismic Design Category C, D, E or F shall be designed in accordance with the requirements of ASCE 7, Section 14.2.4.~~

1901.2.1 Structural concrete with GFRP reinforcement.

Cast-in-place structural concrete internally reinforced with glass fiber reinforced polymer (GFRP) reinforcement conforming to ASTM D7957 and designed in accordance with ACI CODE 440.11 shall be permitted where fire-resistance ratings are not required and only for structures assigned to *Seismic Design Category A*.

1901.3 Anchoring to concrete.

Anchoring to concrete shall be in accordance with ACI 318 as ~~amended~~ supplemented in Section 1905, and applies to cast-in (headed bolts, headed studs and hooked J- or L-bolts), post-installed expansion (torque- controlled and displacement-controlled), undercut, screw, and adhesive anchors.

1901.7 Tolerances for structural concrete.

Where not indicated in *construction documents*, structural tolerances for concrete structural elements shall be in accordance with this section.

1901.7.1 Cast-in-place concrete tolerances.

Structural tolerances for cast-in-place concrete structural elements shall be in accordance with ACI 117.

Exceptions:

1. Group R-3 detached one- or two-family *dwelling*s are not required to comply with this section.
2. Shotcrete is not required to comply with this section.

1901.7.2 Precast concrete tolerances.

Structural tolerances for precast concrete structural elements shall be in accordance with ACI ITG-7.

Exception: Group R-3 detached one- or two-family *dwelling*s are not required to comply with this section.

SECTION 1902

~~DEFINITIONS~~ COORDINATION OF TERMINOLOGY

1902.1 General.

~~The words and terms defined in ACI 318 shall, for the purposes of this chapter and as used elsewhere in this code for concrete construction, have the meanings shown in ACI 318 as modified by Section 1905.1.1. Coordination of terminology used in ACI 318 and ASCE 7 shall be in accordance with Sections 1902.1.1.~~

1902.1.1 Design displacement.

Design displacement shall be the Design Earthquake Displacement, δ_{DE} , defined in ASCE 7 Section 12.8.6.3. For diaphragms that can be idealized as rigid in accordance with ASCE 7 Section 12.3.1.2, δ_{di} , displacement due to diaphragm deformation corresponding to the design earthquake, is permitted to be taken as zero.

SECTION 1903

SPECIFICATIONS FOR TESTS AND MATERIALS

1903.1 General.

Materials used to produce concrete, concrete itself and testing thereof shall comply with the applicable standards listed in ACI 318.

~~Exception:~~ The following standards as referenced in ~~Chapter 35~~ shall be permitted to be used.

- ~~1.—ASTM C150~~
- ~~2.—ASTM C595~~
- ~~3.—ASTM C1157~~

~~1903.2 Special inspections.~~ Where required, special inspections and tests shall be in accordance with ~~Chapter 17.~~

1903.2 ~~1903.3~~ Glass fiber-reinforced concrete.

~~Glass fiber-reinforced concrete (GFRC) and the materials used in such concrete shall be in accordance with the PCI MNL 128 standard.~~

SECTION 1905 SEISMIC REQUIREMENTS ~~MODIFICATIONS TO ACI 318~~

1905.1 General.

In addition to the provisions of ACI 318, structural concrete shall comply with the requirements of Section 1905. ~~The text of ACI 318 shall be modified as indicated in Sections 1905.1.1 through 1905.1.8.~~

1905.2 ~~1905.1.1~~ ACI 318, Section 2.3.

Modify existing definitions and add the following definitions to ACI 318, Section 2.3.

CAST-IN-PLACE CONCRETE EQUIVALENT DIAPHRAGM. A cast-in-place noncomposite topping slab diaphragm, as defined in Section 18.12.5, or a diaphragm constructed with precast concrete components that uses closure strips between precast components with detailing that meets the requirements of ACI 318 for the Seismic Design Category of the structure.

DETAILED PLAIN CONCRETE STRUCTURAL WALL. A wall complying with the requirements of Chapter 14, and Section 1905.5 of the *International Building Code*.

ORDINARY PLAIN CONCRETE STRUCTURAL WALL. A wall complying with the requirements of Chapter 14, excluding 14.6.2.

ORDINARY PRECAST STRUCTURAL WALL. A precast wall complying with the requirements of Chapters 1 through 13, 15, 16 and 19 through 26.

ORDINARY REINFORCED CONCRETE STRUCTURAL WALL. A cast-in-place wall complying with the requirements of Chapters 1 through 13, 15, 16 and through 26.

PRECAST CONCRETE DIAPHRAGM. A *diaphragm* constructed with precast concrete components, with or without a cast-in-place topping, that includes the use of discrete connectors or joint reinforcement to transmit *diaphragm* forces.

~~**SPECIAL STRUCTURAL WALL.** A cast-in-place or precast wall complying with the requirements of 18.2.4 through 18.2.8, 18.10 and 18.11, as applicable, in addition to the requirements for ordinary reinforced concrete structural walls or ordinary precast structural walls, as applicable. Where ASCE 7 refers to a “special reinforced concrete structural wall,” it shall be deemed to mean a “special structural wall.”~~

~~**1905.1.2 ACI 318, Section 1821.**~~

Modify ACI 318 Sections 18.2.1.2 and 18.2.1.6 to read as follows:

- ~~• 18.2.1.2 Structures assigned to Seismic Design Category A shall satisfy requirements of Chapters 1 through 17 and 19 through 26; Chapter 18 does not apply. Structures assigned to Seismic Design Category B, C, D, E or F shall satisfy 18.2.1.3 through 18.2.1.7, as applicable. Except for structural elements of plain concrete complying with Section 1905.1.7 of the International Building Code, structural elements of plain concrete are prohibited in structures assigned to Seismic Design Category C, D, E or F.~~
- ~~• 18.2.1.6 Structural systems designated as part of the seismic force-resisting system shall be restricted to those permitted by ASCE 7. Except for Seismic Design Category A, for which Chapter 18 does not apply, the following provisions shall be satisfied for each structural system designated as part of the seismic force-resisting system, regardless of the seismic design category:~~
 - ~~1. Ordinary moment frames shall satisfy 18.3.~~
 - ~~2. Ordinary reinforced concrete structural walls and ordinary precast structural walls need not satisfy any provisions in Chapter 18.~~
 - ~~3. Intermediate moment frames shall satisfy 18.4.~~
 - ~~4. Intermediate precast structural walls shall satisfy 18.5.~~
 - ~~5. Special moment frames shall satisfy 18.6 through 18.9.~~
 - ~~6. Special structural walls shall satisfy 18.10.~~
 - ~~7. Special structural walls constructed using precast concrete shall satisfy 18.11.~~
 - ~~8. Special moment frames and special structural walls shall also satisfy 18.2.4 through 18.2.8.~~

~~**1905.1.4 ACI 318, Section 1811.**~~

Modify ACI 318, Section 18.11.2.1 to read as follows:

- ~~a) 18.11.2.1 Special structural walls constructed using precast concrete shall satisfy all the requirements of 18.10 for cast-in-place special structural walls in addition to 18.5.2.~~

1905.3 1905.1.3 Intermediate precast structural walls ACI 318, Section 185.

Intermediate precast structural walls shall comply with Section 18.5 of ACI 318 and this section.

Modify ACI 318, Section 18.5 by adding new Section 18.5.2.2 and renumbering existing Sections 18.5.2.2 and 18.5.2.3 to become 18.5.2.3 and 18.5.2.4, respectively.

- ~~Connections that are designed to yield shall be capable of maintaining 80 percent of their design strength at the deformation induced by the design displacement or shall use Type 2 mechanical splices.~~
- ~~Elements of the connection that are not designed to yield shall develop at least $1.5 S_y$.~~
- ~~In structures assigned to SDC D, E or F, wall piers shall be designed in accordance with 18.10.8 or 18.14 in ACI 318.~~

1905.3.1 Connections designed to yield.

Connections that are designed to yield shall be capable of maintaining 80 percent of their design strength at the deformation induced by the design displacement or shall use Type 2 mechanical splices.

1905.4 ~~1905.1.5~~ **Foundations designed to resist earthquake forces** ~~ACI 318, Section 18.13.1.~~

Foundations resisting earthquake-induced forces or transferring earthquake-induced forces between a structure and ground shall comply with the requirements of Section 18.13 of ACI 318 and other applicable provisions of ACI 318 unless modified by Chapter 18.

~~Modify ACI 318, Section 18.13.1.1 to read as follows:~~

- ~~b) 18.13.1.1 Foundations resisting earthquake-induced forces or transferring earthquake-induced forces between a structure and ground shall comply with the requirements of 18.13 and other applicable provisions of ACI 318 unless modified by Chapter 18 of the International Building Code.~~

1905.5 ~~1905.1.6~~ **Detailed plain concrete structural walls** ~~ACI 318, Section 14.6.~~

Detailed plain concrete structural walls are walls conforming to the requirements of ordinary plain concrete structural walls and Section 1905.5.1.

~~Modify ACI 318, Section 14.6 by adding new Section 14.6.2 to read as follows:~~

- ~~14.6.2 Detailed plain concrete structural walls.~~
 - ~~14.6.2.1 Detailed plain concrete structural walls are walls conforming to the requirements of ordinary structural plain concrete walls and 14.6.2.2.~~
 - ~~14.6.2.2 Reinforcement shall be provided as follows:~~
 - ~~a) Vertical reinforcement of at least 0.20 square inch (129 mm^2) in cross-sectional area shall be provided continuously from support to support at each corner, at each side of each opening and at the ends of walls. The continuous vertical bar required beside an opening is permitted to substitute for one of the two No. 5 bars required by 14.6.1.~~
 - ~~b) Horizontal reinforcement at least 0.20 square inch (129 mm^2) in cross-sectional area shall be provided:~~
 - ~~1. Continuously at structurally connected roof and floor levels and at the top of walls.~~
 - ~~2. At the bottom of load-bearing walls or in the top of foundations where doweled to the wall.~~
 - ~~3. At a maximum spacing of 120 inches (3048 mm).~~
- ~~Reinforcement at the top and bottom of openings, where used in determining the maximum spacing specified in Item 3 above, shall be continuous in the wall.~~

1905.5.1 Reinforcement.

Reinforcement shall be provided as follows:

1. Vertical reinforcement of at least 0.20 square inch (129 mm^2) in cross-sectional area shall be provided continuously from support to support at each corner, at each side of each opening, and at the ends of walls. The

continuous vertical bar required beside an opening is permitted to substitute for one of the two No. 5 bars required by Section 14.6.1 of ACI 318.

2. Horizontal reinforcement of not less than 0.20 square inch (129 mm²) in cross-sectional area shall be provided:
 - 2.1 Continuously at structurally connected roof and floor levels and at the top of walls.
 - 2.2 At the bottom of load-bearing walls or in the top of foundations where doweled to the wall.
 - 2.3 At a maximum spacing of 120 inches (3048 mm).

Reinforcement at the top and bottom of openings, where used in determining the maximum spacing specified in Item 2.3 above, shall be continuous in the wall.

1905.6 1905.1.7 Structural plain concrete ~~ACI 318, Section 14.14.~~

Structural plain concrete elements shall comply with this section in lieu of Section 14.1.4 of ACI 318. Delete ACI 318, Section 14.1.4 and replace with the following:

- ~~• 14.1.4 Plain concrete in structures assigned to Seismic Design Category C, D, E or F.~~
- ~~• 14.1.4.1 Structures assigned to Seismic Design Category C, D, E or F shall not have elements of structural plain concrete, except as follows:~~
 - ~~○ Structural plain concrete basement, foundation or other walls below the base as defined in ASCE 7 are permitted in detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls. In dwellings assigned to Seismic Design Category D or E, the height of the wall shall not exceed 8 feet (2438 mm), the thickness shall be not less than 7½ inches (190 mm), and the wall shall retain no more than 4 feet (1219 mm) of unbalanced fill. Walls shall have reinforcement in accordance with 14.6.1.~~
 - ~~○ Isolated footings of plain concrete supporting pedestals or columns are permitted, provided the projection of the footing beyond the face of the supported member does not exceed the footing thickness.~~

~~**Exception:** In detached one- and two-family dwellings three stories or less in height, the projection of the footing beyond the face of the supported member is permitted to exceed the footing thickness.~~
 - ~~○ Plain concrete footings supporting walls are permitted, provided the footings have at least two continuous longitudinal reinforcing bars. Bars shall not be smaller than No. 4 and shall have a total area of not less than 0.002 times the gross cross-sectional area of the footing. For footings that exceed 8 inches (203 mm) in thickness, a minimum of one bar shall be provided at the top and bottom of the footing. Continuity of reinforcement shall be provided at corners and intersections.~~

~~**Exceptions:**~~

- ~~1. In Seismic Design Categories A, B and C, detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls are permitted to have plain concrete footings without longitudinal reinforcement.~~
- ~~2. For foundation systems consisting of a plain concrete footing and a plain concrete stemwall, a minimum of one bar shall be provided at the top of the stemwall and at the bottom of the footing.~~
- ~~3. Where a slab on ground is cast monolithically with the footing, one No. 5 bar is permitted to be located at either the top of the slab or bottom of the footing.~~

1905.6.1 Seismic Design Categories A and B.

In structures assigned to Seismic Design Category A or B, detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls are permitted to have plain concrete footings without longitudinal reinforcement.

1905.6.2 Seismic Design Categories C, D, E and F.

Structures assigned to Seismic Design Category C, D, E or F shall not have elements of structural plain concrete, except as follows:

1. Structural plain concrete basement, foundation or other walls below the base as defined in ASCE/SEI 7 are permitted in detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls. In dwellings assigned to Seismic Design Category D or E, the height of the wall shall not exceed 8 feet (2438 mm), the thickness shall be not less than 7½ inches (190 mm), and the wall shall retain no more than 4 feet (1219 mm) of unbalanced fill. Walls shall have reinforcement in accordance with 14.6.1 of ACI 318.
2. Isolated footings of plain concrete supporting pedestals or columns are permitted, provided the projection of the footing beyond the face of the supported member does not exceed the footing thickness.

Exception: In detached one- and two-family dwellings three stories or less in height, the projection of the footing beyond the face of the supported member is permitted to exceed the footing thickness.

3. Plain concrete footings supporting walls are permitted, provided that the footings have at not fewer than two continuous longitudinal reinforcing bars. Bars shall not be smaller than No. 4 and shall have a total area of not less than 0.002 times the gross cross-sectional area of the footing. For footings that exceed 8 inches (203 mm) in thickness, not fewer than one bar shall be provided at the top and bottom of the footing. Continuity of reinforcement shall be provided at corners and intersections.

Exceptions:

1. Where assigned to Seismic Design Category C, detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls are permitted to have plain concrete footings without longitudinal reinforcement.
2. For foundation systems consisting of a plain concrete footing and a plain concrete stemwall, not fewer than one bar shall be provided at the top of the stemwall and at the bottom of the footing.
3. Footings cast monolithically with a slab-on-ground shall have not fewer than one No. 4 bar at the top and bottom of the footing or one No. 5 bar or two No. 4 bars in the middle third of the footing depth.

1905.7 ~~1905.1.8~~ Design requirements for anchors ~~ACI 318, Section 17.23.~~

- ~~4. For the design requirements for anchors, Sections 1905.7.1 and 1905.7.2 provide exceptions that are permitted to ACI 318. 17.10.5.2—Where the tensile component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor tensile force associated with the same load combination, anchors and their attachments shall be designed in accordance with 17.10.5.3. The anchor design tensile strength shall be determined in accordance with 17.10.5.4.~~

~~**Exception:** Anchors designed to resist wall out-of-plane forces with design strengths equal to or greater than the force determined in accordance with ASCE 7 Equation 12.11-1 or 12.14-10 shall be deemed to satisfy Section 17.10.5.3(d).~~

- ~~5. 17.10.5.3(d)—The anchor or group of anchors shall be designed for the maximum tension obtained from design load combinations that include E, with E increased by Ω_0 . The anchor design tensile strength shall be calculated from 17.10.5.4.~~
- ~~6. 17.10.6.2 Where the shear component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor shear force associated with the same load combination, anchors and their attachments shall be designed in accordance with 17.10.6.3. The anchor design shear strength for resisting earthquake forces shall be determined in accordance with 17.7.~~

Exceptions:

- ~~1. For the calculation of the in-plane shear strength of anchor bolts attaching wood sill plates of bearing or nonbearing walls of light frame wood structures to foundations or foundation stem walls, the in-plane shear strength in accordance with 17.7.2 and 17.7.3 need not be computed and 17.10.6.3 shall be deemed to be satisfied provided all of the following are met:
 - ~~1.1. The allowable in-plane shear strength of the anchor is determined in accordance with ANSI/AWC NDS Table 12E for lateral design values parallel to grain.~~
 - ~~1.2. The maximum anchor nominal diameter is $\frac{5}{8}$ inch (16 mm).~~
 - ~~1.3. Anchor bolts are embedded into concrete a minimum of 7 inches (178 mm).~~
 - ~~1.4. Anchor bolts are located a minimum of $1\frac{3}{4}$ inches (45 mm) from the edge of the concrete parallel to the length of the wood sill plate.~~
 - ~~1.5. Anchor bolts are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the wood sill plate.~~
 - ~~1.6. The sill plate is 2-inch (51 mm) or 3-inch (76 mm) nominal thickness.~~~~
- ~~2. For the calculation of the in-plane shear strength of anchor bolts attaching cold formed steel track of bearing or nonbearing walls of light frame construction to foundations or foundation stem walls, the in-plane shear strength in accordance with 17.7.2 and 17.7.3 need not be computed and 17.10.6.3 shall be deemed to be satisfied provided all of the following are met:

~~Allowable in-plane shear strength of exempt anchors, parallel to the edge of concrete, shall be permitted to be determined in accordance with AISI S100 Section J3.3.1.~~

 - ~~2.1. The maximum anchor nominal diameter is $\frac{5}{8}$ inch (16 mm).~~
 - ~~2.2. Anchors are embedded into concrete a minimum of 7 inches (178 mm).~~
 - ~~2.3. Anchors are located a minimum of $1\frac{3}{4}$ inches (45 mm) from the edge of the concrete parallel to the length of the track.~~
 - ~~2.4. Anchors are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the track.~~
 - ~~2.5. The track is 33 to 68 mil (0.84 mm to 1.73 mm) designation thickness.~~~~
- ~~3. In light frame construction bearing or nonbearing walls, shear strength of concrete anchors less than or equal to 1 inch [25 mm] in diameter attaching sill plate or track to foundation or foundation stem wall need not satisfy 17.10.6.3(a) through (c) when the design strength of the anchors is determined in accordance with 17.7.2.1(c).~~

1905.7.1 Anchors in tension.

The following exception is permitted to ACI 318 Section 17.10.5.2:

Exception: Anchors designed to resist wall out-of-plane forces with *design strengths* equal to or greater than the force determined in accordance with ASCE/SEI 7 equation 12.11-1 or 12.14-1 shall be deemed to satisfy Section 17.10.5.3(d) of ACI 318.

1905.7.2 Anchors in shear.

The following exceptions are permitted to ACI 318 Section 17.10.6.2:

Exceptions:

1. For the calculation of the in-plane shear strength of anchor bolts attaching wood sill plates of bearing or nonbearing walls of light-frame wood structures to foundations or foundation stemwalls, the in-plane shear strength in accordance with 17.7.2 and 17.7.3 of ACI 318 need not be computed and Section 17.10.6.3 of ACI 318 shall be deemed to be satisfied provided all of the following are met:

- 1.1. The allowable in-plane shear strength of the anchor is determined in accordance with ANSI/AWC NDS Table 12E for lateral design values parallel to grain.
- 1.2. The maximum anchor nominal diameter is $\frac{5}{8}$ inch (16 mm).
- 1.3. Anchor bolts are embedded into concrete a minimum of 7 inches (178 mm).
- 1.4. Anchor bolts are located not less than $1\frac{3}{4}$ inches (45 mm) from the edge of the concrete parallel to the length of the wood sill plate.
- 1.5. Anchor bolts are located not less than 15 anchor diameters from the edge of the concrete perpendicular to the length of the wood sill plate.
- 1.6. The sill plate is 2-inch (51 mm) or 3-inch (76 mm) nominal thickness.
2. For the calculation of the in-plane shear strength of anchor bolts attaching cold-formed steel track of bearing or nonbearing walls of light-frame construction to foundations or foundation stemwalls, the in-plane shear strength in accordance with Sections 17.7.2 and 17.7.3 of ACI 318 need not be computed and 17.10.6.3 shall be deemed to be satisfied provided all of the following are met:
- Allowable in-plane shear strength of exempt anchors, parallel to the edge of concrete, shall be permitted to be determined in accordance with AISI S100 Section J3.3.1.
- 2.1. The maximum anchor nominal diameter is $\frac{5}{8}$ inch (16 mm).
- 2.2. Anchors are embedded into concrete a minimum of 7 inches (178 mm).
- 2.3. Anchors are located a minimum of $1\frac{3}{4}$ inches (45 mm) from the edge of the concrete parallel to the length of the track.
- 2.4. Anchors are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the track.
- 2.5. The track is 33 to 68 mil (0.84 mm to 1.73 mm) designation thickness.
3. In light-frame construction bearing or nonbearing walls, shear strength of concrete anchors less than or equal to 1 inch (25 mm) in diameter attaching sill plate or track to foundation or foundation stemwalls need not satisfy Sections 17.10.6.3(a) through (c) when the design strength of the anchors is determined in accordance with Section 17.7.2.1(c) of ACI 318.

SECTION 1906

STRUCTURAL PLAIN CONCRETE FOOTINGS FOR LIGHT-FRAME CONSTRUCTION

1906.1 ~~Scope.~~ Plain concrete footings.

~~The design and construction of structural plain concrete, both cast in place and precast, shall comply with the minimum requirements of ACI 318, as modified in Section 1905.~~ For Group R-3 occupancies and buildings of other occupancies less than two stories above grade plane of light-frame construction, the required thickness of plain concrete footings is permitted to be 6 inches (152 mm), provided that the footing does not extend more than 4 inches (102 mm) on either side of the supported wall.

~~**Exception:** For Group R-3 occupancies and buildings of other occupancies less than two stories above grade plane of light-frame construction, the required footing thickness of ACI 318 is permitted to be reduced to 6 inches (152 mm), provided that the footing does not extend more than 4 inches (102 mm) on either side of the supported wall.~~

SECTION 1907 ~~MINIMUM SLAB PROVISIONS~~ SLABS-ON-GROUND

1907.1 Structural slabs-on-ground.

Structural concrete slabs-on-ground shall comply with all applicable provisions of this chapter. Slabs-on-ground shall be considered structural concrete where required by ACI 318 or where designed to transmit either of the following:

1. Vertical loads or lateral forces from other parts of the *structure* to the soil.
2. Vertical loads or lateral forces from other parts of the *structure* to foundations.

1907.2 Non-structural slabs on ground.

Non-structural slabs-on-ground shall be required to comply with Sections 1904.2, 1907.3, and 1907.4. Portions of the non-structural slabs on ground used to resist uplift forces or overturning shall be designed in accordance with accepted engineering practice throughout the entire portion designated as *dead load* to resist uplift forces or overturning.

1907.3 Thickness.

The thickness of concrete floor slabs supported directly on the ground shall be not less than 3½ inches (89 mm).

~~1907.1~~ 1907.4 General Vapor retarder.

~~The thickness of concrete floor slabs supported directly on the ground shall be not less than 3½ inches (89 mm).~~ A 6-mil (0.006 inch; 0.15 mm) polyethylene vapor retarder with joints lapped not less than 6 inches (152 mm) shall be placed between the base course or subgrade and the concrete floor slab, or other *approved* equivalent methods or materials shall be used to retard vapor transmission through the floor slab.

Exception: A vapor retarder is not required:

1. For detached structures accessory to occupancies in Group R-3, such as garages, utility buildings or other unheated facilities.
2. For unheated storage rooms having an area of less than 70 square feet (6.5 m²) and carports attached to occupancies in Group R-3.
3. For buildings of other occupancies where migration of moisture through the slab from below will not be detrimental to the intended occupancy of the building.
4. For driveways, walks, patios and other flatwork that will not be enclosed at a later date.
5. Where *approved* based on local site conditions.

1908.1 General.

~~Shotcrete is mortar or concrete that is pneumatically projected at high velocity onto a surface. Except as specified in this section, shotcrete shall conform to the requirements of this chapter for plain or reinforced concrete.~~ shall be in accordance with the requirements of ACI 318.

~~1908.2 Proportions and materials.~~

~~Shotcrete proportions shall be selected that allow suitable placement procedures using the delivery equipment selected and shall result in finished in-place hardened shotcrete meeting the strength requirements of this code.~~

~~1908.3 Aggregate.~~

~~Coarse aggregate, if used, shall not exceed ¾-inch (19.1 mm).~~

~~1908.4 Reinforcement.~~

~~Reinforcement used in shotcrete construction shall comply with the provisions of Sections 1908.4.1 through 1908.4.4.~~

~~1908.4.1 Size.~~

The maximum size of reinforcement shall be No. 5 bars unless it is demonstrated by preconstruction tests that adequate encasement of larger bars will be achieved.

1908.4.2 Clearance.

Where No. 5 or smaller bars are used, there shall be a minimum clearance between parallel reinforcement bars of 2 ¹/₂ inches (64 mm). When bars larger than No. 5 are permitted, there shall be a minimum clearance between parallel bars equal to six diameters of the bars used. Where two curtains of steel are provided, the curtain nearer the nozzle shall have a minimum spacing equal to 12 bar diameters and the remaining curtain shall have a minimum spacing of six bar diameters.

Exception: Subject to the approval of the *building official*, required clearances shall be reduced where it is demonstrated by preconstruction tests that adequate encasement of the bars used in the design will be achieved.

1908.4.3 Splices.

Lap splices of reinforcing bars shall utilize the noncontact lap splice method with a minimum clearance of 2 inches (51 mm) between bars. The use of contact lap splices necessary for support of the reinforcing is permitted where *approved* by the *building official*, based on satisfactory preconstruction tests that show that adequate encasement of the bars will be achieved, and provided that the splice is oriented so that a plane through the center of the spliced bars is perpendicular to the surface of the shotcrete.

1908.4.4 Spirally tied columns.

Shotcrete shall not be applied to spirally tied columns.

1908.5 Preconstruction tests.

Where preconstruction tests are required by Section 1908.4, a test panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project. The sample panel shall be representative of the project and simulate job conditions as closely as possible. The panel thickness and reinforcing shall reproduce the thickest and most congested area specified in the structural design. It shall be shot at the same angle, using the same nozzleman and with the same concrete mix design that will be used on the project. The equipment used in preconstruction testing shall be the same equipment used in the work requiring such testing, unless substitute equipment is approved by the building official. Reports of preconstruction tests shall be submitted to the building official as specified in Section 1704.5.

1908.6 Rebound.

Any rebound or accumulated loose aggregate shall be removed from the surfaces to be covered prior to placing the initial or any succeeding layers of shotcrete. Rebound shall not be used as aggregate.

1908.7 Joints.

Except where permitted herein, unfinished work shall not be allowed to stand for more than 30 minutes unless edges are sloped to a thin edge. For structural elements that will be under compression and for construction joints shown on the *approved construction documents*, square joints are permitted. Before placing additional material adjacent to previously applied work, sloping and square edges shall be cleaned and wetted.

1908.8 Damage.

In-place shotcrete that exhibits sags, sloughs, segregation, honeycombing, sand pockets or other obvious defects shall be removed and replaced. Shotcrete above sags and sloughs shall be removed and replaced while still plastic.

1908.9 Curing.

During the curing periods specified herein, shotcrete shall be maintained above 40°F (4°C) and in moist condition.

1908.9.1 Initial curing.

Shotcrete shall be kept continuously moist for 24 hours after shotcreting is complete or shall be sealed with an *approved* curing compound.

1908.9.2 Final curing.

Final curing shall continue for seven days after shotcreting, or for three days if high-early-strength cement is used, or until the specified strength is obtained. Final curing shall consist of the initial curing process or the shotcrete shall be covered with an *approved* moisture-retaining cover.

1908.9.3 Natural curing.

Natural curing shall not be used in lieu of that specified in this section unless the relative humidity remains at or above 85 percent, and is authorized by the *registered design professional* and *approved* by the *building official*.

1908.10 Strength tests.

Strength tests for shotcrete shall be made by an *approved agency* on specimens that are representative of the work and that have been water soaked for not fewer than 24 hours prior to testing. Where the maximum size aggregate is larger than $\frac{3}{8}$ inch (9.5 mm), specimens shall consist of not less than three 3-inch diameter (76 mm) cores or 3-inch (76 mm) cubes. Where the maximum size aggregate is $\frac{3}{8}$ inch (9.5 mm) or smaller, specimens shall consist of not less than 2-inch diameter (51 mm) cores or 2-inch (51 mm) cubes.

1908.10.1 Sampling.

Specimens shall be taken from the in-place work or from test panels, and shall be taken not less than once each shift, but not less than one for each 50 cubic yards (38.2 m³) of shotcrete.

1908.10.2 Panel criteria.

Where the maximum size aggregate is larger than $\frac{3}{8}$ inch (9.5 mm), the test panels shall have minimum dimensions of 18 inches by 18 inches (457 mm by 457 mm). Where the maximum size aggregate is $\frac{3}{8}$ inch (9.5 mm) or smaller, the test panels shall have minimum dimensions of 12 inches by 12 inches (305 mm by 305 mm). Panels shall be shot in the same position as the work, during the course of the work and by the nozzle men doing the work. The conditions under which the panels are cured shall be the same as the work.

1908.10.3 Acceptance criteria.

The average compressive strength of three cores from the in-place work or a single test panel shall equal or exceed 0.85 f'_c with no single core less than 0.75 f'_c . The average compressive strength of three cubes taken from the in-place work or a single test panel shall equal or exceed f'_c with no individual cube less than 0.88 f'_c . To check accuracy, locations represented by erratic core or cube strengths shall be retested.

Chapter 21 Masonry

2102.1 General. The following notations are used in the chapter:

NOTATIONS.

d_b	=	Diameter of reinforcement, inches (mm).
F_s	=	Allowable tensile or compressive stress in reinforcement, psi (MPa).
f_r	=	Modulus of rupture, psi (MPa).

f_s	=	Computed stress in reinforcement due to design loads, psi (MPa)
f'_{AAC}	=	Specified compressive strength of AAC masonry, the minimum compressive strength for a class of AAC masonry as specified in TMS 602, psi (MPa).
f'_{m}	=	Specified compressive strength of masonry at age of 28 days, psi (MPa).
f'_{mi}	=	Specified compressive strength of masonry at the time of prestress transfer, psi (MPa).
K	=	The lesser of the masonry cover, clear spacing between adjacent reinforcement, or five times d_b, inches (mm).
L_s	=	Distance between supports, inches (mm).
l_d	=	Required development length or lap length of reinforcement, inches (mm).
P	=	The applied load at failure, pounds (N).
S_t	=	Thickness of the test specimen measured parallel to the direction of load, inches (mm).
S_w	=	Width of the test specimen measured parallel to the loading cylinder, inches (mm).

2103.1 Masonry units.

Concrete masonry units, clay or shale masonry units, stone masonry units, glass unit masonry and AAC masonry units shall comply with Article 2.3 of TMS 602. Architectural cast stone shall conform to ~~ASTM C1364 and~~ TMS 504. ~~Adhered manufactured stone masonry veneer units shall conform to ASTM C1670.~~

Exception: Structural clay tile for nonstructural use in fireproofing of structural members and in wall furring shall not be required to meet the compressive strength specifications. The fire-resistance rating shall be determined in accordance with ASTM E119 or UL 263 and shall comply with the requirements of Table 705.5.

2103.2.4 Mortar for adhered masonry veneer.

Mortar for use with adhered masonry veneer shall conform to [Section 13.3 of TMS 402](#). ~~ASTM C270 for Type N or S, or shall comply with ANSI A118.4 for latex-modified Portland cement mortar.~~

2107.2 TMS 402, Section ~~61611~~ [6.1.7.1](#), lap splices.

As an alternative to Section ~~6.1.6.1.1~~ [6.1.7.1](#), it shall be permitted to design lap splices in accordance with Section 2107.2.1.

2107.2.1 Lap splices.

The minimum length of lap splices for reinforcing bars in tension or compression, l_d , shall be:

$$l_d = 0.002d_b f_s$$

For SI:

$$l_d = 0.29d_b f_s$$

but not less than 12 inches (305 mm). The length of the lapped splice shall be not less than 40 bar diameters.

~~where:~~

~~d_b = Diameter of reinforcement, inches (mm).~~

~~f_s = Computed stress in reinforcement due to design loads, psi (MPa).~~

In regions of moment where the design tensile stresses in the reinforcement are greater than 80 percent ~~of the allowable steel tension stress~~, F_s , the lap length of splices shall be increased not less than 50 percent of the minimum required length, but need not be greater than 72 d_b . Other equivalent means of stress transfer to accomplish the same 50 percent increase shall be permitted. Where epoxy coated bars are used, lap length shall be increased by 50 percent.

2107.3 TMS 402, Section ~~6.1.6.1~~ 6.1.7, splices of reinforcement.

~~Add to~~ **Modify** Section ~~6.1.6.1~~ 6.1.7 as follows:

- ~~6.1.6.1~~ 6.1.7– Splices of reinforcement. Lap splices, welded splices or mechanical splices are permitted in accordance with the provisions of this section. Welding shall conform to AWS D1.4. Welded splices shall be of ASTM A706 steel reinforcement. Reinforcement larger than No. 9 (M #29) shall be spliced using mechanical connections in accordance with Section ~~6.1.6.1.3~~ 6.1.7.2.

2108.2 TMS 402, Section ~~6.1.5.1.1~~ 6.1.6, development.

~~Modify~~ **Add a** the second paragraph to ~~of~~ Section ~~6.1.6.6.1.5.1.1~~ as follows:

The required development length of reinforcement ~~shall be determined by Equation (6-1), but shall be not less than 12 inches (305 mm) and~~ need not be greater than $72 d_b$.

2108.3 TMS 402, Section 6.1.7, splices.

~~Modify~~ **Add to** Sections ~~6.1.6.1.2 and 6.1.6.1.3~~ 6.1.7.2.1 and 6.1.7.3.1 as follows:

- ~~6.1.6.1.2~~ 6.1.7.3.1 – ~~A welded splice shall have the bars butted and welded to develop not less than 125 percent of the yield strength, f_y , of the bar in tension or compression, as required. Welded splices shall be of ASTM A706 steel reinforcement.~~ Welded splices shall not be permitted in plastic hinge zones of intermediate or special reinforced walls.
- ~~6.1.6.1.3~~ 6.1.7.2.1 – Mechanical splices shall be classified as Type 1 or 2 in accordance with Section 18.2.7.1 of ACI 318. Type 1 mechanical splices shall not be used within a plastic hinge zone or within a beam-column joint of intermediate or special *reinforced masonry* shear walls. Type 2 mechanical splices are permitted in any location within a member.

SECTION 2109 EMPIRICAL DESIGN OF ADOBE MASONRY

2109.1 General.

Empirically designed adobe masonry shall conform to the requirements of Appendix A of TMS 402-~~16~~, except where otherwise noted in this section.

2109.1.1 Limitations.

The use of empirical design of adobe masonry shall be limited as noted in Section A.1.2 of TMS 402-~~16~~. In buildings that exceed one or more of the limitations of Section A.1.2 of TMS 402-~~16~~, masonry shall be designed in accordance with the engineered design provisions of Section 2101.2 or the foundation wall provisions of Section 1807.1.5.

Section ~~A.1.2.2~~ A.1.2.3 of TMS 402-~~16~~ shall be modified as follows:

- ~~A.1.2.2~~ A.1.2.3 – *Wind*. Empirical requirements shall not apply to the design or construction of masonry for buildings, parts of buildings, or other structures to be located in areas where V_{asd} as determined in accordance with Section 1609.3.1 of the *International Building Code* exceeds 110 mph.

2109.2 Adobe construction.

Adobe construction shall comply with this section and shall be subject to the requirements of this code for Type V construction, Appendix A of TMS 402-~~16~~, and this section.

2109.2.1.2.4 Modulus of rupture determination.

The modulus of rupture shall be determined by the equation:

$$f_r = 3 PL_s / [2 S_w (S_t^2)]$$

(Equation 21-2)

where, for the purposes of this section only:

S_w = Width of the test specimen measured parallel to the loading cylinder, inches (mm).

f_t = Modulus of rupture, psi (MPa).

L_s = Distance between supports, inches (mm).

S_t = Thickness of the test specimen measured parallel to the direction of load, inches (mm).

P = The applied load at failure, pounds (N).

2109.2.4.8 Exterior finish.

Exterior finishes applied to adobe masonry walls shall be of any type permitted by this section or Chapter 14, except where stated otherwise in this section. Exterior walls constructed of unstabilized adobe units shall have their exterior surface covered with not fewer than two coats of Portland cement plaster having a minimum thickness of 3/4 inch (19.1 mm) and conforming to ASTM C926. Lathing shall comply with ASTM C1063. Fasteners shall be spaced at 16 inches (406 mm) on center maximum. Exposed wood surfaces shall be treated with an approved wood preservative or other protective coating prior to lath application.

2109.2.4.8.1 Where required.

Unstabilized adobe masonry walls shall receive a weather protective exterior finish in accordance with Section 2109.2.4.8.

2109.2.4.8.2 Vapor permeance.

Plaster and finish assemblies shall have a vapor permeance of not less than 5 perms.

Exception: Insulation products applied to the exterior of stabilized adobe masonry walls in Climate Zones 2B, 3B, 4B and 5B shall not have a vapor permeance requirement.

2109.2.4.8.3 Plaster thickness and coats.

Plaster applied to adobe masonry shall be not less than 7/8 inch (22 mm) and not greater than 2 inches (51 mm) thick. Plaster shall be applied in not less than two coats.

2109.2.4.8.4 Plaster application.

Where plaster is applied directly to adobe masonry walls, no intermediate membrane shall be used.

2109.2.4.8.5 Lath for plaster.

Lath shall be provided for all plasters, except where not required elsewhere in Section 2109.2.4.8. Fasteners shall be corrosion resistant and spaced at a maximum of 16 inches (406 mm) on center with a minimum 1 1/2-inch (38 mm) penetration into the adobe wall. Metal lath shall comply with ASTM C1063, as modified by this section, and shall be corrosion resistant. Plastic lath shall comply with ASTM C1788, as modified by this section. Wood substrates shall be protected with No. 15 asphalt felt, an approved wood preservative or other protective coating prior to lath application.

2109.2.4.8.6 Cement plaster.

Cement plaster shall conform to ASTM C926 and shall comply with Chapter 25, except that the proportion of lime in plaster coats shall be not less than 1 part lime to 4 parts cement. The combined thickness of cement plaster coats shall not exceed 1 inch (25 mm).

2109.2.4.8.7 Lime plaster.

Lime plaster is any plaster with a binder composed of calcium hydroxide, including Type N or S hydrated lime, hydraulic lime, natural hydraulic lime, or slaked quicklime. Hydrated lime shall comply with ASTM C206. Hydraulic lime shall comply with ASTM C1707. Natural hydraulic lime shall comply with ASTM C141 and EN 459. Quicklime shall comply with ASTM C5.

2109.2.4.8.8 Cement-lime plaster.

Cement-lime plaster shall be any plaster mix type CL, F or FL, as described in ASTM C926.

2109.2.4.8.9 Clay plaster.

Clay plaster shall comply with this section.

2109.2.4.8.9.1 General.

Clay plaster shall be any plaster having a clay or clay subsoil binder. Such plaster shall contain sufficient clay to fully bind the aggregate and shall be permitted to contain reinforcing fibers. Acceptable reinforcing fibers include chopped straw, sisal, and animal hair.

2109.2.4.8.9.2 Clay subsoil requirements.

The suitability of clay subsoil shall be determined in accordance with the Figure 2 Ribbon Test and the Figure 3 Ball Test in the appendix of ASTM E2392/E2392M.

2109.2.4.8.9.3 Weather-exposed locations.

Clay plaster exposed to water from direct or wind-driven rain or snow shall be finished with an *approved* erosion-resistant finish. The use of clay plasters shall not be permitted on weather-exposed parapets.

2109.2.4.8.9.4 Prohibited finish coat.

Plaster containing Portland cement shall not be permitted as a finish over clay plaster.

2109.2.4.8.9.5 Conditions where lathing is not required.

For *unstabilized adobe* walls finished with unstabilized clay plaster, lathing shall not be required.

Chapter 22 Steel

2201.2 Identification.

Identification of steel members shall be in accordance with the applicable reference standards within this chapter. Other steel furnished for structural load-carrying purposes shall be identified for conformity to the ordered grade in accordance with the specified ASTM standard or other specification and the provisions of this chapter. Where the steel grade is not readily identifiable from marking and test records, the steel shall be tested to verify conformity to such standards.

2201.3 Protection.

The protection of steel members shall be in accordance with the applicable reference standards within this chapter.

2201.4 Connections.

The design and installation of steel connections shall be in accordance with the applicable reference standards within this chapter. For *special inspection* of welding or installation of high-strength bolts, see Section 1705.2.

2201.5 Anchor Rods.

Anchor rods shall be set in accordance with the *approved construction documents*. The protrusion of the threaded ends through the connected material shall fully engage the threads of the nuts, but shall not be greater than the length of the threaded portion of the bolts.

~~SECTION 2202 IDENTIFICATION OF STEEL FOR STRUCTURAL PURPOSES~~

~~2202.1 General.~~

~~Identification of structural steel elements shall be in accordance with AISC 360. Identification of cold formed steel members shall be in accordance with AISI S100. Identification of cold formed steel light frame construction shall also comply with the requirements contained in AISI S240 or AISI S220, as applicable. Other steel furnished for structural load-carrying purposes shall be properly identified for conformity to the ordered grade in accordance with the specified ASTM standard or other specification and the provisions of this chapter. Where the steel grade is not readily identifiable from marking and test records, the steel shall be tested to verify conformity to such standards.~~

~~SECTION 2203 PROTECTION OF STEEL FOR STRUCTURAL PURPOSES~~

~~2203.1 General.~~

~~Painting of structural steel elements shall be in accordance with AISC 360. Painting of open-web steel joists and joist girders shall be in accordance with SJI 100 and SJI 200. Individual structural members and assembled panels of cold-formed steel construction shall be protected against corrosion in accordance with the requirements contained in AISI S100. Protection of cold formed steel light frame construction shall be in accordance with AISI S240 or AISI S220, as applicable.~~

~~SECTION 2204 CONNECTIONS~~

~~2204.1 Welding.~~

~~The details of design, workmanship and technique for welding and qualification of welding personnel shall be in accordance with the specifications listed in Sections 2205, 2206, 2207, 2208, 2210 and 2211. For *special inspection* of welding, see Section 1705.2.~~

~~2204.2 Bolting.~~

~~The design, installation and inspection of bolts shall be in accordance with the requirements of Sections 2205, 2206, 2207, 2210 and 2211. For *special inspection* of the installation of high-strength bolts, see Section 1705.2.~~

~~2204.3 Anchor rods.~~

~~Anchor rods shall be set in accordance with the *approved construction documents*. The protrusion of the threaded ends through the connected material shall fully engage the threads of the nuts but shall not be greater than the length of the threads on the bolts.~~

SECTION ~~2205~~ 2202 STRUCTURAL STEEL AND COMPOSITE STRUCTURAL STEEL AND CONCRETE

~~2205.1~~ 2202.1 General.

The design, fabrication and erection of *structural steel elements* and composite structural steel and concrete elements in buildings, structures and portions thereof shall be in accordance with AISC 360.

~~2205.2~~ 2202.2 Seismic design.

Where required, the seismic design, fabrication and erection of buildings, structures and portions thereof shall be in accordance with Section ~~2205.2.1~~ 2202.2.1 or ~~2205.2.2~~ 2202.2.2, as applicable.

~~2205.2.1~~ 2202.2.1 Structural steel seismic force-resisting systems and composite structural steel and concrete seismic force-resisting systems.

The design, detailing, fabrication and erection of structural steel *seismic force-resisting systems* and composite structural steel and concrete seismic force-resisting systems shall be in accordance with the provisions of Section ~~2205.2.1.1~~ 2202.2.1.1 or ~~2205.2.1.2~~ 2202.2.1.2, as applicable.

~~2205.2.1.1~~ 2202.2.1.1 Seismic Design Category B or C.

Structures assigned to *Seismic Design Category* B or C shall be of any construction permitted in Section ~~2205~~ 2202. Where a response modification coefficient, R , in accordance with ASCE 7, Table 12.2-1, is used for the design of structures assigned to *Seismic Design Category* B or C, the structures shall be designed and detailed in accordance with the requirements of AISC 341. Beam-to-column moment connections in structural steel special moment frames and intermediate moment frames shall be prequalified in accordance with AISC 341, Section K1, qualified by testing in accordance with AISC 341, Section K2, or shall be prequalified in accordance with AISC 358.

Exception: The response modification coefficient, R , designated for “Steel systems not specifically detailed for seismic resistance, excluding cantilever column systems” in ASCE 7, Table 12.2-1, shall be permitted for structural steel systems designed and detailed in accordance with AISC 360, and need not be designed and detailed in accordance with AISC 341.

~~2205.2.1.2~~ 2202.2.1.2 Seismic Design Category D, E or F.

Structures assigned to *Seismic Design Category* D, E or F shall be designed and detailed in accordance with AISC 341, except as permitted in ASCE 7, Table 15.4-1. Beam-to-column moment connections in structural steel special moment frames and intermediate moment frames shall be prequalified in accordance with AISC 341, Section K1, qualified by testing in accordance with AISC 341, Section K2, or shall be prequalified in accordance with AISC 358.

~~2205.2.2~~ 2202.2.2 Structural steel elements.

The design, detailing, fabrication and erection of *structural steel elements* in *seismic force-resisting systems* other than those covered in Section ~~2205.2.1~~ 2202.2.1, including struts, *collectors*, chords and foundation elements, shall be in accordance with AISC 341 where either of the following applies:

1. The structure is assigned to *Seismic Design Category* D, E or F, except as permitted in ASCE 7, Table 15.4-1.
2. A response modification coefficient, R , greater than 3 in accordance with ASCE 7, Table 12.2-1, is used for the design of the structure assigned to *Seismic Design Category* B or C.

2203 STRUCTURAL STAINLESS STEEL

2203.1 General.

The design, fabrication, and erection of austenitic and duplex structural stainless steel shall be in accordance with AISC 370.

SECTION ~~2210~~ 2204 COLD-FORMED STEEL

~~2210.1~~ 2204.1 General.

The design of cold-formed carbon and low-alloy steel structural members not covered in Sections 2206 through 2209 shall be in accordance with AISI S100. ~~The design of cold-formed stainless steel structural members shall be in accordance with ASCE 8. Cold-formed steel light-frame construction shall comply with Section 2211. The design of cold-formed steel diaphragms shall be in accordance with additional provisions of AISI S310 as applicable.~~ Where required, the seismic design of cold-formed steel structures shall be in accordance with the additional provisions of Section ~~2210.2~~ 2204.2.

~~2210.2~~ 2204.2 Seismic design ~~requirements for cold-formed steel structures.~~

The design and detailing of cold-formed steel seismic force-resisting systems shall be in accordance with Section 2204.2.1 and 2204.2.2, as applicable. ~~Where a response modification coefficient, R, in accordance with ASCE 7, Table 12.2-1, is used for the design of cold-formed steel structures, the structures shall be designed and detailed in accordance with the requirements of AISI S100, ASCE 8, or, for cold-formed steel special bolted moment frames, AISI S400.~~

2204.2.1 CFS Special Bolted Moment Frames.

Where a response modification coefficient, R, in accordance with ASCE 7, Table 12.2-1, is used for the design of cold-formed steel special bolted moment frames, the structures shall be designed and detailed in accordance with the requirements of AISI S400.

2204.2.2 Cold-formed steel seismic force resisting systems.

The response modification coefficient, R, designated in ASCE Table 12.2-1 for "Steel systems not specifically detailed for seismic resistance, excluding cantilever column systems" shall be permitted for systems designed and detailed in accordance with AISI S100. Such systems need not be designed and detailed in accordance with AISI S400.

SECTION 2205

COLD-FORMED STAINLESS STEEL

2205.1 General.

The design of cold-formed stainless steel structural members shall be in accordance with ASCE 8.

~~2211.1.1~~ 2206.1.1 Seismic requirements for cold-formed steel structural systems ~~requirements for cold-formed steel structural systems.~~

The design of cold-formed steel *light-frame construction* to resist seismic forces shall be in accordance with the provisions of Section ~~2211.1.1.1~~ 2206.1.1.1 or ~~2211.1.1.2~~ 2206.1.1.2, as applicable.

2206.3 Cutting and notching.

The cutting and notching of holes in cold-formed steel framing members shall be in accordance with AISI S240 for structural members and AISI S220 for nonstructural members.

SECTION 2206

COMPOSITE STRUCTURAL STEEL AND CONCRETE STRUCTURES

2206.1 General.

~~Systems of structural steel elements acting compositely with reinforced concrete shall be designed in accordance with AISC 360 and ACI 318, excluding ACI 318 Chapter 14.~~

2206.2 Seismic design.

~~Where required, the seismic design, fabrication and erection of composite steel and concrete systems shall be in accordance with Section 2206.2.1.~~

2206.2.1 Seismic requirements for composite structural steel and concrete construction.

~~Where a response modification coefficient, R , in accordance with ASCE 7, Table 12.2-1, is used for the design of systems of structural steel acting compositely with reinforced concrete, the structures shall be designed and detailed in accordance with the requirements of AISC 341.~~

2207.2 Design.

The registered design professional shall indicate on the construction documents the steel joist and steel joist girder designations from [SJI 100 or SJI 200](#); ~~the specifications listed in Section 2207.1;~~ and shall indicate the requirements for joist and joist girder design, layout, end supports, anchorage, bridging design that differs from ~~the~~ [SJI 100 or SJI 200](#), ~~specifications listed in Section 2207.1,~~ bridging termination connections and bearing connection design to resist uplift and lateral loads. These documents shall indicate special requirements as follows:

1. Special loads including:
 - 1.1. Concentrated loads.
 - 1.2. Nonuniform loads.
 - 1.3. Net uplift loads.
 - 1.4. Axial loads.
 - 1.5. End moments.
 - 1.6. Connection forces.
2. Special considerations including:
 - 2.1. Profiles for joist and joist girder configurations that differ from those defined by SJI 100 or SJI 200.
 - 2.2. Oversized or other nonstandard web openings.
 - 2.3. Extended ends.
3. ~~Live and total load deflection~~ [Deflection](#) ~~deflection~~ criteria for joists and joist girder configurations that differ from those defined by SJI 100 or SJI 200.

2207.3 Calculations.

2207.3 Calculations. The steel joist and joist girder manufacturer shall design the steel joists and steel joist girders in accordance with ~~the SJI specifications listed in Section 2207.1~~ [SJI 100 or SJI 200](#) to support the load requirements of Section 2207.2. The registered design professional shall be permitted to require submission of the steel joist and joist girder calculations as prepared by a registered design professional responsible for the product design. Where requested by the registered design professional, the steel joist manufacturer shall submit design calculations with a cover letter bearing the seal and signature of the joist manufacturer's registered design professional. In addition to the design calculations submitted under seal and signature, the following shall be included:

1. Bridging design that differs from the SJI [100 or SJI 200](#), ~~specifications listed in Section 2207.1~~, such as cantilevered conditions and net uplift.
2. Connection design for:
 - 2.1. Connections that differ from the SJI [100 or SJI 200](#), ~~specifications listed in Section 2207.1~~, such as flush-framed or framed connections.
 - 2.2. Field splices.
 - 2.3. Joist headers.

2207.4 Steel joist drawings.

Steel joist placement plans shall be provided to show the *steel joist* products as specified on the *approved construction documents* and are to be utilized for field installation in accordance with specific project requirements as stated in Section 2207.2. *Steel joist* placement plans shall include, at a minimum, the following:

1. Listing of applicable *loads* as stated in Section 2207.2 and used in the design of the *steel joists* and joist girders as specified in the *approved construction documents*.
2. Profiles for joist and joist girder configurations that differ from those defined by the SJI [100 or SJI 200](#), ~~specifications listed in Section 2207.1~~.
3. Connection requirements for:
 - 3.1. Joist supports.
 - 3.2. Joist girder supports.
 - 3.3. Field splices.
 - 3.4. Bridging attachments.
4. ~~Live and total load deflection~~ Deflection criteria for joists and joist girder configurations that differ from those defined by the SJI [100 or SJI 200](#), ~~specifications listed in Section 2207.1~~.
5. Size, location and connections for bridging.
6. Joist headers.

Steel joist placement plans do not require the seal and signature of the joist manufacturer's *registered design professional*.

2207.5 Certification.

...Section 1704.5 stating that work was performed in accordance with approved construction documents and with SJI [100 or SJI 200](#), as applicable. ~~listed in Section 2207.1~~.

SECTION 2208

STEEL DECK

2208.1 Steel decks.

The design and construction of cold-formed steel floor and roof decks and composite slabs of concrete and steel deck shall be in accordance with SDI SD. The design of cold-formed steel diaphragms shall be in accordance with additional provisions of AISI S310, as applicable.

2209.1 ~~Storage racks~~ General.

The design, testing and utilization of steel *storage racks* made of cold-formed or hot-rolled steel structural members shall be in accordance with ~~RMH~~ ANSI/MH 16.1. The design testing, and utilization of steel cantilevered storage racks made of

cold-formed or hot-rolled steel structural members shall be in accordance with ANSI/MH 16.3. ~~Where required by ASCE 7, the seismic design of steel storage racks shall be in accordance with Section 15.5.3 of ASCE 7.~~

2209.2 ~~Cantilevered steel cantilevered storage racks~~ Seismic design.

~~The design, testing and utilization of steel cantilevered storage racks made of cold-formed or hot-rolled steel structural members shall be in accordance with RMI ANSI/MH 16.3.~~ Where required by ASCE 7, the seismic design of steel storage racks and cantilevered steel storage racks shall be in accordance with Section 15.5.3 of ASCE 7.

2209.3 Certification.

For rack steel storage racks structures that are 8 feet (2438 mm) in height or greater to the top load level and assigned to Seismic Design Category D, E, or F at completion of the storage rack installation, a certificate of compliance shall be submitted to the owner or the owner's authorized agent stating that the work was performed in accordance with approved construction documents.

~~2210.1.1.1 Noncomposite steel floor decks.~~

~~Noncomposite steel floor decks shall be permitted to be designed and constructed in accordance with ANSI/SDI NC1.0.~~

~~2210.1.1.2 Steel roof deck.~~

~~Steel roof decks shall be permitted to be designed and constructed in accordance with ANSI/SDI RD1.0.~~

~~2210.1.1.3 Composite slabs on steel decks.~~

~~Composite slabs of concrete and steel deck shall be permitted to be designed and constructed in accordance with SDI-C.~~

SECTION 2210

METAL BUILDING SYSTEMS

2210.1 General.

The design, fabrication and erection of a metal building system shall be in accordance with the provisions of this section.

2210.1.1 Design.

The design of metal building systems shall be in accordance with Sections 2212.1.1.1 through 2212.1.1.4, as applicable.

2210.1.1.1 Structural Steel.

The design, fabrication and erection of structural steel shall be in accordance with Section 2202.

2210.1.1.2 Cold-Formed Steel.

The design of cold-formed carbon and low-alloy steel structural members shall be in accordance with Section 2204.

2210.1.1.3 Steel Joists.

The design of *steel joists* shall be in accordance with Section 2207.

2210.1.1.4 Steel Cable.

The design, fabrication and erection, including related connections, shall be in accordance with Section 2214.

2210.2 Seismic Design.

Where required, the seismic design, fabrication and erection of the structural steel seismic force-resisting system shall be in accordance with Section 2202.2.1 or 2202.2.2, as applicable.

SECTION 2211

INDUSTRIAL BOLTLESS STEEL SHELVING

2212.1 General.

The design, testing and utilization of industrial boltless steel shelving shall be in accordance with MHI ANSI/MH 28.2. Where required by ASCE 7, the seismic design of industrial boltless steel shelving shall be in accordance with Chapter 15 of ASCE 7.

SECTION 2212

INDUSTRIAL STEEL WORK PLATFORMS

2212.1 General. The design, testing and utilization of industrial steel work platforms shall be in accordance with MHI ANSI/MH 28.3. Where required by ASCE 7, the seismic design of industrial steel work platforms shall be in accordance with Chapter 15 of ASCE 7.

SECTION 2213

STAIRS, LADDERS AND GUARDING FOR STEEL STORAGE RACKS AND INDUSTRIAL STEEL WORK PLATFORMS

2213.1 General.

The design and installation of stairs, ladders and guarding serving *steel storage racks* and industrial steel work platforms shall be in accordance with ANSI/MH 32.1.

SECTION ~~2208~~ 2214

STEEL CABLE STRUCTURES

~~2208.1~~ 2214.1 General.

The design, fabrication and erection including related connections, and protective coatings of steel cables for buildings shall be in accordance with ASCE 19.

Chapter 23 Wood

2301.2 ~~Nominal Sizes~~ Dimensions.

For the purposes of this chapter, where dimensions of lumber are specified, they shall be deemed to be nominal dimensions unless specifically designated as actual dimensions (see Section 2304.2). Where dimensions of cross-laminated timber thickness are specified, they shall be deemed to be actual dimensions.

2303.1 General.

Structural sawn lumber; end-jointed lumber; *prefabricated wood I-joists*; *structural glued-laminated timber*; cross-laminated timber; wood structural panels; fiberboard sheathing (where used structurally); hardboard siding (where used structurally); particleboard; preservative-treated wood; structural log members; structural composite lumber; round timber poles and piles; fire-retardant-treated wood; hardwood plywood; wood trusses; joist hangers; nails; and staples shall conform to the applicable provisions of this section.

2303.1.4 ~~Structural glued-cross~~ Cross-laminated timber.

Cross-laminated timbers shall be manufactured and identified in accordance with ANSI/APA PRG 320.

[BF] 2303.2 Fire-retardant-treated wood.

Fire-retardant-treated wood is any wood product that, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E84 or UL 723, a listed flame spread index of 25 or less. ~~and show no evidence of significant progressive combustion when the test is continued~~ Additionally, ~~the~~ The ASTM E84 or UL 723 test shall be continued for an additional 20- minute period. ~~Additionally, and~~ the flame front shall not progress more than 10.5 feet (3200 mm) beyond the centerline of the burners at any time during the test.

2303.2.1 Alternate fire testing.

Fire-retardant-treated wood is also any wood product that, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E2768, a listed flame spread index of 25 or less and where the flame front does not progress more than 10.5 feet (3200 mm) beyond the centerline of the burners at any time during the test.

2303.2.4 Fire testing of wood structural panels. Wood structural panels shall be tested with a ripped or cut longitudinal gap of 1/8 inch (3.2 mm).

~~2303.2.5~~ 2303.2.6 Strength adjustments Design values.

Design values for ~~untreated lumber and wood structural panels~~, fire-retardant-treated wood, including connection design values, shall be subject to all adjustments applicable to untreated wood as specified in this chapter and shall be further adjusted to account for the effects of the fire-retardant treatment. ~~Section 2303.1, shall be adjusted for fire-retardant-treated wood.~~ Adjustments to design values for the effects of the fire-retardant treatment shall be based on an approved method of investigation that takes into consideration ~~the effects of~~ the anticipated temperature and humidity to which the fire-retardant-treated wood will be subjected, the type of treatment and redrying procedures. Adjustments to flexural design values for fire-retardant-treated plywood shall be determined in accordance with Section 2303.2.6.1. Adjustments to flexural, tension, compression and shear design values for fire-retardant-treated lumber shall be determined in accordance with Section 2303.2.6.2. Design values and treatment adjustment factors for fire-retardant-treated laminated veneer lumber shall be determined in accordance with 2303.2.6.3.

~~2303.2.5.1~~ 2303.2.6.1 Wood structural panels Fire-retardant-treated plywood.

The effect of treatment and ~~the method of~~ redrying after treatment, and any treatment-based effects due to exposure to high temperatures and high humidities on the flexure properties of fire-retardant-treated softwood plywood shall be determined in accordance with ASTM D5516. The test data developed ~~by~~ in accordance with ASTM D5516 shall be used to develop treatment adjustment factors, ~~maximum loads and spans, or both, for untreated plywood design values~~ in

accordance with ASTM D6305. Each manufacturer shall publish the allowable maximum *loads* and spans for service as floor and roof sheathing for its treatment [based on the adjusted design values and taking into account the climatological location](#).

2303.2.5.2 2303.2.6.2 Fire-retardant-treated lumber.

For each species of wood that is treated, the effects of ~~the treatment, the method of~~ [and](#) redrying after treatment and [any treatment-based effects due to](#) exposure to high temperatures and high humidities on the allowable design properties of fire-retardant-treated lumber shall be determined in accordance with ASTM D5664. The test data developed ~~by~~ [in accordance with](#) ASTM D5664 shall be used to develop ~~modification treatment adjustment~~ factors for use at or near room temperature and at elevated temperatures and humidity in accordance with ASTM D6841. Each manufacturer shall publish the ~~modification treatment adjustment~~ factors for service at [maximum](#) temperatures of not less than 80°F (27°C) and for roof framing. The roof framing modification factors shall take into consideration the climatological location.

2303.2.6.3 Fire-retardant-treated laminated veneer lumber.

[The effect of treatment and redrying after treatment and any treatment-based effects due to exposure to high temperatures and high humidities on the allowable design properties of fire-retardant-treated laminated veneer lumber shall be determined in accordance with ASTM D8223. Each manufacturer shall publish reference design values and treatment-based design value adjustment factors in accordance with ASTM D8223, taking into account the climatological location.](#)

2303.4.1.1 Truss design drawings.

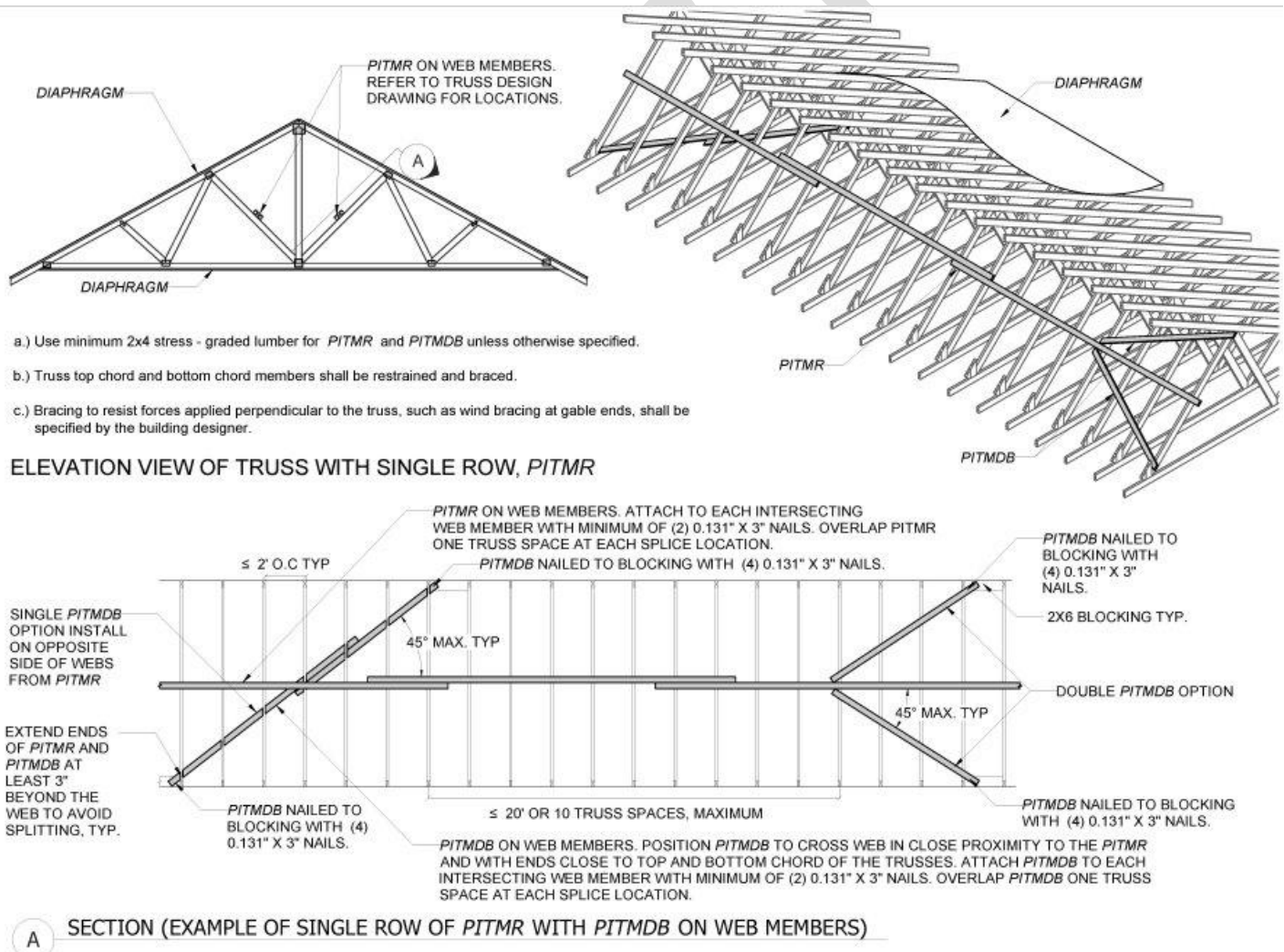
The written, graphic and pictorial depiction of each individual truss shall be provided to the *building official* for approval prior to installation. Truss design drawings shall be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the following information:

1. Slope or depth, span and spacing.
2. Location of all joints and support locations.
3. Number of plies if greater than one.
4. Required bearing widths.
5. Design loads as applicable, including:
 - 5.1. Top chord live load.
 - 5.2. Top chord dead load.
 - 5.3. Bottom chord live load.
 - 5.4. Bottom chord dead load.
 - 5.5. Additional loads and locations.
 - 5.6. Environmental design criteria and loads (such as wind, rain, snow, seismic).
6. Other lateral loads, including drag strut loads.
7. Adjustments to wood member and metal connector plate design value for conditions of use.
8. Maximum reaction force and direction, including maximum uplift reaction forces where applicable.
9. Joint connection type and description, such as size and thickness or gage, and the dimensioned location of each joint connector except where symmetrically located relative to the joint interface.
10. Size, species and grade for each wood member.
11. Truss-to-truss connections and truss field assembly requirements.
12. Calculated span-to-deflection ratio and maximum vertical and horizontal deflection for live and total load as applicable.
13. Maximum axial tension and compression forces in the truss members.
14. Required permanent individual truss member restraint location and the method and details of restraint [and diagonal](#) bracing to be used in accordance with Section 2303.4.1.2.

2303.4.1.2 Permanent individual truss member restraint (PITMR) and permanent individual truss member diagonal bracing (PITMDB).

Where ~~permanent restraint of truss members is required on~~ the truss design drawings designate the need for *permanent individual truss member restraint*, it shall be accomplished by one of the following methods:

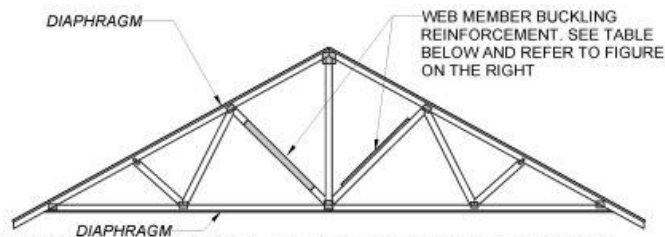
1. ~~Permanent individual truss member restraint/bracing shall be~~ PITMR and PITMDB installed using standard industry lateral restraint and diagonal bracing details in accordance with ~~generally~~ TPI 1, Section 2.3.3.1.1, accepted engineering practice, or Figures 2303.4.1.2(1), (3) and (5). ~~Locations for lateral restraint shall be identified on the truss design drawing.~~
2. Individual truss member reinforcement in place of the specified lateral restraints (i.e., buckling reinforcement such as T-reinforcement, L-reinforcement, proprietary reinforcement, etc.) such ~~The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss~~ suitable means (for example, buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement). The buckling reinforcement of individual truss members ~~of the trusses~~ shall be installed as shown on the truss design drawing, on supplemental truss member buckling reinforcement details provided by the truss designer or in accordance with Figures 2303.4.1.2 (2) and (4).
3. A project-specific ~~permanent individual truss member restraint/bracing design shall be permitted to be specified~~ PITMR and PITMDB design provided by any registered design professional.



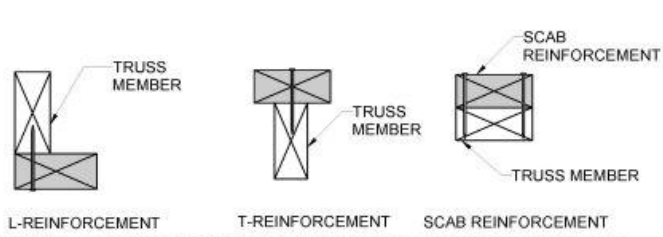
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

FIGURE 2303.4.1.2 (1)

PITMR AND PITMDB FOR TRUSS WEB MEMBERS REQUIRING ONE ROW OF PITMR



ELEVATION VIEW OF L, T OR SCAB REINFORCEMENT



TYPES OF WEB MEMBER BUCKLING REINFORCEMENT

- a.) Truss top chord and bottom chord members shall be restrained and braced.
b.) Bracing to resist forces applied perpendicular to the truss, such as wind bracing at gable ends, shall be specified by the building designer.
c.) Use the table below unless project specific web member reinforcement is provided on the truss design drawing or supplemental truss buckling reinforcement details are provided by the truss designer.

NUMBER OF ROWS OF PITMR SPECIFIED ON WEB MEMBER	SIZE OF TRUSS WEB	TYPE AND SIZE OF WEB REINFORCEMENT ¹ FOR T, L OR SCAB ²	GRADE OF WEB REINFORCEMENT	MINIMUM LENGTH OF WEB REINFORCEMENT	MINIMUM CONNECTION OF WEB REINFORCEMENT TO WEB
ONE	2x4	2x4	Same species and grade or better than web member	90% of web or extend to within 6" of end of web member, whichever is greater	(0.131" x 3") nails at 6" on-center ²
	2x6	2x6			
	2x8	2x8			

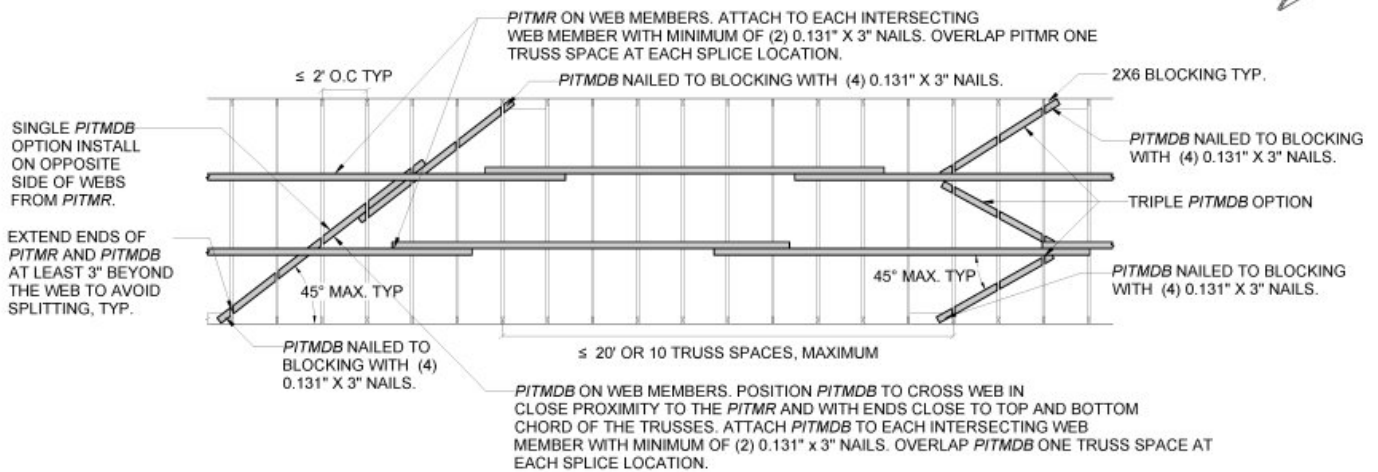
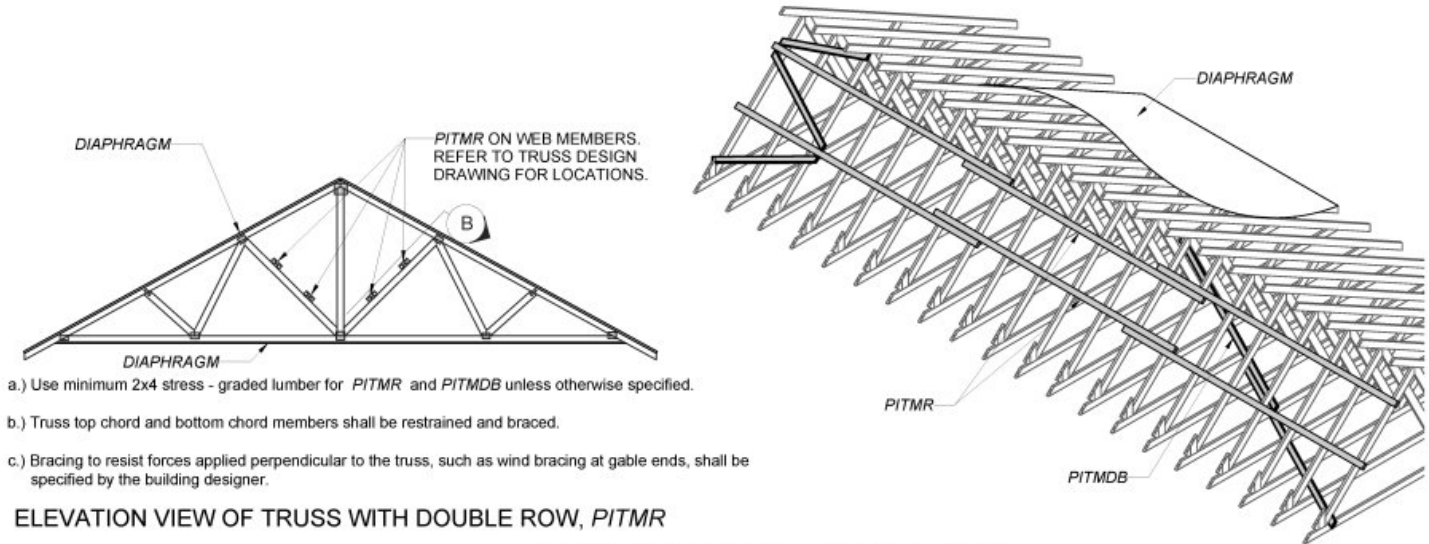
¹Maximum allowable web length is 14'

²Attach Scab reinforcement to web with two rows of minimum 0.131" x 3" nails at 6" on-center

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

FIGURE 2303.4.1.2(2)

ALTERNATIVE INSTALLATION USING BUCKLING REINFORCEMENT FOR TRUSS WEB MEMBERS IN LIEU OF ONE ROW OF PITM

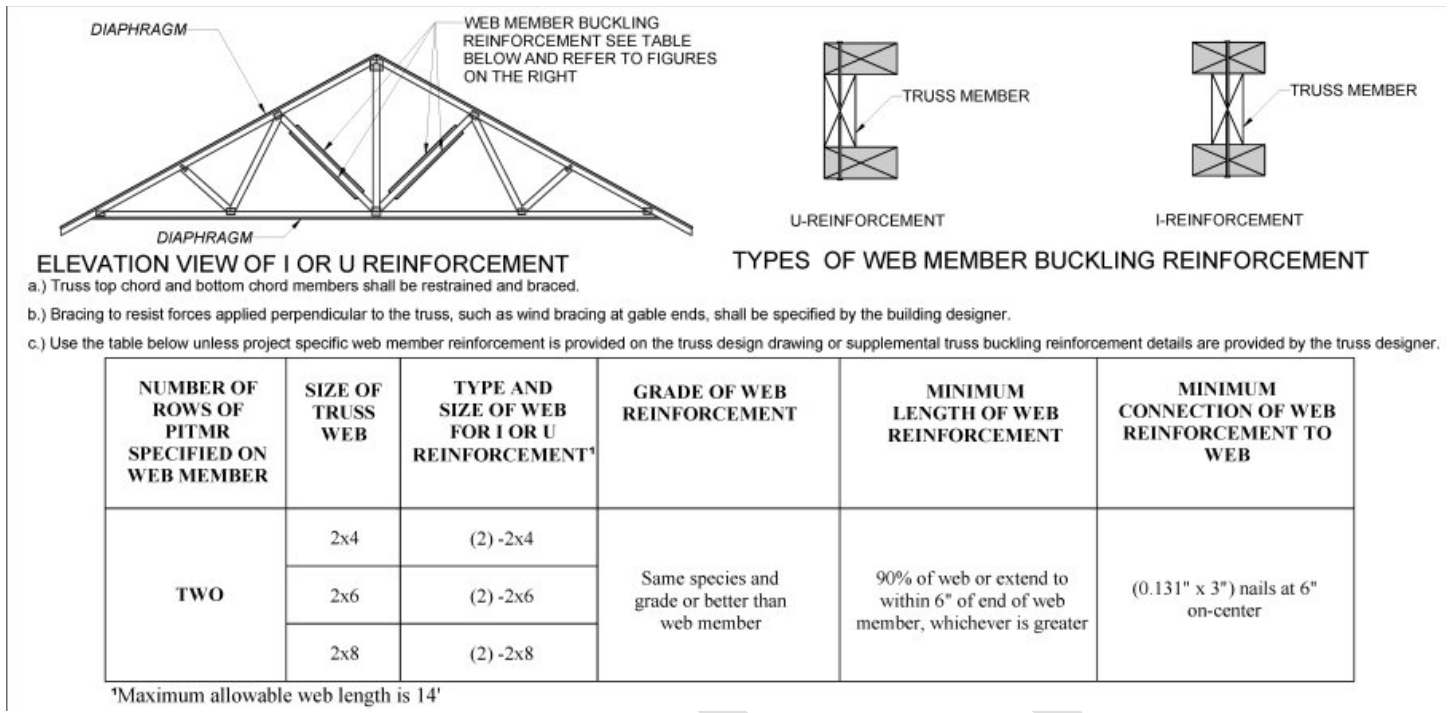


B SECTION (EXAMPLE OF DOUBLE ROW OF PITMR WITH PITMDB ON WEB MEMBERS)

For SI: 1 inch = 25.4 mm.

FIGURE 2303.4.1.2(3)

PITMR AND PITMDB FOR TRUSS WEB MEMBERS REQUIRING TWO ROWS OF PITMR



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

FIGURE 2303.4.1.2(4)

ALTERNATIVE INSTALLATION USING BUCKLING REINFORCEMENT FOR TRUSS WEB MEMBERS IN LIEU OF TWO ROWS OF PITMR

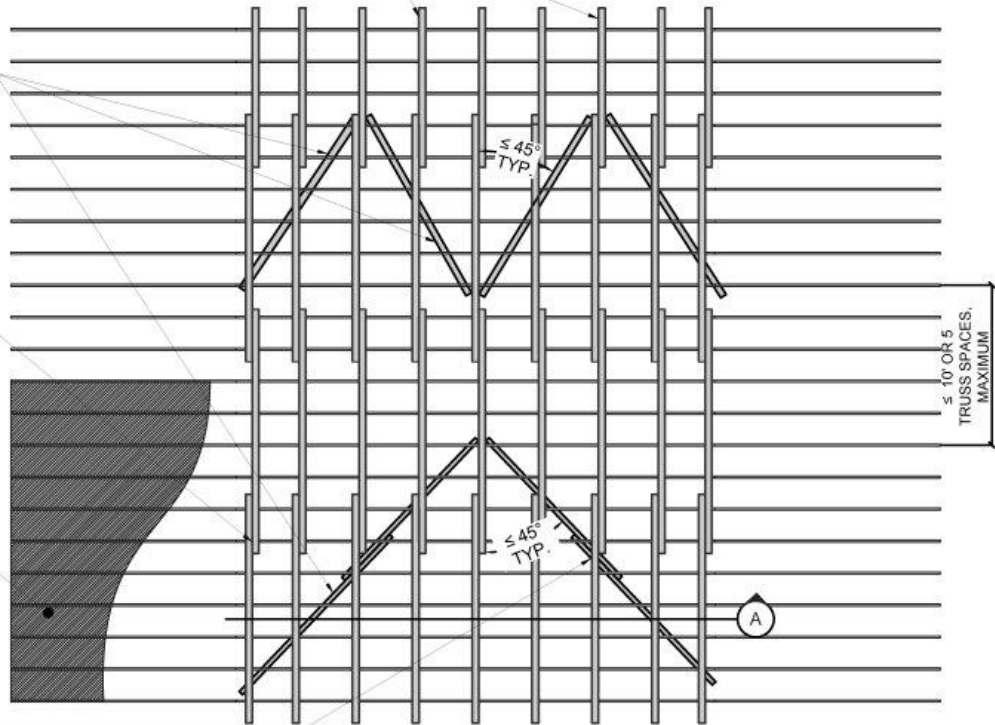
PITMR INSTALLED ON TOP CHORD OF SUPPORTING TRUSSES. REFER TO TRUSS DESIGN DRAWINGS FOR SPACING AND LOCATION. ATTACH TO EACH TOP CHORD WITH MINIMUM (2) 0.131" X 3" NAILS. LAP *PITMR* AT LEAST ONE TRUSS SPACE AT EACH SPLICE LOCATION.

PITMDB INSTALLED ON BOTTOM EDGE OF TOP CHORD OF THE SUPPORTING TRUSSES. ATTACH TO EACH TOP CHORD WITH MINIMUM (2) 0.131" X 3" NAILS. REPEAT *PITMDB* AT $\leq 10'$ OR 5 TRUSS SPACES MAXIMUM.

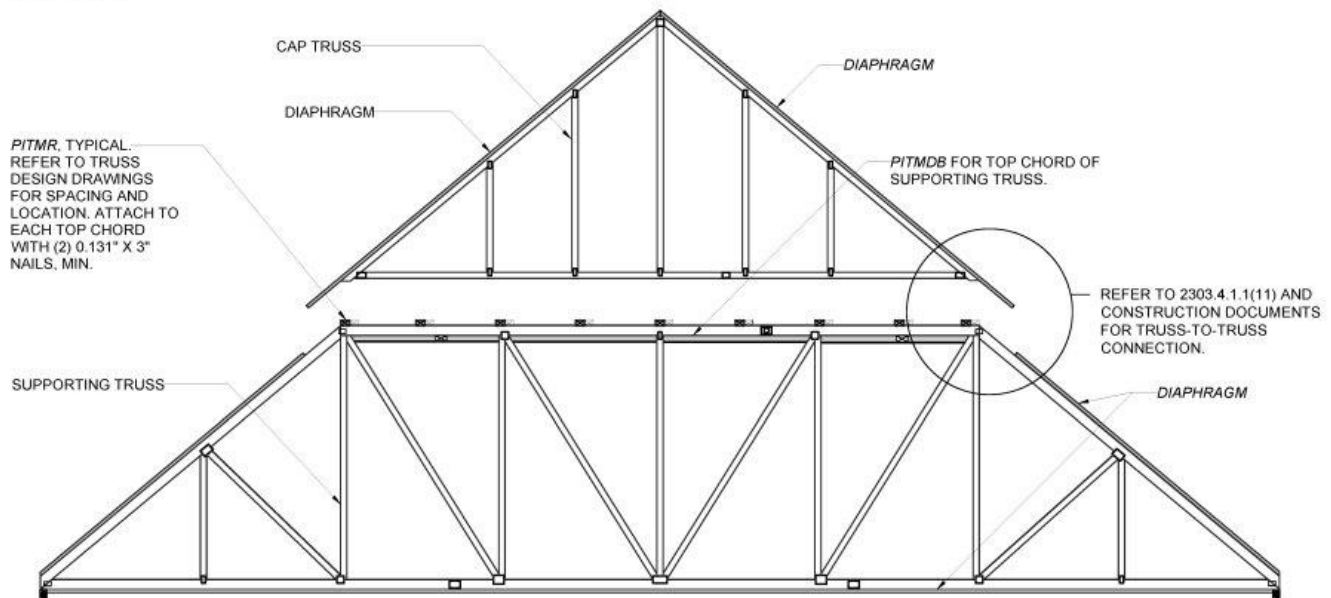
EXTEND ENDS OF *PITMR* AND *PITMDB* AT LEAST 3" BEYOND THE TOP CHORD TO AVOID SPLITTING, TYP.

DIAPHRAGM

LAP *PITMDB* AT LEAST ONE TRUSS SPACE AT EACH SPLICE LOCATION.



PLAN VIEW



- a.) Use minimum 2x4 stress - graded lumber for *PITMR* and *PITMDB* unless otherwise specified.
- b.) Web *PITMR* and *PITMDB* not shown for clarity.
- c.) Truss top chord and bottom chord members shall be restrained and braced.
- d.) Bracing to resist forces applied perpendicular to the truss, such as wind bracing at gable ends, shall be specified by the building designer.

SECTION AT A

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

FIGURE 2303.4.1.2(5)

PITMR and PITMDB FOR FLAT PORTION OF TOP CHORD IN A PIGGYBACK ASSEMBLY

2303.4.1.2.1 Trusses installed without a diaphragm.

Trusses installed without a *diaphragm* on the top or bottom chord shall require a project specific *PITMR* and *PITMDB* design prepared by a *registered design professional*.

Exception: Group U occupancies.

2303.4.1.3 Trusses spanning 60 feet or greater.

The owner or the owner's authorized agent shall contract with any qualified *registered design professional* for the design of the temporary installation restraint and diagonal bracing and the ~~permanent individual truss member restraint/bracing~~ *PITMR* and *PITMDB* for all trusses with clear spans 60 feet (18 288 mm) or greater.

2303.7 Shrinkage.

Consideration shall be given in design ~~to for~~ the ~~possible effect~~ effects of wood cross-grain dimensional changes ~~considered vertically~~ that ~~may occur in lumber fabricated in a green condition~~ as a result of changes in the wood moisture content after installation.

2304.6.1 Wood structural panel sheathing.

Where *wood structural panel* sheathing is used as the exposed finish on the outside of *exterior walls*, it shall have an exterior exposure durability classification. Where *wood structural panel* sheathing is used elsewhere, but not as the exposed finish, it shall be of a type manufactured with exterior glue (Exposure 1 or Exterior). *Wood structural panel* sheathing, connections and framing spacing shall be in accordance with Table 2304.6.1 for the applicable basic wind speed and exposure category where used in enclosed buildings with a mean roof height not greater than 30 feet (9144 mm) and a topographic factor (K_z) of 1.0.

TABLE 2304.6.1

MAXIMUM ~~ALLOWABLE STRESS~~ BASIC DESIGN WIND SPEED, V_{asd} PERMITTED FOR WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST WIND PRESSURES^{a, b, c}

MINIMUM NAIL		MINIMUM WOOD STRUCTURAL PANEL SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inches)	MAXIMUM WALL STUD SPACING (inches)	PANEL NAIL SPACING		MAXIMUM ALLOWABLE STRESS <u>BASIC</u> DESIGN WIND SPEED, V _{asd} ^d (MPH)		
Size	Penetration (inches)				Edges (inches o.c.)	Field (inches o.c.)	Wind exposure category		
							B	C	D
6d common (2.0" × 0.113")	1.5	24/0	3/8	16	6	12 ^e	140 140	115 90	110 85
		24/16	7/16	16	6	12 ^e	150 140	125 100	115 90
						6 ^e	190 150	160 125	150 140
8d common (2.5" × 0.131")	1.75	24/16	7/16	16	6	12 ^e	170 130	140 110	135 105
						6 ^e	190 150	160 125	150 140
				24	6	12 ^e	140 110	115 90	110 85
						6 ^e	140 110	115 90	110 85

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

- a. Panel strength axis shall be parallel or perpendicular to supports. Three-ply plywood sheathing with studs spaced more than 16 inches on center shall be applied with panel strength axis perpendicular to supports.
- b. The table is based on wind pressures acting toward and away from building surfaces in accordance with Section 30.7.4 of ASCE 7. Lateral requirements shall be in accordance with Section 2305 or 2308.
- c. Wood structural panels with span ratings of wall-16 or wall-24 shall be permitted as an alternative to panels with a 24/0 span rating. Plywood siding rated 16 on center or 24 on center shall be permitted as an alternative to panels with a 24/16 span rating. Wall-16 and plywood siding 16 on center shall be used with studs spaced not more than 16 inches on center.
- d. ~~V_{std} shall be determined in accordance with Section 1609.3.1.~~
- e. Where the specific gravity of the wood species used for wall framing is greater than or equal to 0.35 but less than 0.42 in accordance with AWC NDS, nail spacing in the field of the panel shall be multiplied by 0.67. Where the specific gravity of the wood species used for wall framing is less than 0.35, fastening of the wall sheathing shall be designed in accordance with AWC NDS.

TABLE 2304.8(2)

SHEATHING LUMBER, MINIMUM GRADE REQUIREMENTS: BOARD GRADE

SOLID FLOOR OR ROOF SHEATHING	SPACED ROOF SHEATHING	GRADING RULES
Utility	Standard	NLGA, <u>PLIB</u> /WCLIB, <u>or</u> WWPA
4 common or utility	3 common or standard	NLGA, <u>PLIB</u> /WCLIB, WWPA, NLSLB or NELMA
No. 3	No. 2	SPIB
Merchantable	Construction common	RIS

TABLE 2304.8(3)

ALLOWABLE SPANS AND LOADS FOR WOOD STRUCTURAL PANEL SHEATHING AND SINGLE-FLOOR GRADES CONTINUOUS OVER TWO OR MORE SPANS WITH STRENGTH AXIS PERPENDICULAR TO SUPPORTS^a

SHEATHING GRADES		ROOF ^b				FLOOR ^c
Panel span rating roof/floor span	Panel thickness (inches)	Maximum span (inches)		Load ^d (psf)		Maximum span (inches)
		With edge support ^e	Without edge support	Total load	Live load	
16/0	3/8	16	16	40	30	0
20/0	3/8	20	20	40	30	0
24/0	3/8, 7/16, 1/2	24	20 ^f	40	30	0
24/16	7/16, 1/2	24	24	50	40	16
32/16	15/32, 1/2, 5/8	32	28	40	30	16 ^g
40/20	19/32, 5/8, 3/4, 7/8	40	32	40	30	20 ^{g,h}
48/24	23/32, 3/4, 7/8	48	36	45	35	24
54/32	7/8, 1	54	40	45	35	32
60/32	7/8, 1 1/8	60	48	45	35	32

SINGLE FLOOR GRADES		ROOF ^b				FLOOR ^c
Panel span rating	Panel thickness (inches)	Maximum span (inches)		Load ^e (psf)		Maximum span (inches)
		With edge support ^e	Without edge support	Total load	Live load	
16 o.c.	1/2, 19/32, 5/8	24	24	50	40	16 ^g
20 o.c.	19/32, 5/8, 3/4	32	32	40	30	20 ^{g,h}
24 o.c.	23/32, 3/4	48	36	35	25	24
32 o.c.	7/8, 1	48	40	50	40	32
48 o.c.	13/32, 1 1/8	60	48	50	40	48

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kN/m².

- Applies to panels 24 inches or wider.
- Uniform load deflection limitations $1/180$ of span under live load plus dead load, $1/240$ under live load only.
- Panel edges shall have approved tongue-and-groove joints or shall be supported with blocking unless $1/4$ -inch minimum thickness underlayment or $1 1/2$ inches of approved cellular or lightweight concrete is placed over the subfloor, or finish floor is $3/4$ -inch wood strip. Allowable uniform load based on deflection of $1/360$ of span is 100 pounds per square foot except the span rating of 48 inches on center is based on a total load of 65 pounds per square foot.
- Allowable load at maximum span. [Where the total load includes snow, use allowable stress design snow loads.](#)
- Tongue-and-groove edges, panel edge clips (one midway between each support, except two equally spaced between supports 48 inches on center), lumber blocking or other. Only lumber blocking shall satisfy blocked diaphragm requirements. Where the total load includes snow, use allowable stress design snow loads.
- For $1/2$ -inch panel, maximum span shall be 24 inches.
- Span is permitted to be 24 inches on center where $3/4$ -inch wood strip flooring is installed at right angles to joist.
- Span is permitted to be 24 inches on center for floors where $1 1/2$ inches of cellular or lightweight concrete is applied over the panels.

TABLE 2304.8(5)

ALLOWABLE LOAD (PSF) FOR WOOD STRUCTURAL PANEL ROOF SHEATHING CONTINUOUS OVER TWO OR MORE SPANS AND STRENGTH AXIS PARALLEL TO SUPPORTS (Plywood structural panels are five-ply, five-layer unless otherwise noted)^a

PANEL GRADE	THICKNESS (inch)	MAXIMUM SPAN (inches)	LOAD AT MAXIMUM SPAN (psf)	
			Live	Total ^c
Structural I sheathing	7/16	24	20	30
	15/32	24	35 ^b	45 ^b
	1/2	24	40 ^b	50 ^b
	19/32, 5/8	24	70	80
	23/32, 3/4	24	90	100
Sheathing, other grades covered in DOC PS 1 or DOC PS 2	7/16	16	40	50
	15/32	24	20	25
	1/2	24	25	30

	19/32	24	40 ^b	50 ^b
	5/8	24	45 ^b	55 ^b
	23/32, 3/4	24	60 ^b	65 ^b

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kN/m².

- Uniform load deflection limitations $1/180$ of span under live load plus dead load, $1/240$ under live load only. Edges shall be blocked with lumber or other approved type of edge supports.
- For composite and four-ply plywood structural panel, load shall be reduced by 15 pounds per square foot.
- [Where the total load includes snow, use allowable stress design snow loads.](#)

2304.9 Lumber decking.

Lumber decking shall be designed and installed in accordance with the general provisions of this code and Sections 2304.9.1 through 2304.9.5.3. [Other lumber decking patterns and connection designs shall be substantiated through engineering analysis.](#)

2304.9.2 Layup patterns.

Lumber decking is permitted to be laid up following one of five standard patterns as defined in Sections 2304.9.2.1 through 2304.9.2.5. ~~Other patterns are permitted to be used provided that they are substantiated through engineering analysis.~~

2304.10.1 ~~Connection fire resistance rating~~ [Fire protection of connections.](#)

~~Fire resistance ratings for connections in~~ [Connections used with fire-resistance-rated members and in fire-resistance-rated assemblies of Type IV-A, IV-B or IV-C construction shall be protected for the time associated with the fire-resistance rating. Protection time shall be determined by one of the following:](#)

- [Testing in accordance with Section 703.2 where the connection is part of the fire-resistance test.](#)
- [Engineering analysis that demonstrates that the temperature rise at any portion of the connection is limited to an average temperature rise of 250°F \(139°C\), and a maximum temperature rise of 325°F \(181°C\), for a time corresponding to the required fire-resistance rating of the structural element being connected. For the purposes of this analysis, the connection includes connectors, fasteners and portions of wood members included in the structural design of the connection.](#)

TABLE 2304.10.2 FASTENING SCHEDULE

The remaining portion of the table is unchanged and omitted for clarity.

DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^g	SPACING AND LOCATION	
Wood structural panels (WSP), subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing ^a			
		Edges (inches)	Intermediate supports (inches)
30. 3/8" – 1/2"	6d common or deformed (2" × 0.113"); or 2 ³ / ₈ " × 0.113" nail (subfloor and wall)	6	12
	8d common or deformed (2 ¹ / ₂ " × 0.131"× 0.281" head) nail (roof); or RSRS-01 (2 ³ / ₈ " × 0.113" × 0.281" head) nail (roof) ^d	6 ^e	6 ^e

	1 ³ / ₄ " 16 gage staple, ⁷ / ₁₆ " crown (subfloor and wall)	4	8
	2 ³ / ₈ " × 0.113" × 0.266" head nail (roof)	3 ^f	3 ^f
	1 ³ / ₄ " 16 gage staple, ⁷ / ₁₆ " crown (roof)	3 ^f	3 ^f
31. 19/32" – 3/4"	8d common (2 ¹ / ₂ " × 0.131"); or deformed (2" × 0.113") (subfloor and wall)	6	12
	8d common or deformed (2 ¹ / ₂ " × 0.131" × 0.281" head) <u>nail</u> (roof); or RSRs-01 (2 ³ / ₈ " × 0.113" × <u>0.281" head</u>) nail (roof) ^d	6 ^e	6 ^e
	2 ³ / ₈ " × 0.113" × 0.266" head nail; or 2" 16 gage staple, ⁷ / ₁₆ " crown <u>(subfloor and wall)</u>	4	8

For SI: 1 inch = 25.4 mm.

- a. Nails spaced at 6 inches at intermediate supports where spans are 48 inches or more. For nailing of wood structural panel and particleboard diaphragms and shear walls, refer to Section 2305. Nails for wall sheathing are permitted to be common, box or casing.
- b. Spacing shall be 6 inches on center on the edges and 12 inches on center at intermediate supports for nonstructural applications. Panel supports at 16 inches (20 inches if strength axis in the long direction of the panel, unless otherwise marked).
- c. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule and the ceiling joist is fastened to the top plate in accordance with this schedule, the number of toenails in the rafter shall be permitted to be reduced by one nail.
- d. RSRs-01 is a Roof Sheathing Ring Shank nail meeting the specifications in ASTM F1667.
- e. Tabulated fastener requirements apply where the basic wind speed, V, is less than 140 mph. For wood structural panel roof sheathing attached to gable-end roof framing and to intermediate supports within 48 inches of roof edges and ridges, nails shall be spaced at 4 inches on center where the basic wind speed, V, is greater than 130 mph in Exposure B or greater than 110 mph in Exposure C. Spacing exceeding 6 inches on center at intermediate supports shall be permitted where the fastening is designed per the AWC NDS. Where the specific gravity of the wood species used for roof framing is greater than or equal to 0.35 but less than 0.42 in accordance with AWC NDS, fastening of roof sheathing shall be with RSRs-03 (2-1/2" × 0.131" × 0.281" head) nails unless alternative fastening is designed in accordance with AWC NDS. Where the specific gravity of the wood species used for roof framing is less than 0.35, fastening of the roof sheathing shall be designed in accordance with AWC NDS.
- f. Fastening is only permitted where the basic wind speed, V, is less than or equal to 110 mph and where fastening is to wood framing of a species with specific gravity greater than or equal to 0.42 in accordance with AWC NDS.
- g. Nails and staples are carbon steel meeting the specifications of ASTM F1667. Connections using nails and staples of other materials, such as stainless steel, shall be designed by acceptable engineering practice or approved under Section 104.2.3.

~~TABLE 2304.10.1~~ TABLE 2304.10.2

FASTENING SCHEDULE

Portions of table are unchanged and omitted for clarity.

DESCRIPTION OF BUILDING ELEMENTS	NUMBER AND TYPE OF FASTENER ^g	SPACING AND LOCATION
Roof		
1. Blocking between ceiling joists, rafters or trusses to top plate or other framing below	<u>4-8d box (2 1/2" x 0.113"); or</u> 3-8d common (2 1/2" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails; or 3-3" 14 gage staples, 7/16" crown	Each end, toenail
2. Ceiling joists to top plate	<u>4-8d box (2 1/2" x 0.113"); or</u> 3-8d common (2 1/2" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails; or 3-3" 14 gage staples, 7/16" crown	Each joist, toenail
6. Rafter or roof truss to top plate (See Section 2308.7.5, Table 2308.7.5)	3-10 common (3" x 0.148"); or 3-16d box (3 1/2" x 0.135"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131 nails; or 4-3" 14 gage staples, 7/16" crown	<u>2 toenails on one side and 1 toenail on opposite side of rafter or truss^c</u> <u>Toenail^e</u>
7. Roof rafters to ridge valley or hip rafters; or roof rafter to 2-inch ridge beam	2-16d common (3 1/2" x 0.162"); or <u>3-16d box (3 1/2" x 0.135"); or</u> 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails; or 3-3" 14 gage staples, 7/16" crown	End nail
Wall		
9. Stud to stud and abutting studs at intersecting wall corners (at braced wall panels)	16d common (3 1/2" x 0.162"); or	16" o.c. face nail
	2 16d box (3 1/2" x 0.135"); or <u>3" x 0.131" nails; or</u> <u>3-3" 14 gage staples, 7/16" crown</u> 3" x 0.131" nails; or 3-3" 14 gage staples, 7/16" crown	12" o.c. face nail 12" o.c. face nail
11. Continuous header to stud	4-8d common (2 1/2" x 0.131"); or 4-10d box (3" x 0.128") <u>or 5-8d box (2 1/2"</u>	Toenail
13. Top plate to top plate, at end joints	8-16d common (3 1/2" x 0.162"); or <u>12-16d box (3 1/2" x 0.135"); or</u> 12-10d box (3" x 0.128"); or 12-3" x 0.131" nails; or	Each side of end joint, face nail (minimum 24" lap splice length each side of end joint)

	12-3" 14 gage staples, 7/16" crown	
16. Stud to top or bottom plate	3-16d box (3/2" x 0.135"); or 4-8d common (21/2" x 0.131"); or 4-10d box (3" x 0.128"); or 4-3" x 0.131" nails; or 4-8d box (2/2" x 0.113"); or 4-3" 14 gage staples, 7/16" crown	Toenail
	2-16d common (31/2" x 0.162"); or 3-16d box (3/2" x 0.135"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails; or 3-3" 14 gage staples, 7/16" crown	End nail
18. 1" brace to each stud and plate	3-8d box (2/2" x 0.113"); or 2-8d common (21/2" x 0.131"); or 2-10d box (3" x 0.128"); or 2-3" x 0.131" nails; or 2-3" 14 gage staples, 7/16" crown	Face nail
19. 1" x 6" sheathing to each bearing	3-8d box (2/2" x 0.113"); or 2-8d common (21/2" x 0.131"); or 2-10d box (3" x 0.128"); or 2-1/2" 16 gage staples, 1" crown	Face nail
20. 1" x 8" and wider sheathing to each bearing	3-8d common (21/2" x 0.131"); or 3-8d box (21/2" x 0.113"); or 3-10d box (3" x 0.128"); or 3-13/4" 16 gage staples, 1" crown	Face nail
	Wider than 1" x 8" 3-8d common (2/2" x 0.131"); or 4-8d box (2/2" x 0.113"); or 3-10d box (3" x 0.128"); or 4-1/2" 16 gage staples, 1" crown	
Floor		
21. Joist to sill, top plate, or girder	4-8d box (21/2" x 0.113"); or 3-8d common (21/2" x 0.131"); or floor 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails; or 3-3" 14 gage staples, 7/16" crown	Toenail
22. Rim joist, band joist, or blocking to top plate, sill or other framing below	8d box (21/2" x 0.113")	4" o.c., toenail
	8d common (21/2" x 0.131"); or 10d box (3" x 0.128"); or 3" x 0.131" nails; or 3" 14 gage staples, 7/16" crown	6" o.c., toenail
23. 1" x 6" subfloor or less to each joist	3-8d box (21/2" x 0.113"); or 2-8d common (21/2" x 0.131"); or	Face nail

	2 3-10d box (3" × 0.128"); or 2-13/4" 16 gage staples, 1" crown		
24. 2 subfloor to joist or girder	3-16d box (31/2" × 0.135"); or 2-16d common (31/2" × 0.162")	Face nail	
25. 2" planks (plank & beam – floor & roof)	3-16d box (31/2" × 0.135"); or 2-16d common (31/2" × 0.162")	Each bearing, face nail	
27. Ledger strip supporting joists or rafters	3-16d common (31/2" × 0.162"); or 4-16d box (31/2" × 0.135"); or 4-10d box (3" × 0.128"); or 4-3" × 0.131" nails; or 4-3" 14 gage staples, 7/16" crown	Each joist or rafter, face nail	
	Wood structural panels (WSP), subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing ^a		
		Edges (Inches)	Intermediate supports (Inches)
30. 3/8" – 1/2"	6d common or deformed (2" × 0.113"); or 23/8" × 0.113" nail (subfloor and wall)	6	12
	8d common or deformed (2 1/2" × 0.131" × 0.281" head) (roof) or RSRS-01 (2 3/8" × 0.113") nail (roof) ^d 23/8" × 0.113" nail (subfloor and wall)	6 ^e 6	12 6 ^e 12
	1 3/4" 16 gage staple, 7/16" crown (subfloor and wall)	4	8
	2 3/8" × 0.113" × 0.266" head nail (roof)	4-3 ^f	8-3 ^f
	1 3/4" 16 gage staple, 7/16" crown (roof)	3 ^f	6-3 ^f
31. 19/32" – 3/4"	8d common (2 1/2" × 0.131"); or 6d deformed (2" × 0.113") (subfloor and	6	12
	8d common or deformed (2 1/2" × 0.131" × 0.281" head) (roof) or RSRS-01 (2 3/8" × 0.113") nail (roof) ^d	6 ^e	12 6 ^e
	2 3/8" × 0.113" × 0.266" head nail; or 2" 16 gage staple, 7/16" crown	4	8
32. 7/8" – 1 1/4"	10d common (3" × 0.148"); or 8d deformed (2 1/2" × 0.131" × 0.281"	6	12
Other exterior wall sheathing			
33. 1/2" fiberboard sheathing ^b	1 1/2" × 0.120", galvanized roofing nail (7/16" head diameter); or 1 1/4" 16 gage staple with 7/16" or 1" crown	3	6
34. 25/32" fiberboard sheathing ^b	1 3/4" × 0.120" galvanized roofing nail (7/16" diameter head); or 1 1/2" 16 gage staple with 7/16" or 1" crown	3	6
Wood structural panels, combination subfloor underlayment to framing			

35. $\frac{3}{4}$ " and less	8d common ($2\frac{1}{2}$ " $\times$ 0.131"); or 6d deformed (2 " $\times$ 0.113"); <u>or deformed (2" $\times$ 0.120")</u>	6	12
36. $\frac{7}{8}$ " – 1"	8d common ($2\frac{1}{2}$ " $\times$ 0.131"); or 8d deformed ($2\frac{1}{2}$ " $\times$ 0.131"); <u>or deformed ($2\frac{1}{2}$" $\times$ 0.120")</u>	6	12
37. $1\frac{1}{8}$ " – $1\frac{1}{4}$ "	10d common (3 " $\times$ 0.148"); or 8d deformed ($2\frac{1}{2}$ " $\times$ 0.131"); <u>or deformed ($2\frac{1}{2}$" $\times$ 0.120")</u>	6	12
Panel siding to framing			
38. $\frac{1}{2}$ " or less	6d corrosion-resistant siding ($1\frac{7}{8}$ " $\times$ 0.106"); or	6	12
39. $\frac{5}{8}$ "	8d corrosion-resistant siding ($2\frac{3}{8}$ " $\times$ 0.128"); or 8d corrosion-resistant casing ($2\frac{1}{2}$ " $\times$ 0.113")	6	12
Wood structural panels (WSP), subfloor, roof and interior wall sheathing to framing and particleboard wall sheathing to framing ^a			
		Edges (inches)	Intermediate
Interior paneling			
40. $\frac{1}{4}$ "	4d casing ($1\frac{1}{2}$ " $\times$ 0.080"); or 4d finish ($1\frac{1}{2}$ " $\times$ 0.072")	6	12
41. $\frac{3}{8}$ "	6d casing (2 " $\times$ 0.099"); or 6d finish <u>(2" $\times$ 0.092")</u> (Panel supports at 24 inches)	6	12

For SI: 1 inch = 25.4 mm.

- a. Nails spaced at 6 inches at intermediate supports where spans are 48 inches or more. For nailing of wood structural panel and particleboard diaphragms and shear walls, refer to Section 2305. Nails for wall sheathing are permitted to be common, box or casing.
- b. Spacing shall be 6 inches on center on the edges and 12 inches on center at intermediate supports for nonstructural applications. Panel supports at 16 inches (20 inches if strength axis in the long direction of the panel, unless otherwise marked).
- c. Where a rafter is fastened to an adjacent parallel ceiling joist in accordance with this schedule and the ceiling joist is fastened to the top plate in accordance with this schedule, the number of toenails in the rafter shall be permitted to be reduced by one nail.
- d. RSRS-01 is a Roof Sheathing Ring Shank nail meeting the specifications in ASTM F1667.
- e. Tabulated fastener requirements apply where the ultimate design wind speed is less than 140 mph. For wood structural panel roof sheathing attached to gable-end roof framing and to intermediate supports within 48 inches of roof edges and ridges, nails shall be spaced at 4 inches on center where the ultimate design wind speed is greater than 130 mph in Exposure B or greater than 110 mph in Exposure C. Spacing exceeding 6 inches on center at intermediate supports shall be permitted where the fastening is designed per the AWC NDS.
- f. Fastening is only permitted where the ultimate design wind speed is less than or equal to 110 mph.
- g. Nails and staples are carbon steel meeting the specifications of ASTM F1667. Connections using nails and staples of other materials, such as stainless steel, shall be designed by acceptable engineering practice or approved under Section 104.11.

2304.10.5-2304.10.6 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* and *fire-retardant-treated* wood shall be in accordance with Sections 2304.10.6.1 through 2304.10.6.4. The coating weights for zinc-coated fasteners

shall be in accordance with ASTM A153. [The coating weight for zinc-coated nails shall be in accordance with ASTM A153, Class D or ASTM A641 Class 3S \[1 ounce per square per foot ² \(305 g/m²\)\]](#). Stainless steel driven fasteners shall be in accordance with the material requirements of ASTM F1667.

2304.11.1.1 Columns.

Minimum dimensions of columns shall be in accordance with Table 2304.11. Columns shall be ~~continuous or superimposed throughout all stories and~~ connected in an *approved* manner. [Columns shall be continuous or aligned vertically from floor to floor in all stories of Type IV-HT construction.](#) Girders and beams at column connections shall be closely fitted around columns and adjoining ends shall be cross tied to each other, or intertied by caps or ties, to transfer horizontal *loads* across joints. Wood bolsters shall not be placed on tops of columns unless the columns support roof *loads* only. Where traditional heavy timber detailing is used, connections shall be by means of reinforced concrete or metal caps with brackets, by properly designed steel or iron caps, with pintles and base plates, by timber splice plates affixed to the columns by metal connectors housed within the contact faces, or by other *approved* methods.

2304.11.3 Floors.

Floors shall be without concealed spaces: [or with concealed spaces complying with Section 602.4.4.3.](#) Wood floors shall be constructed in accordance with Section 2304.11.3.1 or 2304.11.3.2.

2304.11.4 Roof decks.

Roofs shall be without concealed spaces ~~and roof~~ [or with concealed spaces complying with Section 602.4.4.3.](#) *Roof decks* shall be constructed in accordance with Section 2304.11.4.1 or 2304.11.4.2. Other types of decking shall be an alternative that provides equivalent *fire resistance* and structural properties. Where supported by a wall, *roof decks* shall be anchored to walls to resist forces determined in accordance with Chapter 16. Such anchors shall consist of steel bolts, lags, *screws* or approved hardware of sufficient strength to resist prescribed forces.

2304.11.4.1 Cross-laminated timber roofs.

Cross-laminated timber roofs shall be not less than 3 inches (76 mm) ~~nominal~~ in thickness and shall be continuous from support to support and mechanically fastened to one another.

2304.12.1 Locations requiring waterborne preservatives or naturally durable wood.

Wood used above ground in the locations specified in Sections 2304.12.1.1 through 2304.12.1.5, ~~2304.12.2.6 and 2304.12.2.8~~ shall be *naturally durable wood* or *preservative-treated wood* using waterborne preservatives, in accordance with AWP A U1 for above-ground use.

2304.12.2 Other locations.

Wood used in the locations specified in Sections 2304.12.2.1 through ~~2304.12.2.5~~ [2304.12.2.8](#) shall be *naturally durable wood* or *preservative-treated wood* in accordance with AWP A U1. *Preservative-treated wood* used in interior locations shall be protected with two coats of urethane, shellac, latex epoxy or varnish unless waterborne preservatives are used. Prior to application of the protective finish, the wood shall be dried in accordance with the manufacturer's recommendations.

2304.12.2.3 Supporting member for permanent appurtenances.

Naturally durable or *preservative-treated wood* shall be utilized for those portions of wood members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances where such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering to prevent moisture or water accumulation on the surface or at joints between members.

Exception: ~~Buildings~~ Sawn lumber in buildings located in a geographical region where experience has demonstrated that climatic conditions preclude the need to use durable materials where the structure is exposed to the weather.

~~2304.12.2.4~~ 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 fully protected from moisture by a roof, eave or similar covering shall be pressure treated with preservative or be manufactured from naturally durable or preservative-treated wood.~~

~~2304.12.2.5~~ 2304.12.2.4 Supporting members for permeable floors and roofs.

Wood structural members that support moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, shall be of naturally durable or preservative-treated wood unless separated from such floors or roofs by an impervious moisture barrier. The impervious moisture barrier system protecting the structure supporting floors shall provide positive drainage of water that infiltrates the moisture-permeable floor topping.

~~2304.12.2.6~~ 2304.12.2.5 Ventilation beneath balcony or elevated walking surfaces.

Enclosed framing in exterior balconies and elevated walking surfaces that ~~are exposed to rain, snow or drainage from irrigation~~ have weather-exposed surfaces shall be provided with openings that provide a net free cross-ventilation area not less than 1/150 of the area of each separate space.

~~2304.12.3~~ 2304.12.2.6 Wood in contact with the ground or fresh water.

Wood used in contact with exposed earth shall be naturally durable for both decay and termite resistance or preservative treated in accordance with AWPA U1 for soil or fresh water use.

Exception: Untreated wood is permitted where such wood is continuously and entirely below the ground-water level or submerged in fresh water.

~~2304.12.3.1~~ 2304.12.2.6.1 Posts or columns.

Posts and columns that are supporting permanent structures and embedded in concrete that is exposed to the weather or in direct contact with the earth shall be of preservative-treated wood.

~~2304.12.4~~ 2304.12.2.7 Termite protection.

In geographical areas where hazard of termite damage is known to be very heavy, wood floor framing in the locations specified in Section 2304.12.1.1 and exposed framing of exterior decks or balconies shall be of naturally durable species (termite resistant) or preservative treated in accordance with AWPA U1 for the species, product preservative and end use or provided with approved methods of termite protection.

~~2304.12.5~~ 2304.12.2.8 Wood used in retaining walls and cribs.

Wood installed in retaining or crib walls shall be preservative treated in accordance with AWPA U1 for soil and fresh water use.

~~2304.12.6~~ 2304.12.3 Attic ventilation.

For attic ventilation, see Section 1202.2.2.

~~2304.12.7~~ 2304.12.4 Under-floor ventilation (crawl space).

For under-floor ventilation (crawl space), see Section 1202.4.

2305.1 General.

Structures using wood~~-frame~~ shear walls or wood~~-frame~~ diaphragms to resist wind, or seismic ~~or other lateral~~ loads shall be designed and constructed in accordance with AWC SDPWS and the applicable provisions of Sections 2305, 2306 and 2307.

2305.1.2 Permanent load duration.

Permanent loads are associated with permanent load duration in accordance with the ANSI/AWC NDS. For wood shear walls and wood diaphragms designed to resist lateral loads of permanent load duration only and that are not in combination with wind or seismic lateral loads, the design unit shear capacities shall be taken as the AWC SDPWS nominal unit shear capacities, multiplied by 0.2 for use with allowable stress design in Section 2306 and 0.3 for use with load and resistance factor design in Section 2307.

2306.1.3 ~~Preservative-treated wood~~ allowable stresses ~~stress adjustments~~.

The allowable unit stresses for ~~preservative-treated wood~~ conforming to AWPA U1 need not be adjusted for treatment, but are subject to other adjustments. Load duration factors greater than 1.6 shall not be used in the structural design of preservative-treated wood members.

~~The allowable unit stresses for fire-retardant treated wood, including fastener values, shall be developed from an approved method of investigation that considers the effects of anticipated temperature and humidity to which the fire-retardant-treated wood will be subjected, the type of treatment and the redrying process. Other adjustments are applicable except that the impact load duration shall not apply.~~

2306.1.4 ~~Fire-retardant-treated wood~~ allowable stresses.

The allowable unit stresses for fire-retardant-treated wood, including connection design values, shall be developed in accordance with the provisions of Section 2303.2.6. Load duration factors greater than 1.6 shall not be used in the structural design of fire-retardant-treated wood members.

~~2306.1.4~~ 2306.1.5 Lumber decking.

The capacity of lumber decking arranged according to the patterns described in Section 2304.9.2 shall be the lesser of the capacities determined for ~~flexure~~ moment and deflection according to the formulas in Table 2306.1.4.

TABLE 2306.1.5
ALLOWABLE LOADS FOR LUMBER DECKING

PATTERN	ALLOWABLE AREA LOAD ^{a, b}	
	Flexure <u>Moment</u>	Deflection

Table rows and figures unchanged and left out for clarity

For SI: 1 inch = 25.4 mm.

Σw = Allowable total uniform load limited by ~~bending~~ moment.

Σw_{Δ} = Allowable total uniform load limited by deflection.

d = Actual decking thickness.

l = Span of decking.

F_b' = Allowable bending stress adjusted by applicable factors.

E' = Modulus of elasticity adjusted by applicable factors.

~~b~~

~~d = Actual decking thickness.~~

~~l = Span of decking.~~

~~F_b' = Allowable bending stress adjusted by applicable factors.~~

~~E = Modulus of elasticity adjusted by applicable factors.~~

TABLE 2306.3(3)

ALLOWABLE SHEAR VALUES FOR WIND OR SEISMIC FORCES FOR SHEAR WALLS OF LATH AND PLASTER OR GYPSUM BOARD WOOD FRAMED WALL ASSEMBLIES UTILIZING STAPLES

TYPE OF MATERIAL	THICKNESS OF MATERIAL	WALL CONSTRUCTION	STAPLE SPACING ^b MAXIMUM (inches)	SHEAR VALUE ^a , c (plf)	MINIMUM STAPLE SIZE f, g
1. Expanded metal or woven wire lath and Portland cement plaster	7/8"	Unblocked	6	180	No. 16 gage galv. staple, 7/8" legs
2. Gypsum lath, plain or perforated	3/8" lath and 1/2"	Unblocked	5	100	No. 16 gage galv. staple, 1 1/8" long
3. Gypsum sheathing	2 × 8	Unblocked	4	75	No. 16 gage galv. staple, 1 3/4" long
	1/2" × 4'	Blocked	4	175 100	
4. Gypsum board, gypsum veneer base or water-resistant gypsum backing board	1/2"	Unblocked	7	75	No. 16 gage galv. staple, 1 1/2" long
		Unblocked	4	110	
		Unblocked	7	100	
		Unblocked	4	125	
		Blocked	7	125	
		Blocked	4	150	
	5/8"	Unblocked	7	115	

			4	145	No. 16 gage galv. <u>staple</u> , 11/2" legs , 15/8" long
		Blocked	7	145	
			4	175	
		Blocked Two-ply	Base ply: 9 Face ply: 7	250	No. 16 gage galv. staple 15/8" long No. 15 gage galv. staple, 21/4" long

2308.1 General.

The requirements of this section are intended for buildings of conventional light-frame construction not exceeding the story height limitations of Section 2308.2.1. Other construction methods are permitted to be used, provided that a satisfactory design is submitted showing compliance with other provisions of this code. Interior nonload-bearing partitions, ceilings and curtain walls of *conventional light-frame construction* are not subject to the limitations of Section 2308.2. Detached one- and two-family dwellings and townhouses not more than three *stories above grade plane* in height with a separate *means of egress* and their accessory structures shall comply with the *International Residential Code*.

~~2308.1.1 Portions exceeding limitations of conventional light-frame construction.~~

~~Where portions of a building of otherwise conventional light-frame construction exceed the limits of Section 2308.2, those portions and the supporting load path shall be designed in accordance with accepted engineering practice and the provisions of this code. For the purposes of this section, the term "portions" shall mean parts of buildings containing volume and area such as a room or a series of rooms. The extent of such design need only demonstrate compliance of the nonconventional light-framed elements with other applicable provisions of this code and shall be compatible with the performance of the conventional light framed system.~~

~~2308.1.2 Connections and fasteners.~~

~~Connectors and fasteners used in conventional construction shall comply with the requirements of Section 2304.10.~~

2308.2 Limitations.

Buildings are permitted to be constructed in accordance with the provisions of *conventional light-frame construction*, subject to the limitations in Sections 2308.2.1 through ~~2308.2.6~~ 2308.2.7.

2308.2.3 Allowable loads.

Loads shall be in accordance with Chapter 16 and shall not exceed the following:

1. Average *dead loads* shall not exceed 15 psf (718 N/m²) for combined roof and ceiling, *exterior walls*, floors and partitions.

Exceptions:

1. Subject to the limitations of Section 2308.6.10, stone or masonry *veneer* up to the less of 5 inches (127 mm) thick or 50 pounds per square foot (2395 N/m²) and installed in accordance with Chapter 14 is permitted to a height of 30 feet (9144 mm) above a noncombustible foundation, with an additional 8 feet (2439) permitted for *gable ends*.
2. Concrete or masonry fireplaces, heaters and chimneys shall be permitted in accordance with the provisions of this code.

2. *Live loads* shall not exceed 40 psf (1916 N/m²) for floors.

Exception: *Live loads* for concrete slab-on-ground floors in *Risk Categories* I and II shall be not more than 125 psf.

3. Allowable stress design ~~g~~Ground snow loads, ~~p_g(asd)~~, shall not exceed 50 psf (2395 N/m²).
4. Where design for tornado loads is required, tornado loads on the main wind force resisting system and all components and cladding shall not exceed the corresponding wind loads on these same elements.

2308.2.7 Hillside light-frame construction.

Design in accordance with Section 2308.1.1 shall be provided for the floor immediately above the *cripple walls* or post and beam systems and all structural elements and connections from this floor down to and including connections to the foundation and design of the foundation to transfer lateral loads from the framing above in *buildings* where all of the following apply:

1. The grade slope exceeds 1 unit vertical in 5 units horizontal where averaged across the full length of any side of the *building*, and
2. The tallest *cripple wall* clear height exceeds 7 feet (2134 mm), or where a post and beam system occurs at the *building* perimeter, the post and beam system tallest post clear height exceeds 7 feet (2134 m), and
3. Of the total plan area below the lowest framed floor, whether open or enclosed, less than 50 percent is *occupiable space* having interior wall finishes conforming to Section 2304.7 or Chapter 25 of this code.

Exception: Light-frame *buildings* in which the lowest framed floor is supported directly on concrete or *masonry walls* over the full length of all sides except the downhill side of the *building* are exempt from this provision.

2308.3 Portions or elements exceeding limitations of conventional light frame construction.

Where a *building* of otherwise *conventional light-frame construction* contains portions or structural elements that exceed the limits of Section 2308.2, those portions or elements, and the supporting load path, shall be designed in accordance with accepted engineering practice and the provisions of this code. For the purposes of this section, the term “portions” shall mean parts of *buildings* containing volume and area such as a room or a series of rooms. The extent of such design need only demonstrate compliance of the nonconventional light-framed elements with other applicable provisions of this code and shall be compatible with the performance of the conventional light-framed system.

2308.4 Structural elements or systems not described herein.

Where a *building* of otherwise *conventional construction* contains structural elements or systems not described in Section 2308, these elements or systems shall be designed in accordance with accepted engineering practice and the provisions of this code. The extent of such design need only demonstrate compliance of the nonconventional elements with other applicable provisions of this code and shall be compatible with the performance of the conventionally framed system.

2308.5 Connections and fasteners.

Connectors and fasteners used in conventional construction shall comply with the requirements of Section 2304.10.

2308.6 Cutting, notching and boring of dimensional wood framing.

The provisions of this section shall only apply to dimensional wood framing and shall not include engineered wood products, heavy timber or prefabricated/manufactured wood assemblies.

2308.6.1 Floor joists, roof rafters, and ceiling joists.

Notches on framing ends shall not exceed one-fourth the member depth. Notches in the top or bottom of the member shall not exceed one-sixth the depth and shall not be located in the middle third of the span. A notch not more than one-third of

the depth is permitted in the top of a rafter or ceiling joist not further from the face of the support than the depth of the member. Holes bored in members shall not be within 2 inches (51 mm) of the top or bottom of the member and the diameter of any such hole shall not exceed one- third the depth of the member. Where the member is notched, the hole shall not be closer than 2 inches (51 mm) to the notch.

2308.6.1.1 Ceiling joists.

Where ceiling joists also serve as floor joists, they shall be considered floor joists within this section.

2308.6.2 Wall studs.

In exterior walls and bearing partitions, a wood stud shall not be cut or notched in excess of 25 percent of its depth. In nonbearing partitions that do not support loads other than the weight of the partition, a stud shall not be cut or notched in excess of 40 percent of its depth.

2308.6.3 Bored holes.

The diameter of bored holes in wood studs shall not exceed 40 percent of the stud depth. The diameter of bored holes in wood studs shall not exceed 60 percent of the stud depth in nonbearing partitions. The diameter of bored holes in wood studs shall not exceed 60 percent of the stud depth in any wall where each stud is doubled, provided that not more than two such successive doubled studs are so bored. The edge of the bored hole shall not be closer than 5/8 inch (15.9 mm) to the edge of the stud. Bored holes shall not be located at the same section of stud as a cut or notch.

2308.6.4 Limitations.

In designated lateral-force resisting system assemblies designed in accordance with this code and greater than three-stories in height or in Seismic Design Categories C, D, E, and F, the cutting, notching and boring of wall studs shall be as prescribed by the registered design professional.

In structures designed in accordance with the International Residential Code, modification of wall studs shall comply with the International Residential Code.

TABLE 2308.8.1.1(1)

HEADER AND GIRDER SPANS^{a, b} FOR EXTERIOR BEARING WALLS (Maximum spans for Douglas fir-larch, hem-fir, Southern pine and spruce-pine-fir and required number of jack studs)

The remaining portion of the table is unchanged and omitted for clarity.

GIRDERS AND HEADERS SUPPORTING	SIZE	<u>ALLOWABLE STRESS DESIGN</u> GROUND SNOW LOAD, $p_{g(asd)}$ (psf) ^e								
		30			50			70		
		Building width ^c (feet)								
		12	24	36	12	24	36	12	24	36
		Span ^f NJ ^d	Span ^f NJ ^d	Span ^f NJ ^d	Span ^f NJ ^d	Span ^f NJ ^d	Span ^f NJ ^d	Span ^f NJ ^d	Span ^f NJ ^d	Span ^f NJ ^d

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

- Spans are given in feet and inches.
- Spans are based on minimum design properties for No. 2 grade lumber of Douglas fir-larch, hem-fir, Southern pine and spruce-pine fir.
- Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
- NJ = Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.

- e. Use 30 psf [allowable stress design](#) ground snow load for cases in which [allowable stress design](#) ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.
- f. Spans are calculated assuming the top of the header or girder is laterally braced by perpendicular framing. Where the top of the header or girder is not laterally braced (for example, cripple studs bearing on the header), tabulated spans for headers consisting of 2 × 8, 2 × 10, or 2 × 12 sizes shall be multiplied by 0.70 or the header or girder shall be designed.

2308.4.2.4 Notches and holes.

~~Notches on the ends of joists shall not exceed one-fourth the joist depth. Notches in the top or bottom of joists shall not exceed one-sixth the depth and shall not be located in the middle third of the span. Holes bored in joists shall not be within 2 inches (51 mm) of the top or bottom of the joist and the diameter of any such hole shall not exceed one-third the depth of the joist.~~

2308.5.6 [2308.9.6](#) Cripple walls.

Foundation *cripple walls* shall be framed of studs that are not less than the size of the studding above ~~and~~. [Exterior cripple wall studs shall be](#) not less than 14 inches (356 mm) in length, or shall be framed of solid blocking. Where exceeding 4 feet (1219 mm) in height, such walls shall be framed of studs having the size required for an additional story. See Section 2308.6.6 for cripple wall bracing.

2308.5.9 Cutting and notching.

~~In exterior walls and bearing partitions, a wood stud shall not be cut or notched in excess of 25 percent of its depth. In nonbearing partitions that do not support loads other than the weight of the partition, a stud shall not be cut or notched in excess of 40 percent of its depth.~~

2308.5.10 Bored holes.

~~Bored holes not greater than The diameter of bored holes in wood studs shall not exceed 40 percent of the stud width are permitted to be bored in any wood stud. Bored holes not greater than depth. The diameter of bored holes in wood studs shall not exceed 60 percent of the stud width are permitted in nonbearing partitions or depth in nonbearing partitions. The diameter of bored holes in wood studs shall not exceed 60 percent of the stud depth in any wall where each bored stud is doubled, provided that not more than two such successive doubled studs are so bored. The edge of a the bored hole shall not be nearer closer than 5/8 inch (15.9 mm) to the edge of the stud. Bored holes shall not be located at the same section of stud as a cut or notch.~~

TABLE ~~2308.6.3(1)~~ [2308.10.3\(1\)](#) BRACING METHODS

The remaining portion of the table is unchanged and omitted for clarity.

METHODS, MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
			Fasteners	Spacing
GB Gypsum board (Double sided)	1/2" or 5/8" by not less than 4' wide to studs at maximum of 24" o.c.		Section 2506.2 for exterior and interior sheathing: 5d annual-ringed cooler nails (1 ⁵ / ₈ " × 0.086") or 1 ¹ / ₄ " screws (Type W or S) for 1/2" gypsum board or 1 ⁵ / ₈ " screws (Type W or S) for 5/8" gypsum board	For all braced wall panel locations: 7" o.c. along panel edges (including top and bottom plates) and 7" o.c. in the field

For SI: 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

a. Method LIB shall have gypsum board fastened to one or more side(s) with nails or screws

TABLE ~~2308.6.3(1)~~ 2310.10.3(3)

BRACING METHODS

METHODS, MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA ^a	
			Fasteners	Spacing
LIBa Let-in- bracing	1" × 4" wood or approved metal straps attached at 45° to 60° angles to studs at maximum of 16" o.c.		Table 2304.10.2	Wood: per stud plus top and bottom plates
			Metal strap: installed in accordance with manufacturer's recommendations	Metal strap: installed in accordance with manufacturer's recommendations
DWB Diagonal wood boards	3/4" thick (1" nominal) × 6" minimum width to studs at maximum of 24" o.c.		Table 2304.10.2	Per stud
WSP Wood structural panel	3/8" in accordance with Table 2308.6.3(2) or 2308.6.3(3)		Table 2304.10.2	6" edges 12" field
SFB Structural fiberboard sheathing	1/2" in accordance with Table 2304.10.2 to studs at maximum 16" o.c.		Table 2304.10.2	3" edges 6" field
GB Gypsum board (Double sided)	1/2" or 5/8" by not less than 4' wide to studs at maximum of 24" o.c.		Section 2506.2 for exterior and interior sheathing: 5d annual ringed cooler nails (15/8" × 0.086") or 11/4" screws (Type W or S) for 1/2" gypsum board or 15/8" screws (Type W or S) for 5/8" gypsum board	For all braced wall panel locations: 7" o.c. along panel edges (including top and bottom plates) and 7" o.c. in the field
PBS Particleboard sheathing	3/8" or 1/2" in accordance with Table 2308.6.3(4) to studs at maximum of 16" o.c.		6d common (2" long × 0.113" dia.) nails for 3/8" thick sheathing or 8d common (2 1/2" long × 0.131" dia.) nails for 1/2" thick sheathing	3" edges 6" field
PCP Portland cement plaster	Section 2510 to studs at maximum of 16" o.c.		1 1/2" long, 11 gage, <u>0.120" dia.</u> , 7/16" dia. head nails or 7/8" long, 16 gage staples	6" o.c. on all framing members

~~2308.6.6.2~~ 2308.10.6.2 Cripple wall bracing in Seismic Design Categories D and E.

For the purposes of this section, *cripple walls* in *Seismic Design Categories* D and E ~~having~~ shall not have a stud height exceeding 14 inches (356 mm) ~~shall be considered to be a story and~~ and studs shall be ~~braced~~ solid blocked in accordance with TABLE 2308.6.1. ~~Where interior braced wall lines occur without a continuous foundation below, the length of parallel exterior cripple wall bracing shall be one and one-half times the lengths required by TABLE 2308.6.1. Where the cripple wall sheathing type used is Method WSP or DWB and this additional length of bracing cannot be provided, the capacity of WSP or DWB sheathing shall be increased by reducing the spacing of fasteners along the perimeter of each piece of sheathing to 4 inches (102 mm) on center.~~ Section 2308.5.6 for the full dwelling perimeter and for the full length of interior braced walls lines supported on foundations, excepting ventilation and access openings.

TABLE 2308.7.3.1

~~RAFTER TIE CONNECTIONS~~

RAFTER SLOPE	TIE SPACING (inches)	NO SNOW LOAD				GROUND SNOW LOAD (pound per square foot)								
						30-pounds per square foot				50-pounds per square foot				
		Roof span (feet)												
		12	20-24	28	36	12	20	28	36	12	20	28	36	
		Required number of 16d commons (31/2 ^{2"} x 0.162 ^{2"}) nails ^{a,b} per connection _{c,d,e,f}												
3:12	12	4-3	6-5	8	10	4	6	8	11	5	8	12	15	
	16	5	7	10	13	5	8	11	14	6	11	15	20	
	24	7	11	15	19	7	11	16	21	9	16	23	30	
	32	10	14	19	25	10	16	22	28	12	27	30	40	
	48	14	21	29	37	14	32	36	42	18	32	46	60	
4:12	12	3	4	5	6	3	5	6	8	4	6	9	11	
	16	3	5	7	8	4	6	8	11	5	8	12	15	
	24	4	7	10	12	5	9	12	16	7	12	17	22	
	32	6	9	13	16	8	12	16	22	10	16	24	30	
	48	8	14	19	24	10	18	24	32	14	24	34	44	
5:12	12	3	3	4	5	3	4	5	7	3	5	7	9	
	16	3	4	5	7	3	5	7	9	4	7	9	12	
	24	4	6	8	10	4	7	10	13	6	10	14	18	
	32	5	8	10	13	6	10	14	18	8	14	18	24	
	48	7	11	15	20	8	14	20	26	12	20	28	36	
7:12	12	3	3	3	4	3	3	4	5	3	4	5	7	
	16	3	3	4	5	3	4	5	6	3	5	7	9	
	24	3	4	6	7	3	5	7	9	4	7	10	13	
	32	4	6	8	10	4	8	10	12	6	10	14	18	
	48	5	8	11	14	6	10	14	18	9	14	20	26	
9:12	12	3	3	3	3	3	3	3	4	3	3	4	5	
	16	3	3	3	4	3	3	4	5	3	4	5	7	
	24	3	3	5	6	3	4	6	7	3	6	8	10	
	32	3	4	6	8	4	6	8	10	5	8	10	14	
	48	4	6	9	11	5	8	12	14	7	12	16	20	
12:12	12	3	3	3	3	3	3	3	3	3	3	3	4	
	16	3	3	3	3	3	3	3	4	3	3	4	5	
	24	3	3	3	4	3	3	4	6	3	4	6	8	
	32	3	3	4	5	3	5	6	8	4	6	8	10	
	48	3	4	6	7	4	7	8	12	6	8	12	16	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 47.8 N/m².

- a. ~~40d box (5" × 0.162") or 16d sinker (31/4" × 0.148") nails are permitted to be substituted for 16d common (31/2" × 0.16") nails.~~
- b. ~~Nailing requirements are permitted to be reduced 25 percent if nails are clinched.~~
- c. ~~Rafter tie heel joint connections are not required where the ridge is supported by a load-bearing wall, header or ridge beam.~~
- d. ~~Where intermediate support of the rafter is provided by vertical struts or purlins to a load-bearing wall, the tabulated heel joint connection requirements are permitted to be reduced proportionally to the reduction in span.~~
- e. ~~Equivalent nailing patterns are required for ceiling joist to ceiling joist lap splices.~~
- f. ~~Connected members shall be of sufficient size to prevent splitting due to nailing.~~
- g. ~~For snow loads less than 30 pounds per square foot, the required number of nails is permitted to be reduced by multiplying by the ratio of actual snow load plus 10 divided by 40, but not less than the required for no snow load.~~

TABLE 2308.11.3.1
RAFTER TIE CONNECTIONS^g

<u>RAFTER SLOPE</u>	<u>TIE SPACING (inches)</u>	<u>NO SNOW LOAD</u>			<u>ALLOWABLE STRESS DESIGN GROUND SNOW LOAD $p_{g(asd)}$ (pound per square foot)</u>						
					<u>30 pounds per square foot</u>			<u>50 pounds per square foot</u>			
		<u>Roof span (feet)</u>									
		<u>12</u>	<u>24</u>	<u>36</u>	<u>12</u>	<u>24</u>	<u>36</u>	<u>12</u>	<u>24</u>	<u>36</u>	
		<u>Required number of 16d commons (31/2" x 0.162") nails ^{a,b} per connection</u> <u>c,d,e,f</u>									
<u>3:12</u>	<u>12</u>	<u>3</u>	<u>5</u>	<u>8</u>	<u>3</u>	<u>6</u>	<u>9</u>	<u>5</u>	<u>9</u>	<u>13</u>	
	<u>16</u>	<u>4</u>	<u>7</u>	<u>10</u>	<u>4</u>	<u>8</u>	<u>12</u>	<u>6</u>	<u>12</u>	<u>17</u>	
	<u>19.2</u>	<u>4</u>	<u>8</u>	<u>12</u>	<u>5</u>	<u>10</u>	<u>14</u>	<u>7</u>	<u>14</u>	<u>21</u>	
	<u>24</u>	<u>5</u>	<u>10</u>	<u>15</u>	<u>6</u>	<u>12</u>	<u>18</u>	<u>9</u>	<u>17</u>	<u>26</u>	
	<u>32</u>	<u>7</u>	<u>13</u>	<u>20</u>	<u>8</u>	<u>16</u>	<u>24</u>	<u>12</u>	<u>23</u>	<u>34</u>	
	<u>48</u>	<u>10</u>	<u>20</u>	<u>29</u>	<u>12</u>	<u>24</u>	<u>35</u>	<u>17</u>	<u>34</u>	<u>51</u>	
<u>4:12</u>	<u>12</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>3</u>	<u>5</u>	<u>7</u>	<u>4</u>	<u>7</u>	<u>10</u>	
	<u>16</u>	<u>3</u>	<u>5</u>	<u>8</u>	<u>3</u>	<u>6</u>	<u>9</u>	<u>5</u>	<u>9</u>	<u>13</u>	
	<u>19.2</u>	<u>3</u>	<u>6</u>	<u>9</u>	<u>4</u>	<u>7</u>	<u>11</u>	<u>6</u>	<u>11</u>	<u>16</u>	
	<u>24</u>	<u>4</u>	<u>8</u>	<u>11</u>	<u>5</u>	<u>9</u>	<u>13</u>	<u>7</u>	<u>13</u>	<u>19</u>	
	<u>32</u>	<u>5</u>	<u>10</u>	<u>15</u>	<u>6</u>	<u>12</u>	<u>18</u>	<u>9</u>	<u>17</u>	<u>26</u>	
	<u>48</u>	<u>8</u>	<u>15</u>	<u>22</u>	<u>9</u>	<u>18</u>	<u>26</u>	<u>13</u>	<u>26</u>	<u>38</u>	
<u>5:12</u>	<u>12</u>	<u>3</u>	<u>3</u>	<u>5</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>3</u>	<u>6</u>	<u>8</u>	
	<u>16</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>3</u>	<u>5</u>	<u>7</u>	<u>4</u>	<u>7</u>	<u>11</u>	
	<u>19.2</u>	<u>3</u>	<u>5</u>	<u>7</u>	<u>3</u>	<u>6</u>	<u>9</u>	<u>5</u>	<u>9</u>	<u>13</u>	
	<u>24</u>	<u>3</u>	<u>6</u>	<u>9</u>	<u>4</u>	<u>7</u>	<u>11</u>	<u>6</u>	<u>11</u>	<u>16</u>	

	<u>32</u>	<u>4</u>	<u>8</u>	<u>12</u>	<u>5</u>	<u>10</u>	<u>14</u>	<u>7</u>	<u>13</u>	<u>21</u>
	<u>48</u>	<u>6</u>	<u>12</u>	<u>18</u>	<u>7</u>	<u>14</u>	<u>21</u>	<u>11</u>	<u>21</u>	<u>31</u>
<u>7:12</u>	<u>12</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>6</u>
	<u>16</u>	<u>3</u>	<u>3</u>	<u>5</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>3</u>	<u>5</u>	<u>8</u>
	<u>19.2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>3</u>	<u>6</u>	<u>9</u>
	<u>24</u>	<u>3</u>	<u>5</u>	<u>7</u>	<u>3</u>	<u>5</u>	<u>8</u>	<u>4</u>	<u>8</u>	<u>11</u>
	<u>32</u>	<u>3</u>	<u>6</u>	<u>9</u>	<u>4</u>	<u>7</u>	<u>10</u>	<u>5</u>	<u>10</u>	<u>15</u>
	<u>48</u>	<u>5</u>	<u>9</u>	<u>13</u>	<u>5</u>	<u>10</u>	<u>15</u>	<u>8</u>	<u>15</u>	<u>22</u>
<u>9:12</u>	<u>12</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>5</u>
	<u>16</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>6</u>
	<u>19.2</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>3</u>	<u>5</u>	<u>7</u>
	<u>24</u>	<u>3</u>	<u>5</u>	<u>5</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>3</u>	<u>6</u>	<u>9</u>
	<u>32</u>	<u>3</u>	<u>7</u>	<u>7</u>	<u>3</u>	<u>6</u>	<u>8</u>	<u>4</u>	<u>8</u>	<u>12</u>
	<u>48</u>	<u>4</u>	<u>10</u>	<u>10</u>	<u>4</u>	<u>8</u>	<u>12</u>	<u>6</u>	<u>12</u>	<u>17</u>
<u>12:12</u>	<u>12</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>
	<u>16</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>5</u>
	<u>19.2</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>3</u>	<u>4</u>	<u>6</u>
	<u>24</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>5</u>	<u>3</u>	<u>5</u>	<u>7</u>
	<u>32</u>	<u>3</u>	<u>5</u>	<u>5</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>3</u>	<u>6</u>	<u>9</u>
	<u>48</u>	<u>3</u>	<u>8</u>	<u>8</u>	<u>3</u>	<u>6</u>	<u>9</u>	<u>5</u>	<u>9</u>	<u>13</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 47.8 N/m².

- 10d common (3" x 0.148") nails shall be permitted to be substituted for 16d common (3½" x 0.162") nails where the required number of nails is taken as 1.2 times the required number of 16d common nails, rounded up to the next full nail.
- Rafter tie heel joint connections are not required where the ridge is supported by a load-bearing wall, header or ridge beam.
- Where intermediate support of the rafter is provided by vertical struts or purlins to a load-bearing wall, the tabulated heel joint connection requirements are permitted to be reduced proportionally to the reduction in span.
- Equivalent nailing patterns are required for ceiling joist to ceiling joist lap splices.
- Connected members shall be of sufficient size to prevent splitting due to nailing.
- For allowable stress design snow loads less than 30 pounds per square foot, the required number of nails is permitted to be reduced by multiplying by the ratio of actual snow load plus 10 divided by 40, but not less than the number required for no snow load.
- Applies to roof live load of 20 psf or less.
- Tabulated heel joint connection requirements assume that ceiling joists or rafter ties are located at the bottom of the attic space. Where ceiling joists or rafter ties are located higher in the attic, heel joint connection requirements shall be increased by the adjustment factors in Table 2308.7.3.1(1).
- Tabulated requirements are based on 10 psf roof dead load in combination with the specified roof snow load and roof live load.

2308.7.4 Notches and holes.

Notching at the ends of rafters or ceiling joists shall not exceed one-fourth the depth. Notches in the top or bottom of the rafter or ceiling joist shall not exceed one-sixth the depth and shall not be located in the middle one-third of the span, except that a notch not more than one-third of the depth is permitted in the top of the rafter or ceiling joist not further from the face of the support than the depth of the member. Holes bored in rafters or ceiling joists shall not be within 2 inches (51 mm) of the top and bottom and their diameter shall not exceed one-third the depth of the member.

TABLE 2308.7.2(3) 2308.11.2(3)

RAFTER SPANS FOR COMMON LUMBER SPECIES ((Allowable stress design p_g Ground snow load, $p_{g(asd)} = 30$ psf, ceiling not attached to rafters, $L/\Delta = 180$)

The body and footnotes of the table are unchanged and omitted for clarity.

TABLE 2308.7.2(4) 2308.11.2(4)

RAFTER SPANS FOR COMMON LUMBER SPECIES (Allowable stress design p_g Ground snow load, $p_{g(asd)} = 50$ psf, ceiling not attached to rafters, $L/\Delta = 180$)

The body and footnotes of the table are unchanged and omitted for clarity.

TABLE 2308.7.2(5) 2308.11.2(5)

RAFTER SPANS FOR COMMON LUMBER SPECIES (Allowable stress design p_g Ground snow load, $p_{g(asd)} = 30$ psf, ceiling attached to rafters, $L/\Delta = 240$)

The body and footnotes of the table are unchanged and omitted for clarity.

TABLE 2308.7.2(6) 2308.11.2(6)

RAFTER SPANS FOR COMMON LUMBER SPECIES (Allowable stress design p_g Ground snow load, $p_{g(asd)} = 50$ psf, ceiling attached to rafters, $L/\Delta = 240$)

The body and footnotes of the table are unchanged and omitted for clarity.

TABLE 2308.11.3.1(1)

HEEL JOINT CONNECTION ADJUSTMENT FACTORS

<u>H_c/H_r ^{a,b}</u>	<u>HEEL JOINT CONNECTION ADJUSTMENT FACTOR</u>
<u>1/3</u>	<u>1.5</u>
<u>1/4</u>	<u>1.33</u>
<u>1/5</u>	<u>1.25</u>
<u>1/6</u>	<u>1.2</u>
<u>1/10 or less</u>	<u>1.11</u>

- a. H_c = Height of ceiling joists or rafter ties measured vertically from the top of the rafter support walls to the bottom of the ceiling joists or rafter ties; H_r = Height of roof ridge measured vertically from the top of the rafter support walls to the bottom of the roof ridge.

- b. Where H_c/H_r exceeds 1/3, connections shall be designed in accordance with accepted engineering practice.

2308.7.5 2308.11.4 Wind uplift.

The roof construction shall have rafter and truss ties to the wall below. Resultant uplift *loads* shall be transferred to the foundation using a continuous *load* path. The rafter or truss to wall connection shall comply with Tables 2304.10.2 and 2308.7.5.

Exception: The truss to wall connection shall be permitted to be determined from the uplift forces as specified on the truss design drawings or as shown on the construction documents.

TABLE 2308.7.5 REQUIRED RATING OF APPROVED UPLIFT CONNECTORS (pounds)^{a, b, c, e, f, g, h}

NOMINAL ALLOWABLE STRESS SPEED, V_{asd}ⁱ	ROOF SPAN (feet)							OVERHANGS (pounds/foot)^d
	12	20	24	28	32	36	40	
85	-72	-120	-145	-169	-193	-217	-241	-38.55
90	-91	-151	-181	-212	-242	-272	-302	-43.22
100	-131	-281	-262	-305	-349	-393	-436	-53.36
110	-175	-292	-351	-409	-467	-526	-584	-64.56

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = ~~1.61 km/hr~~ 0.447 meters per second, 1 pound = 0.454 Kg, 1 pound/foot = 14.5939 N/m.

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

- The uplift connection requirements are based on a 30-foot mean roof height located in Exposure B. For Exposure C or D and for other mean roof heights, multiply the loads by the following adjustment coefficients:
- The uplift connection requirements are based on the framing being spaced 24 inches on center. Multiply by 0.67 for framing spaced 16 inches on center and multiply by 0.5 for framing spaced 12 inches on center.
- The uplift connection requirements include an allowance for 10 pounds of dead load.
- The uplift connection requirements do not account for the effects of overhangs. The magnitude of the loads shall be increased by adding the overhang loads found in the table. The overhang loads are based on framing spaced 24 inches on center. The overhang loads given shall be multiplied by the overhang projection and added to the roof uplift value in the table.
- The uplift connection requirements are based on wind loading on end zones as defined in Figure 28.5-1 of ASCE 7. Connection loads for connections located a distance of 20 percent of the least horizontal dimension of the building from the corner of the building are permitted to be reduced by multiplying the table connection value by 0.7 and multiplying the overhang load by 0.8.
- For wall-to-wall and wall-to-foundation connections, the capacity of the uplift connector is permitted to be reduced by 100 pounds for each full wall above. (For example, if a 500-pound rated connector is used on the roof framing, a 400-pound rated connector is permitted at the next floor level down).
- Interpolation is permitted for intermediate values of V_{asd} and roof spans.
- The rated capacity of approved tie-down devices is permitted to include up to a 60-percent increase for wind effects where allowed by material specifications.
- V_{asd} shall be determined in accordance with Section 1609.3.1.

TABLE 2308.7.5 2308.11.4 REQUIRED RATING OF APPROVED UPLIFT CONNECTORS (pounds)^{a, b, c, e, f, g, h}

NOMINAL BASIC DESIGN WIND SPEED, V_{asd}^i	ROOF SPAN (feet)							OVERHANGS (pounds/feet) ^d
	12	20	24	28	32	36	40	
EXPOSURE B								
85 <u>90</u>	72 <u>64</u>	120 <u>85</u>	145 <u>96</u>	169 <u>107</u>	193 <u>117</u>	217 <u>128</u>	241 <u>139</u>	38.55
90 <u>100</u>	94 <u>102</u>	151 <u>139</u>	181 <u>158</u>	212 <u>177</u>	242 <u>195</u>	272 <u>214</u>	302 <u>233</u>	43.22
100 <u>110</u>	131 <u>144</u>	281 <u>199</u>	262 <u>226</u>	305 <u>254</u>	349 <u>282</u>	393 <u>310</u>	436 <u>338</u>	53.36
110 <u>120</u>	175 <u>190</u>	292 <u>265</u>	351 <u>302</u>	409 <u>339</u>	467 <u>377</u>	526 <u>414</u>	584 <u>452</u>	64.56
<u>130</u>	<u>-240</u>	<u>-335</u>	<u>-382</u>	<u>-431</u>	<u>-479</u>	<u>-528</u>	<u>-576</u>	
<u>140</u>	<u>-294</u>	<u>-411</u>	<u>-470</u>	<u>-530</u>	<u>-590</u>	<u>-650</u>	<u>-710</u>	
EXPOSURE C								
<u>90</u>	<u>-126</u>	<u>-175</u>	<u>-199</u>	<u>-223</u>	<u>-247</u>	<u>-272</u>	<u>-296</u>	
<u>100</u>	<u>-179</u>	<u>-250</u>	<u>-285</u>	<u>-320</u>	<u>-356</u>	<u>-391</u>	<u>-426</u>	
<u>110</u>	<u>-238</u>	<u>-332</u>	<u>-380</u>	<u>-428</u>	<u>-476</u>	<u>-525</u>	<u>-573</u>	
<u>120</u>	<u>-302</u>	<u>-424</u>	<u>-485</u>	<u>-547</u>	<u>-608</u>	<u>-669</u>	<u>-731</u>	
<u>130</u>	<u>-371</u>	<u>-521</u>	<u>-597</u>	<u>-674</u>	<u>-751</u>	<u>-828</u>	<u>-904</u>	
<u>140</u>	<u>-446</u>	<u>-628</u>	<u>-719</u>	<u>-812</u>	<u>-904</u>	<u>-997</u>	<u>-1090</u>	
EXPOSURE D								
<u>90</u>	<u>-166</u>	<u>-232</u>	<u>-265</u>	<u>-298</u>	<u>-311</u>	<u>-364</u>	<u>-396</u>	
<u>100</u>	<u>-229</u>	<u>-321</u>	<u>-367</u>	<u>-413</u>	<u>-459</u>	<u>-505</u>	<u>-551</u>	
<u>110</u>	<u>-298</u>	<u>-418</u>	<u>-478</u>	<u>-539</u>	<u>-601</u>	<u>-662</u>	<u>-723</u>	
<u>120</u>	<u>-373</u>	<u>-526</u>	<u>-603</u>	<u>-679</u>	<u>-756</u>	<u>-833</u>	<u>-910</u>	
<u>130</u>	<u>-455</u>	<u>-641</u>	<u>-734</u>	<u>-829</u>	<u>-924</u>	<u>-1020</u>	<u>-1114</u>	
<u>140</u>	<u>-544</u>	<u>-767</u>	<u>-878</u>	<u>-992</u>	<u>-1106</u>	<u>-1220</u>	<u>-1333</u>	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 1.61 km/hr, 1 pound = 0.454 Kg, 1 pound/foot = 14.5939 N/m.

- a. The uplift connection requirements are based on a 33 30-foot mean roof height. ~~located in Exposure B. For Exposure C or D and for other mean roof heights, multiply the loads by the following adjustment coefficients:~~

	Mean Roof Height (feet)									
EXPOSURE	15	20	25	30	35	40	45	50	55	60

~~B 1.001.001.001.001.051.091.121.161.19 1.22~~
~~C 1.211.291.351.401.451.491.531.561.59 1.62~~
~~D 1.471.551.611.661.701.741.781.811.84 1.87~~

- b. The uplift connection requirements are based on the framing being spaced 24 inches on center. Multiply by 0.67 for framing spaced 16 inches on center and multiply by 0.5 for framing spaced 12 inches on center.
- c. The uplift connection requirements include an allowance for 10 pounds of dead load.
- d. The uplift connection requirements ~~do not account for~~ include the effects of 24" overhangs. ~~The magnitude of the loads shall be increased by adding the overhang loads found in the table. The overhang loads are based on framing spaced 24 inches on center. The overhang loads given shall be multiplied by the overhang projection and added to the roof uplift value in the table.~~
- e. The uplift connection requirements are based on wind loading on end zones as defined in Figure 28.3-1 of ASCE 7. Connection loads for connections located a distance of 20 percent of the least horizontal dimension of the building from the corner of the building are permitted to be reduced by multiplying the table connection value by 0.75. ~~and multiplying the overhang load by 0.8.~~
- f. For wall-to-wall and wall-to-foundation connections, the capacity of the uplift connector is permitted to be reduced by 100 pounds for each full wall above. (For example, if a 500-pound rated connector is used on the roof framing, a 400-pound rated connector is permitted at the next floor level down).
- g. Interpolation is permitted for intermediate values of V_{asd} and roof spans.
- h. The rated capacity of approved tie-down devices is permitted to include up to a 60-percent increase for wind effects where allowed by material specifications. The required rating of approved uplift connectors is based on Allowable Stress Design loads.
- i. V_{asd} shall be determined in accordance with Section 1609.3.1.

2308.8 Design of elements.

~~Combining of engineered elements or systems and conventionally specified elements or systems shall be permitted subject to the limits of Sections 2308.8.1 and 2308.8.2.~~

2308.8.1 Elements exceeding limitations of conventional construction.

~~Where a building of otherwise conventional construction contains structural elements exceeding the limits of Section 2308.2, these elements and the supporting load path shall be designed in accordance with accepted engineering practice and the provisions of this code.~~

2308.8.2 Structural elements or systems not described herein.

~~Where a building of otherwise conventional construction contains structural elements or systems not described in Section 2308, these elements or systems shall be designed in accordance with accepted engineering practice and the provisions of this code. The extent of such design need only demonstrate compliance of the nonconventional elements with other applicable provisions of this code and shall be compatible with the performance of the conventionally framed system.~~

Chapter 24 Glass and Glazing

SECTION 2401

GENERAL

2401.1 Scope.

The provisions of this chapter shall govern the materials, design, construction and quality of glass, light-transmitting ceramic and light-transmitting plastic panels for exterior and interior use in both vertical and sloped applications in buildings and structures. [Light-transmitting plastic glazing shall also meet the applicable requirements of Chapter 26.](#)

2403.3 [Glass](#) framing.

To be considered firmly supported, the framing members for each individual pane of glass shall be designed so [that](#) the deflection of the edge of the glass perpendicular to the glass pane ~~does shall~~ not exceed 1/175 of the glass edge length ~~or 3/4 inch (19.1 mm), whichever is less where the glass edge length is not more than 13 feet 6 inches (4115 mm), or 1/240 of the glass edge length + 1/4 inch (6.4 mm) where the glass edge length is greater than 13 feet 6 inches (4115 mm).~~ when subjected to the larger of the positive or negative load where loads are combined as specified in Section 1605.

2404.1 Vertical glass.

Glass sloped 15 degrees (0.26 rad) or less from vertical in windows, curtain and window walls, doors and other exterior applications shall be designed to resist the wind loads due to *basic design* wind speed, V , in Section 1609 for components and cladding. Glass in glazed curtain walls, glazed storefronts and glazed partitions shall meet the seismic requirements of ASCE 7, Section 13.5.9. The load resistance of glass under uniform load shall be determined in accordance with ASTM E1300.

The design of vertical glazing shall be based on Equation 24-1.

$$0.6F_{gw} \leq F_{ga} \quad \text{(Equation 24-1)}$$

where:

F_{gw} = Wind load on the glass due to *basic design* wind speed, V , computed in accordance with Section 1609.

F_{ga} = Short duration load on the glass as determined in accordance with ASTM E1300.

2404.2 Sloped glass.

Glass sloped more than 15 degrees (0.26 rad) from vertical in skylights, *sunrooms*, sloped roofs and other exterior applications shall be designed to resist the most critical combinations of loads determined by Equations 24-2, 24-3 and 24-4.

$$F_g = 0.6W_o - D \quad \text{(Equation 24-2)}$$

$$F_g = 0.6W_i + D + 0.5 \text{ } 0.35S \quad \text{(Equation 24-3)}$$

$$F_g = 0.3W_i + D + 0.7S \quad \text{(Equation 24-4)}$$

where:

D = Glass dead load psf (kN/m²).

For glass sloped 30 degrees (0.52 rad) or less from horizontal,

= $13t_g$ (For SI: $0.0245t_g$).

For glass sloped more than 30 degrees (0.52 rad) from horizontal,

= $13t_g \cos \theta$ (For SI: $0.0245t_g \cos \theta$).

F_g = Total *load*, psf (kN/m²) on glass.

S = Snow *load*, psf (kN/m²) as determined in Section 1608 [from the reliability-targeted \(strength-based\) maps in Figures 1608.2\(1\) through 1608.2\(4\).](#)

t_g = Total glass thickness, inches (mm) of glass panes and plies.

W_i = Inward wind force, psf (kN/m²) due to *basic design-wind speed*, V , as calculated in Section 1609.

W_o = Outward wind force, psf (kN/m²) due to *basic design-wind speed*, V , as calculated in Section 1609.

θ = Angle of slope from horizontal.

Exception: The performance grade rating of *unit skylights* and *tubular daylighting devices* shall be determined in accordance with Section 2405.5.

The design of sloped glazing shall be based on Equation 24-5.

$$F_g \leq F_{ga} \quad \text{(Equation 24-5)}$$

where:

F_g = Total *load* on the glass as determined by Equations 24-2, 24-3 and 24-4.

F_{ga} = Short duration *load* resistance of the glass as determined in accordance with ASTM E1300 for Equations 24-2 and 24-3; or the long duration *load* resistance of the glass as determined in accordance with ASTM E1300 for Equation 24-4.

2404.3.1 Vertical wired glass.

Wired glass sloped 15 degrees (0.26 rad) or less from vertical in windows, curtain and window walls, doors and other exterior applications shall be designed to resist the wind *loads* in Section 1609 for components and cladding according to the following equation:

$$0.6F_{gw} < 0.5F_{ge} \quad \text{(Equation 24-6)}$$

where:

F_{gw} = Wind *load* on the glass due to *basic design-wind speed*, V , computed in accordance with Section 1609.

F_{ge} = Nonfactored *load* from ASTM E1300 using a thickness designation for monolithic glass that is not greater than the thickness of wired glass.

2404.3.3 Vertical patterned glass.

Patterned glass sloped 15 degrees (0.26 rad) or less from vertical in windows, curtain and window walls, doors and other exterior applications shall be designed to resist the wind *loads* in Section 1609 for components and cladding according to Equation 24-9.

$$F_{gw} < 1.0F_{ge} \quad \text{(Equation 24-9)}$$

where:

F_{gw} = Wind *load* on the glass due to *basic design-wind speed*, V , computed in accordance with Section 1609.

F_{ge} = Nonfactored *load* in accordance with ASTM E1300. The value for patterned glass shall be based on the thinnest part of the glass. Interpolation between nonfactored *load* charts in ASTM E1300 shall be permitted.

SECTION 2405

SLOPED GLAZING AND SKYLIGHTS

2405.1 Scope.

This section applies to the installation of glass and other transparent, translucent or opaque glazing material installed at a slope [of](#) more than 15 degrees (0.26 rad) from the vertical plane, including glazing materials in skylights, roofs and sloped walls.

2405.2 Allowable glazing materials and limitations.

Sloped glazing shall be any of the following materials, subject to the listed limitations.

1. For monolithic glazing systems, the glazing material of the single light or layer shall be laminated glass with a minimum 30-mil (0.76 mm) polyvinyl butyral (or equivalent) interlayer, wired glass, light-transmitting plastic materials meeting the requirements of Section ~~2607~~ 2606, heat-strengthened glass or fully tempered glass.
2. For multiple-layer glazing systems, each light or layer shall consist of any of the glazing materials specified in Item 1. Annealed glass is permitted to be used as specified in Exceptions 2 and 3 of Section 2405.3.

Laminated glass and plastic materials described in Items 1 and 2 shall not require the screening or height restrictions provided in Section 2405.3.

For additional requirements for plastic skylights, see Section 2610. Glass-block construction shall conform to the requirements of Section 2110.1.

2405.3 Screening.

~~Where used in monolithic glazing systems, annealed, heat-strengthened, and fully tempered glass shall have broken glass retention screens, where required, installed below the glazing material. The screens and their fastenings shall be: capable of supporting twice the weight of the glazing; firmly and substantially fastened to the framing members; and installed within 4 inches (102 mm) of the glass. The screens shall be constructed of a noncombustible material not thinner than No. 12 B&S gage (0.0808 inch) with mesh not larger than 1 inch by 1 inch (25 mm by 25 mm). In a corrosive atmosphere, structurally equivalent noncorrosive screen materials shall be used. Annealed, heat-strengthened glass, fully tempered and wired glass, where used in multiple-layer glazing systems as the bottom glass layer over the walking surface, shall be equipped with screening that conforms to the requirements for monolithic glazing systems.~~

Exception: In monolithic and multiple-layer sloped glazing systems, the following applies:

- ~~1. Fully tempered glass installed without protective screens where glazed between intervening floors at a slope of 30 degrees (0.52 rad) or less from the vertical plane, shall have the highest point of the glass 10 feet (3048 mm) or less above the walking surface.~~
- ~~2. Screens are not required below any glazing material, including annealed glass, where the walking surface below the glazing material is permanently protected from the risk of falling glass or the area below the glazing material is not a walking surface.~~
- ~~3. Any glazing material, including annealed glass, is permitted to be installed without screens in the sloped glazing systems of commercial or detached noncombustible greenhouses used exclusively for growing plants and not open to the public, provided that the height of the greenhouse at the ridge does not exceed 30 feet (9144 mm) above grade.~~
- ~~4. Screens shall not be required in individual dwelling units in Groups R-2, R-3 and R-4 where fully tempered glass is used as single glazing or as both panes in an insulating glass unit, and the following conditions are met:~~
 - ~~4.1. Each pane of the glass is 16 square feet (1.5 m²) or less in area.~~
 - ~~4.2. The highest point of the glass is 12 feet (3658 mm) or less above any walking surface or other accessible area.~~
 - ~~4.3. The glass thickness is $\frac{3}{16}$ inch (4.8 mm) or less.~~
- ~~5. Screens shall not be required for laminated glass with a 15-mil (0.38 mm) polyvinyl butyral (or equivalent) interlayer used in individual dwelling units in Groups R-2, R-3 and R-4 within the following limits:~~
 - ~~5.1. Each pane of glass is 16 square feet (1.5 m²) or less in area.~~
 - ~~5.2. The highest point of the glass is 12 feet (3658 mm) or less above a walking surface or other accessible area.~~

2405.3.1 Screens under monolithic glazing.

Heat-strengthened glass and fully tempered glass shall have screens installed below the full area of the glazing material.

2405.3.2 Screens under multiple-layer glazing.

Heat-strengthened glass, fully tempered glass and wired glass used as the bottom glass layer shall have screens installed below the full area of the glazing material.

2405.3.3 Screening not required in monolithic and multiple-layer sloped glazing systems.

In monolithic and multiple-layer sloped glazing systems, retention screens are not required for any of the following :

1. Fully tempered glass shall be permitted to be installed without retention screens where glazed between intervening floors at a slope of 30 degrees (0.52 rad) or less from the vertical plane, and having the highest point of the glass 10 feet (3048 mm) or less above the walking surface.
2. Any glazing material, including annealed glass, where the walking surface below the glazing material is permanently protected from the risk of falling glass or the area below the glazing material is not a walking surface.
3. Any glazing material, including annealed glass, in the sloped glazing systems of commercial or detached noncombustible greenhouses used exclusively for growing plants and not open to the public, provided that the height of the greenhouse at the ridge does not exceed 30 feet (9144 mm) above grade.
4. Individual dwelling units in Groups R-2, R-3 and R-4 where fully tempered glass is used as single glazing or as both panes in an insulating glass unit, and all of the following conditions are met:
 - 4.1. Each pane of the glass is 16 square feet (1.5 m²) or less in area.
 - 4.2. The highest point of the glass is 12 feet (3658 mm) or less above any walking surface or other accessible area.
 - 4.3. The glass thickness is $\frac{3}{16}$ inch (4.8 mm) or less.
5. Laminated glass with a 15-mil (0.38 mm) polyvinyl butyral (or equivalent) interlayer used in individual dwelling units in Groups R-2, R-3 and R-4 where both of the following conditions are met:
 - 5.1. Each pane of glass is 16 square feet (1.5 m²) or less in area.
 - 5.2. The highest point of the glass is 12 feet (3658 mm) or less above a walking surface or other accessible area.

2405.3.4 Screens not required.

For all types of glazing not specifically noted in Sections 2405.3.1 through 2405.3.3 and complying with Section 2405.2, retention screens shall not be required.

2405.5.2 Skylights rated for separate performance grades for positive and negative design pressure.

The design of skylights rated for performance grade for both positive and negative design pressures shall be based on Equations 24-14 and 24-15.

$$F_{gi} < PG_{Pos} \quad \text{(Equation 24-14)}$$

$$F_{go} < PG_{Neg} \quad \text{(Equation 24-15)}$$

where:

PG_{Pos} = Performance grade rating of the skylight under positive design pressure;

PG_{Neg} = Performance grade rating of the skylight under negative design pressure; and

F_{gi} and F_{go} are determined in accordance with the following:

For

where:

W_o = Outward wind force, psf (kN/m²) due to *basic design wind speed*, V , as calculated in Section 1609.

D = The dead weight of the glazing, psf (kN/m²) as determined in Section 2404.2 for glass, or by the weight of the plastic, psf (kN/m²) for plastic glazing.

F_{gi} = Maximum load on the skylight determined from Equations 24-3 and 24-4 in Section 2404.2.

F_{go} = Maximum load on the skylight determined from Equation 24-2.

For $0.6 W_o < D$,

where:

W_o = The outward wind force, psf (kN/m²) due to *basic design wind speed*, V , as calculated in Section 1609.

D = The dead weight of the glazing, psf (kN/m²) as determined in Section 2404.2 for glass, or by the weight of the plastic for plastic glazing.

F_{gi} = Maximum load on the skylight determined from Equations 24-2 through 24-4 in Section 2404.2.

$F_{go} = 0$.

2406.1 Human impact loads.

~~Individual glazed areas, including glass mirrors,~~ in hazardous locations as defined in Section 2406.4 including glass mirrors, single panes of glass, laminated glass, and all panes in multi-pane glass assemblies shall comply with Sections 2406.1.1 through 2406.1.4.

Exception: Mirrors and other glass panels mounted or hung on a surface that provides a continuous backing support.

2406.4.3 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 greater than 9 square feet (0.84 m²).
2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor or adjacent walking surface.
3. The top edge of the glazing is greater than 36 inches (914 mm) above the floor or adjacent walking surface.
4. One or more walking surface(s) are within 36 inches (914 mm), measured horizontally and in a straight line, of the plane of the glazing.

Exceptions:

1. Decorative glazing.
2. Where a horizontal rail is installed on the accessible side(s) of the glazing 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 be not less than 1½ inches (38 mm) in cross-sectional height.
3. Outboard panes in insulating glass units or multiple glazing where the bottom exposed edge of the glass is 8 feet (2438 mm) or more above any grade or walking surface adjacent to the glass exterior. ~~18 inches (457 mm) or more above any adjacent exterior surface, above 25 feet (7620 mm) or more above any grade, roof, walking surface or other horizontal or sloped (within 45 degrees of horizontal) (0.79 rad) surface adjacent to the glass exterior.~~

2406.5 Fire department access panels.

Fire department glass access panels shall be of tempered glass. For multipanel glass assemblies ~~insulating glass units~~, all panes shall be tempered glass.

SECTION 2407

GLASS IN HANDRAILS AND GUARDS

2407.1 Materials.

Glass used in a *handrail* or a *guard* shall be laminated glass constructed of fully tempered or heat-strengthened glass and shall comply with Category II ~~or of~~ CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1. Glazing in ~~railing in-fill panels a~~ *handrail or a guard* shall be of an approved safety glazing material that conforms to the provisions of Section 2406.1.1. For all glazing types, the minimum nominal thickness shall be 1/4 inch (6.4 mm).

Exception: Single fully tempered glass complying with Category II of CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1 shall be permitted to be used in handrails and ~~guardrails~~ *guards* where there is no walking surface beneath them or the walking surface is permanently protected from the risk of falling glass.

2407.1.1 Loads.

~~The panels~~ *Glass handrails and guards and* and their support systems shall be designed to withstand the *loads* specified in Section 1607.9. *Calculated stresses for the loads specified in Section 1607.9 shall be less than or equal to 3,000 pounds per square inch (20.7 MPa) for heat strengthened glass and less than or equal to 6,000 pounds per square inch (41.4 MPa) for fully tempered glass.* ~~Glass guard elements handrails and guards shall be designed using a factor of safety of four.~~

2407.1.2 ~~Structural~~ *Guards with structural* glass balusters ~~panels~~.

Guards with structural glass ~~baluster panels~~ *balusters, whether vertical posts, columns or panels,* shall be installed with an attached top rail or *handrail*. The top rail or *handrail* shall be supported by not fewer than three glass ~~baluster panels~~ *balusters,* 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. The ~~panels~~ *balusters* shall be tested to remain in place as a barrier following impact or glass breakage in accordance with ASTM E2353.

2407.1.4 Glazing in windborne debris regions.

Glazing installed in ~~in-fill panels~~ *exterior handrails* or ~~balusters~~ *guards* in windborne debris regions shall ~~comply with the following: be laminated glass complying with Category II of CPSC 16 CFR 1201 or Class A of ANSI Z97.1. Where the top rail is supported by glass, the assembly shall be tested according to the impact requirements of Section 1609.2 and the top rail shall remain in place after impact.~~

2407.1.4.1 ~~Balusters and in-fill panels.~~

~~Glass installed in exterior railing in-fill panels or balusters shall be laminated glass complying with Category II of CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1.~~

2407.1.4.2 ~~Glass supporting top rail.~~

~~Where the top rail is supported by glass, the assembly shall be tested according to the impact requirements of Section 1609.2. The top rail shall remain in place after impact.~~

2409.1 Glass walkways.

Glass installed as a part of a floor/ceiling assembly as a walking surface and constructed with laminated glass shall comply with either of the following:

1. ASTM E2751. ~~or with the~~
2. ~~L~~oad requirements specified in Chapter 16 [and approval in accordance with the provisions of Section 104.2.3.](#)

Such assemblies shall comply with the *fire-resistance* rating and marking requirements of this code where applicable.

Chapter 25 ~~Gypsum Board,~~ Gypsum Panel Products and Plaster

2501.1 Scope.

Provisions of this chapter shall govern the materials, design, construction and quality of ~~gypsum board,~~ *gypsum panel products*, lath, *gypsum plaster*, *cement plaster* and reinforced gypsum concrete.

2502.1 General.

Lathing, plastering and ~~gypsum board and~~ *gypsum panel product* construction shall be done in the manner and with the materials specified in this chapter and, where required for fire protection, shall comply with the provisions of Chapter 7.

2503.1 Inspection.

Lath, ~~gypsum board~~ and *gypsum panel products* shall be inspected in accordance with Section [110.3.6.](#) ~~105.3.~~

2504.1 Scope.

The following requirements shall be met where construction involves ~~gypsum board,~~ *gypsum panel products* or lath and plaster in vertical and *horizontal assemblies*.

2504.1.1 Wood framing.

Wood supports for lath, ~~gypsum board~~ or *gypsum panel products*, as well as...

2504.1.2 Studless partitions.

...gypsum lath, ~~gypsum board~~ or *gypsum panel product*...

2505.1 Resistance to shear (wood framing).

Wood-frame shear walls sheathed with ~~gypsum board,~~ *gypsum panel products* or lath...

2505.2 Resistance to shear (steel framing).

Cold-formed steel-frame shear walls sheathed with ~~gypsum board,~~ *gypsum panel products* and constructed...

SECTION 2506

~~GYP SUM BOARD AND~~ GYP SUM PANEL PRODUCT MATERIALS

2506.1 General.

~~Gypsum board,~~ ~~g~~[G](#)ypsum panel products and accessories shall be...

2506.2 Standards.

~~Gypsum board,~~ ~~g~~[G](#)ypsum panel products shall conform...

TABLE 2506.2

~~GYP SUM BOARD AND~~ GYP SUM PANEL PRODUCTS MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Adhesives for fastening gypsum board to wood framing	ASTM C557
Expandable foam adhesives for fastening gypsum wallboard to wood framing	ASTM D6464
Glass mat gypsum substrate used as sheathing	ASTM C1177

2508.1 General.

~~Gypsum board, g~~Gypsum panel products and gypsum plaster construction...

TABLE 2508.1
INSTALLATION OF GYPSUM CONSTRUCTION

MATERIAL	STANDARD
Gypsum board and g Gypsum panel products	GA 216; ASTM C840
Gypsum sheathing and gypsum panel products	ASTM C1280; GA-253
Gypsum veneer base	ASTM C844
Interior lathing and furring	ASTM C841
Steel framing for gypsum board and gypsum panel products	ASTM C754; C1007

2508.2 Limitations.

Gypsum wallboard or *gypsum plaster* shall not be used in any exterior surface where such gypsum construction will be exposed directly to the weather. *Gypsum wallboard* shall not be used where there will be direct exposure to water or continuous high humidity conditions. *Gypsum sheathing* shall be installed on exterior surfaces in accordance with ASTM C1280 [or GA-253](#).

2508.3 Single-ply application.

Edges and ends of ~~gypsum board and~~ gypsum panel products shall occur...

2508.4 Adhesives.

~~Gypsum board, g~~Gypsum panel products secured to framing...

2508.5 Joint treatment.

~~Gypsum board, g~~Gypsum panel product fire-resistance-rated assemblies shall have joints and fasteners treated.

Exceptions: Joint and fastener treatment need not be provided where any of the following conditions occur:

1. Where the ~~gypsum board or~~ the gypsum panel product is to receive...

2508.6 Horizontal ~~gypsum board or~~ gypsum panel product diaphragm ceilings.

~~Gypsum board, g~~Gypsum panel products shall be permitted...

TABLE 2508.6

**SHEAR CAPACITY FOR HORIZONTAL WOOD-FRAME GYPSUM ~~BOARD~~ PANEL PRODUCT
DIAPHRAGM CEILING ASSEMBLIES**

MATERIAL	THICKNESS OF MATERIAL (MINIMUM) (inches)	SPACING OF FRAMING MEMBERS (inches)	SHEAR VALUE ^{a,b} (PLF OF CEILING)	MINIMUM FASTENER SIZE
Gypsum board or gypsum panel product	1/2	16 o.c.	90	5d cooler or wallboard nail; 1 5/8-inch long; 0.086-inch shank; 15/64-inch head ^c
Gypsum board or gypsum panel product	1/2	24 o.c.	70	5d cooler or wallboard nail; 1 5/8-inch long; 0.086-inch shank; 15/64-inch head ^c

2508.6.2 Installation.

~~Gypsum board and~~ gypsum panel products used in a horizontal...

2508.6.3 Blocking of perimeter edges.

...in width for the attachment of the ~~gypsum board or~~ gypsum panel product.

2508.6.4 Fasteners.

Fasteners used for the attachment of ~~gypsum board and~~ gypsum panel products to a horizontal diaphragm ceiling shall be as defined in Table 2508.6. Fasteners shall be spaced not more than 7 inches (178 mm) on center at all supports, including perimeter blocking, and not more than 3/8 inch (9.5 mm) from the edges and ends of the ~~gypsum board or~~ gypsum panel product.

2508.6.5 lateral force restrictions.

~~Gypsum board and~~ gypsum panel products shall not be used...

2510.6 Water-resistive barriers.

Water-resistive barriers shall be installed as required in Section 1403.2 and, ~~where applied over wood-based sheathing, shall comply with Section 2510.6.1 or 2510.6.2, include a water-resistive vapor-permeable barrier with a performance at least equivalent to two layers of water-resistive barrier complying with ASTM E2556, Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing (installed in accordance with Section 1404.4) intended to drain to the water-resistive barrier is directed between the layers.~~

Exceptions: Sections 2510.6.1 and 2510.6.2 shall not apply to construction where accumulation, condensation or freezing of moisture will not damage the materials.

- ~~1. Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of a water-resistive barrier complying with ASTM E2556, Type II and is separated from the stucco by an intervening, substantially nonwatery absorbing layer or drainage space.~~

2. ~~Where the water-resistive barrier is applied over wood-based sheathing in Climate Zone 1A, 2A or 3A, a ventilated air space shall be provided between the stucco and water-resistive barrier.~~

2510.6.1 Dry climates.

One of the following shall apply for dry (B) climate zones:

1. The water-resistive barrier shall be two layers of 10-minute Grade D paper or have a water resistance equal to or greater than two layers of water-resistive barrier complying with ASTM E2556, Type I. The individual layers shall be installed independently such that each layer provides a separate continuous plane and any flashing, installed in accordance with Section 1404.4 and intended to drain to the water-resistive barrier, is directed between the layers.
2. The water-resistive barrier shall be 60-minute Grade D paper or have a water resistance equal to or greater than one layer of water-resistive barrier complying with ASTM E2556, Type II. The water-resistive barrier shall be separated from the stucco by a layer of foam plastic insulating sheathing or other nonwater absorbing layer, drainage space or means of drainage complying with 2510.6.2. Flashing installed in accordance with Section 1404.4 and intended to drain to the water-resistive barrier, shall be directed to the exterior side of the water-resistive barrier.

2510.6.2 Moist or marine climates.

In moist (A) or marine (C) climate zones, water-resistive barrier shall comply with one of the following:

1. In addition to complying with Item 1 or 2 of Section 2510.6.1, a space or drainage material not less than $\frac{3}{16}$ inch (4.8 mm) in depth shall be applied to the exterior side of the water-resistive barrier.
2. In addition to complying with Item 2 of Section 2510.6.1, drainage on the exterior side of the water-resistive barrier shall have a minimum drainage efficiency of 90 percent as measured in accordance with ASTM E2273 or Annex A2 of ASTM E2925.

Chapter 26 Plastic

2602.1 Exterior ~~finish~~ wall covering and architectural trim.

See Chapter 14 for requirements for exterior wall ~~finish~~ covering and architectural trim.

2603.1.1 Spray-applied foam plastic.

Single- and multiple-component spray-applied foam plastic insulation shall comply with the provisions of Section 2603 and ICC 1100-2018.

2603.1.2 Insulating Sheathing.

Foam plastic materials used as insulating sheathing shall comply with the provisions of Section 2603 and the material standards in Table 2603.1.2.

TABLE 2603.1.2

MATERIAL STANDARDS FOR FOAM PLASTIC INSULATING SHEATHING

<u>MATERIAL</u>	<u>STANDARD</u>
<u>Expanded Polystyrene (EPS)</u>	<u>ASTM C578</u>
<u>Extruded Polystyrene (XPS)</u>	<u>ASTM C578</u>

2603.4 Thermal barrier.

Except as provided for in Sections 2603.4.1 and 2603.9, foam plastic shall be separated from the interior of a building by an approved thermal barrier of $\frac{1}{2}$ -inch (12.7 mm) *gypsum wallboard*, *mass timber* or heavy timber in accordance with Section ~~2304.11~~ ~~602.4~~ 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. Combustible concealed spaces shall comply with Section 718.

2603.4.1.4 Exterior walls, one-story buildings.

~~For one-story buildings, foam plastic having a flame spread index of 25 or less, and a smoke developed index of not more than 450, shall be permitted without thermal barriers in or on exterior walls in a thickness not more than 4 inches (102 mm) where the foam plastic is covered by a thickness of not less than 0.032-inch-thick (0.81 mm) aluminum or corrosion-resistant steel having a base metal thickness of 0.0160 inch (0.41 mm) and the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.~~ For exterior walls of one-story buildings constructed of insulated metal panels (IMP) with foam plastic insulation cores, the thermal barrier is not required when all of the following apply:

1. The foam plastic insulation thickness is not more than 4 inches (102 mm)
2. The foam plastic insulation core has a flame spread index of 25 or less and a smoke developed index of 450 or less.
3. The foam plastic insulation is covered by a thickness of not less than 0.032-inch-thick (0.81 mm) aluminum or corrosion-resistant steel having a base metal thickness of 0.0160 inch (0.41 mm).
4. The building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

2603.4.1.15 Separately controlled climate structures.

In nonsprinklered buildings of Group U, foam plastic having a thickness that does not exceed 4 inches (102 mm) and a maximum flame spread index of 75 is permitted in separately controlled climate structures where the aggregate floor area does not exceed 400 square feet (37 m²) and the foam plastic is covered by a metal facing not less than 0.032-inch-thick (0.81 mm) aluminum or corrosion-resistant steel having a minimum base metal thickness of 0.016 inch (0.41 mm). A thickness of up to 10 inches (254 mm) is permitted where protected by a thermal barrier.

2603.5.5 Vertical and lateral fire propagation.

The exterior wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.

Exceptions:

1. One-story buildings complying with Section 2603.4.1.4.
2. ~~Wall~~ Exterior wall assemblies where the foam plastic insulation is covered on each face by not less than 1-inch (25 mm) thickness of masonry or concrete and meeting one of the following:
 - 2.1. There is no airspace between the insulation and the concrete or masonry.
 - 2.2. The insulation has a *flame spread index* of not more than 25 as determined in accordance with ASTM E84 or UL 723 and the maximum airspace between the insulation and the concrete or masonry is not more than 1 inch (25 mm).

2603.9 Special approval.

Foam plastic shall not be required to comply with the requirements of Section 2603.4 or those of Section 2603.6 where specifically approved based on [one of the following](#) large-scale tests:~~such as, but not limited to,~~

1. NFPA 286 (~~with~~ [using](#) the acceptance criteria of Section 803.1.1.1)
2. FM 4880
3. UL 1040
4. UL 1715

Such testing shall be ~~related to the actual end-use configuration and be~~ performed on the finished manufactured foam plastic assembly in the maximum thickness intended for use. Foam plastics that are used as *interior finish* on the basis of ~~these special~~ tests shall [also](#) conform to the *flame spread* and smoke-developed requirements of Chapter 8. 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.

2607.3 Height limitation.

Light-transmitting plastics shall not be installed more than 75 feet (22 860 mm) above *grade* [plane](#). ~~except as allowed by Section 2607.5.~~

2607.5 Automatic sprinkler system.

Where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, the maximum percentage area of *exterior wall* in any *story* in light-transmitting plastic wall panels and the maximum square footage of a single area given in Table 2607.4 shall be increased 100 percent, but the area of light-transmitting plastic wall panels shall not exceed 50 percent of the wall area in any *story*, or the area permitted by Section 705.8 for unprotected openings, whichever is smaller. These installations shall ~~be exempt from height limitations not~~ [be installed more than 75 feet \(22 860 mm\) above grade plane.](#)

2610.1 Light-transmitting plastic glazing of skylight assemblies.

Skylight assemblies glazed with light-transmitting plastic shall conform to the provisions of this section and [Section 2606](#). ~~Unit skylights glazed with light-transmitting plastic shall comply with Section 2405.5.~~

Exception: Skylights in which the light-transmitting plastic conforms to the required roof-covering class in accordance with Section 1505.

[2610.1.1 Unit skylights.](#)

[Unit skylights glazed with light-transmitting plastic shall comply with Section 2405.5.](#)

SECTION 2612

PLASTIC COMPOSITES [S DECKING](#)

Chapter 27 Electrical

[F] 2702.1.2 Fuel-line piping protection.

Fuel lines supplying a generator set inside a *high-rise building* shall be separated from areas of the *building* other than the room the generator is located in by [one of the following methods](#): ~~an approved method, or an assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.~~

1. [A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating](#)

of not less than 2 hours. Where the *building* is protected throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1, the required rating shall be reduced to 1 hour.

2. An assembly that has a *fire-resistance rating* of not less than 2 hours. Where the building is protected throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1, the required *fire-resistance rating* shall be reduced to 1 hour.
3. Other approved methods.

[F] 2702.2.3 Emergency responder ~~radio~~ communication coverage systems.

Standby power shall be provided for in-building 2-way emergency responder ~~radio~~ communication coverage systems required in Section 918 and the *International Fire Code*. The standby power supply shall be capable of operating the in-building 2-way emergency responder ~~communication radio~~ coverage system at 100-percent system operation capacity for a duration of not less than 12 hours ~~at 100-percent system operation capacity~~.

[F] 2702.2.4 Emergency voice/alarm communication systems.

~~Emergency Standby~~ power shall be provided for emergency voice/alarm communication systems ~~as required in Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in accordance with NFPA 72. Section 907.5.2.2.5.~~

[F] 2702.2.12 Hydrogen fuel gas rooms.

Standby power shall be provided for hydrogen fuel gas rooms as required by the International Fire Code.

SECTION 2703 LIGHTNING PROTECTION SYSTEMS.

2703.1 General.

Where provided, lightning protection systems shall comply with Sections 2703.2 through 2703.3.

2703.2 Installation.

Lightning protection systems shall be installed in accordance with NFPA 780 or UL 96A. UL 96A shall not be utilized for buildings used for the production, handling, or storage of ammunition, explosives, flammable liquids, flammable gases, or other explosive ingredients including dust.

2703.2.1 Surge protection.

Where lightning protection systems are installed, surge protective devices shall also be installed in accordance with NFPA 70 and either NFPA 780 or UL 96A, as applicable.

2703.3 Interconnection of systems.

All lightning protection systems on a *building* or *structure* shall be interconnected in accordance with NFPA 780 or UL 96A, as applicable.

Chapter 29 Plumbing Systems

[NY] 2901.1 Scope. The provisions of this chapter and the *Plumbing Code of New York State* shall govern the design, construction, erection and installation of plumbing components, appliances, equipment and systems used in *buildings* and structures covered by this code. Toilet and bathing rooms shall be constructed in accordance with Section 1210 ~~1209~~. The *Fire Code of New York State*, the *Property Maintenance Code of New York State* and the *Plumbing Code of New York State* shall govern the use and maintenance of plumbing components, appliances, equipment and systems. The *Existing Building*

Code of New York State and the Plumbing Code of New York State shall govern the alteration, repair, relocation, replacement and addition of plumbing components, appliances, equipment and systems.

[NY] TABLE 2902.1 MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES^a (See Sections 2902.1.1 and 2902.2)

Portions of the body of the table are unchanged and are omitted for clarity. Changes to footnotes are shown below the changed portion of the table.

NO.	CLASSIFI- CATION	DESCRIPTION	WATER CLOSETS (URINALS: SEE SECTION 424.2)		LAVATORIES		BATHTUB S/ SHOWERS	DRINKING FOUNTAIN (SEE SECTION 410)	OTHER
			MALE	FEMALE	MALE	FEMALE			
1	Assembly ^g	**These cells are not modified, and are omitted for clarity**							

- The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by this code.
- [\[NY\]](#) Toilet facilities for employees shall be separate from facilities for ~~inmates~~ [incarcerated individuals](#) or care recipients.
- A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient sleeping units shall be permitted, provided that each patient sleeping unit has direct access to the toilet room and provisions for privacy for the toilet room user are provided.
- The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.
- For business and mercantile classifications with an occupant load of 15 or fewer, a service sink shall not be required.
- [\[NY\]](#) The required number and type of plumbing fixtures for indoor and outdoor swimming pools shall be in accordance with Section ~~609 of the International Swimming Pool and Spa Code~~ [2902.1.4](#).
- [\[NY\]](#) [Facilities subject to mass gatherings, which are likely to attract 5,000 people or more and continue for 24 hours or more, shall meet the provisions of this Code and Subpart 7-4 of the New York State Department of Health regulations \(10NYCRR, Part 7, Subpart 7-4\), whichever is more restrictive.](#)

~~[NY]~~ 2902.1.1 Fixture calculations.

To determine the occupant load of each sex, the total occupant load shall be divided in half. To determine the required number of fixtures ~~for each sex~~, the fixture ratio or ratios for each fixture type shall be applied to the occupant load of ~~that~~ [each](#) sex in accordance with Table 2902.1. Fractional numbers resulting from applying the fixture ratios of Table 2902.1 shall be rounded up to the next whole number. [For calculations involving multiple occupancies, such fractional numbers for each occupancy shall first be summed and then rounded up to the next whole number.](#)

~~The plumbing fixtures located in single-user toilet facilities and bathing rooms, including family or assisted-use toilet and bathing rooms, shall contribute toward the total number of required plumbing fixtures for a building or tenant space, and shall be deducted proportionately, from the required gender ratios of Table 2902.1.~~

~~The total number of fixtures shall be permitted to be based on any combination of single-user, multi-user and separate facilities.~~

~~For calculations involving multiple occupancies, such fractional numbers for each occupancy shall first be summed and then rounded up to the next whole number.~~

Exceptions:

1. The total occupant load shall not be required to be divided in half where approved statistical data indicates a distribution of the sexes of other than 50 percent of each sex.
2. Where multiple-user facilities are designed to serve all genders, the minimum fixture count shall be calculated 100 percent, based on total occupant load. In such multiple-user user facilities, each fixture type shall be in accordance with ICC A117.1.

~~[NY]~~ 2902.1.2 Fixtures in Single-user toilet facilities and bathing facilities-rooms. The plumbing fixtures located in Ssingle-user toilet facilities and bathing-single-user rooms, and including family or assisted-use toilet rooms facilities and bathing rooms, shall contribute toward the total number of required plumbing fixtures for a building or tenant space. The number of fixtures in single-user toilet facilities, single-user bathing rooms and family or assisted-use toilet facilities shall be deducted proportionately from the required gender ratios of Table 2902.1. Single-user toilet facilities and bathing rooms, and family or assisted-use toilet facilities and bathing rooms shall be identified as being available for use by all persons regardless of their sex.

The total number of fixtures shall be based on the required number of separate facilities or based on the aggregate of any combination of single-user or separate facilities.

~~[NY] 2902.1.3 Multi-user toilet and bathing facilities.~~ ~~Where multi-user facilities designed to serve all genders are provided, urinals shall be either located in stalls, or located in an area visually separated from the remainder of the facility. Privacy for water closets shall be installed in accordance with Section 1209.3.1.~~

~~[NY]~~ 2902.1.3 **Lavatory distribution.** Where two or more toilet ~~rooms~~ facilities are provided for each sex, the required number of lavatories shall be distributed proportionately to the required number of male- and female-designated water closets.

[NY] 2902.1.4 Shower requirements for swimming pools. Indoor and outdoor swimming pool facilities shall have dressing facilities and not less than one cleansing shower for males, and one cleansing shower for females for every 7500 square feet (697 m²), or portion thereof. Where the result of the fixture calculation is a portion of a whole number, the result shall be rounded up to the nearest whole number. In addition to the cleansing showers, not less than one rinse shower shall be provided on the deck of or at the entrance of each pool.

2902.2 Separate facilities.

Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate toilet facilities shall not be required for dwelling units and sleeping units.
2. Separate toilet facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.
3. Separate toilet facilities shall not be required in mercantile occupancies in which the maximum occupant load is 100 or fewer.
4. Separate toilet facilities shall not be required in business occupancies in which the maximum occupant load is 25 or fewer.
5. Separate toilet facilities shall not be required to be designated by sex where Ssingle-user toilet and bathing rooms are provided in accordance with Section 2902.1.2 shall be designated as gender neutral.
6. ~~Separate facilities shall not be required where multiuser facilities designed for use by both sexes are provided in accordance with Section 2902.1.3.~~
7. Separate toilet facilities shall not be required where rooms having both water closets and lavatory fixtures are designed for use by all persons regardless of sex and privacy is provided for water closets in accordance with Section 405.3.4 of the International Plumbing Code and for urinals in accordance with Section 405.3.5 of the International Plumbing Code.

~~[P] 2902.2.1 Family or assisted-use toilet facilities serving as separate facilities.~~ ~~Where a building or tenant space requires a separate toilet facility for each sex and each toilet facility is required to have only one water closet, two family~~

~~or assisted-use toilet facilities shall be permitted to serve as the required separate facilities. Family or assisted-use toilet facilities shall not be required to be identified for exclusive use by either sex as required by Section 2902.4.~~

[P] 2902.3.1 Access.

The route to the public toilet facilities required by Section 2902.3 shall not pass through kitchens, storage rooms or closets. Access to the required toilet facilities shall be from within the building or from the exterior of the building. The public shall have access to the required toilet facilities at all times that the building is occupied.

[P] 2902.3.2 prohibited ~~toilet room~~ location for toilet facilities. Toilet ~~rooms~~ facilities shall not open directly into a room used for the preparation of food for service to the public.

[P] 2902.3.3 Location of toilet facilities in occupancies other than malls. In occupancies other than covered and open mall buildings, the required public and employee toilet facilities shall be located not more than one story above or below the space required to be provided with toilet facilities, and the path of travel to such facilities shall not exceed a distance of 500 feet (152 m).

Exceptions:

1. The location and maximum distances of travel to required employee facilities in factory and industrial occupancies shall be permitted to exceed that required by this section, provided that the location and maximum distances of travel are approved.
2. The location and maximum distances of travel to required public and employee facilities in Group S occupancies shall be permitted to exceed that required by this section, provided that the location and maximum distances of travel are approved.

[P] 2902.3.5 Pay facilities.

Where pay toilet facilities are installed, such toilet facilities shall be in excess of the required minimum toilet facilities. Required toilet facilities shall be free of charge.

[P] 2902.3.6 Door locking.

Where a toilet ~~room~~ facility is provided for the use of multiple occupants, the egress door for the room shall not be lockable from the inside of the room. This section does not apply to family or assisted-use toilet ~~room~~ facilities.

Exception: The egress door of a multiple occupant toilet room shall be permitted to be lockable from inside the room where all the following criteria are met:

1. The egress door shall be lockable from the inside of the room only by authorized personnel by the use of a key or other approved means.
2. The egress door shall be readily openable from the toilet room in accordance with Section 1010.2.
3. The egress door shall be capable of being unlocked from outside the room with a key or other approved means.

[P] 2902.4 Signage. Required public toilet facilities shall be provided with signs that indicate whether the facility is to be used by males, by females, or by all persons regardless of sex. Signs shall be readily visible and located near the entrance to each toilet facility. Signs for accessible toilet facilities shall comply with Section 1112.

2902.5 Drinking fountain location.

Drinking fountains shall not be required to be located in individual tenant spaces provided that public drinking fountains are located within a distance of travel of 500 feet (152 m) of the most remote location in the tenant space and not more than one story above or below the tenant space. Where the tenant space is in a covered or open mall, such distance shall not exceed 300 feet (91 m). ~~Drinking fountains shall be located on an accessible route.~~

[P] 2902.7 Service sink location.

Service sinks shall not be required to be located in individual tenant spaces in a covered mall provided that service sinks are located within a distance of travel of 300 feet (91 m) of the most remote location in the tenant space and not more than one story above or below the tenant space. Service sinks shall be located on an accessible route.

[NY] 2902.9 Grease interceptors. In addition to the requirements of this code new and existing grease interceptors shall comply with Section 1003.3.9. of the Plumbing Code of New York State.

Exception: Grease interceptors that meet all of the following requirements:

1. Serve individual dwelling units;
2. Are not accessible to or open to the public;
3. Are installed in accordance with the manufacturer's installation instructions;
4. Are maintained in accordance with the applicable provisions of this Code, and the Property Maintenance Code of New York State, and the manufacturer's installation instructions; and
5. Are regularly serviced and cleaned to prevent the discharge of oil, grease, and other substances harmful or hazardous to the building drainage system, the public sewer, the private sewage disposal system or the sewage treatment plant or processes, and a record of all maintenance, cleaning, and repairs is kept.

[P] 2903 INSTALLATION OF FIXTURES

[P] 2903.1 Setting.

Fixtures shall be set level and in proper alignment with reference to adjacent walls.

[P] 2903.1.1 Water closets, urinals, lavatories and bidets.

A water closet, urinal, lavatory or bidet shall not be set closer than 15 inches (381 mm) from its center to any side wall, partition, vanity or other obstruction. Where partitions or other obstructions do not separate water closets, urinals or bidets, the fixtures shall not be set closer than 30 inches (762 mm) center to center between adjacent fixtures or adjacent water closets, urinals or bidets. There shall be not less than a 21-inch (533 mm) clearance in front of a water closet, urinal, lavatory or bidet to any wall, fixture or door. Water closet compartments shall be not less than 30 inches (762 mm) in width and not less than 60 inches (1524 mm) in depth for floor-mounted water closets and not less than 30 inches (762 mm) in width and 56 inches (1422 mm) in depth for wall-hung water closets.

Exception: An accessible children's water closet shall be set not closer than 12 inches (305 mm) from its center to the required partition or to the wall on one side.

[P] 2903.1.2 Public lavatories.

In employee and public toilet rooms, the required lavatory shall be located in the same room as the required water closet.

[P] 2903.1.3 Location of fixtures and piping.

Piping, fixtures or equipment shall not be located in such a manner as to interfere with the normal operation of windows, doors or other means of egress openings.

Chapter 30 Elevators and Conveying Systems

3001.2 Elevator emergency ~~Emergency elevator~~ communication systems ~~for the deaf, hard of hearing and speech impaired.~~

An elevator emergency two-way communication system ~~The system shall provide visible text~~ that includes both visual and audible communication modes ~~that meet all of the following requirements~~ complying with the requirements in ASME

A17.1/CSA B44 shall be provided in each elevator car. The system shall provide a means to enable authorized personnel to verify:

1. The presence of someone in the car.
2. That the person(s) is trapped.

Once an entrapment is verified, the system shall enable authorized personnel to:

1. Determine if assistance is needed. ~~When operating in each mode, include a live interactive system that allows back and forth conversation between the elevator occupants and emergency personnel.~~
2. Communicate when help is on the way. ~~Is fully accessible by the deaf, hard of hearing and speech impaired, and shall include voice only options for hearing individuals. operational when the elevator is operational.~~
3. Communicate when help arrives on site. ~~Has the ability to communicate with emergency personnel utilizing existing video conferencing technology, chat/text software or other approved technology. Allows elevator occupants to select the text based or audible mode depending on their communication needs to interact with emergency personnel.~~

3001.3 Referenced standards.

~~Except as otherwise provided for in this code, t~~ The design, construction, installation, alteration, repair and maintenance of elevators and conveying systems and their components shall conform to the applicable standard specified in Table 3001.3 and Section 3001.6. ~~ASCE 24 for construction in flood hazard areas established in Section 1612.3.~~

3001.6 Structural Design.

All interior and exterior elevators, escalators, and other conveying systems and their components shall comply with all applicable design loading criteria in Chapter 16, including wind, flood, and seismic loads established in Sections 1609, 1612, and 1613.

3002.1 Hoistway enclosure protection.

~~Elevator, dumbwaiter and other hoistway enclosures shall be shaft enclosures complying with Sections 712 and 713.~~ A hoistway for elevators, dumbwaiters and other vertical access devices shall be comply with Sections 712 and 713. Where the hoistway is required to be enclosed, it shall be constructed as a shaft enclosure in accordance with Section 713.

3002.1.1 Opening protectives.

Openings in fire-resistant rated hoistway enclosures shall be protected as required in Chapter 7.

Exception: The elevator car doors and the associated elevator hoistway ~~enclosure~~ doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I Emergency Recall Operation.

3002.1.2 Hardware.

Hardware on ~~opening protectives~~ elevator hoistway doors shall be of an *approved* type installed as tested, except that *approved* interlocks, mechanical locks and electric contacts, door and gate electric contacts and door-operating mechanisms shall be exempt from the fire test requirements.

3002.2 Number of elevator cars in a hoistway.

Where four or more elevator cars serve all or the same portion of a building, the elevators shall be located in not fewer than two separate fire-resistance rated hoistways. Not more than four elevator cars shall be located in any single fire-resistance rated hoistway enclosure.

3002.3 Emergency signs.

A ~~An approved~~ pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the exit stairways and not to use the elevators in case of fire. Where elevators are not a

component of the accessible means of egress the ~~The~~ sign shall read: IN CASE OF FIRE, ELEVATORS ARE OUT OF SERVICE. USE EXIT ~~STAIRS~~. Where the elevator is a component of the accessible means of egress, a sign complying with Section 1009.11 shall be provided.

Exception ~~Exceptions~~:

- ~~1. The emergency sign shall not be required for elevators that are part of an accessible means of egress complying with Section 1009.4.~~
2. The emergency sign shall not be required for elevators that are used for occupant self-evacuation in accordance with Section 3008.

3002.6 Prohibited doors or other devices.

Doors or other devices, other than ~~hoistway doors and~~ the elevator car door and the associated elevator hoistway doors, shall be prohibited at the point of access to an elevator car unless such doors or other devices are readily openable from inside the car ~~side~~ without a key, tool, special knowledge or effort.

3005.4 Machine rooms, control rooms, machinery spaces, and control spaces.

~~Elevator machine rooms, control rooms, control spaces and machinery spaces outside of but attached to a hoistway that have openings into the hoistway—~~The following rooms and spaces shall be enclosed with *fire barriers* constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both.:

1. Machine rooms
2. Control rooms
3. Control spaces
4. Machinery spaces outside of the hoistway enclosure

The *fire-resistance rating* shall be not less than the required rating of the hoistway enclosure served by the machinery. Openings in the *fire barriers* shall be protected with assemblies having a *fire protection rating* not less than that required for the hoistway enclosure doors.

3006.1 General.

~~Elevator hoistway openings and enclosed~~ Enclosed elevator lobbies and elevator hoistway door protection shall be provided in accordance with the following:

1. Where elevator hoistway door opening protection is required by Section 3006.2, such protection shall be provided in accordance with Section 3006.3.
2. Where enclosed elevator lobbies are required for underground buildings, such lobbies shall comply with Section 405.4.3.
3. Where an *area of refuge* is required and an enclosed elevator lobby is provided to serve as an *area of refuge*, the enclosed elevator lobby shall comply with Section ~~1009.6~~ 1009.6.4.
4. Where fire service access elevators are provided, enclosed elevator lobbies shall comply with Section 3007.6.
5. Where occupant evacuation elevators are provided, enclosed elevator lobbies shall comply with Section 3008.6.

3006.2 Elevator hoistway door ~~Hoistway opening~~ protection required.

Elevator hoistway ~~door openings~~ doors shall be protected in accordance with Section 3006.3 where an elevator hoistway connects more than three *stories*, is required to be enclosed within a *shaft enclosure* in accordance with Section 712.1.1 and any of the following conditions apply:

1. The building is not protected throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.
2. The building contains a Group I-1, Condition 2 occupancy.
3. The building contains a Group I-2 occupancy.
4. The building contains a Group I-3 occupancy.

5. The building is a high rise and the elevator hoistway is more than 75 feet (22 860 mm) in height. The height of the hoistway shall be measured from the *lowest floor* to the highest floor of the floors served by the hoistway.
6. The elevator hoistway door is located in the wall of a corridor required to be fire-resistance rated in accordance with Section 1020.1.

Exceptions:

1. Protection of elevator hoistway ~~door openings~~ doors is not required where the elevator serves only *open parking garages* in accordance with Section 406.5.
2. Protection of elevator hoistway ~~door openings~~ doors is not required at the level(s) of exit discharge, provided that the level(s) of exit discharge is equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1.
3. ~~Enclosed elevator lobbies and protection~~ Protection of elevator hoistway ~~door openings~~ doors is not required on levels where the elevator hoistway door opens to the exterior.

3006.3 Elevator hoistway door ~~Hoistway opening~~ protection.

Where Section 3006.2 requires protection of the elevator hoistway ~~door opening~~ doors, the protection shall be provided by one of the following:

1. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway ~~shaft enclosure~~ doors from each floor ~~by-with~~ fire partitions in accordance with Section 708. In addition, doors protecting openings in the ~~elevator lobby enclosure walls~~ fire partitions shall comply with Section 716.2.2.1 ~~as required for corridor walls~~. Penetrations of the ~~enclosed elevator lobby~~ fire partitions by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.
2. An enclosed elevator lobby shall be provided at each floor to separate the elevator hoistway ~~shaft enclosure~~ doors from each floor ~~by-with~~ smoke partitions in accordance with Section 710 where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1 or 903.3.1.2. In addition, doors protecting openings in the *smoke partitions* shall comply with Sections 710.5.2.2, 710.5.2.3 and 716.2.6.1. Penetrations of the ~~enclosed elevator lobby~~ smoke partitions by ducts and air transfer openings shall be protected as required for *corridors* in accordance with Section 717.5.4.1.
3. Additional doors or other devices shall be provided at each elevator hoistway door ~~opening~~ in accordance with Section 3002.6. Such door or other devices shall comply with the smoke and draft control door assembly requirements in Section 716.2.2.1.1 when tested in accordance with UL 1784 without an artificial bottom seal.
4. The elevator hoistway shall be pressurized in accordance with Section 909.21.
5. A smoke protective curtain assembly for hoistways shall be provided at each elevator hoistway door opening in accordance with Section 3002.6. Such curtain assemblies shall comply with the smoke and draft control requirements in Section 716.2.2.1.1 when tested in accordance with UL 1784 without an artificial bottom seal. Such curtain assemblies shall be equipped with a control unit listed to UL 864. Such curtain assemblies shall comply with section 2.11.6.3 of ASME A17.1/CSA B44. Installation and maintenance shall be in accordance with NFPA 105

3006.4 Means of egress. Elevator lobbies shall be provided with not less than one means of egress complying with Chapter 10 and other provisions in this code. Egress through an enclosed elevator lobby shall be permitted in accordance with Item 1 of Section 1016.2. Electrically locked exit access doors providing egress from elevator lobbies shall be permitted in accordance with Section 1010.2.14.

3007.1 General.

Where required by Section 403.6.1, every floor above and including the lowest level of fire department vehicle access of the building shall be served by fire service access elevators complying with Sections 3007.1 through 3007.9. Except as modified in this section, fire service access elevators shall be installed in accordance with this chapter and ASME A17.1/CSA B44.

Exceptions:

1. Elevators that only service an open or enclosed parking garage and the lobby of the building shall not be required to serve as fire service access elevators.

2. The elevator shall not be required to serve the top floor of a building where that floor is utilized only for equipment for building systems.

3007.2.2 **Automatic** Sprinkler system monitoring.

The automatic sprinkler system shall have a sprinkler control valve supervisory switch and water-flow-initiating device provided for each floor that is monitored by the building's *fire alarm system*.

3007.6 Fire service access elevator lobby.

The fire service access elevator shall open into an enclosed fire service access elevator lobby in accordance with Sections 3007.6.1 through 3007.6.5. Egress is permitted through the enclosed elevator lobby in accordance with Item 1 of Section 1016.2.

Exception ~~Exceptions:~~

1. Where a fire service access elevator has two entrances onto a floor, the second entrance shall be permitted to be protected in accordance with Section 3006.3.2.
2. A fire service access elevator lobby is not required to be provided at an occupied roof.

3007.6.2 **Elevator lobby** ~~Lobby enclosure separation.~~

The fire service access elevator lobby shall be ~~enclosed~~ separated from each floor with a *smoke barrier* in accordance with Section 709 ~~having a fire-resistance rating of not less than 1 hour~~, except that lobby doorways shall comply with Section 3007.6.3.

Exception: ~~Enclosed fire~~ Fire service access elevator lobbies are not required to be separated at the *levels of exit discharge*.

3007.6.3 ~~Lobby~~ **Elevator lobby** doorways.

Other than doors to ~~the hoistway~~, elevator control room or elevator control space, each door ~~doorway to an enclosed fire service access elevator lobby in the smoke barrier~~ shall be provided with a $\frac{3}{4}$ -hour *fire door assembly* complying with Section 716. ~~The~~ Such *fire door assembly* shall comply with the smoke and draft control door assembly requirements of Section 716.2.2.1.1 and be tested in accordance with UL 1784 without an artificial bottom seal.

3008.6.1 Access to interior exit stairway or ramp.

The occupant evacuation elevator lobby shall have *direct access* from the enclosed elevator lobby to an *interior exit stairway or ramp*.

Exceptions:

1. Access to an *interior exit stairway or ramp* shall be permitted to be through a protected path of travel that has a level of fire protection not less than the elevator lobby enclosure. The protected path shall be separated from the enclosed elevator lobby through an opening protected by a smoke and draft control assembly in accordance Section ~~716.2.2.1~~ 716.2.2.1.1.
2. Elevators that only service an *open parking garage* and the elevator lobby of the building shall not be required to provide *direct access*.

3008.6.2 **Elevator lobby** ~~Lobby enclosure separation.~~

The occupant evacuation elevator lobby shall be ~~enclosed~~ separated from each floor with a *smoke barrier* in accordance with Section 709 ~~having a fire-resistance rating of not less than 1 hour~~, except that lobby doorways shall comply with Section 3008.6.3.

Exception: ~~Enclosed occupant~~ Occupant evacuation elevator lobbies are not required to be separated at the *levels of exit discharge*.

3008.6.3 **Elevator lobby** ~~Lobby~~ doorways.

Other than the doors to ~~the hoistway~~, elevator machine rooms, machinery spaces, control rooms and control spaces ~~within the lobby enclosure in the~~ smoke barrier, each doorway to an occupant evacuation elevator lobby shall be provided with a ³/₄- hour fire door assembly complying with Section 716. ~~The~~ Such fire door assembly shall comply with the smoke and draft control assembly requirements of Section 716.2.2.1.1 and be tested in accordance with UL 1784 without an artificial bottom seal.

3008.6.3.1 Vision panel.

A vision panel shall be installed in each fire door assembly ~~protecting the lobby doorway in the~~ smoke barrier. The vision panel shall consist of fire-protection-rated glazing, shall comply with the requirements of Section 716 and shall be located to furnish clear vision of the occupant evacuation elevator lobby.

3008.6.3.2 Door closing.

Each fire door assembly ~~protecting the lobby doorway in the~~ smoke barrier shall be automatic-closing upon receipt of any fire alarm signal from the emergency voice/alarm communication system serving the building.

3008.6.4 Lobby size.

Each occupant evacuation elevator lobby shall have minimum floor area as follows:

1. The occupant evacuation elevator lobby floor area shall accommodate, at 3 square feet (0.28 m²) per person, not less than 25 percent of the occupant load of the floor area served by the lobby.
2. The occupant evacuation elevator lobby floor area shall accommodate one wheelchair space of 30 inches by ~~48~~ 52 inches (760 mm by ~~1220~~ 1320 mm) for each 50 persons, or portion thereof, of the occupant load of the floor area served by the lobby.

Exception: The size of lobbies serving multiple banks of elevators shall have the minimum floor area approved on an individual basis and shall be consistent with the building's fire safety and evacuation plan.

SECTION 3009

PRIVATE RESIDENCE ELEVATORS.

3009.1 General.

The design, construction, and installation, of elevators installed within a residential dwelling unit or installed to provide access to one individual residential dwelling unit shall conform to ASME A17.1/CSA B44, Section 5.3.

3009.2 Hoistway Enclosures.

Hoistway enclosures shall comply with ASME A17.1/CSA B44, Requirement 5.3.1.1.

3009.3 Hoistway Opening Protection.

Hoistway landing doors for private residence elevators shall comply with ASME A17.1/CSA B44, Requirements 5.3.1.8.1 through 5.3.1.8.3.

Chapter 31 Special Construction

3101.1 Scope.

The provisions of this chapter shall govern special building construction including membrane structures, temporary structures, pedestrian walkways and tunnels, automatic vehicular gates, awnings and canopies, marquees, signs, telecommunications and broadcast towers, swimming pools, spas and hot tubs, automatic vehicular gates, ~~antennas, relocatable buildings, swimming pool enclosures and safety devices, and~~ solar energy systems, ~~public use restroom~~

~~buildings on publicly owned lands in flood hazard areas~~ [greenhouses, relocatable buildings](#) and intermodal shipping containers.

3102.3 Type of construction.

Noncombustible membrane structures shall be classified as Type IIB construction. Noncombustible frame or cable-supported structures covered by an *approved* membrane in accordance with Section 3102.3.1 shall be classified as Type IIB construction. Heavy timber frame-supported structures covered by an *approved* membrane in accordance with Section 3102.3.1 shall be classified as Type IV-[HT](#) construction. Other membrane structures shall be classified as Type V construction.

Exception: Plastic less than 30 feet (9144 mm) above any floor used in greenhouses, where occupancy by the general public is not authorized, and for aquaculture pond covers is not required to meet the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701.

3102.6.1.1 Membrane.

A membrane meeting the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall be permitted to be used as the roof or as a skylight on buildings of Type IIB, III, IV-[HT](#) and V construction, provided that the membrane is not less than 20 feet (6096 mm) above any floor, balcony or gallery.

3103.1 General.

The provisions of Sections 3103.1 through ~~3103.4~~ [3103.7](#) shall apply to structures erected for a period of less than 180 days. [Temporary Tents](#), *special event structures*, tents, umbrella structures and other membrane structures erected for a period of less than 180 days *also* shall also comply with the *International Fire Code* . ~~Those~~ [Temporary structures](#) erected for a longer period of time [and public-occupancy temporary structures](#) shall comply with applicable sections of this code.

Exceptions:

1. [Public-occupancy temporary structures complying with Section 3103.1.1 shall be permitted to remain in service for 180 days or more but not more than 1 year where approved by the building official.](#)
2. [Public-occupancy temporary structures erected within the confines of an existing structure are not required to comply with Section 3103.5.](#)

[3103.1.1 Extended period of service time.](#)

[Public-occupancy temporary structures shall be permitted to remain in service for 180 days or more without complying with requirements in this code for new building or structures where extensions for up to 1 year are granted by the Building Official in accordance with Section 108.1 and where the following conditions are satisfied:](#)

1. [Additional inspections as determined by the Building Official shall be performed by a qualified person to verify that site conditions and the approved installation comply with the conditions of approval at the time of final inspection.](#)
2. [A qualified person shall perform follow up inspections after initial occupancy at intervals not exceeding 180 days to verify the site conditions and the installation conform to the approved site conditions and installation requirements. Inspection records shall be kept and shall be made available for verification by the building official.](#)
3. [An examination shall be performed by a registered design professional to determine the adequacy of the temporary structure to resist the structural loads required in Section 3103.6.](#)
4. [Relocation of the public-occupancy temporary structure shall require a new permit application.](#)
5. [The use or occupancy approved at the time of final inspection shall remain unchanged.](#)
6. [A request for an extension is submitted to the building official. The request shall include records of the inspections and examination in Items 1 and 3 above](#)

[3103.5 Bleachers.](#)

Temporary bleachers, grandstands and folding and telescopic seating, that are not building elements, shall comply with ICC 300.

3103.6 Structural requirements.

Temporary structures shall comply with the structural requirements of this code. Public-occupancy temporary structures shall be designed and erected to comply with the structural requirements of this code and Sections 3103.6.1 through 3103.6.4.

Exception: Where approved, live loads less than those prescribed by Table 1607.1 shall be permitted, provided a registered design professional demonstrates that a rational approach has been used and that such reductions are warranted.

Temporary non-building structures ancillary to public assemblies or special event structures whose structural failure or collapse would endanger assembled public shall be assigned a risk category corresponding to the risk category of the public assembly. For the purposes of establishing an occupant load for the assembled public endangered by structural failure or collapse, the applicable occupant load determination in Section 1004.5 or 1004.6 shall be applied over the assembly area within a radius equal 1.5 times the height of the temporary non-building structure.

3103.6.1 Structural loads.

Public-occupancy temporary structures shall be designed in accordance with Chapter 16, except as modified by Sections 3103.561.1 through 3103.6.1.6.

3103.6.1.1 Snow loads.

Snow loads on public-occupancy temporary structures shall be determined in accordance with Section 1608. The ground snow loads, p_g , in Section 1608 shall be permitted to be modified according to Table 3103.6.1.1.

Exception: Ground snow loads, p_g , for public-occupancy temporary structures that employ controlled-occupancy procedures per Section 3103.8 shall be permitted to be modified using a ground snow load reduction factor of 0.65 instead of the ground snow load reduction factors in Table 3102.6.1.1.

Where the public-occupancy temporary structure is not subject to snow loads or not constructed and occupied during times when snow is to be expected, snow loads need not be considered, provided that where the period of time when the public-occupancy temporary structure is in service shifts to include times when snow is to be expected, one of the following conditions is met:

1. The design is reviewed and modified, as appropriate, to account for snow loads; or
2. Controlled occupancy procedures in accordance with Section 3103.8 are implemented.

TABLE 3103.6.1.1 REDUCTION FACTORS FOR GROUND SNOW LOADS FOR PUBLIC-OCCUPANCY TEMPORARY STRUCTURES

<u>Risk Category</u>	<u>Service Life</u>	
	<u>≤ 10 yr</u>	<u>>10 yr</u>
<u>II</u>	<u>0.7</u>	<u>1.0</u>
<u>III</u>	<u>0.8</u>	<u>1.0</u>
<u>IV</u>	<u>1.0</u>	<u>1.0</u>

3103.6.1.2 Wind loads.

The design wind loads on public-occupancy temporary structures shall be permitted to be modified in accordance with the wind load reduction factors in Table 3103.6.1.2.

Exceptions:

1. Design wind loads for public-occupancy temporary structures that implement controlled occupancy procedures per Section 3103.8 shall be permitted to be modified using a wind load reduction factor of 0.65.
2. For public-occupancy temporary structures erected in a hurricane-prone region outside of hurricane season, the basic wind speed, V, shall be permitted to be set as follows, depending on risk category:
 - 2.1. Risk Category II: 115 mph,
 - 2.2. Risk Category III: 120 mph, and
 - 2.3. Risk Category IV: 125 mph.

TABLE 3103.6.1.2 REDUCTION FACTORS FOR WIND LOADS FOR PUBLIC-OCCUPANCY TEMPORARY STRUCTURES

<u>Risk Category</u>	<u>Service Life</u>	
	<u>≤ 10 yr</u>	<u>>10 yr</u>
<u>II</u>	<u>0.8</u>	<u>1.0</u>
<u>III</u>	<u>0.9</u>	<u>1.0</u>
<u>IV</u>	<u>1.0</u>	<u>1.0</u>

3103.6.1.3 Flood loads.

Public-occupancy temporary structures need not be designed for flood loads specified in Section 1612. Controlled occupancy procedures in accordance with Section 3103.8 shall be implemented.

3103.6.1.4 Seismic loads.

Seismic loads on public-occupancy temporary structures assigned to Seismic Design Categories C through F shall be permitted to be taken as 75 percent of those determined by Section 1613. Public-occupancy temporary structures assigned to Seismic Design Categories A and B need not be designed for seismic loads.

3103.6.1.5 Ice loads.

Ice loads on public-occupancy temporary structures shall be determined with at maximum nominal thickness of 0.5 inch (13 mm), for all risk categories. Where the public-occupancy temporary structure is not subject to ice loads or not constructed and occupied during times when ice is to be expected, ice loads need not be considered, provided that where the period of time when the public-occupancy temporary structure is in service shifts to include times when ice is to be expected, one of the following conditions is met:

1. The design is reviewed and modified, as appropriate, to account for ice loads.
2. Controlled occupancy procedures in accordance with Section 3103.8 are implemented

3103.6.1.6 Tsunami loads.

Public-occupancy temporary structure in a tsunami design zone are not required to be designed for tsunami loads specified in Section 1615. Controlled occupancy procedures in accordance with Section 3103.8 shall be implemented.

3103.6.2 Foundations.

Public-occupancy temporary structures shall be permitted to be supported on the ground with temporary foundations where *approved* by the building official. Consideration shall be given for the impacts of differential settlement where foundations do not extend below the ground or foundations supported on compressible materials. The presumptive load-bearing value for *public-occupancy temporary structures* supported on a pavement, slab on grade or on other collapsible or controlled low strength substrates soils such as beach sand or grass shall be assumed not to exceed 1,000 pounds per square foot (47.88 kPa) unless determined through testing and evaluation by a *registered design professional*. The presumptive load-bearing values listed in Table 1806.2 shall be permitted to be used for other supporting soil conditions.

3103.6.3 Installation and maintenance inspections.

A qualified person shall inspect *public-occupancy temporary structures* that are assembled using transportable and reusable materials. Components shall be inspected when purchased or acquired and at least once per year. The inspection shall evaluate individual components, and the fully assembled *structure*, to determine suitability for use based on the requirements in ESTA ANSI E1.21. Inspection records shall be kept and shall be made available for verification by the *building official*. Additionally, *public-occupancy temporary structures* shall be inspected at regular intervals when in service to ensure that the structure continues to perform as designed and initially erected.

3103.6.4 Durability.

Reusable components used in the erection and the installation of *public-occupancy temporary structures* shall be manufactured of durable materials necessary to withstand environmental conditions at the service location. Components damaged during transportation or installation and due to the effects of weathering shall be replaced or repaired.

3103.7 Serviceability.

The effects of structural loads or conditions shall not adversely affect the serviceability or performance of the *public-occupancy temporary structure*.

3103.8 Controlled occupancy procedures.

Where controlled occupancy procedures are required to be implemented for *public-occupancy temporary* in Section 3103.561, the procedures shall comply with this section and ANSI ES1.7. An operations management plan in accordance with ANSI E1.21 shall be submitted to the *building official* for approval as a part of the *permit* documents. In addition, the operations management plan shall include an emergency action plan that documents the following information, where applicable:

1. Surfaces on which snow or ice accumulates shall be monitored before and during occupancy of the *public-occupancy temporary structure*. Any loads in excess of the design snow or ice load shall be removed prior to its occupancy, or the *public-occupancy temporary structure* shall be vacated in the event that either the design snow or ice load is exceeded during its occupancy.
2. Wind speeds associated with the design wind loads shall be monitored before and during occupancy of the *public-occupancy temporary structure*. The *public-occupancy temporary structure* shall be vacated in the event that the design wind speed is expected to be exceeded during its occupancy.
3. Criteria for initiating occupant evacuation procedures for *flood* and tsunami events.
4. Occupant evacuation procedures shall be specified for each environmental hazard where the occupant management plan specifies the *public-occupancy temporary structure* is to be evacuated.
5. Procedures for anchoring or removal of the *public-occupancy temporary structure*, or other additional measures or procedures to be implemented to mitigate hazards in snow, wind, *flood*, ice, or tsunami events.

3104.5.3 Open sides on walkway.

Where the distance between the connected buildings is more than 10 feet (3048 mm), the walls at the intersection of the *pedestrian walkway* and each building need not be fire-resistance rated provided that both sidewalls of the *pedestrian walkway* are not less than 50 percent open with the open area uniformly distributed to prevent the accumulation of smoke and *toxic* gases. The roof of the walkway shall be located not more than 40 feet (12 160 mm) above *grade plane*, and the walkway shall only be permitted to connect to the third or lower *story* of each building.

Exception: Where the *pedestrian walkway* is protected with ~~a~~an automatic sprinkler system in accordance with Section 903.3.1.1, the roof of the walkway shall be located not more than 55 feet (16 764 mm) above *grade plane* and the walkway shall only be permitted to connect to the fifth or lower *story* of each building.

3105.2 Design and construction.

Awnings and *canopies* shall be designed and constructed to withstand wind or other lateral *loads* and *live loads* as required by Chapter 16 with due allowance for shape, open construction and similar features that relieve the pressures or loads. Structural members shall be protected to prevent deterioration. *Awnings* shall have frames of noncombustible material, *fire-retardant-treated wood*, *heavy timber* complying with Section 2304.11, or 1-hour construction ~~with combustible or noncombustible covers~~ and shall be either fixed, retractable, folding or collapsible.

[NY] 3109.1 General.

The provisions of this section shall control the design and construction as well as substantial modification of swimming pools, spas and hot tubs installed in or on the lot of buildings regulated under the Building Code of New York State.

Exceptions:

1. Pools located in or on the lot of detached one- and two-family dwellings classified as Group R-3 and constructed under the Building Code of New York State may be regulated by the Residential Code of New York State.
2. ~~Swimming p~~Pools which contain, are designated to contain, or are capable of containing water less than 24 inches (610 mm) deep at any point shall only be ~~regulated by~~ required to comply with Section 3109.1.1.

[NY] 3109.1.1 Compliance with other codes.

Swimming pools, ~~wading pools~~, spas and hot tubs shall comply with this section and other applicable sections of this code. The requirements of this section and of the other applicable sections of this code shall be in addition to, and not in replacement of or substitution for, the requirements of other applicable federal, state and local laws and regulations, including, but not necessarily limited to:

3. The requirements of Subpart 6-1 (Swimming pools) of Title 10 of the Official Compilation of Codes, Rules and Regulations of the State of New York (NYCRR), where applicable (DOH 10 NYCRR 6-1).
4. The requirements of Section 8003 (Federal swimming pool and spa drain cover standard) of Title 15 of the United States Code (CPSC 15 USC 8003), where applicable.

[NY] 3109.3.2 Permanent barriers.

Swimming pools, spas, and hot tubs shall be completely enclosed by a permanent barrier complying with Sections 3109.3.2.1 through ~~3109.3.2.6~~ 3109.3.2.9.

Exception: A hot tub or spa with a safety cover which complies with ASTM F1346 shall not be required to comply with section 3109.3.2.

3111.1.1 Wind resistance.

Rooftop-mounted photovoltaic ~~panels and modules~~ (PV) panel systems and solar thermal collectors shall be designed in accordance with Section 1609.

3111.2 Solar thermal systems.

Solar thermal systems shall be designed and installed in accordance with [this section](#), ~~Section 2606.12~~, the *International Plumbing Code*, the *International Mechanical Code* and the *International Fire Code*. [Where light-transmitting plastic covers are used, solar thermal collectors shall be designed in accordance with Section 2606.12.](#)

3111.3.1 Equipment.

Photovoltaic panels and modules shall be *listed* and *labeled* in accordance with UL 1703 or [with both UL 61730-1 and UL 61730-2](#). Inverters shall be *listed* and *labeled* in accordance with UL 1741. Systems connected to the utility grid shall use inverters *listed* for utility interaction.

3111.3.2 Fire classification.

Rooftop-mounted photovoltaic [\(PV\) panel](#) systems shall have a fire classification in accordance with Section 1505.9. Building-integrated photovoltaic [\(BIPV\)](#) systems [installed as roof coverings](#) shall have a fire classification in accordance with Section 1505.8.

3111.3.3 Building-integrated photovoltaic [\(BIPV\)](#) systems.

[BIPV](#) systems [installed](#) ~~that serve~~ as *roof coverings* shall be designed and installed in accordance with [Section 1507](#). ~~Section 1507.17.~~

[3111.3.5 Elevated photovoltaic \(PV\) support structures.](#)

[Elevated PV support structures](#) shall comply with either 3111.3.5.1 or 3111.3.5.2.

[Exception: Elevated PV support structures that are installed over agricultural use.](#)

[3111.3.5.1 PV panels installed over open-grid framing or non-combustible deck.](#)

[Elevated PV support structures](#) with PV panels installed over open-grid framing or over a noncombustible deck shall have PV panels tested, *listed*, and *labeled* with a fire type rating in accordance with UL 1703 or with both UL 61730-1 and UL 61730-2. *Photovoltaic panels* marked “not fire rated” shall not be installed on *elevated PV support structures*.

[3111.3.5.2 PV panels installed over a roof assembly.](#)

[Elevated PV support structures](#) with a *PV panel system* installed over a roof assembly shall have a fire classification in accordance with Section 1505.9.

~~3111.3.5~~ [3111.3.6](#) Ground-mounted photovoltaic [\(PV\) panel](#) systems.

Ground-mounted photovoltaic [panel](#) systems shall be designed and installed in accordance with Chapter 16 and the *International Fire Code*.

~~3111.3.5.1~~ [3111.3.6.1](#) Fire separation distances.

Ground-mounted photovoltaic [panel](#) systems shall be subject to the *fire separation distance* requirements determined by the local jurisdiction.

~~3114.1~~ General.

~~For the purpose of this section, public restroom buildings are located on publicly owned lands in flood hazard areas and intended for public use. Public restroom buildings and portions of other buildings that contain public restrooms are limited to toilet rooms, bathrooms, showers and changing rooms. Public restroom buildings and portions of buildings that contain public restrooms shall comply with the requirements of this section. Public use restrooms that are not elevated or dry~~

~~floodproofed in accordance with Section 1612 shall comply with Section 3114.2. Portions of buildings that include uses other than public-use toilet rooms, bathrooms, showers and changing rooms shall comply with Section 1612.~~

3114.2 Flood resistance.

~~Public-use restrooms on publicly owned lands in flood hazard areas shall comply with the requirements of ASCE 24, except for elevation requirements, and shall comply with all of the following criteria:~~

- ~~1.—The building footprint is not more than 1,500 square feet (139 m²).~~
- ~~2.—Located, designed and constructed to resist the effects of flood hazards and flood loads to minimize flood damage from a combination of wind and water loads associated with the base flood.~~
- ~~3.—Anchored to prevent flotation, collapse or lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy during conditions of the base flood.~~
- ~~4.—Constructed of flood-damage-resistant materials.~~
- ~~5.—Where enclosed by walls, the walls have flood openings.~~
- ~~6.—Mechanical and electrical systems are located above the base flood elevation.~~
- ~~7.—Plumbing fixtures and plumbing connections are located above the base flood elevation.~~
- ~~8.—An emergency plan, approved by the jurisdiction, is submitted to the building official and includes building design documents specifying implementation of protection measures prior to the onset of flooding conditions.~~

Exceptions:

- ~~1.—Minimum necessary electric equipment required to address health, life safety and electric code requirements is permitted below the base flood elevation in accordance with ASCE 24 provisions for electric elements installed below the minimum elevations.~~
- ~~2.—Plumbing fixtures and connections are permitted below the base flood elevation provided that the fixtures and connections are designed and installed to minimize or eliminate infiltration of floodwaters into the sanitary sewage system and discharges from sanitary sewage systems into floodwaters.~~

SECTION 3114

INTERMODAL SHIPPING CONTAINERS

3114.1 General.

The provisions of Section 3114 and other applicable sections of this code shall apply to intermodal shipping containers that are repurposed for use as buildings or structures, or as a part of buildings or structures.

Exceptions:

1. Intermodal shipping containers previously approved as existing relocatable buildings complying with Chapter 14 of the International Existing Building Code.
2. Stationary storage battery arrays located in intermodal shipping containers complying with Chapter 12 of the International Fire Code.
3. Intermodal shipping containers that are listed as equipment complying with the standard for equipment, such as air chillers, engine generators, modular data centers, and other similar equipment.
4. Intermodal shipping containers housing or supporting experimental equipment are exempt from the requirements of Section 3114, provided that they comply with all of the following:
 - 4.1. Such units shall be single stand-alone units supported at grade level and used only for occupancies as specified under Risk Category I in Table 1604.5.
 - 4.2. Such units are located a minimum of 8 feet (2438 mm) from adjacent structures, and are not connected to a fuel gas system or fuel gas utility.

4.3. In hurricane-prone regions and flood hazard areas, such units are designed in accordance with the applicable provisions of Chapter 16.

3114.2 Construction documents.

The construction documents shall contain information to verify the dimensions and establish the physical properties of the steel components and wood floor components of the intermodal shipping container, in addition to the information required by Sections 107 and 1603.

3114.3 Intermodal shipping container information.

Intermodal shipping containers shall bear an existing data plate containing the following information as required by ISO 6346 and verified by an approved agency. A report of the verification process and findings shall be provided to the building owner.

1. Manufacturer's name or identification number.
2. Date manufactured.
3. Safety approval number.
4. Identification number.
5. Maximum operating gross mass or weight (kg) (lbs).
6. Allowable stacking load for 1.8G (kg) (lbs).
7. Transverse racking test force (Newtons).
8. Valid maintenance examination date.

Where approved by the building official, the markings and existing data plate are permitted to be removed from the intermodal shipping containers before they are repurposed for use as buildings or structures or as a part of buildings or structures.

3114.4 Protection against decay and termites.

Wood structural floors of intermodal shipping containers shall be protected from decay and termites in accordance with the applicable provisions of Section 2304.12.1.1.

3114.5 Under-floor ventilation.

The space between the bottom of the floor joists and the earth under any intermodal shipping container, except spaces occupied by basements and cellars, shall be provided with ventilation in accordance with Section 1202.4.

3114.6 Roof assemblies.

Intermodal shipping container roof assemblies shall comply with the applicable requirements of Chapter 15.

Exception: Single-unit, stand-alone intermodal shipping containers not attached to, or stacked vertically over, other intermodal shipping containers, buildings or structures.

3114.7 Joints and voids.

Joints and voids that create concealed spaces between connected or stacked intermodal shipping containers at fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved fire-resistant joint system in accordance with Section 715.

3114.8 Structural.

Intermodal shipping containers that conform to ISO 1496-1 and are repurposed for use as *buildings* or *structures*, or as a part of *buildings* or *structures*, shall be designed in accordance with Chapter 16 and this section.

3114.8.1 Foundations and supports.

Intermodal shipping containers repurposed for use as a permanent *building* or *structure* shall be supported on foundations or other supporting *structures* designed and constructed in accordance with Chapters 16 through 23.

3114.8.1.1 Anchorage.

Intermodal shipping containers shall be anchored to foundations or other supporting *structures* as necessary to provide a continuous load path for all applicable design and environmental *loads* in accordance with Chapter 16.

3114.8.1.2 Stacking.

Intermodal shipping containers used to support stacked units shall comply with Section 3114.8.4.

3114.8.2 Welds.

The strength of new welds and connections shall be of not less than the strength provided by the original connections. All new welds and connections shall be designed and constructed in accordance with Chapters 16, 17, and 22.

3114.8.3 Structural design.

The structural design for the intermodal shipping containers repurposed for use as a building or structure, or as part of a building or structure, shall comply with Section 3114.8.4 or 3114.8.5.

3114.8.4 Detailed design procedure.

A structural analysis meeting the requirements of this section shall be provided to the *building official* to demonstrate the structural adequacy of the intermodal shipping containers.

Exception: Structures using an intermodal shipping container designed in accordance with Section 3114.8.5.

3114.8.4.1 Material properties.

Structural material properties for existing *intermodal shipping container* steel components shall be established by Section 2202.

3114.8.4.2 Seismic design parameters.

The seismic force-resisting system shall be designed and detailed in accordance with ASCE 7 and one of the following:

1. Where all or portions of the profiled steel panel elements are considered to be the seismic force-resisting system, design and detailing shall be in accordance with the AISI S100 and, ASCE 7, Table 12.2-1 requirements for steel systems not specifically detailed for seismic resistance, excluding cantilever column systems.
2. Where all or portions of the profiled steel panel elements are not considered to be the seismic force-resisting system, an independent seismic force-resisting system shall be selected, and detailed in accordance with ASCE 7, Table 12.2-1.
3. Where all or portions of the profiled steel panel elements are retained and integrated into a seismic force-resisting system other than as permitted by Item 1, seismic design parameters shall be developed from testing and analysis in accordance with Section 104.2.3 and ASCE 7, Section 12.2.1.1 or 12.2.1.2.

3114.8.4.3 Allowable shear value.

The allowable shear values for the profiled steel panel side walls and end walls shall be determined in accordance with the design approach selected in Section 3114.8.4.2. Where penetrations are made in the side walls or end walls designated as part of the lateral force-resisting system, the penetrations shall be substantiated by rational analysis.

3114.8.5 Simplified structural design procedure of single-unit containers.

Single-unit intermodal shipping containers conforming to the limitations of Section 3114.8.5.1 shall be permitted to be designed in accordance with Sections 3114.8.5.2 and 3114.8.5.3.

3114.8.5.1 Limitations.

The use of Section 3114.8.5 is subject to the following limitations:

1. The intermodal shipping container shall be a single-unit, stand-alone unit supported on a foundation and shall not be in contact with or supporting any other shipping container or other structure.
2. The intermodal shipping container top and bottom rails, corner castings, and columns or any portion thereof shall not be notched, cut, or removed in any manner.
3. The intermodal shipping container shall be erected in a level and horizontal position with the floor located at the bottom.
4. The intermodal shipping container shall be located in Seismic Design Category A, B, C or D.

3114.8.5.2 Structural design assumptions.

Where permitted by Section 3114.8.5.1, single-unit, stand-alone intermodal shipping containers shall be designed using the following assumptions for profiled steel panel lateral-force resisting system:

1. The appropriate detailing requirements contained in Chapters 16 through 23.
2. Response modification coefficient, $R = 2$.
3. Overstrength factor, $\Omega_0 = 2.5$.
4. Deflection amplification factor, $C_d = 2$.
5. Limits on structural height, $h_n = 9.5$ feet (2900 mm).

3114.8.5.3 Allowable shear.

The allowable shear for the profiled steel panel side walls (longitudinal) and end walls (transverse) for wind design and seismic design using the coefficients of Section 3114.8.5.2 shall be in accordance with Table 3114.8.5.3, provided that all of the following conditions are met:

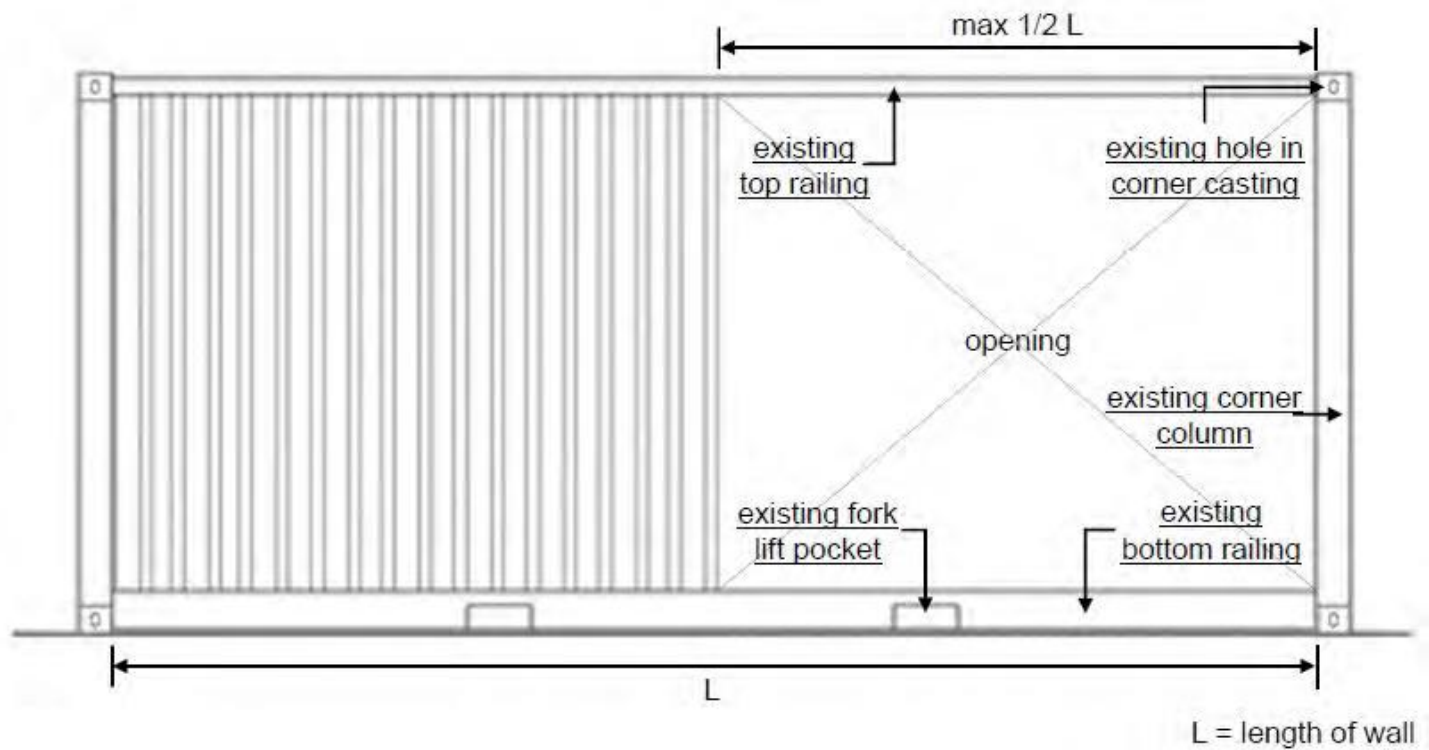
1. The total linear length of all openings in any individual side wall or end wall shall be limited to not more than 50 percent of the length of that side wall or end wall, as shown in Figure 3114.8.5.3(1).
2. Any full-height wall length, or portion thereof, less than 4 feet (305 mm) shall not be considered as a portion of the lateral force-resisting system, as shown in Figure 3114.8.5.3(2).
3. All side walls or end walls used as part of the lateral force-resisting system shall have an existing or new boundary element on all sides to form a continuous load path, or paths, with adequate strength and stiffness to transfer all forces from the point of application to the final point of resistance, as shown in Figure 3114.8.5.3(3).
4. Where openings are made in the intermodal shipping container walls, floors or roofs, for doors, windows and other openings:
 - 4.1. The openings shall be framed with steel elements that are designed in accordance with Chapters 16 and 22.
 - 4.2. The cross section and material grade of any new steel element shall be equal to or greater than the steel element removed.
5. A maximum of one penetration not greater than 6 inches (152 mm) in diameter for conduits, pipes, tubes or vents, or not greater than 16 square inches (10 323 mm²) for electrical boxes, is permitted for each individual 8-foot (2438 mm) length of lateral force-resisting wall. Penetrations located in walls that are not part of the lateral force-resisting system shall not be limited in size or quantity. Existing intermodal shipping container vents shall not be considered a penetration, as shown in Figure 3114.8.5.3(4).
6. End wall doors designated as part of the lateral force-resisting system shall be intermittently welded closed around the full perimeter of the door panels.

TABLE 3114.8.5.3 ALLOWABLE SHEAR VALUES FOR PROFILED STEEL PANEL SIDE WALLS AND END WALLS FOR WIND OR SEISMIC LOADING

<u>CONTAINER DESIGNATION</u> ^b	<u>CONTAINER DIMENSION (nominal length)</u>	<u>CONTAINER DIMENSION (nominal height)</u>	<u>ALLOWABLE SHEAR VALUES (PLF)</u> ^{a, c}	
			<u>Side Wall</u>	<u>End Wall</u>
<u>1EEE</u>	<u>45 feet</u>	<u>9.5 feet</u>	<u>75</u>	<u>843</u>
<u>1EE</u>		<u>8.5 feet</u>		
<u>1AAA</u>	<u>40 feet</u>	<u>9.5 feet</u>	<u>84</u>	
<u>1AA</u>		<u>8.5 feet</u>		
<u>1A</u>		<u>8.0 feet</u>		
<u>1AX</u>		<u>< 8.0 feet</u>		
<u>1BBB</u>	<u>30 feet</u>	<u>9.5 feet</u>	<u>112</u>	
<u>1BB</u>		<u>8.5 feet</u>		
<u>1B</u>		<u>8.0 feet</u>		
<u>1BX</u>		<u>< 8.0 feet</u>		
<u>1CC</u>	<u>20 feet</u>	<u>8.5 feet</u>	<u>168</u>	
<u>1C</u>		<u>8.0 feet</u>		
<u>1CX</u>		<u>< 8.0 feet</u>		
<u>1D</u>	<u>10 feet</u>	<u>8.0 feet</u>	<u>337</u>	
<u>1DX</u>		<u>< 8.0 feet</u>		

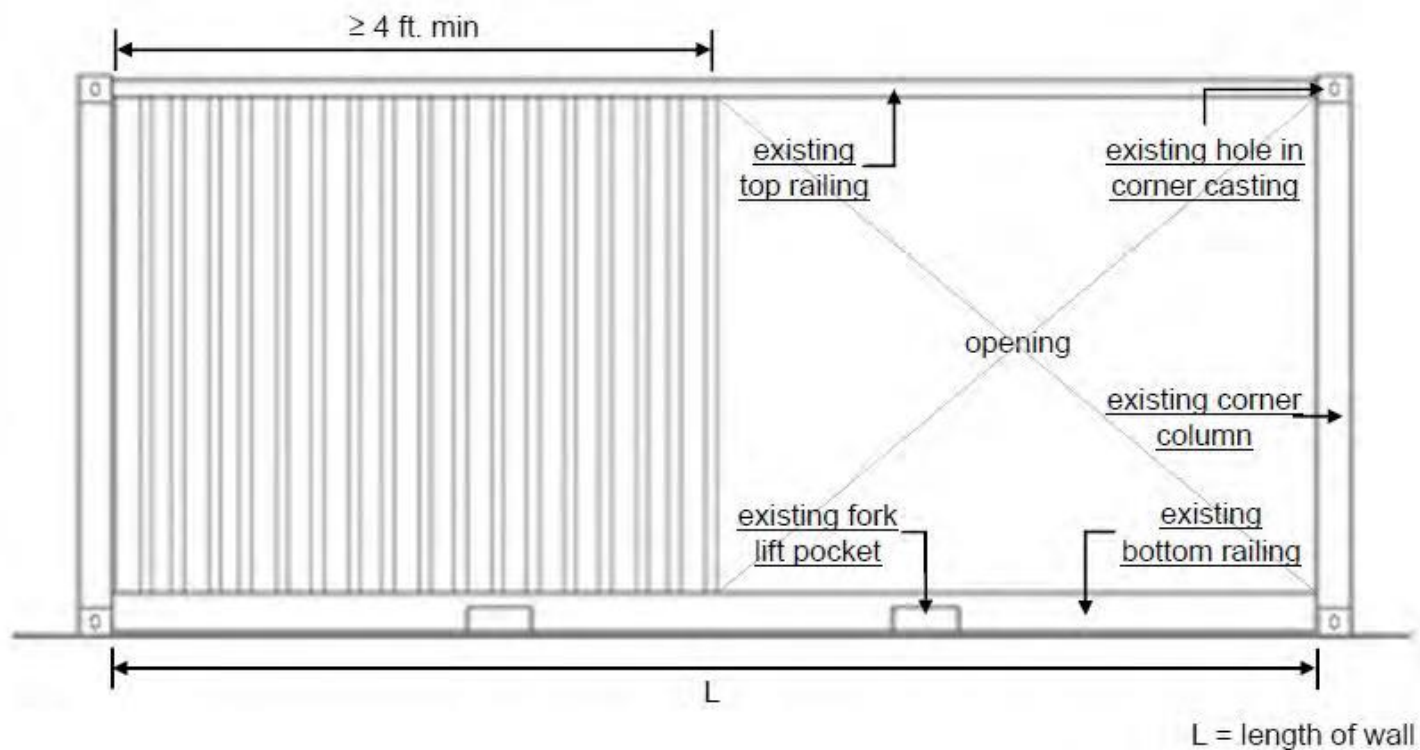
For SI: 1 foot = 304.8 mm.

- The allowable strength shear values for the side walls and end walls of the intermodal shipping containers are derived from ISO 1496-1 and reduced by a factor of safety of 5.
- Container designation type is derived from ISO 668.
- Limitations of Sections 3114.8.5.1 and 3114.8.5.3 shall apply.



[FIGURE 3114.8.5.3\(1\)](#)

[BRACING UNIT DISTRIBUTION—MAXIMUM LINEAR LENGTH](#)



For SI: 1 foot = 304.8 mm.

FIGURE 3114.8.5.3(2)

BRACING UNIT DISTRIBUTION—MINIMUM LINEAR LENGTH

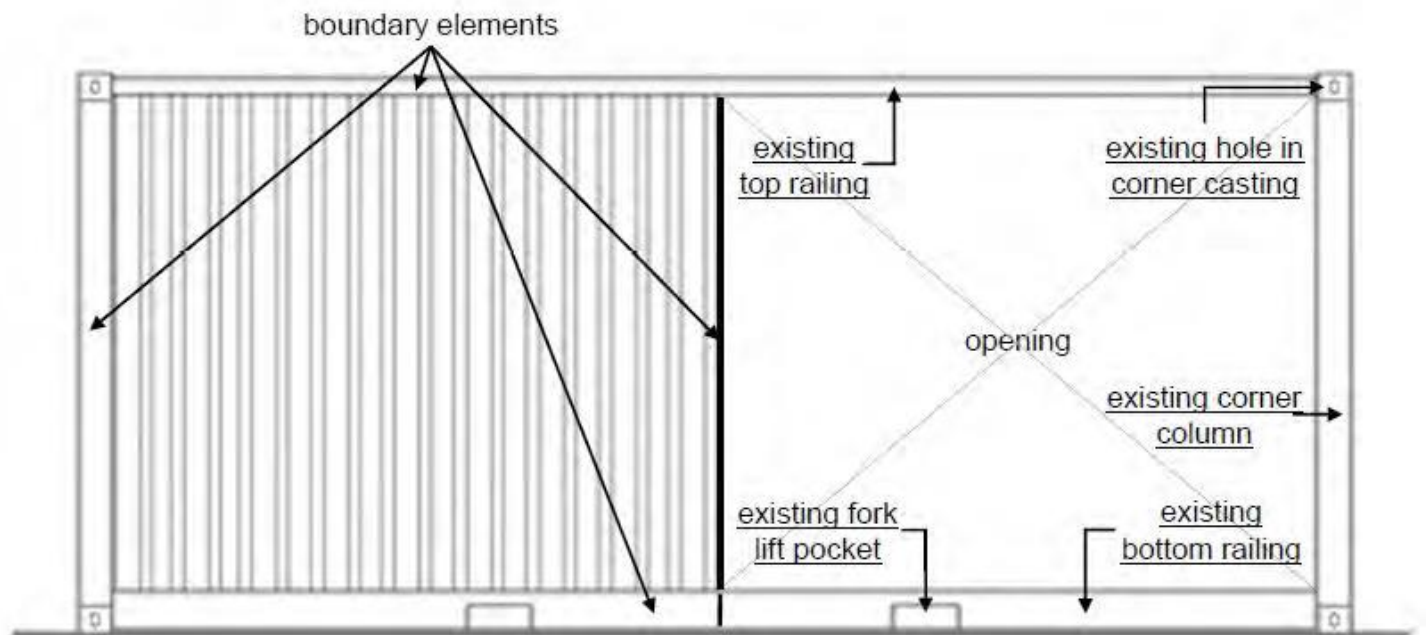
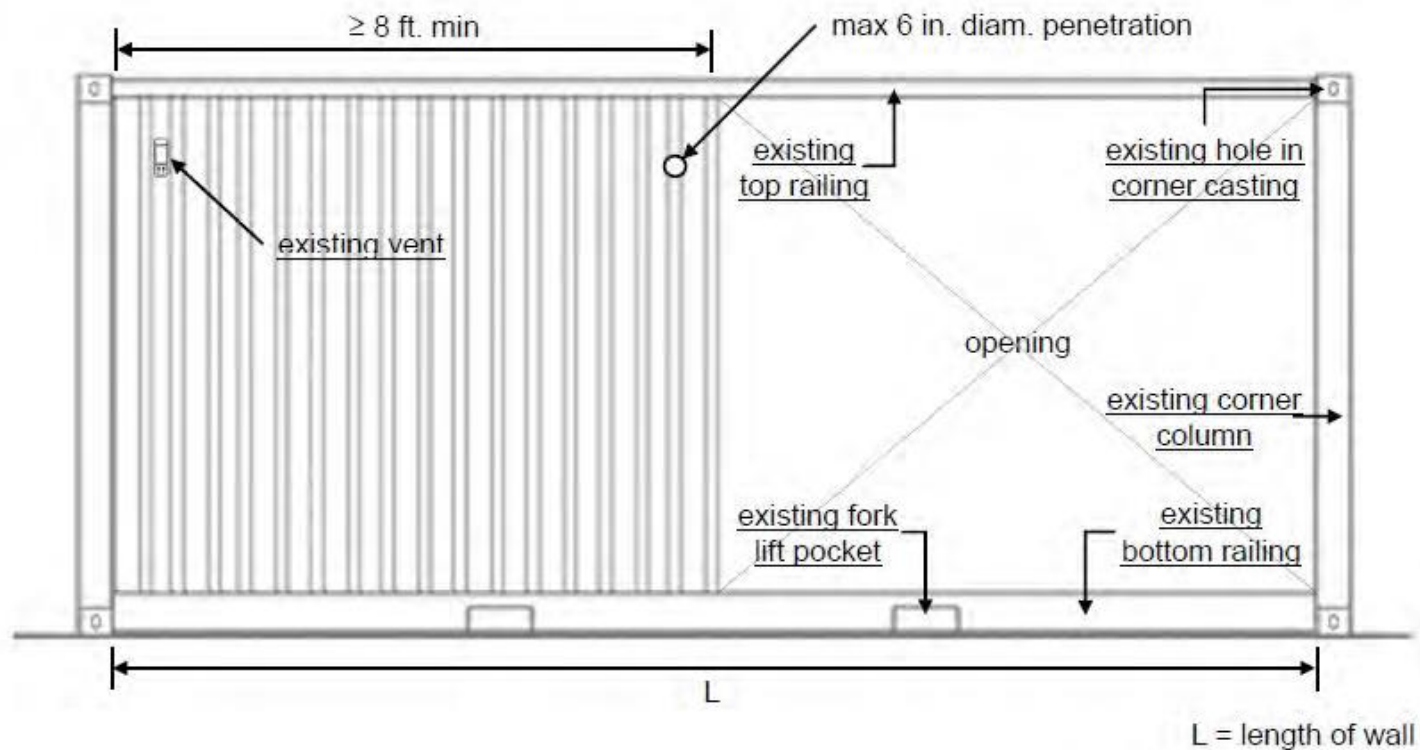


FIGURE 3114.8.5.3(3)
BRACING UNIT DISTRIBUTION—BOUNDARY ELEMENTS



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

FIGURE 3114.8.5.3(4)

BRACING UNIT DISTRIBUTION—PENETRATION LIMITATIONS

TABLE 3114.8.5.3

ALLOWABLE SHEAR VALUES FOR PROFILED STEEL PANEL SIDE WALLS AND END WALLS FOR WIND OR SEISMIC LOADING

<u>CONTAINER DESIGNATION b</u>	<u>CONTAINER DIMENSION (nominal length)</u>	<u>CONTAINER DIMENSION (nominal height)</u>	<u>ALLOWABLE SHEAR VALUES (PLF) a, c</u>	
			<u>Side Wall</u>	<u>End Wall</u>
<u>1EEE</u>	<u>45 feet</u>	<u>9.5 feet</u>	<u>75</u>	<u>843</u>
<u>1EE</u>		<u>8.5 feet</u>		
<u>1AAA</u>	<u>40 feet</u>	<u>9.5 feet</u>	<u>84</u>	
<u>1AA</u>		<u>8.5 feet</u>		
<u>1A</u>		<u>8.0 feet</u>		
<u>1AX</u>		<u>< 8.0 feet</u>		
<u>1BBB</u>	<u>30 feet</u>	<u>9.5 feet</u>	<u>112</u>	
<u>1BB</u>		<u>8.5 feet</u>		
<u>1B</u>		<u>8.0 feet</u>		
<u>1BX</u>		<u>< 8.0 feet</u>		
<u>1CC</u>	<u>20 feet</u>	<u>8.5 feet</u>	<u>168</u>	
<u>1C</u>		<u>8.0 feet</u>		
<u>1CX</u>		<u>< 8.0 feet</u>		
<u>1D</u>	<u>10 feet</u>	<u>8.0 feet</u>	<u>337</u>	
<u>1DX</u>		<u>< 8.0 feet</u>		

For SI: 1 foot = 304.8 mm.

- The allowable strength shear values for the side walls and end walls of the intermodal shipping containers are derived from ISO 1496-1 and reduced by a factor of safety of 5.
- Container designation type is derived from ISO 668.
- Limitations of Section Sections 3114.8.5.1 and 3114.8.5.3 shall apply.

Chapter 33 Safeguards During Construction

3301.1 Scope.

The provisions of this chapter shall govern safety during construction and the protection of adjacent public and private properties. Fire safety during construction shall also comply with the applicable provisions of Chapter 33 of the International Fire Code.

3301.2 Storage and placement of construction equipment and materials.

Construction equipment and materials shall be stored and placed so as not to endanger the public, the workers or ~~adjoining~~ adjacent property for the duration of the construction project.

[BS] ~~1511.2 3301.2.1~~ 3301.3 Roof Structural and construction loads.

Structural roof components shall be capable of supporting the roof-covering system and the material and equipment *loads* that will be encountered during installation of the system.

3301.4 ~~3302.1~~ Maintenance of exits, existing structural elements, fire protection devices and sanitary safeguards **Alterations, repairs and additions.**

Required *exits*, existing structural elements, fire protection devices and sanitary safeguards shall be maintained at all times during *alterations, repairs* or *additions* to any building or structure.

Exceptions:

1. Where such required elements or devices are being altered or repaired, adequate substitute provisions shall be made.
2. Maintenance of such elements and devices is not required where the existing building is not occupied.

3301.5 ~~3302.2~~ Removal of waste materials ~~Manner of removal.~~

Waste materials shall be removed in a manner that prevents injury or damage to persons, ~~adjoining~~ adjacent properties and public rights-of-way.

SECTION 3302

OWNER'S RESPONSIBILITY FOR FIRE PROTECTION ~~CONSTRUCTION SAFEGUARDS.~~

3302.1 Site Safety Plan.

The owner or owner's authorized agent shall be responsible for the development, implementation and maintenance of an approved, written site safety plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration or demolition work. The plan shall be submitted and approved before a building permit is issued. Any changes to the plan shall address the requirements of this chapter and other applicable portions of the International Fire Code, the duties of staff, and staff training requirements. The plan shall be submitted for approval in accordance with the International Fire Code.

3302.1.1 Components of site safety plans.

Site safety plans shall include the following as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, *standpipes*, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where *approved*, and signage locations in accordance with the *International Fire Code*.
7. Location and safety considerations for temporary heating equipment.
8. Hot work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of *flammable* and *combustible liquids* and other *hazardous materials*.
11. Provisions for site security and, where required, for a fire watch.
12. Changes that affect this plan.
13. Other site-specific information required by the *International Fire Code*.

3302.2 Site safety director.

The *owner* shall designate a person to be the site safety director. The site safety director shall be responsible for ensuring compliance with the site safety plan. The site safety director shall have the authority to enforce the provisions of this chapter and other provisions as necessary to secure the intent of this chapter. Where guard service is provided in accordance with the *International Fire Code*, the site safety director shall be responsible for the guard service.

3302.3 Fire safety during construction.

~~Fire safety during construction shall comply with the applicable requirements of this code and the applicable provisions of Chapter 33 of the *International Fire Code*.~~

3302.3 Daily fire safety inspection.

The site safety director shall be responsible for completion of a daily fire safety inspection at the project site. Each day, all *building* and outdoor areas shall be inspected to ensure compliance with the inspection list in this section. The results of each inspection shall be documented and maintained on-site until a certificate of occupancy has been issued. Documentation shall be immediately available on-site inspection and review.

1. Any contractors entering the site to perform hot work each day have been instructed in the hot work safety requirements in the *International Fire Code*, and hot work is performed only in areas *approved* by the site safety director.
2. Temporary heating equipment is maintained away from combustible materials in accordance with the equipment manufacturer's instructions.
3. Combustible debris, rubbish and waste material is removed from the *building* in areas where work is not being performed.
4. Temporary wiring does not have exposed conductors.
5. *Flammable liquids* and other *hazardous materials* are stored in locations that have been approved by the site safety director when not involved in work that is being performed.
6. Fire apparatus access roads required by the *International Fire Code* are maintained clear of obstructions that reduce the width of the usable roadway to less than 20 feet (6096 mm).
7. Fire hydrants are clearly visible from access roads and are not obstructed.
8. The location of fire department connections to standpipe and in-service sprinkler systems are clearly identifiable from the access road and such connections are not obstructed.

9. Standpipe systems are in service and continuous to the highest work floor, as specified in Section 3311.
10. Portable fire extinguishers are available in locations required by Sections 3309 and for roofing operations in accordance with the *International Fire Code*.
11. Where a *fire watch* is required, fire watch records complying with the International Fire Code are up-to-date.

3302.3.1 Violations.

Failure to properly conduct, document and maintain documentation required by this section shall constitute an unlawful act in accordance with Section 114.1 and shall result in the issuance of a notice of violation to the site safety director in accordance with Section 114.2. Upon the third offense, the *building official* is authorized to issue a stop work order in accordance with Section 115, and work shall not resume until satisfactory assurances of future compliance have been presented to and *approved* by the *building official*.

3303.5 Water accumulation.

Provision shall be made to prevent the accumulation of water or damage to any foundations on the premises or ~~the adjoining on adjacent~~ property.

SECTION 3307

PROTECTION OF ~~ADJOINING~~ ADJACENT PROPERTY

[BS] 3307.1 Protection required.

~~Adjoining~~ Adjacent public and private property shall be protected from damage during construction, remodeling and demolition work. Protection shall be provided for footings, foundations, party walls, chimneys, skylights and roofs. Provisions shall be made to control water runoff and erosion during construction or demolition activities. The person making or causing an excavation to be made shall provide written notice to the owners of ~~adjoining adjacent buildings property~~ advising them that the excavation is to be made and that the ~~adjoining adjacent buildings property~~ should be protected. Said notification shall be delivered not less than 10 days prior to the scheduled starting date of the excavation.

[BS] 3307.2 Excavation retention systems.

Where a retention system is used to provide support of an excavation for protection of adjacent property or structures, the system shall conform to the requirements in Sections 3307.2.1 through 3307.2.3.

[BS] 3307.2.1 Excavation retention system design.

Excavation retention systems shall be designed by a *registered design professional* to provide vertical and lateral support.

[BS] 3307.2.2 Excavation retention system monitoring.

The retention system design shall include requirements for monitoring of the system and adjacent property or structures for horizontal and vertical movement.

[BS] 3307.2.3 Retention system removal.

Elements of the system shall only be removed or decommissioned where adequate replacement support is provided by backfill or by the new *structure*. Removal or decommissioning shall be performed in such a manner that protects the adjacent property.

[F] 3313.1 Where required.

An approved water supply for fire protection, either temporary or permanent, shall be made available as soon as combustible ~~material arrives on the site.~~ building materials arrive on the site, on commencement of vertical combustible

construction, and on installation of a *standpipe system* in *buildings* under construction, in accordance with Sections 3313.2 through 3313.5.

Exception: The *fire code official* is authorized to reduce the fire-flow requirements for isolated *buildings* or a group of *buildings* in rural areas or small communities where the development of full fire-flow requirements is impractical.

F] 3313.2 Combustible building materials.

When combustible *building materials* of the *building* under construction are delivered to a site, a minimum fire flow of 500 gallons per minute (1893 L/m) shall be provided. The fire hydrant used to provide this fire flow supply shall be within 500 feet (152 m) of the combustible *building materials*, as measured along an *approved* fire apparatus access lane. Where the site configuration is such that one fire hydrant cannot be located within 500 feet (152 m) of all combustible *building materials*, additional fire hydrants shall be required to provide coverage in accordance with this section.

[F] 3313.3 Vertical construction of Types III, IV and V construction.

Prior to commencement of vertical construction of Type III, IV or V *buildings* that utilize any combustible *building materials*, the fire flow required by Sections 3313.3.1 through 3313.3.3 shall be provided, accompanied by fire hydrants in sufficient quantity to deliver the required fire flow and proper coverage.

[F] 3313.3.1 Fire separation up to 30 feet.

Where a *building* of Type III, IV or V construction has a *fire separation distance* of less than 30 feet (9144 mm) from property *lot lines*, and an adjacent property has an *existing structure* or otherwise can be built on, the water supply shall provide either a minimum of 500 gallons per minute (1893 L/m), or the entire fire flow required for the *building* when constructed, whichever is greater.

[F] 3313.3.2 Fire separation of 30 feet up to 60 feet. Where a *building* of Type III, IV or V construction has a *fire separation distance* of 30 feet (9144 mm) up to 60 feet (18 288 mm) from property *lot lines*, and an adjacent property has an *existing structure* or otherwise can be built on, the water supply shall provide a minimum of 500 gallons per minute (1893 L/m), or 50 percent of the fire flow required for the building when constructed, whichever is greater.

[F] 3313.3.3 Fire separation of 60 feet or greater.

Where a *building* of Type III, IV or V construction has a fire separation of 60 feet (18 288 mm) or greater from a property *lot line*, a water supply of 500 gallons per minute (1893 L/m) shall be provided.

[F] 3313.4 Vertical construction, Types I and II construction.

If combustible *building materials* are delivered to the construction site, water supply in accordance with Section 3313.2 shall be provided. Additional water supply for fire flow is not required prior to commencing vertical construction of Type I and II *buildings*.

[F] 3313.5 Standpipe supply.

Regardless of the presence of combustible building materials, the construction type or the *fire separation distance*, where a standpipe is required in accordance with Section 3311, a water supply providing a minimum flow of 500 gallons per minute (1893 L/m) shall be provided. The fire hydrant used for this water supply shall be located within 100 feet (30 480 mm) of the fire department connection supplying the standpipe.

[F] 3314.1 Fire watch during combustible construction.

A fire watch shall be provided during nonworking hours for construction that exceeds 40 feet (12 192 mm) in height above the lowest adjacent grade at any point along the building perimeter, for new multistory construction with an aggregate area exceeding 50,000 square feet (4645 m2) per story or as required by the fire code official.

Chapter 35 Referenced Standards

ACI

440.11-22: Structural Concrete Buildings Reinforced Internally with Fiber Reinforced Polymer (FRP) Bars – Code Requirements

AISC

ANSI/AISC 370-21: Specification for Structural Stainless Steel Buildings

AISI

S310-20 w/S1-22: North American Standard for the Design of Steel Deck Diaphragms, with Supplement 1, 2022 Edition

ANSI

A108.5-21: Setting of Ceramic Tile with Dry-Set Cement Mortar, Modified Dry-Set Cement Mortar, EGP (Exterior Glue plywood) Modified Dry-Set Cement Mortar, or Improved Modified Dry-Set Cement Mortar

E1.21-2020: Entertainment Technology: Temporary Structures Used for Technical Production of Outdoor Entertainment Events

ES1.7-2021: Event Safety Requirements - Weather Preparedness

ASHRAE

90.1-2022: Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings

ASTM

[A641/A641M-19: Specification for Zinc-coated \(Galvanized\) Carbon Steel Wire](#)

[C1902-20: Standard Specification for Cellular Glass Insulation Used in Building and Roof Applications](#)

[D2737-21: Standard Specification for Polyethylene \(PE\) Plastic Tubing](#)

[D3498-19a \(2011\): Standard Specification for Adhesives for Field-Gluing Wood Structural Panels \(Plywood or Oriented Strand Board\) to Wood Based Floor System Framing](#)

[D5878-19: Standard Guides for Using Rock-Mass Classification Systems for Engineering Purpose](#)

[D6913/D6913M-17: Standard Test Methods for Particle-Size Distribution \(Gradation\) of Soils Using Sieve Analysis](#)

[D7793-20: Standard Specification for Insulated Vinyl Siding](#)

[D7957/D7957M-17: Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement](#)

[D8223-19: Standard Practice for Evaluation of Fire-Retardant Treated Laminated Veneer Lumber](#)

[D8257/D8257M-20: Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing](#)

[E2768 -11\(2018\): Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials \(30 min Tunnel Test\)](#)

[E2837-2013 \(2017\): Standard Test Method for Determining the Fire Resistance of Continuity Head-of- Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies](#)

[F1346–91 \(2018\): Standard Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs.](#)

~~G152—13: Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials~~

~~G154—2016A: Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials~~

~~G155—13: Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials~~

GA

[GA-253-2021: Application of Gypsum Sheathing](#)

ICC

~~A117.1-09~~ [A117.1 2017](#): Accessible and Usable Buildings and Facilities

MHI

[ANSI/MH 28.2-2022: Design, Testing and Utilization of Industrial Boltless Steel Shelving](#)

[ANSI/MH 28.3-2022: Design, Testing and Utilization of Industrial Steel Work Platforms](#)

[ANSI/MH 32.1-2018: Stairs, Ladders and Open-Edge Guards for Use with Material Handling Structures](#)

NFPA

~~720—15: Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment~~

[770-2021: Standard on Hybrid \(Water and Inert Gas\) Fire Extinguishing Systems](#)

[780-20: Standard for the Installation of Lightning Protection Systems](#)

PCI

(Precast Prestressed Concrete Institute)

~~MNL~~ [PCI 124 1118 Design Specification](#) for Fire Resistance of Precast Prestressed Concrete

RMI

[ANSI MH16.1-2021: Design, Testing and Utilization of Industrial Storage Racks](#)

SDI

~~SDI-C—2017: Standard for Composite Steel Floor Deck—Slabs~~

~~SDI-NC—2017: Standard for Noncomposite Steel Floor Deck~~

[SDI SD-2022: Standard for Steel Deck](#)

~~SDI RD—2017: Standard for Steel Roof Deck~~

TMS

[402-22: Building Code Requirements for Masonry Structures](#)

UL

[UL 96A-2016: Standard for Installation Requirements for Lightning Protection Systems](#)

[723S—2006: Drop-Out Ceilings Installed Beneath Automatic Sprinklers](#)

[UL 1034-2011: Burglary-Resistant Electric Locking Mechanisms – with revisions through June 2020](#)

[UL 2525-2020: STANDARD Two-Way Emergency Communications systems for Rescue Assistance](#)

[7103—2019: Outline of Investigation for Building-Integrated Photovoltaic Roof Coverings](#)

[8802-2020: Outline of Investigation for Germicidal Systems](#)

[61730-1—2017: Photovoltaic \(PV\) Module Safety Qualification — Part 1: Requirements for Construction—with Revisions through April 2020](#)

[61730-2—2017: Photovoltaic \(PV\) Module Safety Qualification — Part 2: Requirements for Testing—with Revisions through April 2020](#)

WDMA

[WDMA I.S. 11-2018: Industry Standard for Analytical Method for Design Pressure \(DP\) Ratings of Fenestration Products](#)

Appendices

Appendix E Supplementary Accessibility Requirements

E104.2.1 Transient lodging.

In *transient lodging* facilities, dwelling units or sleeping units with accessible communication features shall be provided in accordance with Table E104.2.1. Units ~~required to comply with Table E104.2.1~~ with accessible communication features shall be dispersed among the various classes of units. At least one Accessible unit required by Section 1108.6.1.1 shall also provide accessible communication features. Not more than 10 percent of Accessible units required by Section 1108.6.1.1 shall be used to satisfy the minimum number of units required to provide accessible communication features.

E104.2.2 Group I-3.

In Group I-3 occupancies at least 2 percent ~~, but no fewer than one~~ of the total number of general holding *cells* and general housing *cells* equipped with audible emergency alarm systems notification devices systems, and not less than one cell, shall be provided with visual notification devices. ~~and~~ Permanently installed telephones within the cell shall comply both complying with Section E104.2.4.

[NY] E106.4.8 Detention and correctional facilities.

In detention and correctional facilities, where a public pay telephone is provided in a secured area used only by ~~detainees or inmates~~ detained or incarcerated individuals and security personnel, then not fewer than one TTY shall be provided in not fewer than one secured area.

Appendix G Flood-resistant Construction

G101.5 Designation of floodplain administrator.

The [INSERT JURISDICTION'S SELECTED POSITION TITLE] is designated as the floodplain administrator and is authorized and directed to enforce the provisions of this appendix. The floodplain administrator is authorized to delegate performance of certain duties to other employees of the jurisdiction. Such designation shall not alter any duties and powers of the building official.

SECTION ~~G201~~ G102

DEFINITIONS

~~G201.2~~ G102.1 General.

The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

FUNCTIONALLY DEPENDENT FACILITY.

A facility that cannot ~~be used for perform~~ its intended purpose unless it is located or carried out in close proximity to water, ~~, such as a docking or port facility~~ The term includes only docking facilities, port facilities necessary for the loading or unloading of cargo or passengers, and shipbuilding ~~or~~ and ship repair facilities. The term does not include long-term storage, manufacture, sales or service *facilities*.

MANUFACTURED HOME.

A structure that is transportable in one or more sections, built on a permanent chassis, designed for use with or without a permanent foundation when attached to the required utilities, and constructed to the Federal ~~Mobile~~ Manufactured Home

Construction and Safety Standards and rules and regulations promulgated by the U.S. Department of Housing and Urban Development. The term also includes mobile homes, park trailers, travel trailers and similar transportable structures that are placed on a site for 180 consecutive days or longer.

G104.10 Use of changed technical data.

The floodplain administrator and the applicant shall not use changed flood hazard area boundaries or base flood elevations for proposed buildings or developments unless the floodplain administrator or applicant has applied for a conditional Flood Insurance Rate Map (FIRM) revision and has received the approval of the Federal Emergency Management Agency (FEMA).

SECTION ~~G104~~G105

PERMITS

~~G104.1~~G105.1 Required.

Any person, owner or owner's authorized agent who intends to conduct any development in a flood hazard area shall first make application to the ~~building official~~ floodplain administrator and shall obtain the required *permit*.

~~G104.2~~G105.2 Application for permit.

The applicant shall file an application in writing on a form furnished by the ~~building official~~ floodplain administrator. Such application shall:

1. Identify and describe the development to be covered by the *permit*.
2. Describe the land on which the proposed development is to be conducted by legal description, street address or similar description that will readily identify and definitely locate the site.
3. Include a site plan showing the delineation of *flood hazard areas*, floodway boundaries, *flood zones*, *design flood elevations*, ground elevations, proposed fill and excavation and drainage patterns and facilities.
4. Include in subdivision proposals and other proposed developments with more than 50 lots or larger than 5 acres (20 234 m²), *base flood elevation* data in accordance with Section 1612.3.1 if such data are not identified for the *flood hazard areas* established in Section G103.2.
5. Indicate the use and occupancy for which the proposed development is intended.
6. Be accompanied by construction documents, grading and filling plans and other information deemed appropriate by the ~~building official~~ floodplain administrator.
7. State the valuation of the proposed work.
8. Be signed by the applicant or the applicant's authorized agent.

~~G104.3~~G105.3 Validity of permit.

The issuance of a *permit* under this appendix shall not be construed to be a *permit* for, or approval of, any violation of this appendix or any other ordinance of the jurisdiction. The issuance of a *permit* based on submitted documents and information shall not prevent the ~~building official~~ floodplain administrator from requiring the correction of errors. The ~~building official~~ floodplain administrator is authorized to prevent occupancy or use of a structure or site that is in violation of this appendix or other ordinances of this jurisdiction.

~~G104.4~~G105.4 Expiration.

A *permit* shall become invalid if the proposed development is not commenced within 180 days after its issuance, or if the work authorized is suspended or abandoned for a period of 180 days after the work commences. Extensions shall be requested in writing and justifiable cause demonstrated. The ~~building official~~ floodplain administrator is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each.

~~G104.5~~ G105.5 Suspension or revocation.

The ~~building official~~ floodplain administrator is authorized to suspend or revoke a *permit* issued under this appendix wherever the *permit* is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or code of this jurisdiction.

SECTION ~~G105~~ G106

VARIANCES

~~G105.1~~ G106.1 General.

The board of appeals established pursuant to Section 113, or other established or designed board, shall hear and decide requests for variances. The board ~~of appeals~~ shall base its determination on technical justifications, and has the right to attach such conditions to variances as it deems necessary to further the purposes and objectives of this appendix and Section 1612.

~~G105.2~~ G106.2 Records.

The ~~building official~~ floodplain administrator shall maintain a permanent record of all variance actions, including justification for their issuance.

~~G105.3~~ G106.3 Historic structures.

A variance is authorized to be issued for the repair or rehabilitation of a historic structure upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure, and the variance is the minimum necessary to preserve the historic character and design of the structure.

Exception: Within *flood hazard areas*, historic structures that do not meet one or more of the following designations:

1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

~~G105.4~~ G106.4 Functionally dependent facilities.

A variance is authorized to be issued for the construction or *substantial improvement* of a functionally dependent facility provided that the criteria in Section 1612.1 are met and the variance is the minimum necessary to allow the construction or *substantial improvement*, and that all due consideration has been given to methods and materials that minimize *flood* damages during the *design flood* and do not create additional threats to public safety.

~~G105.5~~ G106.5 Restrictions.

The board ~~of appeals~~ shall not issue a variance for any proposed development in a *floodway* if any increase in flood levels would result during the base *flood discharge*.

~~G105.6~~ G106.6 Considerations.

In reviewing applications for variances, the board ~~of appeals~~ shall consider all technical evaluations, all relevant factors, all other portions of this appendix and the following:

1. The danger that materials and debris may be swept onto other lands resulting in further injury or damage.

2. The danger to life and property due to *flooding* or erosion damage.
3. The susceptibility of the proposed development, including contents, to *flood* damage and the effect of such damage on current and future owners.
4. The importance of the services provided by the proposed development to the community.
5. The availability of alternate locations for the proposed development that are not subject to *flooding* or erosion.
6. The compatibility of the proposed development with existing and anticipated development.
7. The relationship of the proposed development to the comprehensive plan and flood plain management program for that area.
8. The safety of access to the property in times of *flood* for ordinary and emergency vehicles.
9. The expected heights, velocity, duration, rate of rise and debris and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site.
10. The costs of providing governmental services during and after *flood* conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical and water systems, streets and bridges.

~~G105.7~~ G106.7 Conditions for issuance.

Variances shall only be issued by the board ~~of appeals~~ where all of the following criteria are met:

1. A technical showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site renders the elevation standards inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a variance will not result in increased *flood* heights, additional threats to public safety, extraordinary public expense, nor create nuisances, cause fraud on or victimization of the public or conflict with existing local laws or ordinances.
4. A determination that the variance is the minimum necessary, considering the *flood* hazard, to afford relief.
5. Notification to the applicant in writing over the signature of the ~~building official~~ floodplain administrator that the issuance of a variance to construct a structure below the *base flood* level will result in increased premium rates for flood insurance up to amounts as high as \$25 for \$100 of insurance coverage, and that such construction below the *base flood* level increases risks to life and property.

SECTION ~~G501~~ G109

MANUFACTURED HOMES

~~G501.1~~ G109.1 Elevation.

All new and replacement manufactured homes to be placed or substantially improved in a *flood hazard area* shall be elevated such that the top of the foundation for lowest floor of the manufactured home is ~~elevated to~~ at or above the *design flood elevation*.

~~G501.2~~ G109.2 Foundations.

...foundation that is designed in accordance with Section ~~R322~~ R306 of the *International Residential Code*.

~~G501.3~~ G109.3 Anchoring.

~~G501.4~~ G109.4 Protection of mechanical equipment and outside appliances.

...flooding up to the elevation required by Section ~~R322~~[R306](#) of the *International Residential Code*, the systems and equipment shall be permitted to be located below the elevation required by Section ~~R322~~[R306](#) of the *International Residential Code*...

~~G501.5~~ [G109.5](#) Enclosures.

Fully enclosed areas below elevation manufactured homes shall comply with the requirements of Section ~~R322~~[R306](#) of the *International Residential Code*.

SECTION ~~G601~~[G110](#) RECREATIONAL VEHICLES

~~G601.1~~ [G110.1](#) Placement prohibited.

The placement of recreational vehicles shall not be authorized in *coastal high-hazard* areas and in *floodways*.

~~G601.2~~ [G110.2](#) Temporary placement.

Recreational vehicles in *flood hazard areas* shall be fully licensed and ready for highway use, or shall be placed on a site for less than 180 consecutive days.

~~G601.3~~ [G110.3](#) Permanent placement.

Recreational vehicles that are not fully licensed and ready for highway use, or that are to be placed on a site for more than 180 consecutive days, shall meet the requirements of **Section G109** for manufactured homes.

G112.1 Garages and accessory structures.

Garages and accessory structures shall be designed and constructed in accordance with ASCE 24, [subject to the limitations of this section](#):

1. [In flood hazard areas other than coastal high hazard areas and Coastal A Zones, the floors of detached garages and detached accessory storage structures are permitted below the elevations specified in ASCE 24 provided such structures are used solely for parking or storage, are one story and not larger than 600 square feet \(55.75 m²\).](#)
2. [In coastal high hazard areas and Coastal A Zones, the floors of detached garages and detached accessory storage structures are permitted below the elevations specified in ASCE 24 provided such structures are used solely for parking or storage, are one story and are not larger than 100 square feet \(9.29 m²\). Such structures shall not be required to have breakaway walls or flood openings.](#)

Appendix J Grading

J104.4 Liquefaction study.

For sites with ~~mapped~~ maximum considered earthquake spectral response accelerations at short periods (S_s) greater than 0.5g as determined by [Chapter 11 of ASCE 7](#) ~~Section 1613~~, a study of the liquefaction potential of the site shall be provided and the recommendations incorporated in the plans.

Exception: A liquefaction study is not required where the *building official* determines from established local data that the liquefaction potential is low.

Appendix L Earthquake Recording Instrumentation

L101.1 General.

Every structure located where the 1-second spectral response acceleration, S_1 , determined in accordance with [Chapter 11 of ASCE 7 Section 1613.2](#), is greater than 0.40 and either exceeds six stories in height with an aggregate floor area of 60,000 square feet (5574 m²) or more, or exceeds 10 stories in height regardless of floor area, shall be equipped with not fewer than three approved recording accelerographs. The accelerographs shall be interconnected for common start and common timing.

L102

REFERENCED STANDARDS

L102.1 General.

See Table L102.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.

Table L102.1

REFERENCED STANDARDS

<u>STANDARD ACRONYM</u>	<u>STANDARD NAME</u>	<u>SECTIONS HERIN REFERENCED</u>
<u>ASCE/SEI-22</u>	<u>Minimum Design Loads and Associated Criteria for Buildings and Other Structures</u>	<u>L101.1</u>

APPENDIX O PERFORMANCE-BASED APPLICATION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User notes:

About this appendix: Appendix O provides an optional design, review and approval framework for use by the building official. Typical uses would include cases of alternate methods in Chapter 1, select areas of the code that require a rational analysis such as Section 909 and elsewhere. It simply extracts the relevant administrative provisions from the ICC Performance Code into a more concise, usable appendix format for a jurisdiction confronted with such a need. Currently there are multiple, varying jurisdictional rules and procedures in many communities regarding procedure and none in even more. The code official is often left alone to reach decisions not just on the merits of a design, but must first also decide on the submittal and review process. As an appendix, the provisions herein are entirely optional to a jurisdiction. This appendix can be adopted, adopted with local modifications, or even used on a case-by-case basis as part of a Memorandum of Understanding or similar legal agreement between the jurisdiction and the owner/design team. It simply represents another tool for the jurisdiction to reach for in cases of need; it neither encourages nor creates any additional opportunity for performance-based design.

Code development reminder: Code change proposals to this appendix will be considered by the Administrative Code Development Committee during the 2022 (Group B) Code Development Cycle.

O101.1 Introduction.

SECTION O101 GENERAL

O101.1 Introduction

The following administrative provisions are excerpted from the *ICC Performance Code for Buildings and Facilities* and can be used in conjunction with the Alternate Methods provisions in Chapter 1, or for a review of submittals requiring a rational analysis or performance-based design. These provisions provide an established framework for the *building official* in terms of the design expertise needed, the necessary submittals, a review framework and related items.

O101.2 Qualifications.

Registered design professionals shall possess the knowledge, skills and abilities necessary to demonstrate compliance with this code.

O101.3 Construction document preparation.

Construction documents required by this code shall be prepared in adequate detail and submitted for review and approval in accordance with Section 107.

O101.3.1 Review.

Construction documents submitted in accordance with this code shall be reviewed for code compliance with the appropriate code provisions in accordance with Section 107.

O101.4 Construction.

Construction shall comply with the *approved construction documents* submitted in accordance with this code, and shall be verified and *approved* to demonstrate compliance with this code.

O101.4.1 Facility operating policies and procedures.

Policies, operations, training and procedures shall comply with *approved* documents submitted in accordance with this code, and shall be verified and *approved* to demonstrate compliance with this code.

O101.4.2 Maintenance.

Maintenance of the performance-based design shall be ensured throughout the life of the *building* or portion thereof.

O101.4.3 Changes.

The *owner* or the *owner's* authorized agent shall be responsible to ensure that any change to the *facility*, process, or system does not increase the hazard level beyond that originally designed without approval and that changes shall be documented in accordance with the code.

O101.5 Documentation.

The *registered design professional* shall prepare appropriate documentation for the project, clearly detailing the approach and rationale for the design submittal, the construction and the future use of the *building*, facility or process.

O101.5.1 Reports and manuals.

The design report shall document the steps taken in the design analysis, clearly identifying the criteria, parameters, inputs, assumptions, sensitivities and limitations involved in the analysis. The design report shall clearly identify bounding conditions, assumptions and sensitivities that clarify the expected uses and limitations of the performance analysis. This report shall verify that the design approach is in compliance with the applicable codes and acceptable methods and shall be submitted for concurrence by the *building official* prior to the *construction documents* being completed. The report shall document the design features to be incorporated based on the analysis.

The design report shall address the following:

1. Project scope.
2. Goals and objectives.
3. Performance criteria.
4. Hazard scenarios.
5. Design fire loads and hazards.
6. Final design.
7. Evaluation.
8. Bounding conditions and critical design assumptions.
9. Critical design features.
10. System design and operational requirements.
11. Operational and maintenance requirements.
12. Commissioning testing requirements and acceptance criteria.
13. Frequency of certificate renewal.
14. Supporting documents and references.
15. Preliminary site and floor plans.

O101.5.2 Design submittal.

Applicable construction documents shall be submitted to the building official for review. The documents shall be submitted in accordance with the jurisdiction's procedures and in sufficient detail to obtain appropriate permits.

O101.6 Review.

Construction documents submitted in accordance with this code shall be reviewed for code compliance with the appropriate code provisions.

O101.6.1 Peer review.

The owner or the owner's authorized agent shall be responsible for retaining and furnishing the services of a registered design professional or recognized expert, who will perform as a peer reviewer, where required and approved by the building official.

O101.6.2 Costs.

The costs of special services, including contract review, where required by the building official, shall be borne by the owner or the owner's authorized agent.

O101.7 Permits.

Prior to the start of construction, appropriate permits shall be obtained in accordance with the jurisdiction's procedures and applicable codes.

O101.8 Verification of compliance.

Upon completion of the project, documentation shall be prepared that verifies performance and prescriptive code provisions have been met. Where required by the building official, the registered design professional shall file a report that verifies bounding conditions are met.

O101.9 Extent of documentation.

Approved construction documents, the operations and maintenance manual, inspection and testing records, and certificates of occupancy with conditions shall be included in the project documentation of the *building official's* records.

O101.10 Analysis of change.

The *registered design professional* shall evaluate the *existing building, facilities, premises, processes, and contents*, and the applicable documentation of the proposed change as it affects portions of the *building, facility, premises, processes and contents* that were previously designed for compliance under a performance-based code. Prior to any change that was not documented in a previously approved design, the registered design professional shall examine the applicable design documents, bounding conditions, operation and maintenance manuals, and deed restrictions.

APPENDIX P SLEEPING LOFTS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User notes:

About this appendix: Appendix P provides allowances for, and limitations on, spaces intended to be used as sleeping lofts, while differentiating these spaces from mezzanines and other habitable space.

Code development reminder: Code change proposals to sections in this appendix will be considered by the IBC-General Code Development Committee during the 2025 (Group B) Code Development cycle.

SECTION P101 **GENERAL**

P101.1 General.

Where provided in Group R occupancies, *sleeping lofts* shall comply with the provisions of this code, except as modified by this appendix. *Sleeping lofts* constructed in compliance with this appendix shall be considered a portion of the *story* below. Such *sleeping lofts* shall not contribute to either the *building area* or number of *stories* as regulated by Section 503.1. The *sleeping loft* floor area shall be included in determining the *fire area*.

The following *sleeping lofts* are exempt from compliance with this appendix:

1. *Sleeping lofts* with a maximum depth of less than 3 feet (914 mm).
2. *Sleeping lofts* with a floor area of less than 35 square feet (3.3 m²).
3. *Sleeping lofts* not provided with a permanent means of egress.

P101.2 Sleeping loft limitations.

Sleeping lofts shall comply with the following:

1. The *sleeping loft* floor area shall be less than 70 square feet (6.5 m²).
2. The *sleeping loft* ceiling height shall not exceed 7 feet (2134 mm) for more than one half of the *sleeping loft* floor area.

The provisions of this appendix shall not apply to *sleeping lofts* that do not comply with Items 1 and 2.

P101.3 Sleeping loft ceiling height.

The clear height below the *sleeping loft* floor construction shall not be less than 7 feet (2134 mm). The ceiling height above the finished floor of the *sleeping loft* shall not be less than 3 feet (914 mm). Portions of the *sleeping loft* with a sloped ceiling measuring less than 3 feet (914 mm) from the finished floor to the finished ceiling shall not contribute to the *sleeping loft* floor area.

P101.4 Sleeping loft area.

The aggregate area of all *sleeping lofts* and *mezzanines* within a room shall comply with Section 505.2.1.

Exception: The area of a single *sleeping loft* shall not be greater than two-thirds of the area of the room in which it is located, provided that no other *sleeping lofts* or *mezzanines* are open to the room in which the *sleeping loft* is located.

SECTION P102 DEFINITIONS

P102.1 General.

The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

SLEEPING LOFT.

A space on an intermediate level or levels between the floor and ceiling of a Group R occupancy dwelling or *sleeping unit*, open on one or more sides to the room in which the *sleeping loft* is located.

SECTION P103 MEANS OF EGRESS

P103.1 General.

Where a permanent means of egress is provided for *sleeping lofts*, the means of egress shall comply with Chapter 10 of this code, as modified by Sections P103.2 through P103.6.

P103.2 Ceiling height at sleeping loft means of egress.

A minimum ceiling height of 3 feet (914 mm) shall be provided for the entire width of the means of egress from the *sleeping loft*.

P103.3 Stairways.

Stairways providing egress from *sleeping lofts* shall be permitted to comply with Sections P103.3.1 through P103.3.3.

P103.3.1 Width.

Stairways providing egress from a *sleeping 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).

P103.3.2 Treads and risers.

Risers for stairs providing egress from a *sleeping 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.

P103.3.3 Landings.

Landings at stairways providing egress from *sleeping lofts* shall comply with Section 1011.6, except that the depth of landings in the direction of travel shall be not less than 24 inches (508 mm).

P103.4 Alternating tread devices.

Alternating tread devices shall be permitted as a means of egress from *sleeping lofts*, where the *sleeping loft* floor is not more than 10 feet (3048 mm) above the floor of the room to which it is open. *Handrails* and treads of such *alternating tread devices* shall comply with Section 1011.14.

P103.5 Ship's ladders.

Ship's ladders shall be permitted as a means of egress from *sleeping lofts* where the *sleeping loft* floor is not more than 10 feet (3048 mm) above the floor of the room to which it is open. Handrails and treads of such ship's ladders shall comply with Section 1011.15.

P103.6 Ladders.

Ladders shall be permitted as a means of egress from *sleeping lofts* where the *sleeping loft* floor is not more than 10 feet (3048 mm) above the floor of the room to which it is open. Such ladders shall comply with Sections P103.6.1 and P103.6.2.

P103.6.1 Size and capacity.

Ladders providing egress from *sleeping 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).

P103.6.2 Incline.

Ladders shall be inclined at 70 to 80 degrees from horizontal.

SECTION P104

GUARDS

P104.1 General. Guards complying with Section 1015 of this code shall be provided at the open sides of *sleeping lofts*.

Exception: The guard height at *sleeping lofts* shall be permitted to be 36 inches (914 mm) where the ceiling height of the *sleeping loft* is 42 inches (1067 mm) or less.

SECTION P105

SMOKE ALARMS

P105.1 General.

Listed *single-* or *multiple-station smoke alarms* complying with UL 217 shall be installed in all *sleeping lofts*.

SECTION P1056

REFERENCED STANDARDS

P106.1 General.

See Table P106.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title and the section or sections of this appendix referencing the standard.

[NY] APPENDIX ~~Q~~ Q ASSISTIVE LISTENING SYSTEMS PERFORMANCE STANDARDS

The contents of the appendix are unchanged, but sections are renumbered to coordinate with IBC

[NY] APPENDIX ~~P~~ R DIAPER CHANGING STATIONS

The contents of the appendix are unchanged, but sections are renumbered to coordinate with IBC