CHAPTER 3 USE AND OCCUPANCY CLASSIFICATION

SECTION 301 GENERAL

301.1 Scope. The provisions of this chapter shall control the classification of all buildings and structures as to use and occupancy.

SECTION 302 CLASSIFICATION

302.1 General. Structures or portions of structures shall be classified with respect to occupancy in one or more of the groups listed below. A room or space that is intended to be occupied at different times for different purposes shall comply with all of the requirements that are applicable to each of the purposes for which the room or space will be occupied. Structures with multiple occupancies or uses shall comply with Section 508. Where a structure is proposed for a purpose that is not specifically provided for in this code, such structure shall be classified in the group that the occupancy most nearly resembles, according to the fire safety and relative hazard involved.

- 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

SECTION 303 ASSEMBLY GROUP A

303.1 Assembly Group A. Assembly Group A occupancy includes, among others, the use of a building or structure, or a portion thereof, for the gathering of persons for purposes such as civic, social or religious functions; recreation, food or drink consumption; or awaiting transportation.

Exceptions:

1. A building or tenant space used for assembly purposes with an occupant load of less than 50 persons shall be classified as a Group B occupancy.

- 2. A room or space used for assembly purposes with an occupant load of less than 50 persons and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.
- 3. A room or space used for assembly purposes that is less than 750 square feet (70 m²) in area and is accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.

Assembly occupancies shall include the following:

A-1 Assembly uses, usually with fixed seating, intended for the production and viewing of the performing arts or motion pictures including, but not limited to:

> Motion picture theaters Symphony and concert halls Television and radio studios admitting an audience Theaters

- A-2 Assembly uses intended for food and/or drink consumption including, but not limited to:
 - Banquet halls Night clubs Restaurants Taverns and bars
- A-3 Assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A including, but not limited to:

Amusement arcades Art galleries Bowling alleys Places of religious worship Community halls Courtrooms Dance halls (not including food or drink consumption) Exhibition halls Funeral parlors Gymnasiums (without spectator seating) Indoor swimming pools (without spectator seating) Indoor tennis courts (without spectator seating) Lecture halls Libraries Museums Waiting areas in transportation terminals Pool and billiard parlors

- A-4 Assembly uses intended for viewing of indoor sporting events and activities with spectator seating including, but not limited to:
 - Arenas Skating rinks Swimming pools Tennis courts

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A-5 Assembly uses intended for participation in or viewing outdoor activities including, but not limited to:

Amusement park structures Bleachers Grandstands Stadiums

SECTION 304 BUSINESS GROUP B

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:

Airport traffic control towers Animal hospitals, kennels and pounds Banks Barber and beauty shops Car wash Civic administration Clinic-outpatient Dry cleaning and laundries: pick-up and delivery stations and self-service Educational occupancies for students above the 12th grade Electronic data processing Laboratories: testing and research Motor vehicle showrooms Post offices Print shops Professional services (architects, attorneys, dentists, physicians, engineers, etc.) Radio and television stations Telephone exchanges Training and skill development not within a school or academic program

SECTION 305 EDUCATIONAL GROUP E

305.1 Educational Group E. Educational Group E occupancy includes, among others, the use of a building or structure, or a portion thereof, by six or more persons at any one time for educational purposes through the 12th grade. Religious educational rooms and religious auditoriums, which are accessory to places of religious worship in accordance with Section 508.3.1 and have occupant loads of less than 100, shall be classified as A-3 occupancies.

305.2 Day care. The use of a building or structure, or portion thereof, for educational, supervision or personal care services for more than five children older than $2^{1}/_{2}$ years of age, shall be classified as a Group E occupancy.

SECTION 306 FACTORY GROUP F

306.1 Factory Industrial Group F. Factory Industrial Group F occupancy includes, among others, the use of a building or

structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as a Group H hazardous or Group S storage occupancy.

306.2 Factory Industrial F-1 Moderate-hazard Occupancy.

Factory industrial uses which 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:

Aircraft Appliances Athletic equipment Automobiles and other motor vehicles **Bakeries** Beverages; over 12-percent alcohol content Bicycles Boats Brooms or brushes **Business** machines Cameras and photo equipment Canvas or similar fabric Carpets and rugs (includes cleaning) Clothing Construction and agricultural machinery Disinfectants Dry cleaning and dyeing Electric generation plants Electronics Engines (including rebuilding) Food processing Furniture Hemp products Jute products Laundries Leather products Machinery Metals Millwork (sash & door) Motion pictures and television filming (without spectators) Musical instruments Optical goods Paper mills or products Photographic film Plastic products Printing or publishing Recreational vehicles **Refuse** incineration Shoes Soaps and detergents Textiles Tobacco Trailers Upholstering Wood; distillation Woodworking (cabinet)

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306.3 Factory Industrial F-2 Low-hazard Occupancy. Factory industrial uses that involve the fabrication or manufacturing of noncombustible materials which during finishing, packing or processing do not involve a significant fire hazard

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shall be classified as F-2 occupancies and shall include, but not be limited to, the following:

Beverages; up to and including 12-percent alcohol content Brick and masonry Ceramic products

Foundries Glass products Gypsum Ice

Metal products (fabrication and assembly)

SECTION 307 HIGH-HAZARD GROUP H

[F] 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 constructed and located as required in Section 414. Hazardous uses 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*.

Exceptions: The following shall not be classified in Group H, but shall be classified in the occupancy that they most nearly resemble:

- 1. Buildings and structures that contain not more than the maximum allowable quantities per control area of hazardous materials as shown in Tables 307.1(1) and 307.1(2), provided that such buildings are maintained in accordance with the *International Fire Code*.
- 2. Buildings utilizing control areas in accordance with Section 414.2 that contain not more than the maximum allowable quantities per control area of hazardous materials as shown in Tables 307.1(1) and 307.1(2).
- 3. 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*.
- 4. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the *International Fire Code*.
- 5. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.
- 6. 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 or 1-hour horizontal assemblies or both.
- 7. Cleaning establishments that utilize a liquid solvent having a flash point at or above 200°F (93°C).

- 8. Liquor stores and distributors without bulk storage.
- 9. Refrigeration systems.
- 10. The storage or utilization of materials for agricultural purposes on the premises.
- 11. Stationary batteries utilized for facility emergency power, uninterrupted power supply or telecommunication facilities, provided that the batteries are provided with safety venting caps and ventilation is provided in accordance with the *International Mechanical Code*.
- 12. Corrosives shall not include personal or household products in their original packaging used in retail display or commonly used building materials.
- 13. Buildings and structures occupied for aerosol storage shall be classified as Group S-1, provided that such buildings conform to the requirements of the *International Fire Code*.
- 14. 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.
- 15. The storage of black powder, smokeless propellant and small arms primers in Groups M, R-3 and R-5 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*, as amended in Section 307.9.

307.1.1 Hazardous materials. Hazardous materials in any quantity shall conform to the requirements of this code, including Section 414, and the *International Fire Code*.

[F] 307.2 Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

AEROSOL. A product that is dispensed from an aerosol container by a propellant.

Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated Level 1, 2 or 3.

Level 1 aerosol products. Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb) (20 kJ/g).

Level 2 aerosol products. Those with a total chemical heat of combustion that is greater than 8,600 Btu/lb (20 kJ/g), but less than or equal to 13,000 Btu/lb (30 kJ/g).

Level 3 aerosol products. Those with a total chemical heat combustion that is greater than 13,000 Btu/lb (30 kJ/g).

AEROSOL CONTAINER. A metal can or a glass or plastic bottle designed to dispense an aerosol. Metal cans shall be limited to a maximum size of 33.8 fluid ounces (1000 ml). Glass or plastic bottles shall be limited to a maximum size of 4 fluid ounces (118 ml).

BALED COTTON. A natural seed fiber wrapped in and secured with industry accepted materials, usually consisting of burlap, woven polypropylene, polyethylene or cotton or sheet polyethylene, and secured with steel, synthetic or wire bands or wire; also includes linters (lint removed from the cottonseed) and motes (residual materials from the ginning process).

BALED COTTON, DENSELY PACKED. Cotton made into banded bales with a packing density of at least 22 pounds per cubic foot (360 kg/m^3), and dimensions complying with the following: a length of 55 inches ($1397 \pm 20 \text{ mm}$), a width of 21 inches ($533.4 \pm 20 \text{ mm}$) and a height of 27.6 to 35.4 inches (701 to 899 mm).

BARRICADE. A structure that consists of a combination of walls, floor and roof, which is designed to withstand the rapid release of energy in an explosion and which is fully confined, partially vented or fully vented; or other effective method of shielding from explosive materials by a natural or artificial barrier.

Artificial barricade. An artificial mound or revetment a minimum thickness of 3 feet (914 mm).

Natural barricade. Natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures that require protection cannot be seen from the magazine or building containing explosives when the trees are bare of leaves.

BOILING POINT. The temperature at which the vapor pressure of a liquid equals the atmospheric pressure of 14.7 pounds per square inch (psi) (101 kPa) gage or 760 mm of mercury. Where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, for the purposes of this classification, the 20-percent evaporated point of a distillation performed in accordance with ASTM D 86 shall be used as the boiling point of the liquid.

CLOSED SYSTEM. The use of a solid or liquid hazardous material involving a closed vessel or system that remains closed during normal operations where vapors emitted by the product are not liberated outside of the vessel or system and the product is not exposed to the atmosphere during normal operations; and all uses of compressed gases. Examples of closed systems for solids and liquids include product conveyed through a piping system into a closed vessel, system or piece of equipment.

COMBUSTIBLE DUST. Finely divided solid material that is 420 microns or less in diameter and which, when dispersed in air in the proper proportions, could be ignited by a flame, spark or other source of ignition. Combustible dust will pass through a U.S. No. 40 standard sieve.

COMBUSTIBLE FIBERS. Readily ignitable and free-burning materials in a fibrous or shredded form, such as cocoa fiber, cloth, cotton, excelsior, hay, hemp, henequen, istle, jute, kapok, oakum, rags, sisal, Spanish moss, straw, tow, wastepaper, certain synthetic fibers or other like materials. This definition does not include densely packed baled cotton. **COMBUSTIBLE LIQUID.** A liquid having a closed cup flash point at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:

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).

The category of combustible liquids does not include compressed gases or cryogenic fluids.

COMPRESSED GAS. A material, or mixture of materials which:

- 1. Is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure; and
- 2. Has a boiling point of 68°F (20°C) or less at 14.7 psia (101 kPa) which is either liquefied, nonliquefied or in solution, except those gases which have no other healthor physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68°F (20°C).

The states of a compressed gas are categorized as follows:

- 1. Nonliquefied compressed gases are gases, other than those in solution, which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C).
- 2. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C).
- 3. Compressed gases in solution are nonliquefied gases that are dissolved in a solvent.
- 4. Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.

CONTROL AREA. Spaces within a building where quantities of hazardous materials not exceeding the maximum allowable quantities per control area are stored, dispensed, used or handled. See also the definition of "Outdoor control area" in the *International Fire Code*.

CORROSIVE. A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method described in DOTn 49 CFR, Part 173.137, such a chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.

CRYOGENIC FLUID. A liquid having a boiling point lower than -150°F (-101°C) at 14.7 pounds per square inch atmosphere (psia) (an absolute pressure of 101 kPa).

MA		ABLE QUANTIT	Y PER CONTR	OL AREA OF H			SING A PHYSIC	AL HAZARD ^{a, j} acb	,m,n,p	eveteme ^b
MATERIAL	CLASS	THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	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 liquid ^{e, i}	II IIIA IIIB	H-2 or H-3 H-2 or H-3 N/A	N/A	120 ^{d, e} 330 ^{d, e} 13,200 ^{e, f}	N/A	N/A	120^{d} 330^{d} $13,200^{f}$	N/A	N/A	$30^{\rm d} \\ 80^{\rm d} \\ 3,300^{\rm f}$
Combustible fiber	Loose baled ^o	Н-3	(100) (1,000)	N/A	N/A	(100) $(1,000)$	N/A	N/A	(20) (200)	N/A
Consumer fireworks (Class C, Common)	1.4G	Н-3	125 ^{d, e, 1}	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cryogenics, flammable	N/A	H-2	N/A	45 ^d	N/A	N/A	45 ^d	N/A	N/A	10^{d}
Cryogenics, oxidizing	N/A	Н-3	N/A	45 ^d	N/A	N/A	45 ^d	N/A	N/A	10^{d}
	Division 1.1 Division 1.2	H-1 H-1 1 -12	16,00 16,00 00,00	(1) ^{e, g} (1) ^{e, g}	N/A N/A	0.25^{g} 0.25^{g}	$(0.25)^{g}_{(1)g}$	N/A N/A	$0.25^{g}_{0.25^{g}}$ $0.25^{g}_{1.5}$	$(0.25)^{g}_{(1)}$
Explosives	Division 1.5 Division 1.4 Division 1.4G Division 1.5 Division 1.6	н-1 от 2 Н-3 Н-1 Н-1 Н-1	50 ^{6, g} 50 ^{6, g} 125 ^{d, e, l} 1 ^{e, g} 1 ^{d, e, g}	(50) ^{e, g} N/A N/A N/A	N/A N/A N/A N/A N/A	15 508 N/A 0.258 N/A	$(1)^{\beta}$ (50) ^g N/A (0.25) ^g N/A	N/A N/A N/A N/A N/A	1 ⁵ N/A N/A 0.25 ^g N/A	(1) ^s N/A N/A (0.25) ^g N/A
Flammable gas	Gaseous liquefied	H-2	N/A	N/A 30 ^{d, e}	1,000 ^{d, e} N/A	N/A	N/A 30 ^{d, e}	1,000 ^{d, e} N/A	N/A	N/A
Flammable liquid ^c	1A 1B and 1C	H-2 or H-3	N/A	30 ^{d, e} 120 ^{d, e}	N/A	N/A	30^{d} 120^{d}	N/A	N/A	$10^{\rm d}$ $30^{\rm d}$
Combination flammable liquid (1A, 1B, 1C)	N/A	H-2 or H-3	N/A	120 ^{d, e, h}	N/A	N/A	120 ^{d, h}	N/A	N/A	30 ^{d, h}
Flammable solid	N/A	H-3	125 ^{d, e}	N/A	N/A	125 ^d	N/A	N/A	25 ^d	N/A
Organic peroxide	O U I II II V ≻	H-1 H-2 H-3 H-3 N/A N/A	1e. g 5d, e 50d. e NL NL	$\begin{array}{c} (1)^{e,g}\\ (5)^{d,e}\\ (50)^{d,e}\\ (125)^{d,e}\\ NL\\ NL \end{array}$	N/A N/A N/A N/A N/A N/A	0.25 ^g 1 ^d 50 ^d N/L N/L	(0.25) ^g (1) (50) ^d (125) ^d N/L	N/A N/A N/A N/A N/A N/A	0.25 ^g 1 ^d 25 ^d NL NL	$(0.25)^{g}$ (1) ^d (10) ^d (25) ^d NL NL
Oxidizer	4 % 0 –	H-1 H-2 or H-3 H-3 N/A	1 ^{e, g} 10 ^{d, e} 250 ^{d, e} 4,000e.f	$(1)^{e, g}$ $(10)^{d, e}$ $(250)^{d, e}$ $(4,000)^{e, f}$	N/A N/A N/A N/A	0.25^{g}_{d} 2^{d} 250^{d} $4,000^{f}$	$(0.25)^{g}$ (2) ^d (250) ^d (4,000) ^f	N/A N/A N/A N/A	0.25^{g}_{d} $2^{d}_{50^{d}}$ $1,000^{f}$	$(0.25)^{g}_{(2)^{d}}$ $(2)^{d}$ $(50)^{d}$ $(1,000)^{f}$
Oxidizing gas	Gaseous liquefied	Н-3	N/A N/A	N/A 15 ^{d, e}	1,500 ^{d, e} N/A	N/A N/A	N/A 15 ^{d, e}	1,500 ^{d, e} N/A	N/A N/A	N/A N/A

[F] TABLE 307.1(1) MIM ALLOWABLE CLIANTITY DED CONTECL ADEA OF HAZABDOLIS MATEDIALS DOGING A DUVSICA

(continued)

		GROUP WHEN		STORAGE ^b		USE	-CLOSED SYSTEM	۸Sb	USE-OPEN	SYSTEMS ^b
MATERIAL	CLASS	THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	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)
Pyrophoric material	N/A	H-2	4e, g	(4) ^{e, g}	50 ^{e, g}	18	(1) ^g	10 ^{e, g}	0	0
	4	H-1	1e, g	(1) ^{e, g}	$10^{\rm d, \ g}$	0.25^{g}	$(0.25)^{g}$	2e, g	0.25^{g}	$(0.25)^{g}$
TT:	ю	H-1 or H-2	5 ^{d, e}	(5) ^{d, e}	50 ^{d, e}	1^{d}	(1)	10 ^{d, e}	1^{d}	(1) ^d
Unstable (reactive)	2	H-3	50 ^{d, e}	(50) ^{d, e}	250 ^{d, e}	50^{d}	$(50)^{d}$	250 ^{d, e}	10^{d}	$(10)^{d}$
	1	N/A	NL	NL	N/L	NL	N/L	NL	NL	NL
	б	H-2	5 ^{d, e}	(5) ^{d, e}	N/A	5^{d}	(5) ^d	N/A	1^{d}	(1) ^d
Water reactive	7	H-3	50 ^{d, e}	(50) ^{d, e}	N/A	50^{d}	$(50)^{d}$	N/A	10^{d}	$(10)^{d}$

[F] TABLE 307.1(1)—continued

1 cubic foot = 0.023 m^3 , 1 pound = 0.454 kg, 1 gallon = 3.785 L. For SI:

NL = Not Limited; N/A = 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 quantity listed for storage.

occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons. പ

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 also applies, the increase for both notes shall be applied accumulatively. ų.

Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, exhausted enclosures or safety cans. Where Note d also applies, the increase for both notes shall be applied accumulatively. e.

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. ÷

Permitted only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. åð

h. Containing not more than the maximum allowable quantity per control area of Class IA, IB or IC flammable liquids.

i. Inside a building, the maximum capacity of a combustible liquid storage system that is connected to a fuel-oil piping system shall be 660 gallons provided such system complies with the International Fire Code. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.

A maximum quantity of 200 pounds of solid or 20 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment. Storage containers and the manner of storage shall be approved. Ł.

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. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 2703.1.2 of the International Fire Code.

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) Ŀ.

Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class. o.

The following shall not be included in determining the maximum allowable quantities: p.

1. Liquid or gaseous fuel in fuel tanks on vehicles.

Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with this code.
 Gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code*.

Gaseous fuels in piping systems and fixed appliances regulated by the International Fuel Gas Code.

4. Liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code

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N/A

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N/A

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N/A

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[F] TABLE 307.1(2) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD^{a, b, c, j}

		STORAGEd		USE	-CLOSED SYSTE	- MS ^d	USE-OPEN	SYSTEMS
MATERIAL	Solid pounds ^{e, f}	Liquid gallons (pounds) ^{e, f}	Gas (cubic feet at NTP) ^e	Solid pounds ^e	Liquid gallons (pounds) ^e	Gas (cubic feet at NTP) ^e	Solid pounds ^e	Liquid gallons (pounds) ^e
Corrosive	5,000	500	810 ^{f, g}	5,000	500	810 ^{f, g}	1,000	100
Highly toxic	10	(10) ⁱ	20 ^h	10	(10) ⁱ	20 ^h	3	(3) ⁱ
Toxic	500	(500) ⁱ	810 ^f	500	(500) ⁱ	810 ^f	125	(125) ⁱ

For SI: 1 cubic foot = 0.028 m^3 , 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. For use of control areas, see Section 414.2.

b. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial 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.

c. 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).

d. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.

e. 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 f also applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *International Fire Code*. Where Note e also applies, the increase for both notes shall be applied accumulatively.

g. A single cylinder containing 150 pounds or less of anhydrous ammonia in a single control area in a nonsprinklered building shall be considered a maximum allowable quantity. Two cylinders, each containing 150 pounds or less in a single control area, shall be considered a maximum allowable quantity provided the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

h. Allowed only when stored in approved exhausted gas cabinets or exhausted enclosures as specified in the International Fire Code.

i. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.

j. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 2703.1.2 of the International Fire Code.

DAY BOX. A portable magazine designed to hold explosive materials constructed in accordance with the requirements for a Type 3 magazine as defined and classified in Chapter 33 of the *International Fire Code*.

DEFLAGRATION. An exothermic reaction, such as the extremely rapid oxidation of a flammable dust or vapor in air, in which the reaction progresses through the unburned material at a rate less than the velocity of sound. A deflagration can have an explosive effect.

DETACHED BUILDING. A separate single-story building, without a basement or crawl space, used for the storage or use of hazardous materials and located an approved distance from all structures.

DETONATION. An exothermic reaction characterized by the presence of a shock wave in the material which establishes and maintains the reaction. The reaction zone progresses through the material at a rate greater than the velocity of sound. The principal heating mechanism is one of shock compression. Detonations have an explosive effect.

DISPENSING. The pouring or transferring of any material from a container, tank or similar vessel, whereby vapors, dusts, fumes, mists or gases are liberated to the atmosphere.

EXPLOSIVE. Any chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, igniters and display fireworks, 1.3G (Class B, Special).

The term "explosive" includes any material determined to be within the scope of USC Title 18: Chapter 40 and also includes any material classified as an explosive other than consumer

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fireworks, 1.4G (Class C, Common) by the hazardous materials regulations of DOTn 49 CFR.

High explosive. Explosive material, such as dynamite, which can be caused to detonate by means of a No. 8 test blasting cap when unconfined.

Low explosive. Explosive material that will burn or deflagrate when ignited. It is characterized by a rate of reaction that is less than the speed of sound. Examples of low explosives include, but are not limited to, black powder; safety fuse; igniters; igniter cord; fuse lighters; fireworks, 1.3G (Class B, Special) and propellants, 1.3C.

Mass-detonating explosives. Division 1.1, 1.2 and 1.5 explosives alone or in combination, or loaded into various types of ammunition or containers, most of which can be expected to explode virtually instantaneously when a small portion is subjected to fire, severe concussion, impact, the impulse of an initiating agent or the effect of a considerable discharge of energy from without. Materials that react in this manner represent a mass explosion hazard. Such an explosive will normally cause severe structural damage to adjacent objects. Explosive propagation could occur immediately to other items of ammunition and explosives stored sufficiently close to and not adequately protected from the initially exploding pile with a time interval short enough so that two or more quantities must be considered as one for quantity-distance purposes.

UN/DOTn Class 1 explosives. The former classification system used by DOTn included the terms "high" and "low" explosives as defined herein. The following terms further define explosives under the current system applied by DOTn for all explosive materials defined as hazard Class 1 materials. Compatibility group letters are used in concert with the division to specify further limitations on each divi-

sion noted (i.e., the letter G identifies the material as a pyrotechnic substance or article containing a pyrotechnic substance and similar materials).

Division 1.1. Explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.

Division 1.2. Explosives that have a projection hazard but not a mass explosion hazard.

Division 1.3. Explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

Division 1.4. Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

Division 1.5. Very insensitive explosives. This division is comprised of substances that have a mass explosion hazard, but that are so insensitive there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.

Division 1.6. Extremely insensitive articles which do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

FIREWORKS. Any composition or device for the purpose of producing a visible or audible effect for entertainment purposes by combustion, deflagration or detonation that meets the definition of 1.4G fireworks or 1.3G fireworks as set forth herein.

FIREWORKS, 1.3G. (Formerly Class B, Special Fireworks.) Large fireworks devices, which are explosive materials, intended for use in fireworks displays and designed to produce audible or visible effects by combustion, deflagration or detonation. Such 1.3G fireworks include, but are not limited to, firecrackers containing more than 130 milligrams (2 grains) of explosive composition, aerial shells containing more than 40 grams of pyrotechnic composition, and other display pieces which exceed the limits for classification as 1.4G fireworks. Such 1.3G fireworks are also described as fireworks, UN0335 by the DOTn.

FIREWORKS, 1.4G. (Formerly Class C, Common Fireworks.) Small fireworks devices containing restricted amounts of pyrotechnic composition designed primarily to produce visible or audible effects by combustion. Such 1.4G fireworks which comply with the construction, chemical composition and labeling regulations of the DOTn for fireworks, UN0336, and the U.S. Consumer Product Safety Commission (CPSC) as set forth in CPSC 16 CFR: Parts 1500 and 1507, are not explosive materials for the purpose of this code.

FLAMMABLE GAS. A material that is a gas at $68^{\circ}F(20^{\circ}C)$ or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a boiling point of $68^{\circ}F(20^{\circ}C)$ or less at 14.7 psia (101 kPa)] which:

- 1. Is ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air; or
- 2. Has a flammable range at 14.7 psia (101 kPa) with air of at least 12 percent, regardless of the lower limit.

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of $68^{\circ}F$ (20°C) in accordance with ASTM E 681.

FLAMMABLE LIQUEFIED GAS. A liquefied compressed gas which, under a charged pressure, is partially liquid at a temperature of $68^{\circ}F(20^{\circ}C)$ and which is flammable.

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 $73^{\circ}F(23^{\circ}C)$ and a boiling point at or above $100^{\circ}F(38^{\circ}C)$.

Class IC. Liquids having a flash point at or above $73^{\circ}F$ (23°C) and below 100°F (38°C).

The category of flammable liquids does not include compressed gases or cryogenic fluids.

FLAMMABLE MATERIAL. A material capable of being readily ignited from common sources of heat or at a temperature of 600° F (316°C) or less.

FLAMMABLE SOLID. A solid, other than a blasting agent or explosive, that is capable of causing fire through friction, absorption or moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which has an ignition temperature below 212° F (100° C) or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid as determined in accordance with the test method of CPSC 16 CFR; Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than 0.1 inch (2.5 mm) per second along its major axis.

FLASH POINT. The minimum temperature in degrees Fahrenheit at which a liquid will give off sufficient vapors to form an ignitable mixture with air near the surface or in the container, but will not sustain combustion. The flash point of a liquid shall be determined by appropriate test procedure and apparatus as specified in ASTM D 56, ASTM D 93 or ASTM D 3278.

HANDLING. The deliberate transport by any means to a point of storage or use.

HAZARDOUS MATERIALS. Those chemicals or substances that are physical hazards or health hazards as defined and classified in this section and the *International Fire Code*, whether the materials are in usable or waste condition.

HEALTH HAZARD. A classification of a chemical for which there is statistically significant evidence that acute or chronic health effects are capable of occurring in exposed persons. The term "health hazard" includes chemicals that are toxic or highly toxic, and corrosive. **HIGHLY TOXIC.** A material which produces a lethal dose or lethal concentration that falls within any of the following categories:

- 1. A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
- 2. A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
- 3. A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Mixtures of these materials with ordinary materials, such as water, might not warrant classification as highly toxic. While this system is basically simple in application, any hazard evaluation that is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons.

INCOMPATIBLE MATERIALS. Materials that, when mixed, have the potential to react in a manner that generates heat, fumes, gases or byproducts which are hazardous to life or property.

OPEN SYSTEM. The use of a solid or liquid hazardous material involving a vessel or system that is continuously open to the atmosphere during normal operations and where vapors are liberated, or the product is exposed to the atmosphere during normal operations. Examples of open systems for solids and liquids include dispensing from or into open beakers or containers, dip tank and plating tank operations.

OPERATING BUILDING. A building occupied in conjunction with the manufacture, transportation or use of explosive materials. Operating buildings are separated from one another with the use of intraplant or intraline distances.

ORGANIC PEROXIDE. An organic compound that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. Organic peroxides can pose an explosion hazard (detonation or deflagration) or they can be shock sensitive. They can also decompose into various unstable compounds over an extended period of time.

Class I. Those formulations that are capable of deflagration but not detonation.

Class II. Those formulations that burn very rapidly and that pose a moderate reactivity hazard.

Class III. Those formulations that burn rapidly and that pose a moderate reactivity hazard.

Class IV. Those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.

Class V. Those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.

Unclassified detonable. Organic peroxides that are capable of detonation. These peroxides pose an extremely high explosion hazard through rapid explosive decomposition.

OXIDIZER. A material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials. Examples of other oxidizing gases include bromine, chlorine and fluorine.

Class 4. An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock. Additionally, the oxidizer will enhance the burning rate and can cause spontaneous ignition of combustibles.

Class 3. An oxidizer that will cause a severe increase in the burning rate of combustible materials with which it comes in contact or that will undergo vigorous self-sustained decomposition due to contamination or exposure to heat.

Class 2. An oxidizer that will cause a moderate increase in the burning rate or that causes spontaneous ignition of combustible materials with which it comes in contact.

Class 1. An oxidizer whose primary hazard is that it slightly increases the burning rate but which does not cause spontaneous ignition when it comes in contact with combustible materials.

OXIDIZING GAS. A gas that can support and accelerate combustion of other materials.

PHYSICAL HAZARD. A chemical for which there is evidence that it is a combustible liquid, compressed gas, cryogenic, explosive, flammable gas, flammable liquid, flammable solid, organic peroxide, oxidizer, pyrophoric or unstable (reactive) or water-reactive material.

PYROPHORIC. A chemical with an autoignition temperature in air, at or below a temperature of 130° F (54.4°C).

PYROTECHNIC COMPOSITION. A chemical mixture that produces visible light displays or sounds through a self-propagating, heat-releasing chemical reaction which is initiated by ignition.

TOXIC. A chemical falling within any of the following categories:

- 1. A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
- 2. A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.
- 3. A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 mil-

ligrams per liter of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

UNSTABLE (REACTIVE) MATERIAL. A material, other than an explosive, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor, or in the presence of contaminants, or in contact with incompatible materials. Unstable (reactive) materials are subdivided as follows:

Class 4. Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures. This class includes materials that are sensitive to mechanical or localized thermal shock at normal temperatures and pressures.

Class 3. Materials that in themselves are capable of detonation or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.

Class 2. Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at normal temperatures and pressures, and that can undergo violent chemical change at elevated temperatures and pressures.

Class 1. Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure.

WATER-REACTIVE MATERIAL. A material that explodes; violently reacts; produces flammable, toxic or other hazardous gases; or evolves enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Water-reactive materials are subdivided as follows:

Class 3. Materials that react explosively with water without requiring heat or confinement.

Class 2. Materials that react violently with water or have the ability to boil water. Materials that produce flammable, toxic or other hazardous gases or evolve enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture.

Class 1. Materials that react with water with some release of energy, but not violently.

[F] 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:

Explosives:

Division 1.1 Division 1.2 Division 1.3 **Exception:** 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.

Division 1.4

Exception: Articles, including articles packaged for shipment, that are not regulated as an explosive under Bureau of Alcohol, Tobacco and Firearms 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.

Division 1.5 Division 1.6

Organic peroxides, unclassified detonable

Oxidizers, Class 4

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

[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 which are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 psi (103.4 kPa) gage.

Combustible dusts

Cryogenic fluids, flammable

Flammable gases

- 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 psi (103 kPa) gage

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 Consumer fireworks, 1.4G (Class C, Common) Cryogenic fluids, oxidizing 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

[F] 307.6 High-hazard Group H-4. Buildings and structures which contain materials that are health hazards shall be classified as Group H-4. Such materials shall include, but not be limited to, the following:

Corrosives Highly toxic materials Toxic materials

[F] 307.7 High-hazard Group H-5 structures. Semiconductor fabrication facilities and comparable research and development areas in which hazardous production materials (HPM) are used and the aggregate quantity of materials is in excess of those listed in Tables 307.1(1) and 307.1(2) shall be classified as Group H-5. Such facilities and areas shall be designed and constructed in accordance with Section 415.8.

[F] 307.8 Multiple hazards. Buildings and structures containing a material or materials representing hazards that are classified in one or more of Groups H-1, H-2, H-3 and H-4 shall conform to the code requirements for each of the occupancies so classified.

307.9 Amendments. The following changes shall be made to the *International Fire Code* (IFC) for the use of Exception 15 in Section 307.1:

1. Change Section 314.1 of the IFC to read as follows:

314.1 General. Indoor displays constructed within any building or structure shall comply with Sections 314.2 through 314.5.

2. Add new Section 314.5 to the IFC to read as follows:

314.5 Smokeless powder and small arms primers. Vendors shall not store, display or sell smokeless powder or small arms primers during trade shows inside exhibition halls except as follows:

- 1. The amount of smokeless powder each vender may store is limited to the storage arrangements and storage amounts established in Section 3306.5.2.1.
- 2. Smokeless powder shall remain in the manufacturer's original sealed container and the container shall remain sealed while inside the building. The repackaging of smokeless powder shall not be performed inside the building. Damaged containers shall not be repackaged inside the building and shall be immediately removed from the building in such manner to avoid spilling any powder.
- 3. There shall be at least 50 feet separation between vendors and 20 feet from any exit.
- 4. Small arms primers shall be displayed and stored in the manufacturer's original packaging and in accordance with the requirements of Section 3306.5.2.3.
- 3. Change Exception 4 and add Exceptions 10 and 11 to Section 3301.1 of the IFC as follows:
 - 4. The possession, storage and use of not more than 15 pounds (6.75 kg) of commercially manufactured sporting black powder, 20 pounds (9 kg) of smokeless powder and any amount of small arms primers for hand loading of small arms ammunition for personal consumption.

- 10. The display of small arms primers in Group M when in the original manufacturer's packaging.
- 11. The possession, storage and use of not more than 50 pounds (23 kg) of commercially manufactured sporting black powder, 100 pounds (45 kg) of smokeless powder, and small arms primers for hand loading of small arms ammunition for personal consumption in Group R-3 or R-5, or 200 pounds (91 kg) of smokeless powder when stored in the manufacturer's original containers in detached Group U structures at least 10 feet (3048 mm) from inhabited buildings and are accessory to Group R-3 or R-5.
- 4. Change the definition of Smokeless Propellants in Section 3302.1 of the IFC as follows:

SMOKELESS PROPELLANTS. Solid propellants, commonly referred to as smokeless powders, or any propellants classified by DOTn as smokeless propellants in accordance with NA3178 (Smokeless Powder for Small Arms), used in small arms ammunition, firearms, cannons, rockets, propellant-actuated devices and similar articles.

5. Change Section 3306.4 of the IFC to read as follows:

3306.4 Storage in residences. Propellants for personal use in quantities not exceeding 50 pounds (23 kg) of black powder or 100 pounds (45 kg) of smokeless powder shall be stored in original containers in occupancies limited to Group R-3 and R-5 or 200 pounds (91 kg) of smokeless powder when stored in the manufacturer's original containers in detached Group U structures at least 10 feet (3048 mm) from inhabited buildings and are accessory to Group R-3 or R-5. In other than Group R-3 or R-5, smokeless powder in quantities exceeding 20 pounds (9 kg) but not exceeding 50 pounds (23 kg) shall be kept in a wooden box or cabinet having walls of at least 1 inch (25 mm) nominal thickness or equivalent.

- 6. Delete Sections 3306.4.1 and 3306.4.2 of the IFC.
- 7. Change Section 3306.5.1.1 of the IFC to read as follows:

3306.5.1.1 Smokeless propellant. No more than 100 pounds (45 kg) of smokeless propellants in containers of 8 pounds (3.6 kg) or less capacity shall be displayed in Group M occupancies.

- 8. Delete Section 3306.5.1.3 of the IFC.
- 9. Change Section 3306.5.2.1 of the IFC as follows:

3306.5.2.1 Smokeless propellant. Commercial stocks of smokeless propellants shall be stored as follows:

- 1. Quantities exceeding 20 pounds (9 kg), but not exceeding 100 pounds (45 kg) shall be stored in portable wooden boxes having walls of at least 1 inch (25 mm) nominal thickness or equivalent.
- 2. Quantities exceeding 100 pounds (45 kg), but not exceeding 800 pounds (363 kg), shall be stored in storage cabinets having walls at least 1 inch (25 mm) nominal thickness or equivalent. Not more than 400 pounds (182 kg) shall be stored in any one cabinet, and cabinets shall be separated by a distance of at

least 25 feet (7620 mm) or by a fire partition having a fire-resistance rating of at least one hour.

- 3. Storage of quantities exceeding 800 pounds (363 kg), but not exceeding 5,000 pounds (2270 kg) in a building shall comply with all of the following:
 - 3.1. The storage is inaccessible to unauthorized personnel.
 - 3.2. Smokeless propellant shall be stored in nonportable storage cabinets having wood walls at least 1 inch (25 mm) nominal thickness or equivalent and having shelves with no more than 3 feet (914 mm) of vertical separation between shelves.
 - 3.3. No more than 400 pounds (182 kg) is stored in any one cabinet.
 - 3.4. Cabinets shall be located against walls with at least 40 feet (12 192 mm) between cabinets. The minimum required separation between cabinets may be reduced to 20 feet (6096 mm) provided that barricades twice the height of the cabinets are attached to the wall, midway between each cabinet. The barricades must extend a minimum of 10 feet (3048 mm) outward, be firmly attached to the wall, and be constructed of steel not less than 0.25 inch thick (6.4 mm), 2-inch (51 mm) nominal thickness wood, brick, or concrete block.
 - 3.5. Smokeless propellant shall be separated from materials classified as combustible liquids, flammable liquids, flammable solids, or oxidizing materials by a distance of 25 feet (7620 mm) or by a fire partition having a fire-resistance rating of 1 hour.
 - 3.6. The building shall be equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1.
- 4. Smokeless propellants not stored according to Item 1, 2, or 3 above shall be stored in a Type 2 or 4 magazine in accordance with Section 3304 and NFPA 495.

SECTION 308 INSTITUTIONAL GROUP I

308.1 Institutional Group I. Institutional Group I occupancy includes, among others, the use of a building or structure, or a portion thereof, in which people are cared for or live in a supervised environment, having physical limitations because of health or age are harbored for medical treatment or other care or treatment, or in which people are detained for penal or correctional purposes or in which the liberty of the occupants is restricted. Institutional occupancies shall be classified as Group I-1, I-2, I-3 or I-4.

308.2 Group I-1. This occupancy shall include buildings, structures or parts thereof housing more than 16 persons, on a

24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment that provides personal care services. The occupants are capable of responding to an emergency situation without physical assistance from staff. This group shall include, but not be limited to, the following:

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

A facility such as the above with five or fewer persons shall be classified as a Group R-3 or shall comply with the *International Residential Code* in accordance with Section 101.2. A facility such as above, housing at least six and not more than 16 persons, shall be classified as Group R-4.

308.3 Group I-2. This occupancy shall include buildings and structures used for medical, surgical, psychiatric, nursing or custodial care on a 24-hour basis for more than five persons who are not capable of self-preservation. This group shall include, but not be limited to, the following:

Hospitals Nursing homes (both intermediate care facilities and skilled nursing facilities) Mental hospitals Detoxification facilities

A facility such as the above with five or fewer persons shall be classified as Group R-3 or shall comply with the *International Residential Code*.

308.3.1 Child care facility. A child care facility that provides care on a 24-hour basis to more than five children $2^{1}/_{2}$ years of age or less shall be classified as Group I-2.

308.4 Group I-3. This occupancy shall include buildings and structures that are inhabited by more than five persons who are under restraint or security. An 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:

Prisons Jails Reformatories Detention centers Correctional centers Prerelease centers

Buildings of Group I-3 shall be classified as one of the occupancy conditions indicated in Sections 308.4.1 through 308.4.5 (see Section 408.1).

308.4.1 Condition 1. This occupancy condition shall include buildings in which free movement is allowed from sleeping areas, and other spaces where access or occupancy is permitted, to the exterior via means of egress without restraint. A Condition 1 facility is permitted to be constructed as Group R.

308.4.2 Condition 2. This occupancy condition shall include buildings in which free movement is allowed from sleeping areas and any other occupied smoke compartment to one or more other smoke compartments. Egress to the exterior is impeded by locked exits.

308.4.3 Condition 3. This occupancy condition shall include buildings in which free movement is allowed within individual smoke compartments, such as within a residential unit comprised of individual sleeping units and group activity spaces, where egress is impeded by remote-controlled release of means of egress from such a smoke compartment to another smoke compartment.

308.4.4 Condition 4. This occupancy condition shall include buildings in which free movement is restricted from an occupied space. Remote-controlled release is provided to permit movement from sleeping units, activity spaces and other occupied areas within the smoke compartment to other smoke compartments.

308.4.5 Condition 5. This occupancy condition shall include buildings in which free movement is restricted from an occupied space. Staff-controlled manual release is provided to permit movement from sleeping units, activity spaces and other occupied areas within the smoke compartment to other smoke compartments.

308.5 Group I-4, day care facilities. This group shall include buildings and structures occupied by persons of any age who receive custodial care for less than 24 hours by individuals other than parents or guardians, relatives by blood, marriage or adoption, and in a place other than the home of the person cared for. A facility such as the above with five or fewer persons shall be classified as a Group R-3 or shall comply with the *International Residential Code* in accordance with Section 101.2. Places of worship during religious functions are not included.

308.5.1 Adult care facility. A facility that provides accommodations for less than 24 hours for more than five unrelated adults and provides supervision and personal care services shall be classified as Group I-4.

Exception: A facility where occupants are capable of responding to an emergency situation without physical assistance from the staff shall be classified as Group A-3.

308.5.2 Child care facility. A facility other than family day homes under Section 310.4 that provides supervision and personal care on less than a 24-hour basis for more than five children $2^{1}/_{2}$ years of age or less shall be classified as Group I-4.

Exception: A child day care facility that provides care for more than five but no more than 100 children $2^{1}/_{2}$ years or less of age, when the rooms where such children are cared for are located on the level of exit discharge and each of these child care rooms has an exit door directly to the exterior, shall be classified as Group E.

SECTION 309 MERCANTILE GROUP M

309.1 Mercantile Group M. Mercantile Group M occupancy includes, among others, buildings and structures or a portion thereof, for the display and sale of merchandise, and involves stocks of goods, wares or merchandise incidental to such pur-

Department stores Drug stores Markets Motor fuel-dispensing facilities Retail or wholesale stores Sales rooms

309.2 Quantity of hazardous materials. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials stored or displayed in a single control area of a Group M occupancy shall not exceed the quantities in Table 414.2.5(1).

SECTION 310 RESIDENTIAL GROUP R

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 *International Residential Code* in accordance with Section 101.2. Residential occupancies shall include the following:

R-1 Residential occupancies containing sleeping units where the occupants are primarily transient in nature, including:

Boarding houses (transient) Hotels (transient) Motels (transient)

Exceptions:

- Non-proprietor occupied bed and breakfast and other transient boarding facilities not more than three stories above grade plane in height with a maximum of 10 occupants total are permitted to be classified as either Group R-3 or Group R-5 provided that smoke alarms are installed in compliance with Section 907.2.10.1.2 for Group R-3 or Section 313.1 of the *International Residential Code* for Group R-5.
- 2. Proprietor occupied bed and breakfast and other transient boarding facilities not more than three stories above grade plane in height, that are also occupied as the residence of the proprietor, with a maximum of 5 guest room sleeping units provided for the transient occupants are permitted to be classified as either Group R-3 or R-5 provided that smoke alarms are installed in compliance with Section 907.2.10.1.2 for Group R-3 or Section 313.1 of the *International Residential Code* for Group R-5.
- **R-2** Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including:

Apartment houses Boarding houses (not transient) Convents Dormitories Fraternities and sororities Hotels (nontransient) Monasteries Motels (nontransient) Vacation timeshare properties

Congregate living facilities with 16 or fewer occupants are permitted to comply with the construction requirements for Group R-3.

- **R-3** Residential 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.
 - Adult care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.
 - Child care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.

Congregate living facilities with 16 or fewer persons.

Adult and child care facilities that are within a single-family home are permitted to comply with the *International Residential Code*.

R-4 Residential occupancies shall include buildings arranged for occupancy as residential care/assisted living facilities including more than five but not more than 16 occupants, excluding staff.

Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code, or shall comply with the *International Residential Code* with the additional requirement to provide an automatic sprinkler system in accordance with Section 903.2.7.

Exception: Group homes licensed by the Virginia Department of Mental Health, Mental Retardation and Substance Abuse Services or the Virginia Department of Social Services that house no more than eight persons with one or more resident counselors shall be classified as Group R-2, R-3, R-4 or R-5. Not more than five of the persons may require physical assistance from staff to respond to an emergency situation.

R-5 Residential occupancies in detached one- and two-family dwellings, townhouses and accessory structures within the scope of the *International Residential Code*, also referred to as the "IRC."

310.2 Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

BOARDING HOUSE. A building arranged or used for lodging for compensation, with or without meals, and not occupied as a single-family unit.

CONGREGATE LIVING FACILITIES. A building or part thereof that contains sleeping units where residents share bathroom and/or kitchen facilities.

DORMITORY. A space in a building where group sleeping accommodations are provided in one room, or in a series of closely associated rooms, for persons not members of the same family group, under joint occupancy and single management, as in college dormitories or fraternity houses.

PERSONAL CARE SERVICE. The care of residents who do not require chronic or convalescent medical or nursing care. Personal care involves responsibility for the safety of the resident while inside the building.

RESIDENTIAL CARE/ASSISTED LIVING FACILI-TIES. A building or part thereof housing persons, on a 24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment which provides personal care services. The occupants are capable of responding to an emergency situation without physical assistance from staff. This classification shall include, but not be limited to, the following: residential board and care facilities, assisted living facilities, halfway houses, group homes, congregate care facilities, social rehabilitation facilities, alcohol and drug abuse centers and convalescent facilities.

TRANSIENT. Occupancy of a dwelling unit or sleeping unit for not more than 30 days.

310.3 Group R-5. The construction of Group R-5 structures shall comply with the IRC. The amendments to the IRC set out in Section 310.6 shall be made to the IRC for its use as part of this code. In addition, all references to Section 101.2 in the IBC relating to the construction of such structures subject to the IRC shall be considered to be references to this section.

310.3.1 Additional requirements. Methods of construction, materials, systems, equipment or components for Group R-5 structures not addressed by prescriptive or performance provisions of the IRC shall comply with applicable IBC requirements.

310.4 Family day homes. Family day homes where program oversight is provided by the Virginia Department of Social Services shall be classified as Group R-2, R-3 or R-5.

Note: Family day homes may generally care for up to 12 children. See the DHCD Related Laws Package for additional information.

310.5 Radon-resistant construction in Group R-3 and R-4 structures. Group R-3 and R-4 structures shall be subject to the radon-resistant construction requirements in Appendix F in localities enforcing such requirements pursuant to Section R324 of the IRC.

310.6 Amendments to the IRC. The following changes shall be made to the IRC for its use as part of this code.

1. Add the following definitions to Section R202 to read:

AIR-IMPERMEABLE INSULATION. An insulation having an air permanence equal to or less than $0.02 \text{ L/s} \cdot \text{m}^2$ at 75 Pa pressure differential tested according to ASTM E 2178 or E 283.

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

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2. Change the definition of "Story Above Grade" in Section R202 to read:

STORY ABOVE GRADE. Any story having its finished floor surface entirely above grade, except that a basement shall be considered as a story above grade where the finished surface of the floor above the basement meets any one of the following:

- 1. Is more than 6 feet (1829 mm) above the grade plane.
- 2. Is more than 6 feet (1829 mm) above the finished ground level for more than 50 percent of the total building perimeter.
- 3. Is more than 12 feet (3658 mm) above the finished ground level at any point.
- 3. Change Section R301.2.1 to read:

R301.2.1 Wind limitations. Buildings and portions thereof shall be limited by wind speed, as defined in Table R301.2(1), and construction methods in accordance with this code. Basic wind speeds shall be determined from Figure R301.2(4). Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where loads for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors are not otherwise specified, the loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.6. Wind speeds for localities in special wind regions, near mountainous terrain and near gorges shall be based on elevation. Areas at 4,000 feet in elevation or higher shall use 110 V mph (48.4 m/s) and areas under 4,000 feet in elevation shall use 90 V mph (39.6 m/s). Gorge areas shall be based on the highest recorded speed per locality or in accordance with local jurisdiction requirements determined in accordance with Section 6.5.4 of ASCE 7.

4. Change Section R301.2.1.1 to read:

R301.2.1.1 Design criteria. Construction in regions where the basic wind speeds from Figure R301.2(4) equal or exceed 110 miles per hour (49m/s) shall be designed in accordance with one of the following:

- 1. American Forest and Paper Association (AF&PA) Wood Frame Construction Manual for One- and Two-Family Dwellings (WFCM); or
- 2. Southern Building Code Congress International Standard for Hurricane Resistant Residential Construction (SSTD 10); or
- 3. Minimum Design Loads for Buildings and Other Structures (ASCE-7); or
- 4. American Iron and Steel Institute (AISI), Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings

(COFS/PM) with Supplement to Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings.

- 5. Concrete construction shall be designed in accordance with the provisions of this code.
- 5. Change Table R301.7 to read:

TABLE R301.7 ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS^{a,b,c,d}

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3/12 with no finished ceiling attached to rafters	L/180
Interior walls and partitions	H/180
Floors and plastered ceilings	L/360
All other structural members	L/240
Exterior walls with plaster or stucco finish	H/360
Exterior walls-wind loads ^a with brittle finishes	H/240
Exterior walls-wind loads ^a with flexible finishes	H/120 ^d
Veneer masonry walls	L/600

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

- a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding loads for the purpose of determining deflection limits herein.
- b. For cantilever members, \boldsymbol{L} shall be taken as twice the length of the cantilever.
- c. For aluminum structural members or panels used in roofs or walls of sunroom additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed L/60. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed L/120.
- d. Deflection for exterior walls with interior gypsum board finish shall be limited to an allowable deflection of H/180.
 - 6. Change Section R302.1 to read:

R302.1 Exterior walls. Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1.

Exceptions:

- 1. Walls, projections, openings or penetrations in walls perpendicular to the line used to determine the fire separation distance.
- 2. Walls of dwellings and accessory structures located on the same lot.
- 3. Detached tool sheds and storage sheds, playhouses and similar structures exempted from permits are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line.
- 4. Detached garages accessory to a dwelling located within 2 feet (610 mm) of a lot line are permitted to have roof eave projections not exceeding 4 inches (102 mm).
- 5. Foundation vents installed in compliance with this code are permitted.
- 7. Add an exception to Section R303.8 to read:

Exception: Seasonal structures not used as a primary residence for more than 90 days per year, unless rented, leased or let on terms expressed or implied to furnish heat, shall not be required to comply with this section.

8. Add Section R303.8.1 to read:

R303.8.1 Nonowner occupied required heating. Every dwelling unit or portion thereof which is to be rented, leased or let on terms either expressed or implied to furnish heat to the occupants thereof shall be provided with facilities in accordance with Section R303.8 during the period from October 15 to May 1.

9. Add Section R303.9 to read:

R303.9 Insect screens. Every door, window and other outside opening required for ventilation purposes shall be supplied with approved tightly fitted screens of not less than 16 mesh per inch (16 mesh per 25 mm) and every screen door used for insect control shall have a self-closing device.

10. Add Section R306.5 to read:

R306.5 Water supply sources and sewage disposal systems. The water and drainage system of any building or premises where plumbing fixtures are installed shall be connected to a public or private water supply and a public or private sewer system. As provided for in Section 103.11 for functional design, water supply sources and sewage disposal systems are regulated and approved by the Virginia Department of Health, and the Virginia Department of Environmental Quality.

Note: See also the Memorandums of Agreement in the "Related Laws Package" which is available from the Virginia Department of Housing and Community Development.

11. Change Section R310.1 to read:

R310.1 Emergency escape and rescue required. Basements and each sleeping room designated on the construction documents shall have at least one openable emergency escape and rescue opening. Such opening shall be directly to the exterior of the building or to a deck, screen porch or egress court, all of which shall provide access to a public street, public alley or yard. Where emergency escape and rescue openings are provided, they shall have a sill height of not more than 44 inches (1118 mm) above the floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside, except that tilt-out or removable sash designed windows shall be permitted to be used. Emergency escape and rescue openings with a finished height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2.

Exceptions:

1. Dwelling units equipped throughout with an approved automatic sprinkler system installed in accordance with NFPA 13, 13R or 13D.

- 2. Basements used only to house mechanical equipment and not exceeding total floor area of 200 square feet (18.58 m²).
- 12. Change Section R310.1.1 to read:

R310.1.1 Minimum opening area. All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.530 m²), including the tilting or removal of the sash as the normal operation to comply with sections R310.1.2 and R310.1.3.

Exception: Grade floor openings shall have a minimum net clear opening of 5 square feet (0.465 m²).

13. Change Section R311.5.3.1 to read:

R311.5.3.1 Riser height. The maximum riser height shall be $8^{-1}/_4$ inches (210 mm). The riser shall be measured vertically between the leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than $3/_8$ inch (9.5 mm).

14. Change Section R311.5.3.2 to read:

R311.5.3.2 Tread depth. The minimum tread depth shall be 9 inches (229 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than $3/_8$ inch (9.5 mm). Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured as above at a point 12 inches (305 mm) from the side where the treads are narrower. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point. Within any flight of stairs, the greatest winder tread depth at the 12 inch (305 mm) walk line shall not exceed the smallest by more than $3/_8$ inch (9.5 mm).

15. Change Section R311.5.5 to read:

R311.5.5 Stairway walking surface. The walking surface of treads and landings of stairways shall be level or sloped no steeper than one unit vertical in 48 inches horizontal (2-percent slope).

16. Change Section R317.1 to read:

R317.1 Two-family dwellings. Dwelling units in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than a 1-hour fire-resistance rating when tested in accordance with ASTM E 119. Fire-resistance-rated floor-ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend to and be tight against the underside of the roof sheathing. Dwelling unit separation wall assemblies, which are constructed on a lot line, shall be constructed as required in Section R317.1 for townhouses.

Exceptions:

1. A fire-resistance rating of ¹/₂ hour shall be permitted in buildings located entirely on the same lot and equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.

- 2. For two-family dwellings located on the same lot, wall assemblies need not extend through attic spaces when the ceiling is protected by not less than $\frac{5}{8}$ -inch (15.9 mm) Type X gypsum board and an attic draft stop constructed as specified in Section R502.12.1 is provided above and along the wall assembly separating the dwellings. The structural framing supporting the ceiling shall also be protected by not less than $\frac{1}{2}$ -inch (12.7 mm) gypsum board or equivalent.
- 17. Add Section R325 Radon-Resistant Construction.
- 18. Add Section R325.1 to read:

R325.1 Local enforcement of radon requirements. Following official action under Article 7 (Section 15.2-2280 et seq.) of Chapter 22 of Title 15.2 of the Code of Virginia by a locality in areas of high radon potential, as indicated by Zone 1 on the U.S. EPA Map of Radon Zones (IRC Figure AF101), such locality shall enforce the provisions contained in Appendix F.

Exception: Buildings or portions thereof with crawl space foundations which are ventilated to the exterior, shall not be required to provide radon-resistant construction.

- 19. Add Section R326 Swimming Pools, Spas and Hot Tubs.
- 20. Add Section R326.1 to read:

R326.1 Use of Appendix G for swimming pools, spas and hot tubs. In addition to other applicable provisions of this code, swimming pools, spas and hot tubs shall comply with the provisions in Appendix G.

- 21. Add Section R327 Patio Covers.
- 22. Add Section R327.1 to read:

R327.1 Use of Appendix H for patio covers. Patio covers shall comply with the provisions in Appendix H.

- 23. Add Section R328 Sound Transmission.
- 24. Add Section R328.1 to read:

R328.1 Sound transmission between dwelling units. Construction assemblies separating dwelling units shall provide airborne sound insulation as required in Appendix K.

25. Add Section R328.2 to read:

R328.2 Airport noise attenuation. This section applies to the construction of the exterior envelope of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means or egress within airport noise zones when enforced by a locality pursuant to Section 15.2-2295 of the Code of Virginia. The exterior envelope of such structures shall comply with Section 1207.4 of the state amendments to the IBC.

26. Change Section R401.4 to read:

R401.4 Soil tests. Where quantifiable data created by sound soil science methodologies indicate expansive, compressible, shifting or unknown soil characteristics are likely to be present, the building official shall determine whether to require a soil test to determine the soil's characteristics at a particular location. This test shall be made by an approved agency using an approved method.

27. Change Section R403.1 to read:

R403.1 General. All exterior walls shall be supported on continuous solid or fully grouted masonry or concrete footings, wood foundations, or other approved structural systems which shall be of sufficient design to accommodate all loads according to Section R301 and to transmit the resulting loads to the soil within the limitations as determined from the character of the soil. Footings shall be supported on undisturbed natural soils or engineered fill.

Exception: One-story detached accessory structures used as tool and storage sheds, playhouses and similar uses, not exceeding 256 square feet (23.7824 m²) of building area, provided all of the following conditions are met:

- 1. The building eave height is 10 feet (3048 mm) or less.
- 2. The maximum height from the finished floor level to grade does not exceed 18 inches (457.2 mm).
- 3. The supporting structural elements in direct contact with the ground shall be placed level on firm soil and when such elements are wood they shall be approved pressure preservative treated suitable for ground contact use.
- 4. The structure is anchored to withstand wind loads as required by this code.
- 5. The structure shall be of light-frame construction with walls and roof of light weight material, not slate, tile, brick or masonry.
- 28. Change Section R404.1 to read as follows and delete Tables R404.1(1), R404.1(2) and R404.1(3):

R404.1 Concrete and masonry foundation walls. Concrete and masonry foundation walls shall be selected and constructed in accordance with Section R404 or in accordance with ACI 318, ACI 332, NCMA TR68-A or ACI 530/ASCE 5/TMS 402 or other approved structural standards.

29. Change Section R408.1 to read:

R408.1 Ventilation. The under-floor space between the bottom of the floor joists and the earth under any building (except space occupied by a basement) shall have ventilation openings through foundation walls or exterior walls. The minimum net area of ventilation openings shall not be less than 1 square foot (0.0929 m^2) for each 150 square feet (14 m^2) of under-floor space area. One such ventilating opening shall be within 3 feet (914 mm) of each corner of the building.

Exception: When the exposed earth is covered with a continuous vapor barrier, the minimum net area of ventilation openings shall be not less than 1 square foot (0.0929 m^2) for each 1500 square feet (139 m^2) of under-floor space area. Joints of the vapor retarder shall overlap by 6 inches (152 mm).

30. Change Section R408.2 to read:

R408.2 Openings for under-floor ventilation. Ventilation openings shall be covered for their height and width with any of the following materials provided that the least dimension of the covering shall not exceed ¹/₄ inch (6.4 mm):

- 1. Perforated sheet metal plates not less than 0.070 inch (1.8 mm) thick.
- 2. Expanded sheet metal plates not less than 0.047 inch (1.2 mm) thick.
- 3. Cast-iron grill or grating.
- 4. Extruded load-bearing brick vents.
- 5. Hardware cloth of 0.035 inch (0.89 mm) wire or heavier.
- 6. Corrosion-resistant wire mesh, with the least dimension being $\frac{1}{8}$ inch (3.2 mm).
- 31. Add Section R502.2.2.1 to read:

R502.2.1 Deck ledger connection to band joist. For residential applications and a total design load of 50 psf, the connection between a pressure preservative treated southern pine (or approved decay-resistant species) deck ledger and a two-inch nominal band joist bearing on a sill plate or wall plate shall be constructed with $\frac{1}{2}$ -inch lag screws or bolts with washers per Table R502.2.2.1.

32. Add Table R502.2.2.1 to read:

TABLE R502.2.2.1

FASTENER SPACING FOR A RESIDENTIAL SOUTHERN PINE DECK LEDGER AND A 2-INCH NOMINAL SOLID-SAWN BAND JOIST (50 PSF TOTAL LOAD)°

JOIST SPAN (ft)	6' and LESS	6'-1" to 8'	8'-1" to 10'	10'-1" to 12'	12'-1" to 14'	14'-1" to 16'	16'-1" to 18'
		On-Ce	nter Sp	acing o	of Faste	eners ^{d,e}	
¹ / ₂ " x 4" Lag Screw ^{a,b}	30	23	18	15	13	11	10
1/2'' Bolt with washers	36	36	34	29	24	21	19

a. The maximum gap between the face of the ledger board and face of the house band joist shall be $1/_2$ inch.

b. The tip of the lag screw shall fully extend beyond the inside face of the band joist.

 $c. \ Ledgers \ shall \ be \ flashed \ to \ prevent \ water \ from \ contacting \ the \ house \ band \ joist.$

d. Lag screws and bolts shall be staggered as set out in Section R502.2.2.1.1.

- e. Deck ledger shall be 2x8 PPT No. 2 Southern Pine (minimum) or other approved method and material as established by standard engineering practice.
 - 33. Add Section R502.2.2.1.1 to read:

R502.2.2.1.1 Placement of lag screws or bolts in residential deck ledgers. The lag screws or bolts shall be placed two inches in from the bottom or top of the deck ledgers and two inches in from the ends. The lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger.

34. Change Section R506.2.1 to read:

R506.2.1 Fill. Fill material shall be free of vegetation and foreign material and shall be natural nonorganic material that is not susceptible to swelling when exposed to moisture. The fill shall be compacted to assure uniform support of the slab, and except where approved, the fill depth shall not exceed 24 inches (610 mm) for clean sand or gravel and 8 inches (203 mm) for earth.

Exception: Material other than natural material may be used as fill material when accompanied by a certification from an RDP and approved by the building official.

35. Change Section R506.2.2 to read:

R506.2.2 Base. A 4-inch-thick (102 mm) base course consisting of clean graded sand, gravel or crushed stone passing a 2-inch (51 mm) sieve shall be placed on the prepared subgrade when the slab is below grade.

Exception: A base course is not required when the concrete slab is installed on well drained or sand-gravel mixture soils classified as Group I according to the United Soil Classification System in accordance with Table R405.1. Material other than natural material may be used as base course material when accompanied by a certification from an RDP and approved by the building official.

36. Replace Section R602.10, including all subsections, with the following:

R602.10 Wall bracing. The use of this section is subject to the following clarification of cross-references:

- 1. In Sections R301.2.2.1.1 and R301.2.2.4.1, delete the references to Table R602.10.1.
- 2. In Section R301.3, delete the exception to Item 1.
- 3. References to Table R602.10.1 in all other provisions of the IRC except those in Items 1 and 2 above shall be references to Table R602.10.1.5 of this section.
- 4. In Section R403.1.6, delete the sentence which reads, "In Seismic Design Categories D_0 , D_1 and D_2 , anchor bolts shall be spaced at 6 feet (1829 mm) on center and located within 12 inches (304 mm) of the ends of each plate section at interior braced wall lines when required by Section R602.10.9 to be supported on a continuous foundation." In addition, all references to Figure R602.10.5 in Section R403.1.6 shall be references to Figure R602.10.3.3(1) of this section.
- 5. Change the reference in Section R502.2.1 from Section R602.10.8 to Section R602.10.5 of this section.

All new buildings, additions and conversions shall be braced in accordance with this section. Where a building, or portion thereof, does not comply with one or more of the bracing requirements in this section, those portions shall be designed and constructed in accordance with the *International Building Code*. For structures in areas where the wind speed from Table R301.2(1) is 110 mph or greater, an engineered design is required.

The building official may require the permit applicant to identify and locate on the construction documents the bracing methods utilized.

R602.10.1 Braced wall lines. Braced wall lines shall be straight lines through the building plan at each level provided with braced wall panels to resist lateral load. The percentage, location and construction of braced wall panels shall be as specified in this section.

R602.10.1.1 Spacing of braced wall lines. In each story, spacing of parallel braced wall lines shall not exceed 50 feet (15 240 mm) as shown in Figure R602.10.1.1. When braced wall lines exceed a spacing of 50 feet (15 240 mm), intermediate braced wall line(s) shall be provided. Each end of a braced wall line shall intersect perpendicularly with other braced wall lines or their projections.

R602.10.1.2 Braced wall panels. Braced wall panels shall be full-height sections of wall constructed along a braced wall line to resist lateral loads in accordance with the intermittent bracing methods specified in Section R602.10.2 or the continuous sheathing methods specified in Section R602.10.3. Mixing of bracing methods shall be permitted as follows:

- 1. Mixing bracing methods from story to story shall be permitted.
- 2. Mixing bracing methods from braced wall line to braced wall line within a story shall be permitted,

except that continuous sheathing methods shall conform to the additional requirements of Section R602.10.3.

3. Mixing intermittent bracing methods along a braced wall line shall be permitted for single-family dwellings in Seismic Design Categories A, B and C and townhouses in Seismic Design Categories A and B. The required percentage of bracing for the braced wall line with mixed methods shall use the higher bracing percentage, per Table R602.10.1.5, of all methods used.

R602.10.1.3 Braced wall panel location. Braced wall panels shall be located at least every 25 feet (7620 mm) on center and shall begin no more than 12.5 feet (3810 mm) from each end of a braced wall line or its projection as shown in Figure R602.10.1.3(1) and Figure R602.10.1.4, but not less than the percentages given in Table R602.10.1.5. Braced wall lines with continuous sheathing shall conform to the additional requirements of Section R602.10.3.3.

All braced wall panels shall be permitted to be offset out-of-plane from the designated braced wall line up to 4 feet (1219 mm) provided the total out-to-out offset in any braced wall line is not more than 8 feet (2438 mm) as shown in Figure R602.10.1.3(2).

R602.10.1.4 Angled walls. The walls of a braced wall line shall be permitted to angle out of plane for a maximum diagonal length of 8 feet (2438 mm). Where the angled wall occurs at a corner, the length of the braced wall line shall be measured from the projected corner as shown in Figure R602.10.1.4. Where the diagonal length is greater than 8 feet (2438 mm), it shall be considered its own braced wall line.



For SI: 1 foot = 305 mm.

FIGURE R602.10.1.1 BRACED WALL LINE SPACING



FIGURE R602.10.1.3(1) BRACED WALL PANELS AND BRACED WALL LINES



FIGURE R602.10.1.3(2) OFFSETS PERMITTED FOR BRACED WALL PANELS ALONG A BRACED WALL LINE



For SI: 1 foot = 305 mm.

FIGURE R602.10.1.4 ANGLED CORNERS **R602.10.1.5 Minimum required percentage of bracing.** The minimum required percentage of bracing along each braced wall line shall be in accordance with Table R602.10.1.5 and shall be the greater of that required by the Seismic Design Category or the design wind speed.

R602.10.2 Intermittent bracing methods. Intermittent braced wall panels shall comply with this section. The location of each panel shall be identified on the construction documents.

R602.10.2.1 Intermittent braced wall panels. Intermittent braced wall panels shall be constructed in accordance with one of the methods listed in Table R602.10.2.1.

R602.10.2.2 Minimum length of intermittent braced wall panels. The minimum length of each intermittent braced wall panel shall comply with Table R602.10.2.2. For Methods DWB, WSP, SFB, GB, PBS, PCP and HPS, each panel shall cover at least three studs where studs are spaced 16 inches (406 mm) on center or at least two studs where studs are spaced 24 inches (610 mm) on center. Only those full-height braced wall panels complying with the length requirements of Table R602.10.2.2(1) shall be permitted to contribute towards the minimum required percentage of bracing.

Exception: For Methods DWB, WSP, SFB, PBS, PCP and HPS, panel lengths less than the dimensions shown in Table R602.10.2.2 shall be permitted provided the effective lengths in accordance with Table R602.10.2(2) are used in place of actual lengths when determining compliance with the percentage of bracing required by Table R602.10.1.5.

R602.10.2.3 Adhesive attachment of sheathing in Seismic Design Category C. Adhesive attachment of wall sheathing shall not be permitted in Seismic Design Category C.

R602.10.3 Continuous sheathing methods. Braced wall lines with continuous sheathing constructed in accordance with this section shall be permitted.

R602.10.3.1 Continuous sheathing braced wall panels. Continuous sheathing methods require structural panel sheathing to be used on all sheathable surfaces of a braced wall line including areas above and below openings and gable end walls. Braced wall panels shall be constructed in accordance with one of the methods listed in Table R602.10.3.1.

			MINIMUM REQUIRE	D PERCENTAGE OF	FULL-HEIGHT BRACI	NG PER WALL LINE
			Braced wall less than or	line spacing equal to 35'	Braced wall greater th less than or	line spacing an 35' and ∵equal to 50'
SEISMIC DESIGN CATEGORY (SDC) OR WIND SPEED	F	LOOR	Methods WSP, CS-WSP, CS-G, CS-PF	All other methods ^d	Methods WSP, CS-WSP, CS-G, CS-PF	All other methods ^d
		One-story house or top floor of a two- or three-story house.	16%	16%	23%	23%
SDC A, B or wind speed ≤100 mph		First floor of a two-story or second floor of a three-story house.	16%	25%	23%	36%
		First floor of a three-story house.	25%	35%	36%	50%
		One-story house or top floor of a two- or three-story house.	16%	25%	23%	36%
SDC C or wind speed <110 mph		First floor of a two-story house or second floor of a three-story house.	30%	45%	43%	64%
		First floor of a three-story house.	45%	60%	64%	86%

TABLE R602.10.1.5 ^{a.b.c} MINIMUM REQUIRED PERCENTAGE OF WALL BRACING

For SI: 1 foot = 305 mm.

a. Foundation cripple wall panels shall be braced in accordance with Section R602.10.8.

b. Methods of bracing shall be as described in Sections R602.10.2 and R602.10.3.

c. The total amount of bracing required for a given braced wall line shall be the product of the minimum required percentage and all the applicable adjustment factors described in Sections R602.10.4, R602.10.7 and R602.10.8.

d. For Method GB, the percentage required shall be doubled for one-sided applications.

	I	NTERMITTENT BRACING M	IETHODS	
METHOD	MATERIAL	MINIMUM THICKNESS	FIGURE	CONNECTION CRITERIA
LIB	Let-in-bracing	1 × 4 wood or approved metal straps at 45° to 60° angles		Wood: 2-8d nails per stud Metal: per manufacturer
DWB	Diagonal wood board at 24" spacing	⁵ / ₈ "		2-8d $(2^{1/2}" \times 0.113")$ nails or 2 staples, $1^{3/4}$ " per stud
WSP	Wood structural panel	3/8"		6d common (2" × 0.113") nails at 6" spacing (panel edges) and at 12" spacing (intermediate supports) or 16 ga. × $1^{3}/_{4}$ staples: at 3" spacing (panel edges) at 6" spacing (intermediate supports)
SFB	Structural fiberboard sheathing	¹ / ₂ " or ²⁵ / ₃₂ " for 16" stud spacing only		$1^{1}/_{2}$ galvanized roofing nails or 8d common $2^{1}/_{2}$ " × 0.131) nails at 3" spacing (panel edges) at 6" spacing (intermediate supports)
GB	Gypsum board	1/ <u>,</u> "		Nails at 7" spacing at panel edges including top and bottom plates; for exterior sheathing nail size, see Table R602.3(1); for interior gypsum board nail size, see Table R702.3.5
PBS	Particleboard sheathing	³ / ₈ " or ¹ / ₂ " for 16" stud spacing only		$1^{1}/_{2}$ " galvanized roofing nails or 8d common ($2^{1}/_{2} \times 0.131$) nails at 3" spacing (panel edges) at 6" spacing (intermediate supports)
РСР	Portland cement plaster	See Section R703.6		$1^{1}/_{2}$ ", 11 gage, $7/_{16}$ " head nails at 16" spacing or $7/_{16}$ ", 16 gage staples at 6" spacing
HPS	Hardboard panel siding	7/ ₁₆ "		0.092" dia., 0.225" head nails with length to accommodate $1^{1/2}$ " penetration into studs at 4" spacing (panel edges), at 8" spacing (intermediate supports)
ABW	Alternate braced wall	See Figure R602.10.1(1)		See Figure R602.10.2.1(1)
IPF	Intermittent portal frame	See Figure R602.10.2.1(2)		See Figure R602.10.1(2)

TABLE B602 10 2 1

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm.



FIGURE R602.10.2.1(2) METHOD IPF: INTERMITTENT PORTAL FRAME BRACED WALL PANEL

		LENGTHOFINI		HACED WALL	PANELS		
				HEIGHT OF INTE	RMITTENT BRAC	ED WALL PANEL	-
BRACING METHOD	FLOOR		8'	9'	10'	11'	12'
DWB, WSP, SFB, GB°, PBS, PCP, HPS	All		48"	48"	48"	53"	58"
ABW	All		28"	32"	34"	38"	42"
		One-story house	16"	16"	16"	18"	20"
IPF		First floor of a two-story house	24"	24"	24"	27"	29"

TABLE R602.10.2.2(1) MINIMUM LENGTH OF INTERMITTENT BRACED WALL PANELS^{a,b}

For SI: 1 foot = 305 mm, 1 inch = 25.4 mm.

a. Interpolation shall be permitted.

b. When determining compliance with the percentage of bracing required by Table R602.10.1.5, the effective length of Method LIB shall be equivalent to 48 inches (1219 mm) provided it complies with the Table R602.10.2.1.

c. Gypsum board applied to both sides of the braced wall panel; where the gypsum board is applied to one side, the required length shall be doubled.

TABLE R602.10.2(2 WALL PANELS WHEN D) ETERMINING PERCENTAGE (OF BRACING ^a
	WALL HEIGHT	
8'	9'	10'
48"	48"	48"
36"	36"	N/A
27"	N/A	N/A
	Ble R602.10.2(2 NALL PANELS WHEN DE 8' 48'' 36'' 27''	TABLE R602.10.2(2)WALL PANELS WHEN DETERMINING PERCENTAGE OWALL HEIGHT8'9'48''48''36''36''27''N/A

For SI: 1 inch = 25.4 mm.

a. Interpolation shall be permitted.

TABLE R602.10.3.1 **CONTINUOUS SHEATHING METHODS** METHOD MATERIAL MINIMUM THICKNESS CONNECTION CRITERIA FIGURE 6d common (2" \times 0.113") nails at 6" spacing (panel edges) and at 12" spacing (intermediate supports) or ³/₈" CS-WSP Wood structural panel 16 ga. $\times 1^{3}/_{4}$ staples: at 3" spacing (panel edges) and 6" spacing (intermediate supports) Wood structural panel supporting roof load ³/₈" CS-G^a See Method CS-WSP only adjacent garage openings Continuous CS-PF^b See Figure R602.10.3.1 See Figure R602.10.3.1 portal frame

For SI: 1 inch = 25.4 mm.

a. Applies to one wall of a garage only.

b. The number of continuous portal frame panels in a braced wall line shall not exceed four. Continuous portal frame panels shall not be stacked vertically in multi-story buildings.



For SI: 1 foot = 305 mm, 1 inch = 25.4 mm, 1 pound = 4.45 N.

FIGURE R602.10.3.1 METHOD CS-PF: CONTINUOUS PORTAL FRAME BRACED WALL PANELS

R602.10.3.2 Length of braced wall panels with continuous sheathing. Braced wall panels along a braced wall line with continuous sheathing shall be full-height with a length based on the adjacent clear opening height in accordance with Table R602.10.3.2. Where a panel has an opening on either side of differing heights, the taller opening shall govern when determining the panel length from Table R602.10.3.2. Only those full-height braced wall panels complying with the length requirements of Table R602.10.3.2 shall be permitted to contribute towards the minimum required percentage of bracing per Table R602.10.1.5. For Method CS-PF, wall height shall be measured from the top of the header to the bottom of the bottom plate as shown in Figure R602.10.3.1.

R602.10.3.3 Braced wall panel location and corner construction. Full-height wall panels complying with the length requirements of Table R602.10.3.2 shall be located at each end of a braced wall line with continuous sheathing and at least every 25 feet (7620 mm) on center.

A minimum 24 inch (610 mm) wood structural panel corner return shall be provided at both ends of a braced wall line with continuous sheathing in accordance with Figures R602.10.3.3(1) and R602.10.3.3(2). In lieu of the corner return, a hold-down device with a minimum uplift design value of 800 pounds (3560 N) shall be fastened to the corner stud and to the foundation or framing below in accordance with Figure R602.10.3.3(3).

Exception: The first braced wall panel shall be permitted to begin 12.5 feet (3810 mm) from each end of the braced wall line provided one of the following is satisfied:

- 1. A minimum 24 inch (610 mm) long, full-height wood structural panel is provided at both sides of a corner constructed in accordance with Figures R602.10.3.3(1) and R602.10.3.3(4), or
- 2. The braced wall panel closest to the corner shall have a hold-down device with a minimum uplift design value of 800 pounds (3560 N) fastened to the stud at the edge of the braced wall panel closest to the corner and to the foundation or framing below in accordance with Figure R602.10.3.3(5).

				WALL HEIGHT		
METHOD	ADJACENT CLEAR OPENING HEIGHT	8'	9'	10'	11'	12'
	64"	24"	27"	30"	33"	36"
	68"	26"	27"	30"	33"	36"
	72"	28"	27"	30"	33"	36"
	76"	29"	30"	30"	33"	36"
	80"	31"	33"	30"	33"	36"
	84"	35"	36"	33"	36"	36"
	88"	39"	39"	36"	38"	36"
	92"	44"	42"	39"	41"	36"
	96"	48"	45"	42"	43"	39"
CS-WSP	100"		48"	45"	47"	42"
	104"		51"	48"	48"	44"
	108"	—	54"	51"	51"	47"
	112"			54"	53"	50"
	116"			57"	56"	53"
	120"	—		60"	58"	55"
	124"	_			61"	58"
	128"				63"	61"
	132"	—			66"	64"
	136"	_				66"
	140"					69"
	144"	_	_	_		72"
CS-G	≤ 120"	24"	27"	30"	33"	36"
CS-PF	≤ 120"	16"	18"	20"	22"	24"

TABLE R602.10.3.2
LENGTH REQUIREMENTS FOR BRACED WALL PANELS IN A BRACED WALL LINE WITH CONTINUOUS SHEATHING ^a

For SI: 1 inch = 25.4 mm, 1 foot = 305 mm.

a. Interpolation shall be permitted.







FIGURE R602.10.3.3(5) BRACED WALL LINE WITH CONTINUOUS SHEATHING – FIRST BRACED WALL PANEL AWAY FROM END OF WALL LINE WITH HOLD-DOWN **R602.10.4 Braced wall panel finish material.** Braced wall panels shall have 1/2-inch thick gypsum board installed on the side of the wall opposite the bracing material and fastened in accordance with Table R702.3.5.

Exceptions:

- 1. Braced wall panels that are constructed in accordance with Methods GB, ABW, IPF and CS-PF.
- 2. When an approved interior finish material with an in-plane shear resistance equivalent to gypsum board is installed.
- 3. For Methods DWB, WSP, SFB, PBS, PCP, and HPS, interior gypsum board may be partially or entirely omitted provided the minimum required percentage of bracing in Table R602.10.1.5 is multiplied by an adjustment factor of 1.5.

R602.10.5 Braced wall panel connections. Braced wall panels shall be connected to floor/ceiling framing or foundations as follows:

- 1. Where framing is perpendicular to a braced wall panel above or below, a rim joist or blocking shall be provided along the entire length of the braced wall panel in accordance with Figure R602.10.5(1). Fastening of wall plates to framing, rim joist or blocking shall be in accordance with Table R602.3(1).
- 2. Where framing is parallel to a braced wall panel above or below, a rim joist, end joist or other parallel framing member shall be provided directly

above and below the panel in accordance with Figure R602.10.5(2). Where a parallel framing member cannot be located directly above and below the panel, full-depth blocking at 16 inch (406 mm) spacing shall be provided between the parallel framing members to each side of the braced wall panel in accordance with Figure R602.10.5(2). Fastening of blocking and wall plates shall be in accordance with Table R602.3(1).

3. Connections of braced wall panels to concrete or masonry shall be in accordance with Section R403.1.6.

R602.10.6 Braced wall panel support. Braced wall panels shall be supported as follows:

- 1. Braced wall panels shall be permitted to be supported on cantilevered floor joists meeting the cantilever limits of Section R502.3.3 provided joists are blocked at the nearest bearing wall location.
- 2. Elevated post or pier foundations supporting braced wall panels shall be designed in accordance with accepted engineering practice.
- 3. Masonry stem walls supporting braced wall panels with a length of 48 inches (1220 mm) or less shall be reinforced in accordance with Figure R602.10.6. Masonry stem walls supporting braced wall panels with a length greater than 48 inches (1220 mm) shall be constructed in accordance with Section R403.1. Braced wall panels constructed in accordance with Methods ABW and IPF shall not be permitted to attach to masonry stem walls.



FIGURE R602.10.5(1) BRACED WALL PANEL CONNECTION WHEN PERPENDICULAR TO FLOOR/CEILING FRAMING



For SI: 1 inch = 25.4 mm.

FIGURE R602.10.5(2) BRACED WALL PANEL CONNECTION WHEN PARALLEL TO FLOOR/CEILING FRAMING



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm.

FIGURE R602.10.6 MASONRY STEM WALLS SUPPORTING BRACED WALL PANELS **R602.10.7 Panel joints.** All vertical joints of braced wall panel sheathing shall occur over and be fastened to common studs. Horizontal joints in braced wall panels shall occur over and be fastened to common blocking of a minimum $1-\frac{1}{2}$ inch (38 mm) thickness. Panel joints for Method IPF shall be constructed in accordance with Figure R602.10.2.1(2). Panel joints for Method CS-PF shall be constructed in accordance with Figure R602.10.3.1.

Exception: Blocking at horizontal joints shall not be required in braced wall panels constructed using Methods WSP, SFB, GB, PBS or HPS where the percentage of bracing required by Table R602.10.1.5 is multiplied by an adjustment factor of 2.0.

R602.10.8 Cripple wall bracing. Cripple walls shall be braced with a percentage and type of bracing as required for the wall above in accordance with Table R602.10.1.5 with the following modifications for cripple wall bracing:

- 1. The bracing percentage as determined from Table R602.10.1.5 shall be multiplied by an adjustment factor of 1.15, and
- 2. The wall panel spacing shall be decreased from 25 feet (7620 mm) to 18 feet (5486 mm).

Cripple walls shall be permitted to be redesignated as the first story walls for purposes of determining wall bracing requirements. If the cripple walls are redesignated, the stories above the redesignated story shall be counted as the second and third stories respectively.

37. Change Section R613.2 to read:

R613.2 Window sills. In dwelling units, where the opening of an operable window is located more than 72 inches (1829 mm) above the finished grade or surface below, the lowest part of the clear opening of the window shall be a minimum of 18 inches (457 mm) above the finished floor of the room in which the window is located. Glazing between the floor and 18 inches (457 mm) shall be fixed or have openings through which a 4-inch-diameter (102 mm) sphere cannot pass.

Exceptions:

- 1. Windows whose openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the opening is in its largest opened position.
- 2. Openings that are provided with window guards that comply with ASTM F 2006 or F 2090.
- 38. Change Section R806.4 and add Table R806.4 to read:

R806.4 Unvented attic assemblies. Unvented attic assemblies (spaces between the ceiling joists of the top story and the roof rafters) shall be permitted if all the following conditions are met:

- 1. The unvented attic space is completely contained within the building thermal envelope.
- 2. No interior vapor retarders are installed on the ceiling side (attic floor) of the unvented attic assembly.
- 3. Where wood shingles or shakes are used, a minimum ¼ inch (6 mm) vented air space 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 vapor retarder, or shall have a vapor retarder coating or covering in direct contact with the underside of the insulation.
- 5. Either Items a, b or c shall be met, depending on the air permeability of the insulation directly under the structural roof sheathing.
 - a. Air-impermeable insulation only. Insulation shall be applied in direct contact to the underside of the structural roof sheathing.
 - b. Air-permeable insulation only. In addition to the air-permeable installed directly below the structural sheathing, rigid board or sheet insulation shall be installed directly above the structural roof sheathing as specified in Table R806.4 for condensation control.
 - c. Air-impermeable and air-permeable insulation. The air-impermeable insulation shall be applied in direct contact to the underside of the structural roof sheathing as specified in Table R806.4 for condensation control. The air-permeable insulation shall be installed directly under the air-impermeable insulation.

CLIMATE ZONE	MINIMUM RIGID BOARD OR AIR-IMPERMEABLE INSULATION <i>R</i> -VALUE ^a
2B and 3B tile roof only	0 (none required)
1, 2A, 2B, 3A, 3B, 3C	R-5
4C	R-10
4A, 4B	R-15
5	R-20
6	R-25
7	R-30
8	R-35

TABLE R806.4	
INSULATION FOR CONDENSATION CONTROL	L

a. Contributes to but does not supersede Chapter 11 energy requirements.

39. Change Section M1502.6 to read:

M1502.6 Duct length. The maximum length of a clothes dryer exhaust duct shall not exceed 35 feet (10 668 mm) from the dryer location to the wall or roof termination. The maximum length of the duct shall be reduced 2.5 feet (762 mm) for each 45-degree (0.8 rad) bend and 5 feet (1524 mm) for each 90-degree (1.6 rad)

bend. The maximum length of the exhaust duct does not include the transition duct.

Exceptions:

- 1. Where the make and model of the clothes dryer to be installed is known and the manufacturer's installation instructions for the dryer are provided to the building official, the maximum length of the exhaust duct, including any transition duct, shall be permitted to be in accordance with the dryer manufacturer's installation instructions.
- 2. Where large-radius 45-degree (0.8 rad) and 90-degree (1.6 rad) bends are installed, determination of the equivalent length of clothes dryer exhaust duct for each bend by engineering calculation in accordance with the ASHRAE Fundamentals Handbook shall be permitted.
- 40. Change Section M1701.1 to read as follows and delete the remainder of Chapter 17:

M1701.1 Scope. Solid-fuel-burning appliances shall be provided with combustion air, in accordance with the appliance manufacturer's installation instructions. Oil-fired appliances shall be provided with combustion air in accordance with NFPA 31. The methods of providing combustion air in this chapter do not apply to fire-places, fireplace stoves and direct-vent appliances. The requirements for combustion and dilution air for gas-fired appliances shall be in accordance with Chapter 24.

41. Add Section M1801.1.1 to read:

M1801.1.1 Equipment changes. Upon the replacement or new installation of any fuel-burning appliances or equipment in existing buildings, an inspection or inspections shall be conducted to ensure that the connected vent or chimney systems comply with the following:

- 1. Vent or chimney systems are sized in accordance with this code.
- 2. Vent or chimney systems are clean, free of any obstruction or blockages, defects or deterioration and are in operable condition.

Where not inspected by the local building department, persons performing such changes or installations shall certify to the building official that the requirements of Items 1 and 2 of this section are met.

42. Change Section G2411.1 to read:

G2411.1 Gas pipe bonding. Each above-ground portion of a gas piping system that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path. Gas piping shall be considered to be bonded where it is connected to appliances that are connected to the equipment grounding conductor of the circuit supplying that appliance.

CSST gas piping systems shall be bonded to the electrical service grounding electrode system at the point where the gas service piping enters the building. The bonding conductor size shall be not less than #6 AWG copper wire or equivalent.

43. Add Section G2415.17 to read:

G2415.17 Isolation. Metallic piping and metallic tubing that conveys fuel gas from an LP-gas storage container shall be provided with an approved dielectric fitting to electrically isolate the underground portion of the pipe or tube from the above ground portion that enters a building. Such dielectric fitting shall be installed above ground, outdoors.

44. Add Section G2425.1.1 to read:

G2425.1.1 Equipment changes. Upon the replacement or new installation of any fuel-burning appliances or equipment in existing buildings, an inspection or inspections shall be conducted to ensure that the connected vent or chimney systems comply with the following:

- 1. Vent or chimney systems are sized in accordance with this code.
- 2. Vent or chimney systems are clean, free of any obstruction or blockages, defects or deterioration and are in operable condition.

Where not inspected by the local building department, persons performing such changes or installations shall certify to the building official that the requirements of Items 1 and 2 of this section are met.

45. Change Section P2602.1 to read:

P2602.1 General. The water and drainage system of any building or premises where plumbing fixtures are installed shall be connected to a public or private water-supply and a public or private sewer system. As provided for in Section 103.11 of Part I of the *Virginia Uniform Statewide Building Code* (13 VAC 5-63) for functional design, water supply sources and sewage disposal systems are regulated and approved by the Virginia Department of Health and the Virginia Department of Environmental Quality.

Note: See also the Memorandums of Agreement in the "Related Laws Package" which is available from the Virginia Department of Housing and Community Development.

46. Change Section P2903.5 to read:

P2903.5 Water hammer. The flow velocity of the water distribution system shall be controlled to reduce the possibility of water hammer. A water-hammer arrestor shall be installed where quick-closing valves are utilized, unless otherwise approved. Water hammer arrestors shall be installed in accordance with manufacturer's specifications. Water hammer arrestors shall conform to ASSE 1010.

47. Add Section P3002.2.1 to read:

P3002.2.1 Tracer wire. Nonmetallic sanitary sewer piping that discharges to public systems shall be locatable. An insulated copper tracer wire, 18 AWG minimum in size and suitable for direct burial or an equivalent product, shall be utilized. The wire shall be installed in the same trench as the sewer within 12 inches (305 mm) of the pipe and shall be installed from within five feet of the building wall to the point where the building sewer intersects with the public system. At a minimum, one end of the wire shall terminate above grade in an accessible location that is resistant to physical damage, such as with a cleanout or at the building wall.

48. Replace Section P3007, Sumps and Ejectors, with the following:

SECTION P3007 SUMPS AND EJECTORS

P3007.1 Building subdrains. Building subdrains that cannot be discharged to the sewer by gravity flow shall be discharged into a tightly covered and vented sump from which the liquid shall be lifted and discharged into the building gravity drainage system by automatic pumping equipment or other approved method. In other than existing structures, the sump shall not receive drainage from any piping within the building capable of being discharged by gravity to the building sewer.

P3007.2 Valves required. A check valve and a full open valve located on the discharge side of the check valve shall be installed in the pump or ejector discharge piping between the pump or ejector and the gravity drainage system. Access shall be provided to such valves. Such valves shall be located above the sump cover required by Section P3007.3.2 or, where the discharge pipe from the ejector is below grade, the valves shall be accessibly located outside the sump below grade in an access pit with a removable access cover.

P3007.3 Sump design. The sump pump, pit and discharge piping shall conform to the requirements of Sections P3007.3.1 through P3007.3.5.

P3007.3.1 Sump pump. The sump pump capacity and head shall be appropriate to anticipated use requirements.

P3007.3.2 Sump pit. The sump pit shall be not less than 18 inches (457 mm) in diameter and 24 inches (610 mm) deep, unless otherwise approved. The pit shall be accessible and located such that all drainage flows into the pit by gravity. The sump pit shall be constructed of tile, concrete, steel, plastic or other approved materials. The pit bottom shall be solid and provide permanent support for the pump. The sump pit shall be fitted with a gastight removable cover adequate to support anticipated loads in the area of use. The sump pit shall be vented in accordance with Chapter 31.

P3007.3.3 Discharge piping. Discharge piping shall meet the requirements of Section P3007.2.

P3007.3.4 Maximum effluent level. The effluent level control shall be adjusted and maintained to at all times prevent the effluent in the sump from rising to within 2 inches (51 mm) of the invert of the gravity drain inlet into the sump.

P3007.3.5 Ejector connection to the drainage system. Pumps connected to the drainage system shall connect to the building sewer or shall connect to a wye fitting in the building drain a minimum of 10 feet (3048 mm) from the base of any soil stack, waste stack or fixture drain. Where the discharge line connects into horizontal drainage piping, the connection shall be made through a wye fitting into the top of the drainage piping.

P3007.4 Sewage pumps and sewage ejectors. A sewage pump or sewage ejector shall automatically discharge the contents of the sump to the building drainage system.

P3007.5 Macerating toilet systems. Macerating toilet systems shall comply with CSA B45.9 or ASME A112.3.4 and shall be installed in accordance with the manufacturer's installation instructions.

P3007.6 Capacity. A sewage pump or sewage ejector shall have the capacity and head for the application requirements. Pumps or ejectors that receive the discharge of water closets shall be capable of handling spherical solids with a diameter of up to and including 2 inches (51 mm). Other pumps or ejectors shall be capable of handling spherical solids with a diameter of up to and including 1 inch (25.4 mm). The minimum capacity of a pump or ejector based on the diameter of the discharge pipe shall be in accordance with Table 3007.6.

Exceptions:

- 1. Grinder pumps or grinder ejectors that receive the discharge of water closets shall have a minimum discharge opening of 1.25 inches (32 mm).
- 2. Macerating toilet assemblies that serve single water closets shall have a minimum discharge opening of 0.75 inch (19 mm).

TABLE P3007.6
MINIMUM CAPACITY OF SEWAGE PUMP OR SEWAGE EJECTOR

DIAMETER OF DISCHARGE PIPE (inches)	CAPACITY OF PUMP OR EJECTOR
2	21
2 ¹ / ₂	30
3	46

For SI: 1 inch = 25.4 mm, 1 gallon per minute = 3.785 L/m.

49. Change the title of Chapter 32 to read:

CHAPTER 32 TRAPS AND STORM DRAINAGE

50. Add Section P3202, Storm Drainage, to read:

SECTION P3202 STORM DRAINAGE

P3202.1 Scope. The provisions of this section shall govern the materials, design, construction and installation of storm drainage.

P3202.2 Subsoil drains. Subsoil drains shall be open-jointed, horizontally split or perforated pipe conforming to one of the standards listed in Table P3202.2.

USE AND OCCUPANCY CLASSIFICATION

Such drains shall not be less than 4 inches (102 mm) in diameter. Where the building is subject to backwater, the subsoil drain shall be protected by an accessibly located backwater valve. Subsoil drains shall not be required to have either a gas-tight cover or vent. The sump and pumping system shall comply with Section P3202.3.

TABLE P3202.2 SUBSOIL DRAIN PIPE

MATERIAL	STANDARD
Asbestos-cement pipe	ASTM C 508
Cast-iron pipe	ASTM A 74, ASTM A 888, CISPI 301
Polyethylene (PE) plastic pipe	ASTM F 405, CSA B182.1, CSA B182.6, CSA B182.8
Polyvinyl chloride (PVC) plastic pipe (type sewer pipe, PS25, PS50 or PS100	ASTM D 2729, ASTM F 891, CSA B182.2, CSA B182.4
Stainless steel drainage systems, Type 316L	ASME A112.3.1
Vitrified clay pipe	ASTM C 4, ASTM C 700

P3202.3 Pumping system. The sump pump, pit and discharge piping shall conform to Section P3202.3.1 through P3202.3.4.

P3202.3.1 Pump capacity and head. The sump pump shall be of a capacity and head appropriate to anticipated use requirements.

P3202.3.2 Sump pit. The sump pit shall not be less than 18 inches (457 mm) in diameter and 24 inches (610 mm) deep, unless otherwise approved. The pit shall be accessible and located such that all drainage flows into the pit by gravity. The sump pit shall be constructed of tile, steel, plastic, cast-iron, concrete or other approved material, with a removable cover adequate to support anticipated loads in the area of use. The pit floor shall be solid and provide permanent support for the pump.

P3202.3.3 Electrical. Electrical outlets shall meet the requirements of Chapters 33 through 42.

P3202.3.4 Piping. Discharge piping shall meet the requirements of Sections P3002.1, P3002.2, P3002.3 and P3003. Discharge piping shall include an accessible full flow check valve. Pipe and fittings shall be the same size, or larger than, pump discharge tapping.

51. Add Section E3501.8 to read:

E3501.8 Energizing service equipment. The building official shall give permission to energize the electrical service equipment of a one- or two-family dwelling unit when all of the following requirements have been approved:

- 1. The service wiring and equipment, including the meter socket enclosure, shall be installed and the service wiring terminated.
- 2. The grounding electrode system shall be installed and terminated.

- 3. At least one receptacle outlet on a ground fault protected circuit shall be installed and the circuit wiring terminated.
- 4. Service equipment covers shall be installed.
- 5. The building roof covering shall be installed.
- 6. Temporary electrical service equipment shall be suitable for wet locations unless the interior is dry and protected from the weather.
- 52. Add the following referenced standards to Chapter 43:

STANDARD REFERENCE NUMBER	TITLE	REFERENCED IN CODE SECTION NUMBER
ASTM C4-03	Specification for Clay Drain Tile and Perforated Clay Drain Tile	P3202.3
ASTM C508-00	Specification for Asbestos-Cement Underdrain Pipe	P3202.3
ASTM D2729-96a	Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings	P3202.3
ASTM E2178-03	Standard Test Method for Air Permeance of Building Materials	R202
ASTM F405-97	5-97 Specification for Polyethylene (PE) Tubing and Fittings	P3202.3
CSA B182.1-02	Plastic Drain and Sewer Pipe and Pipe Fittings	P3202.3
CSA B182.6-02	Profile Polyethylene Sewer Pipe and Pipe Fittings	P3202.3
CSA B182.8-02	Profile Polyethylene Storm Sewer and Drainage Pipe and Fittings	P3202.3

SECTION 311 STORAGE GROUP S

311.1 Storage Group S. Storage Group S occupancy includes, among others, the use of a building or structure, or a portion thereof, for storage that is not classified as a hazardous occupancy.

311.2 Moderate-hazard storage, Group S-1. Buildings occupied for storage uses that are not classified as Group S-2, including, but not limited to, storage of the following:

Aerosols, Levels 2 and 3 Aircraft repair hangar Bags: cloth, burlap and paper Bamboos and rattan Baskets Belting: canvas and leather Books and paper in rolls or packs Boots and shoes Buttons, including cloth covered, pearl or bone Cardboard and cardboard boxes Clothing, woolen wearing apparel I

Cordage Dry boat storage (indoor) Furniture Furs Glues, mucilage, pastes and size Grains Horns and combs, other than celluloid Leather Linoleum Lumber Motor vehicle repair garages complying with the maximum allowable quantities of hazardous materials listed in Table 307.1(1) (see Section 406.6) Photo engravings Resilient flooring Silks Soaps Sugar Tires, bulk storage of Tobacco, cigars, cigarettes and snuff Upholstery and mattresses Wax candles

311.3 Low-hazard storage, Group S-2. Includes, 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. Such products are permitted to have a negligible amount of plastic trim, such as knobs, handles or film wrapping. Storage uses shall include, but not be limited to, storage of the following:

Aircraft hangar Asbestos Beverages up to and including 12-percent alcohol in metal, glass or ceramic containers Cement in bags Chalk and crayons Dairy products in nonwaxed coated paper containers Dry cell batteries Electrical coils Electrical motors Empty cans Food products Foods in noncombustible containers Fresh fruits and vegetables in nonplastic trays or containers Frozen foods Glass Glass bottles, empty or filled with noncombustible liquids Gypsum board Inert pigments Ivory Meats Metal cabinets Metal desks with plastic tops and trim Metal parts Metals Mirrors

Oil-filled and other types of distribution transformers Parking garages, open or enclosed Porcelain and pottery Stoves Talc and soapstones Washers and dryers

SECTION 312 UTILITY AND MISCELLANEOUS GROUP U

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 412.3) Barns Carports Fences more than 6 feet (1829 mm) high Grain silos, accessory to a residential occupancy Greenhouses Livestock shelters Private garages Retaining walls Sheds Stables Tanks Towers